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15-16

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MASSA'GETÆ, an antient people of central Asia, in an expedition against whom Cyrus is said to have lost his life. (Herod., i. 201-216; Justin., i. 8.) It is difficult to determine their position; but it appears probable that they dwelt north of the Jaxartes (Sihon), in the country which is at present inhabited by the middle horde of the Kirghis. Herodotus says that they lived north of the Araxes, by which he probably means the Jaxartes (i. 201), and to the east of the Caspian Sea. According to Strabo, the Hyperborei, Sauromatæ, and Arimaspi dwelt above the Euxine, the Ister, and the Adriatic; and the Sacæ and Massagetæ above the Caspian (p. 507, Casaubon); and a little further he remarks that the Massagetæ were to the east of the Daæ, who bordered on the Caspian Sea (p. 511).

Herodotus was in doubt whether the Massagetæ ought to be reckoned among the Scythians (i. 201); but they were usually regarded as part of the Scythian nation by succeeding writers. (Arrian, iv. 17; Pliny, *H. N.*, vi. 19.) Herodotus appears to have used the name of Massagetæ to designate all the nomadic tribes of central Asia east of the Caspian; while he confined that of Scythia to the country north of the Euxine and the Danube. The similarity of their name (*Massa-getæ;* compare *Tyri-getæ, Thyssagetæ*) would lead us to suppose that they were connected with the Getæ of Europe.

The Massagetæ are described by Herodotus as a numerous and powerful nomadic people, who resembled the Scythians in their dress and mode of life. Gold and silver were plentiful among them; but no iron nor silver was found in their country. They were however in a very low state of civilization even for a nomadic people. They had a community of wives; and their aged people were killed and eaten by their relations. (Compare Rennell's *Geography of Herodotus*, sect. x.; and as to the custom of eating their parents, the article BATTAS, and Moore's *Notices on the Indian Archipelago*, Singapore, 1837.)

MASSA'RIUM, a provisional generic name of Blainville for Alcyonium Massa of Müller.

MASSI'LIA. [MARSEILLE.]

MASSILLON, JEAN BAPTISTE, was born the 24th of June, 1663, at Hières, in Provence, and at a very early age entered the Collège de l'Oratoire[*] of that town; but his father, intending him for the profession of a notary, withdrew him before he had completed his studies. Massillon however eagerly seized every opportunity of returning, and his father was ultimately prevailed upon to allow him to re-enter the college, which he did in 1681, and commenced the study of theology under P. de Beaujeu, afterwards bishop of Castres. Here he read the sermons of Lejeune, and, being pleased with them, made some attempts in that species of composition himself, which, although acknowledged to be successful, did not satisfy his own taste. In 1696 he was called to Paris to direct the seminary of St. Magloire, where he composed his first ecclesiastical conferences, which, although differing in tone from his sermons, were not wanting in vivacity. Although a great admirer of Bourdaloue, Massillon did not take him for his model: he was desirous of opening a new way, and of searching the human heart, its secret passions and interests, in order to arrive at the motives and combat the illusions of self-love by reason and powerful appeals to the feelings. In the pulpit he appeared without gesture or any extravagant display of action; nevertheless when he grew animated, his look and deportment became so expressive, that at this time, when the orators of the pulpit were held in high estimation as patterns of declamation, the celebrated actor Baron, struck with the beauty of Massillon's style, exclaimed, 'There is indeed an orator, but we are merely comedians.' At Versailles he was as successful as he had been at Paris. The court of Louis XIV. was composed of men who might be touched though not convinced. Massillon felt this, and painted the passions with so much truth and such irresistible force, that even those whose vicious tendencies he exposed were constrained to love and admire him.

In 1704 he preached his second Lent sermon at the court, and with so much success that Louis XIV. promised he would hear him every two years; but for some reason unknown, Massillon was never again at Versailles. In 1709 he delivered the funeral oration of the Prince de Conti, which, though much applauded as delivered from the pulpit, was greatly criticised when it appeared in print. After the death of Fléchier in 1710, Massillon remained the last of the orators of the *grand siècle*.

In 1717 Massillon was made bishop of Clermont, and preached before the king his last Lent sermon, which is considered to be his *chef-d'œuvre;* and in 1719 was consecrated in the king's presence by Cardinal de Fleury. Massillon abolished in his diocese those indecorous processions that the ages of ignorance had perpetuated, and also certain superstitious customs spoken of in the *Origines de Clermont*. He died on the 18th September, 1742, of apoplexy.

The fame of this celebrated man stands higher than that of any preacher who has preceded or followed him, by the number, variety, and excellence of his productions, and their eloquent and harmonious style. Grace, dignity, and force, and an inexhaustible fecundity of resources, particularly characterise his works. His *Avent et Carême*, consisting of six volumes, may be justly considered as so many *chef-d'œuvres*. Massillon, in his sermons, endeavoured to convince the young king Louis XV. that he derived his authority from the people, and should never exercise it but for their advantage, nor deceive himself by thinking that he could do no wrong.

The most interesting of his works, next to his sermons, are his 'Conferences,' which are discourses addressed to the young ecclesiastics under his direction in the seminary of St. Magloire.

In a discourse entitled *De l'Ambition des Clercs*, he contends that the Church has no need of great names for its support, but of exemplary virtues; and that profane manners and worldly inclinations, and not the humble origin of its clergy, are the things calculated to dishonour it. His discourse on the application of ecclesiastical revenues is strikingly prophetic, inasmuch as all the consequences which he foresaw have been verified in a remarkable manner. It is worthy of remark that his sermon 'on the small number of the elect' received the approbation of Voltaire, who observes that preachers in general would do better by repeating such models than by composing original discourses of inferior character. Massillon's works were collected and published by his nephew, in 12 vols. 8vo., in 1745 and 1746.

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[*] This College was established by Cardinal Berulle in the beginning of the seventeenth century.

MASSINGER, PHILIP, born at Salisbury, in the year 1584, was the son of one of the earl of Pembroke's retainers,* who appears to have been employed as a special messenger to Queen Elizabeth. In 1602 he was entered at St. Alban's Hall, Oxford, where he was supported by the earl of Pembroke. Here, as Anthony à'Wood informs us, he spent his time in reading 'poetry and romances' rather than 'logic and philosophy, which he ought to have done, as he was patronised to that end.' Perhaps it is unnecessary to fall upon Anthony so harshly as Gifford does for this assertion. The biographer merely means to say that it was a kind of dishonesty to spend the time for which he was indebted to another person in studies alien to those which his benefactor wished him to pursue. Be this as it may, his works are a sufficient contradiction to the accusation of wasted time; and if the earl of Pembroke lost a chaplain, the world has gained what is worth many homilies.

Massinger took no degree, and also seems to have lost his patron's favour. The reason is uncertain, but Gifford supposes that the poet changed his religion at Oxford, and consequently alienated his Protestant friends. Whether he ever did change his religion at all rests on Gifford's inference from certain expressions in his works; but be this as it may, he was driven to betake himself to dramatic composition about the time of his arrival in London. It is probable that he did not for some years attempt anything beyond assisting others in the composition of plays, for we hear little or nothing of him as an author until the appearance of his 'Virgin Martyr' in 1622, sixteen years after his arrival in London. There is evidence moreover to prove that after Beaumont's death in 1615, he assisted Fletcher in the composition of some of the numerous plays (between thirty and forty) which appeared under that author's name during the succeeding ten years. During the rest of his life, Massinger was employed in writing plays, the last of which appeared only six weeks before his death, which took place the 17th of March, 1640, at his own house on the Bankside. His name is noticed in the Burial Register of St. Saviour's with the affecting addition 'a stranger,' showing that the poverty which had pursued him through life had not allowed him resting time enough to make himself known even to the clerk of his own parish.

Massinger's situation as last in order of time of the great dramatic poets of the sixteenth and seventeenth centuries, is probably the reason why he was so utterly lost sight of for seventy years after his death. The first thing we hear of his works is Rowe's intention of editing them, which he afterwards changed into an actual piracy, by which he adapted the 'Fatal Dowry' to suit the taste of the eighteenth century, under the name of the 'Fair Penitent.' That such an audacious forgery could have been palmed on the public and remain undetected for more than half a century is sufficient evidence what easy victims the reading public of those days must have been in the hands of fashionable authors.

In 1759 a bookseller's edition of Massinger appeared, which was followed in 1761 by another; and in 1777 by a third, edited by Monck Mason. On these editions Gifford, the last editor, throws many and apparently well-deserved slurs. Those who wish to see the whole controversy will do well to refer to the *Edinburgh Review* for 1808, where the battles of the earlier editors are fought with considerable prowess.

Gifford gives a complete list of Massinger's plays, with the dates of their appearance, which range from 1621 to 1640. They are thirty-seven in number, including those of which he wrote only a part, but which went under his name. Of these eighteen remain, and ten, if not twelve more, could have been added to their number had it not been for the detestable folly of Warburton, through whose carelessness the MSS. were destroyed by a servant.*

There is a peculiar interest in Massinger's plays derived from the state of the times in which they were written, and the bearing and influence which they must have exercised on those national feelings from which, as is probable, they took their own actual shape. No one who reads the play called 'The City Madam' can help seeing in it the exposition of a state of society likely to give birth to troubles, as well as the direct exhibition of many of those opinions and feelings which took such active part in the Revolution then impending. We see there portrayed a city opulent to extravagance, courtiers needy and unprincipled, and a landed proprietor of no family not scrupling to compare himself with one of the barons of the realm, and appearing to advantage as a blunt honest man contrasted with a noble, overbearing and insolent, though not intended by the poet to exhibit any vices except those incident to all members of his order.†

Still more striking are the political doctrines contained in 'The Maid of Honour.' Massinger is, we believe, the only dramatist of his time who did not either openly or in secret espouse the court doctrine of the divine right of kings. A line in one of Camiola's speeches is worth quoting, as it gives what is evidently the poet's view of the subject. She there says to the king of Sicily—

> 'When you are unjust, the deity
> Which you may challenge as a king, parts from you.'

And this is one of the numberless instances in which Massinger evidently conveys his own sentiments on questions then stirring, through the mouths of his characters. In fact, an analysis of the political references in Massinger's plays would be a work of great extent, as they abound in every scene, and at the same time one of no little interest, if it were only for the sake of possessing a commentary on the events and opinions of the day, by a man like Massinger.

Massinger's plays are distinguished by an almost entire abstinence from common oaths, and although we cannot add to this that they contain no coarse or even disgusting passages, we may, in respect to some of them, those for instance in the 'Virgin Martyr,' shift the blame from Massinger himself to his coadjutor in the composition. Whether this abstinence from profanity arose from the restraining influence of the growing prejudice against stage-plays, or from Massinger's own taste, we cannot now tell, but the delicacy, approaching to feminine, so evident in his writings, would induce us to ascribe it to the poet's own choice. On the whole however it is not too much to say that in dramatic power, in delicacy of expression, and in beauty of thought, he approaches more nearly to Shakspere than any of his contemporaries.

Massinger's extant plays are, 'The Old Law,' 'The Virgin Martyr,' 'The Unnatural Combat,' 'The Duke of Milan,' 'The Bondman,' 'The Renegado,' 'The Parliament of Love,' 'The Roman Actor,' 'The Great Duke of Florence,' 'The Maid of Honour,' 'The Emperor of the East,' 'The Fatal Dowry,' 'A New Way to pay Old Debts,' 'The City Madam,' 'The Guardian,' 'A Very Woman,' and 'The Bashful Lover.' (Gifford's Preface to Massinger; and the *Edinburgh Review* for 1808.)

MASSINISSA. [Numidia.]

MASSOWAH. [Abyssinia.]

MASSURA'DA, or MESURA'DO, CAPE, is situated on the western coast of Africa, in 6° 20′ N. lat. and 10° 30′ W. long. It is formed by a hill about 400 feet high, steep on the west and north-west sides, but declining gradually in other directions. It forms the southern extremity of a bay which affords good anchorage in the dry season, but is open to the north-west. Massurada Bay receives the river Massurada or Rio Doro, which runs along the range of hills that terminates in the cape, and would fall into the sea close to the cape if it were not for a spit of land which runs from the latter in a north-north-east direction across the stream and turns it along the shore for about half a mile. At the mouth of the river is built the town of Monrovia, the principal place in the American settlement of Liberia. This settlement was formed in 1821, by the American Coloniza-

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[*] His father's name has occasioned some dispute among the editors. Gifford asserts it to be Arthur, in which he is probably right.

[*] It is scarcely credible, but such is well known to be the fact, that Warburton, a man professing literary taste, actually left fifty-two manuscript plays in a place of common access for years, the consequence of which was that all except three were destroyed.

[†] The reader who will take the trouble to compare the Introduction to Guizot's 'History of the English Revolution' with this play will find the one an admirable commentary on the other.

tion Society, on nearly the same principles and for the same object as the English settlement at Sierra Leone. The Society acquired by purchase the country along the coast lying between Cape Mount and Trades Town in the kingdom of Sanguin, on the Grain-coast of Guinea, an extent of about 140 miles. Many small rivers water this coast; and though most of them are encumbered by shoals or rapids, boats of moderate size may ascend them for 40 or 60 miles, after which the navigation is usually impeded by cataracts. The country is generally level, and well adapted to the cultivation of Indian corn and rice. The rice raised here is highly prized. Several fruit-trees are indigenous, as the shaddock, and lemons: other fruits have been introduced. The mean annual temperature appears to be between 76° and 78°, and in the dry months (from June to October) the country is frequently visited by tornados or hurricanes from the north-west.

The inhabitants consist of negroes who have obtained their liberty in the United States or are born of free negroes, and such as have been taken from vessels engaged in the slave-trade. According to the laws of the Society, whites are not permitted to settle in this colony, with the exception of the agents of the company, some physicians, and missionaries. The blacks enjoy all the rights of free citizens, as in the United States themselves, and choose their own magistrates, among whom are two censors, who look after the morals of the inhabitants. In 1828 the number of the settlers amounted to 1200, of whom 700 were in Monrovia, but it is said that the number has considerably increased of late. The settlers are more occupied in trading with the neighbouring nations than with agriculture.

(Innes's *Liberia, or the American Colony of Free Negroes on the Coast of Africa*; and *West African Sketches.*)

MASTER OF ARTS. [ARTS.]

MASTERWORT, the old name of an umbelliferous plant with fleshy tuberous roots, growing in moist meadows and woods in the north of Europe and in Newfoundland. It has a stem from one to two feet high, broad twice-ternate leaves, flat large umbels of white or pink flowers, and thin orbicular straw-coloured fruit. Botanists call this plant Imperatoria Ostruthium; it has acrid, bitter, somewhat aromatic roots, and formerly had a great reputation as a remedy for toothache, and as a cure for agues, whence no doubt its names have been derived. It retains a place in continental medical practice, but it is disused in England.

MASTICH, a resin which is extracted from the trunk and branches of the Pistacia lentiscus by incision. This tree grows in the Levant, and particularly in the island of Chios. The fluid which exudes soon concretes into yellowish-white grains or tears, which are semitransparent, brittle, and have a slight but rather agreeable odour and taste. When thrown on burning coals, mastich gives a more penetrating smell. Its specific gravity is 1·074. It is composed of two resins, one of which is soluble in dilute alcohol, and the other is not; this last constitutes from 1-5th to 1-12th of the whole weight of the mastich, and possesses very nearly the characters of copal, it being soluble in absolute alcohol, æther, and oil of turpentine; these liquids also dissolve mastich without leaving any residue. When the portion which is insoluble in dilute alcohol is reduced to powder, and long exposed to the air, it is rendered soluble by the change which it undergoes.

In foreign Pharmacopœias mastich is employed in several ointments, plasters, and fumigating powders; it is retained in the Materia Medica of the London Pharmacopœia, but does not enter into any preparation except as a tincture for preparing what is usually called *eau de luce*. Mastich is principally employed as an ingredient in varnish, and as a temporary stopping for carious teeth.

MASTIFF, the name of a variety of dog of a very old English breed, now seldom seen in its original state of purity. Manwood states that the word is derived from *mase thefese*, because it is supposed to terrify thieves by its voice, which, when the animal is excited, is fearfully deep and loud. This is the *Dogue de forte race* of Buffon and the French, the *Mastivus* of Ray, the *Canis Molossus* of Linnæus, and the *Villaticus* or *Catenarius* of Dr. Caius.

A true-bred mastiff is of considerable size, and very stoutly built. The head is well developed and large, the lips deep and pendulous on each side of the mouth, and the whole aspect noble.

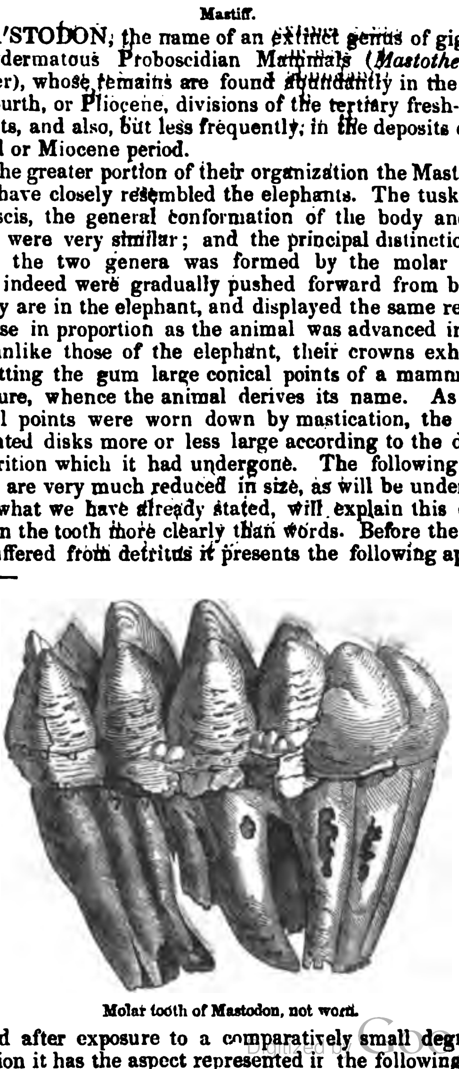
It appears from Claudian and Gratius that the British dogs, mastiffs probably, were highly prized at Rome; and Camden notices the employment of a special officer, *Procurator Cynegii*, appointed in Britain for superintending the breed of these dogs and their transmission to that city, where they appeared in the combats of animals at the amphitheatre, and sometimes upon occasions even more cruel, for there can be little doubt that they were set to worry those unhappy Christians whom the tyrants of the time ordered to be sewed up in the skins of beasts and then exposed to the attacks of those powerful and savage dogs. Pennant quotes Strabo for the fact that the Gauls trained British mastiffs for war, and used them in their battles. According to Dr. Caius, three were a match for a bear, and four for a lion; but Stow mentions a lion-fight with three of these dogs, in which, though two were disabled, and afterward died, the lion was so much harassed that he retreated, and refused to resume the battle.

The mastiff is capable of great attachment, and when kept as a guard is of unfailing vigilance, giving the alarm by its powerful bark, and never ceasing till it has roused the family or secured the intruder. It is now comparatively little used as a watch-dog, especially in great towns, where an active police has almost entirely superseded it

Mastiff.

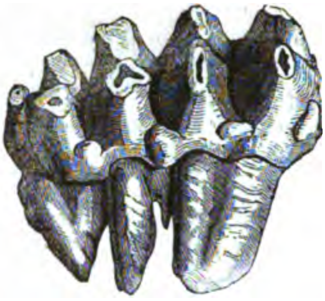
MA'STODON, the name of an extinct genus of gigantic Pachydermatous Proboscidian Mammals (*Mastotherium*, Fischer), whose remains are found abundantly in the third and fourth, or Pliocene, divisions of the tertiary fresh-water deposits, and also, but less frequently, in the deposits of the second or Miocene period.

In the greater portion of their organization the Mastodons must have closely resembled the elephants. The tusks, the proboscis, the general conformation of the body and the limbs, were very similar; and the principal distinction between the two genera was formed by the molar teeth. These indeed were gradually pushed forward from behind as they are in the elephant, and displayed the same relative increase in proportion as the animal was advanced in life; but, unlike those of the elephant, their crowns exhibited on cutting the gum large conical points of a mammiform structure, whence the animal derives its name. As these conical points were worn down by mastication, the tooth presented disks more or less large according to the degree of attrition which it had undergone. The following cuts, which are very much reduced in size, as will be understood from what we have already stated, will explain this difference in the tooth more clearly than words. Before the tooth has suffered from detritus it presents the following appearance:—



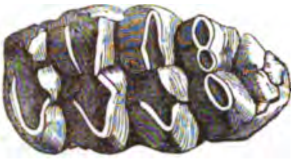
Molar tooth of Mastodon, not worn.

And after exposure to a comparatively small degree of detrition it has the aspect represented in the following cut.



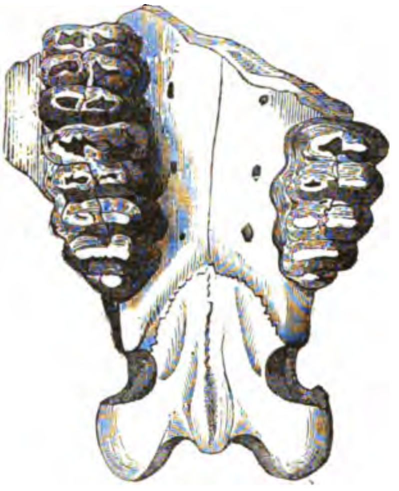
Molar tooth of Mastodon, slightly worn.

But when from longer use the conical teat-like points are more deeply worn down, the following appearance is presented.



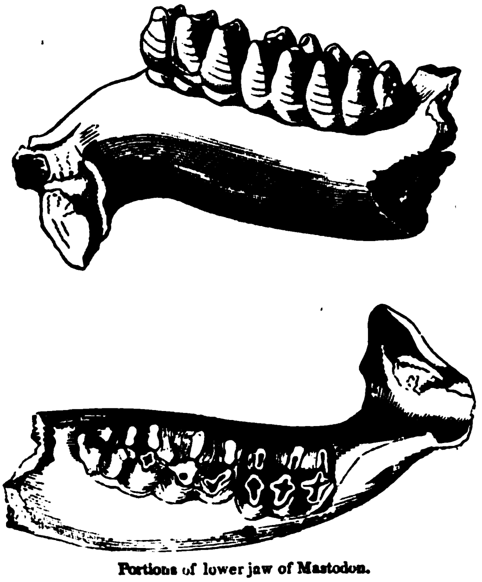
Molar tooth of Mastodon, a good deal worn, seen from above.

The way in which these teeth are set in the upper jaw will be seen from the following cut.



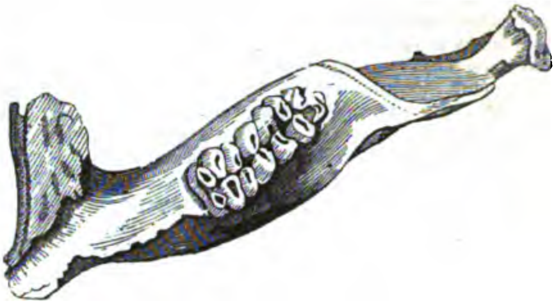
Molar teeth and palate of Mastodon.

And the mode in which those of the lower jaw are arranged will be perceived from the figures given below.



Portions of lower jaw of Mastodon.

The general contour of the lower jaw as viewed from above may be collected from the following figure.



Portion of lower jaw of Mastodon.

The remains of the *Great Mastodon*, ***Mastodon giganteus***, Cuv., appear to have been the first that attracted attention. These occurred in considerable abundance in North America. They gave rise to much speculation and much erroneous opinion, at first; for though the form and size of the molar teeth forbade the inference that they could have belonged to any of the large existing animals, the formidable appearance of the pointed conical tuberosities of the crowns led to conclusions directly the reverse of truth, as we shall presently see. Daubenton, indeed, at first thought that some of these teeth belonged to the Hippopotamus, but he soon perceived that they must have formed part of an animal which had no recent analogue, and Buffon announced that the whole evidence afforded by the remains led to the belief that this antient species, which ought to be regarded as the first and the largest of terrestrial animals, existed only in the first ages of the world ('n'a subsisté que dans les premiers temps'), and never had come down to our time. This opinion of Buffon did not extend beyond the larger molar teeth, and he still regarded the middling sized and worn teeth as those of the Hippopotamus; he also followed Daubenton in considering the femur found with the teeth as that of an elephant, though Dr. Hunter (William) had pointed out the differences between it and the same bone in the elephant, as well as the distinctions existing in the teeth and lower jaw. (*Phil. Trans.*, vol. lviii.) But while William Hunter did this good service, he introduced no small confusion and error. He had heard of the Siberian *Mammoth*, and not having seen the bones of that animal, he immediately concluded that it was identical with the North American fossil, and gave the name to the latter, a nomenclature which was for some time adhered to both by the Anglo-Americans and the English. The skeleton of the Great Mastodon was exhibited at London and Bristol as the *Mammoth*, and accounts of it under the same name were published in London in 1802 and 1803. Nor was this the only error of which William Hunter was the parent, for notwithstanding the rejection of such an opinion by Camper, the former declared that, from the structure of the teeth, the *Mammoth*, as he termed it, was carnivorous; and men, ever prone to catch at the wild and wonderful, greedily adopted this marvellous view, and named the gigantic beast the *Carnivorous Elephant*. We well remember in our early youth hearing the speculations of some as to the sort of prey on which the monster lived, and as to the great services that its enormous tusks, which in the skeleton above noticed were placed in an inverted position, with the curvature downwards, must have rendered when the animal was on its predatory excursions. The confusion created by the application of the same name *Mammoth* to two different genera was great, and for a long time almost inextricable, notwithstanding the endeavours of Pallas, who clearly refuted the supposed identity of the Siberian and American animals, by showing that the Siberian *Mammoth* is a true elephant. Cuvier at once dissipated the clouds that had gathered over the subject, and while he clearly pointed out the osteological differences between the two genera, gave to the supposed *Mammoth* of America the appropriate name of *Mastodon* (Μαστὸς, a teat; ὀδοὺς, a tooth).

The first notice of the teeth and bones of this extinct genus of pachyderms appears to be in 'Phil. Trans.' (vol. xxix., 1714), a century and a quarter ago; and it is not uninstructive to observe what rapid strides natural science has made since that time, when the Royal Society of London published in their Transactions Dr. Mather's letter to Dr. Woodward, in which the former gives an account of a large work in MS. in two vols. folio, but does not name the author. Dr. Mather recommends this work, which appears to have been a commentary on the Bible, with large philosophical remarks, 'to the patronage of some generous Mecænas, to promote the publication of it,' and transcribes, as a specimen, a passage announcing the discovery, in 1705, of enormous bones and teeth at Albany in New England, as the bones of a giant, appealing to them as a confirmation of the text in *Genesis* (vi. 4); another example, if any were wanting, of the folly and danger of mixing up religious questions with scientific inquiries. Portions of remains were sent to France and England at different intervals, and elicited the observations of European zoologists, whilst in America materials were collected for forming two complete skeletons by the zealous industry of Mr. Peale.

Of these two skeletons one was placed in the museum of Mr. Charles Wilson Peale in Philadelphia, and the other was exhibited in London and Bristol by his son Mr. Rembrandt Peale, who published two accounts of it under the name of the *Mammoth* above alluded to.

One of the principal deposits of Mastodon bones appears to have been the Big-bone Lick in the north part of Kentucky, near the Ohio, whence the Mastodon has been called 'the animal of the Ohio.' None of the remains have the appearance of having been rolled, but seem to have been unmoved since the death of the animal; and it is worthy of remark that those which were found at the river of the Great Osages, which runs into the Missouri a little above its confluence with the Mississippi, were in a vertical position, as if the animals had been bogged or buried in the mud. [MEGATHERIIDÆ.]

The traditions which were rife among the Red Men concerning this gigantic form and its destruction must not be passed over in silence. M. Fabri, a French officer, informed Buffon that the savages regarded these bones scattered in various parts of Canada and Louisiana as belonging to an animal which they named the *Père aux bœufs*. The Shawnee Indians believed that with these enormous animals there existed men of proportionate development, and that the Great Being destroyed both with thunderbolts. Those of Virginia state that as a troop of these terrible quadrupeds were destroying the deer, the bisons, and the other animals created for the use of the Indians, the Great Man slew them all with his thunder, except the Big Bull, who, nothing daunted, presented his enormous forehead to the bolts, and shook them off as they fell, till, being at last wounded in the side, he fled towards the great lakes, where he is to this day.

Buffon seems to have been the first who noticed the occurrence of these teeth in the Old World, and figures one alleged to have been found in Little Tartary, and given to him by the Comte de Vergennes. This is very large, having from eight to ten points and weighing eleven pounds four ounces. He also figures another from the museum of the Abbé Chappe, said to have been brought from Siberia. Pallas announces another instance; and gives a figure of one from the Oural Mountains. Cuvier states that he for a long time thought that his *Mastodon giganteus* inhabited the Old Continent as well as America, but he confesses his doubts as to this point. The Abbé Chappe, he remarks, had been in California, and there is no certain evidence that he brought back his Mastodon tooth from Siberia. The tooth figured by Pallas, he thinks, may perhaps have belonged to *Mastodon angustidens*, and he asks, who shall assure us that the Comte de Vergennes was not in error as to the locality of the great molar presented by him to Buffon, and which, together with that formerly in the cabinet of the Abbé Chappe, is in the Paris Museum? Cuvier sums up by saying that he does not entirely pretend to invalidate these three proofs, but that he begins no longer to regard them as sufficient.

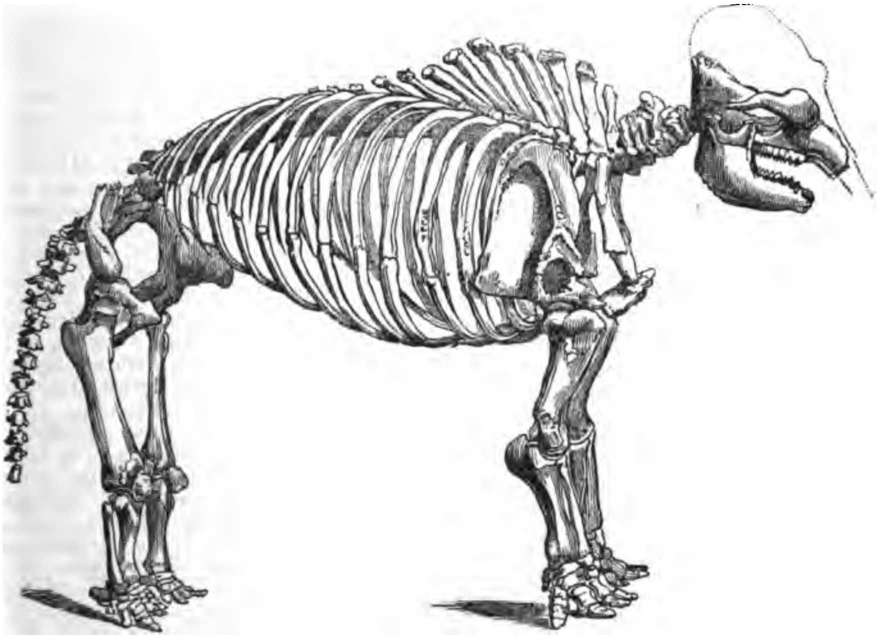
The following species have been named: *Mastodon giganteum*,* *M. angustidens* (Europe, America?), *M. Andium* (Andes), *M. Humboldtii* (Concepçion—Chili), *M. minutus*, *M. Tapiroides*, *M. Turicensis*, *M. Avernensis* (Epplesheim, Puy de Dôme), *M. elephantoides* (Irawaddi, Sewalik Mountains), *M. latidens* (Irawaddi, Sewalik Mountains), and *M. longirostris*, Kaup. Professor Owen has referred the teeth from the Norfolk crag to the last-named species.

Example, *Mastodon giganteus* (Cuv.)—Syn., Mastodon maximus (Cuv.), *Mammut Ohioticus* (Blum.), *Harpagmotherium Canadense* (Fisch.), *Elephas carnivorus* (Gul. Hunter), *Mammoth* of William Hunter and of the Anglo-Americans.

Young.—Tetracaulodon. (Godm.).

Localities.—The United States. Europe?

This species must have equalled the Elephant in height, but seems to have been longer and stouter in its proportions.



Skeleton of Mastodon giganteus.

Remains of *Mastodon* were found by Capt. Cautley in the Sewalik Mountains; and in assigning an age to the formation, the Captain adopts the views of Dr. Falconer, who considers the deposit to be synchronous with that from which Mr. Crawfurd obtained the remains near Prome, on the banks of the Irawaddi. Captain Cautley having found jaws in which the front teeth are not to be distinguished from the teeth of *M. latidens*, and those in the rear from the teeth of *M. elephantoides*, he conceives that the distinction which was established on detached teeth will be found to be erroneous.

The genus *Tetracaulodon* of Godmann is, according to the best authorities, the young of the *Great Mastodon*—*Mastodon giganteus*. One species only, *Tetracaulodon Mastodontoideum* (Godm.), is recorded. (Harlan, *Bull. des Sc. Nat. et de Géol.*, 1830.)

MASTODONSAURUS, Dr. Jæger's name for an extinct saurian found in the *alaunschiefer*, or alum slate (Würtemberg), founded upon teeth, the largest of which, with part of the stone adhering, is figured below, one-half of the size of the original. The other teeth were considerably smaller.

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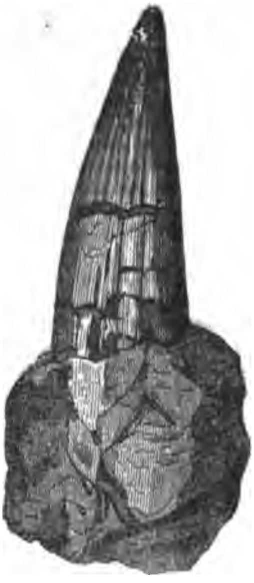
* Giganteus properly.

Dr. Jæger is of opinion that these teeth must be held to approach the nearest to those of the animals belonging to some of the species of *Monitor*. The *Mastodonsaurus*, from the length of its teeth, may be said, in his opinion, to have equalled the *Mosasaurus* of Maastricht in size; but in the formation of the teeth the former differs from the latter. The small teeth, he observes, agree so much in every respect with the large one, that their difference in size is only to be ascribed to their having belonged to animals of a different age, but not of a different genus, and also to their having occupied different places in the jaw.



Tooth of Mastodonsaurus.

(Dr. Jæger's memoir, *Uber die Fossile Reptilien welche in Würtemberg aufgefunden worden sind*, Stuttgart, 1828.)

MASULIPATAM, a district of the province known as the Northern Circars in Hindustan. It is bounded on the north by Rajamundry, on the east by the Bay of Bengal, on the south by Guntoor, and on the west by the dominions of the Nizam. The district which now goes under the name of Masulipatam comprises three of the five original Northern Circars, viz. Condapilly, Ellore, and Masulipatam, and forms a collectorate under the English government. The population amounted, in 1822, to 454,754, and the public revenue to about 150,000*l.* This district contains a large proportion of uncultivated grass-lands, and towards the north there is a great deal of jungle. The principal produce is grain, and some cotton of good quality is raised.

MASULIPATAM, the capital of the district, is a seaport of some consequence, in 16° 10′ N. lat. and 81° 14′ E. long. About a mile and a half south-east from the town is a fort in the form of a parallelogram, 800 yards long by 600 yards broad: there is a straight causeway between the fort and the town upwards of 2000 yards long. There is a considerable manufacture of chintzes in the town and neighbourhood, great quantities of which are exported: they are much esteemed in the greater part of Persia. This is almost the only part of that line of coast on which the surf does not beat; it affords good anchorage for ships of 300 tons burthen. The French established a factory at this place in 1750. It was taken by assault in 1759, by the English under Colonel Forde, and has since continued in our possession. Masulipatam is 203 miles from Hydrabad, 292 miles from Madras, 764 from Calcutta, and 1084 from Delhi, all travelling distances.

MATABUNGA. [Hindustan.]

MATAGORDA. [Mexico.]

MATAPAN, CAPE. [Laconica.]

MATARO′, a seaport of Cataluña in Spain, in 41° 33′ N. lat. and 2° 30′ E. long. It is said to have been founded by the Romans, and to be identical with the Iluro of Ptolemy and Pliny, but the Roman city was farther inland than the existing town of Mataró, which was founded and named by the Arabs.

The more antient or Moslem part of Mataró stands on a rising ground at some distance from the sea; it is small and enclosed with walls; the streets are narrow and gloomy, with the exception of one called La Riera, which is broad, straight, and handsome, and intersects the town. The modern part of Mataró is of much greater extent, and stretches eastward down to the sea. It is laid out in streets, long, broad, and regular; the houses are neat, and many have their façades painted in fresco as is common in Spain and Portugal. One parish church, five convents (now unoccupied), and an hospital, are the principal public buildings. The population at the commencement of the present century was about 25,000, and was increasing rapidly, but must now be estimated much lower. The manufactures and commerce of Mataró at the same time, owing to the industrious and enterprising spirit of the inhabitants, were in a most flourishing condition, but the loss of the American colonies, to which this town used to export calicoes, laces, velvets and other manufactures in silk, gave the death-blow to its prosperity.

The scenery in the neighbourhood of Mataró is exceedingly picturesque. Inland from the town extends a small but most fertile and cultivated plain, the farms in which, says Townsend, are so many gardens, watered by artificial means, 'and producing on the same spot of ground corn, wine, oranges, and olives.' Bounding the plain are ranges of mountains, whose slopes are luxuriantly clothed with wood. The red wine grown in the plain of Mataró is esteemed the best in Cataluña.

(Laborde, *Itinéraire Descriptif de l'Espagne*; Townsend's *Journey through Spain*; Inglis's *Spain in* 1830.)

MATE′. [Paraguay Tea.]

MATE′RIA ME′DICA is that branch of medical science which treats of the articles employed in the practice of medicine, and embraces an explanation of the nature and modes of action of those substances which are had recourse to in order to restore the healthy state of the human frame when its functions or structure are impaired by disease. Thus defined it comprehends both pharmacology and therapeutics. The former means an account of drugs, simple or prepared, in reference to their physical character, natural history, commercial history, chemical composition, and modes of exhibition. The latter means an exposition of the principles which should regulate their employment. The pharmacological part of the subject is sufficiently treated of under each article, as it presents itself in alphabetical order, and it is only requisite to treat here of the general principles involved in their practical application. For the full and satisfactory comprehension of this department, a previous knowledge of the structure of the body, or anatomy, and, above all, of general anatomy, and of the respective duties or offices performed by its component organs while in a state of integrity, or physiology, and of the various degrees of departure from these, when from any cause they become deranged in their action, or pathology, and the signs by which the morbid states are indicated, or nosology, is required. These departments of science are studied only by those persons who intend to follow the medical profession, and at their hands only can a skilful employment of medicines be expected. Something however may be done for the advantage of the public by pointing out how medicines act, and in what way they prove remedial. The object of the administration of a medicine is to arrest the progress of diseased action, and to remove the consequences of its existence, that is, to restore the individual to perfect health, such as he enjoyed before the organ or organs received the impression of the morbific cause; or where both or either of these objects cannot be accomplished, so to retard the career of the unhealthy operations, as to prolong life to the latest possible period. To improve and perfect this most important branch of the healing art is the end and aim of all the other branches of medical science. The means of accomplishing this object have varied in the different stages of human civilisation, and according as different theories of the nature or cause of diseases have prevailed. Many of the medicines formerly in use were of a disgusting or repulsive nature, or of a kind devoid of any active principle, and therefore inert. Many also owed their introduction into practice to superstition, credulity, or a misapplication of the principles of natural and chemical philosophy, and have long been discarded by scientific practitioners, though frequently retained by the populace or by quacks. The medicines used in the present day are still drawn from all the three kingdoms of nature, though the animal kingdom yields few, the vegetable kingdom a considerable number, and the mineral kingdom the greatest number and the most active.

In general few articles produce much effect on the human frame, either in a state of health or disease, which are not possessed of marked sensible qualities, impressing the senses of smell or taste in a distinct manner. Hence bland insipid articles are mostly better fitted to furnish nourishment than medicines, being completely digested, and creating no disturbance or change of action of the vital powers of the system; medicinal substances on the contrary do not appear to be thoroughly digested, but a portion remaining unassimilated acts in some measure as a foreign body, and produces a stimulant or alterant effect on the vital power. Many medicines are indeed absolutely poisonous if given in large doses, or where no diseased state of the system requires their administration. For disease often gives to the system a power of sustaining the action of a dose of medicine which would produce serious disorder if given to a person in health; the morbid state of the system seeming to act as an antidote to the medicine, while the medicine acts as an antidote to the disease—health being the result of their neutralizing power.

Medicines produce two distinct effects: one termed the primary, or in some cases, as when given to a healthy person, the physiological effect; the other secondary, or curative, which can only take place when there exists a disease to be removed. The former is generally uniform or constant; the latter too often variable and uncertain. To lessen the degree of uncertainty in the latter and most important of the two kinds of action, many zealous medical men have instituted experiments with different medicines on themselves or others; while chemists have carefully investigated the chemical composition of the articles, and sought to discover their active principles, or to explain their modes of action. Notwithstanding these valuable aids, therapeutics is still the most imperfect of all the departments of medical science, partly from the difficulties inherent in the subject, and partly from inability in medical men to weigh correctly the evidence respecting the effects of medicines. The union of several articles in one prescription, by which we attempt by one stroke to remove several symptoms, tends still further to obscure the results, and to vitiate the conclusions which may be drawn. The polypharmacy of the antients has been in a great measure abandoned, but still it must be confessed that simplicity in prescribing is not sufficiently studied. (Holland's *Medical Notes and Reflexions on Medical Evidence*, and on *Methods of Prescription*.) On the opposite hand, the attempts to isolate the supposed active principle of many vegetable remedies, and to administer it apart from the others, though in some instances advantageous, by diminishing the size of the dose, or concealing the unpleasantness of the taste, have not produced the consequences expected; for example, in most cases *cinchona bark* administered in some of the old preparations will be found a more valuable tonic than *quinine*. The superiority of many mineral waters, which contain a variety of ingredients in a state of extreme dilution, over the exhibition of the saline materials in a less quantity of liquid, seems to militate against the practice of excessive concentration.

The introduction of new substances into the Materia Medica, by the discovery of new plants, or by the progress of chemistry, may supply deficiencies in the catalogue of remedies. But less benefit to mankind will flow from a multiplication of remedies, than from the establishment of clear and scientific rules for their administration. Every improvement in anatomy and physiology will promote the advancement of therapeutics, by leading to greater precision in the employment of medicines. For nothing is more certain than that medicinal substances act upon special parts of the body, in preference to others, and in many instances on those which are diseased rather than on those which are sound. The careful investigation of the modes of action of medicines is worthy of the best faculties and energies of medical men, and every contribution to this department of science should be regarded as an incalculable benefit conferred on mankind.

(Pereira's *Elements of Materia Medica*; and Vogt, *Lehrbuch der Pharmakodynamik*.)

MATERIALISM is a name applied to any philosophical system which denies the existence of a spiritual or immaterial principle in man, called the mind or soul, distinct from matter, or which (changing the phrase) denies the immateriality of the soul. The name is applied to systems which differ very widely from one another, in respect of the consequences deduced from the denial of the soul's immateriality: and thus it comes to pass that the popular meaning of the word has become loose and incorrect, comprehending what are no better than accidental consequences of the pure and proper idea. Such accidental consequences are the denial of a future state and absolute atheism; and it need not be said that atheism and materialism are treated in current conversation as convertible expressions.

The name materialism also is one of that sort for which Mr. Bentham has constructed the epithet *dyslogistic*. As applied in current conversation, it always carries with it censure. This arises, of course, from the nature of the accidental consequences which have been indicated, and which mankind regard with horror: but inasmuch as the name still continues to be applied to systems from which unchristian and atheistical consequences are expressly excluded, and even to some systems (such as that of Hartley) which admit the existence of a separate soul, but in whose method of explaining mental phenomena there is a dash of materialism, the censure that has come to be indissolubly associated with the name often falls with grievous injustice. Indeed there is hardly a single word in the whole range of philosophic terminology better fitted to exemplify the evils of looseness of application, or of allowing feelings to tinge and discolour the notions conveyed by names.

The systems to which the name materialism is applied may be roughly distributed under a threefold division. First, it is applied (as has been already said) to a system like that of Hartley, which admits the existence of a soul, but which, attempting to explain mental phenomena physically or by movements arising out of the bodily organization, seems to imply materialism. Secondly, it is applied to the systems of Hobbes and Priestley, and of the French school of writers, of which De la Mettrie may be taken as a specimen, which distinctly deny the existence of a soul as a separate principle in man, but which do not deny either a God or a future state. In the systems of these writers is evolved the pure and proper idea of materialism, divested of all unnecessary consequences. Thirdly and lastly, the name is applied to systems like that of the antient Epicureans, or of Spinoza, which deny both a future state of rewards and punishments and a Divine Creator, systems for which atheism would be the better name, inasmuch as materialism fails to denote their more important and distinctive ingredients.

The following is a brief summary of the views of Dr. Priestley, who has more formally than any other writer enunciated the principles of materialism in the pure and proper sense of the word. He denies the existence of a separate immaterial principle in man, called the mind or soul, because he thinks that an immaterial principle could not exist in union with the material body, and because he thinks further that all mental phenomena (as they are called) may be explained by means of supposed movements arising out of the bodily organization. The method by which he thus explains mental phenomena is that of Hartley. [HARTLEY.] Adopting this philosopher's hypothesis of medullary vibrations, he defines mental phenomena as medullary vibrations perceived; and he contends, principally from the analogy of brutes, that bodily organisation is adequate to produce perception. Thus, and by means of such hypothesis, does he dispense with the hypothesis of a separate immaterial soul. But denying the existence of a soul, separate from the body, and capable of surviving when the body perishes, he does not yet deny the immortality of man, and a future state of rewards and punishments. On the contrary, he distinctly affirms these on the authority of Scripture. It is needless to add that Dr. Priestley does not deny the existence of a God. [PRIESTLEY.]

One word more on the absurdity of coupling the denial of a future state with the denial of an immaterial soul, and of making atheism synonymous with materialism. To deny a material soul is necessarily to deny an immortal soul, but not therefore to deny an immortal man. And even to deny the existence of everything save matter in the universe, is not necessarily to deny a Divine principle, as is shown by many of the antient schools of philosophy [ELEATIC PHILOSOPHY], nor even to deny a moral Governor, as is shown by the philosophy of Hobbes, who, denying in one part of his writings the existence of all spirit, and in this respect carrying his views further than Dr. Priestley, yet makes God the corner-stone of moral and political science. [HOBBES.] Hobbes distinctly says that there being nothing, in his opinion, but matter in the universe, it follows that God is matter.

But it is to be remarked in opposition to materialism, even as it is put forth by Dr. Priestley, that it is devoid of philosophical foundation, and rests on a disregard of the limits of true philosophy. Its truth cannot be tested by observation. It rests altogether on hypothesis and conjecture. When we go beyond what are called the qualities of the mind, or of matter either, and speculate upon what it is itself, whether it is something else, or different from that something, whether it has or has not an existence, we have no help but in supposing and conjecturing and imagining. Such speculations may doubtless be interesting, and they may have their use too as an exercise for the imagination, but we cannot calculate upon their results. Much mischief is done moreover by mixing up these results with the results of observation, by jumbling together conjecture and philosophy. The true philosopher, not despising, but setting aside as irrelevant to his object, all speculations on the origin and nature of mind, or of matter either, will start from these as first principles, and will apply himself to observing their qualities and capabilities and laws: and the results will be sound psychology and sound physics.

The converse of the word materialism is immaterialism. This is used only as an abstract term, and even thus very seldom; spiritualism being generally used in its place.

MATERIALS, STRENGTH OF. The strength of any material object, as a rod, bar, beam, chain, or rope, is that power by which the substance resists an effort to destroy the cohesion of its parts. It evidently depends on the disposition of the particles relatively to each other, on the intensity of the force by which the particles cohere together, and on the manner in which the straining power is applied. The inquiry into the laws by which the materials employed in the construction of edifices or machines resist the strains to which they are subject is of considerable importance, because upon a just adaptation of the strength at any one point to the strain there experienced (and an excess or deficiency of the former is nearly equally injurious) depends the stability of the whole.

Whatever be the constitution of a rod or beam, the relation between its strength and the strain to which it may be exposed can be made the subject of mathematical investigation only by imagining the material to consist of an infinite number of particles arranged in lines (like fibres or threads) parallel to each other in the direction of its length. The particles in each line must be supposed to cohere together by powers exerted in that direction; and the several lines to cohere laterally with forces which may, or may not, be equal to those exerted longitudinally. In homogeneous bodies, as glass and some of the metals, the particles may be supposed to be symmetrically disposed throughout the masses, and to attract each other in every direction with equal powers: but the case is different in other bodies, particularly in timber; for in such the lateral cohesions of the fibres are much less powerful than the longitudinal cohesions of the particles in each fibre. In ropes the fibres have no lateral cohesion, and the strength depends on the twisting of the fibres together; in consequence of this, as the latter can scarcely be separated from each other in the direction of the length of the rope, the cohesion of nearly all the particles in any transverse section must be destroyed before a disruption can take place.

A rod of any material, consisting of parallel fibres as above supposed, being placed in a vertical position, and strained by a weight applied at the lower extremity, the particles in every fibre will be separated from each other by the action of the weight, and consequently its length will be increased. The cohesive power by which the particles are kept together will, in most cases, be diminished by the separation; and if the weight be sufficiently great, or if it be allowed to act during a sufficient length of time, the cohesive power will be certainly overcome; that is, the rod will, in some parts of its length, be torn asunder. But before this occurs, since all bodies possess a certain degree of elasticity, on removing the weight the attraction of cohesion will cause the separated particles to return towards their original positions; or the rod will become nearly of the same length as at first. That it does not exactly become so, in general, arises from the imperfect elasticity of the material, on which account the particles come to a state of rest at augmented distances from each other. The elongation of the rod when strained by a weight, and the amount of the weight necessary to produce fracture, will depend on the nature of the material; and, from a want of uniformity in the constitution of materials even of the same kind, though the rods be of like dimensions, great irregularities are found to exist in their power of resisting direct strains. Numerous experiments performed on each of the different kinds of material can alone afford a mean value on which reliance may be placed when it is required to determine the capability of a bar or beam to resist the strain arising from the action of any given force.

If the materials were perfectly elastic, so that the length of the rod became the same, after the removal of the suspended weight, as before that weight was applied, the force of cohesion would evidently be proportional to the intensity of the straining power; and this is generally adopted as an hypothesis in investigations concerning the equilibrium between strengths and strains; it being understood that the latter have only that moderate degree of intensity, compared with the former, which is consistent with the permanent stability of the edifice or machine. The law just mentioned appears to have been discovered by Dr. Hooke; and, as the separation of the particles in any fibre is proportional to the straining power, it follows that, within certain limits, the cohesive power between two particles of an elastic body is proportional to the distances to which one of them is removed by the straining force from the place where it was before at rest. The same law is considered to hold good when the particles of an elastic body are made to approach each other by the action of a compressing force like that of a weight on the top of a vertical pillar.

The power by which the particles in any body resist the action of a force tending to separate those particles in the direction of the length of the body may be considered as constituting the direct or absolute strength; and it is evident that, if the body were of a homogeneous texture, that strength would be proportional to the number of particles in a transverse section; that is, to the area of such section, while the strain is proportional to the weight applied. Therefore, if F designate the cohesive power in a unit of such area, as a square inch, a square foot, &c.; also if A represent the area and W the weight applied, including that of the body itself, we should have $F.A = W$ when the strength and strain are in equilibrio. This formula for the absolute strength may be considered as nearly correct with respect to most of the bodies in nature: and hence (F being determined by experiment) the strength by which a rod of any material resists this kind of strain may be found when the dimensions of the rod are given.

For complete details concerning the experimented values of F, the reader must be referred to the extensive tables which have been published by Barlow (*Essay on the Strength of Timber*); Rennie (*Phil. Trans.* 1818); Tredgold (*Principles of Carpentry*); and Hodgkinson (*Manchester Memoirs*, vol. iv.), our limits permitting us to introduce only the few determinations which follow.

The area of a transverse section of each rod is one square inch, and the values of F are expressed by the breaking weights in pounds avoirdupois.

English oak	F = 8,000 to 12,000
Fir	11,000 to 13,488
Beech	11,500
Mahogany	8,000
Teak	15,000
Cast-steel	134,256
Iron-wire	93,964
Swedish bar-iron	72,064
Cast-iron	18,656 to 19,488
Wrought-copper	33,792
Platinum wire	52,987
Silver do.	38,257
Gold do.	30,888
Zinc do.	22,551
Tin do.	7,129
Lead do.	3,146

Rope (1 inch circumf.) bore 1,000 lb., F = 12,566
Whale-line spun by hand
(2 in. circumf.) . 2,240 „ 7,037
Do. by machinery (1⅞
in. circumf.) . 3,520 „ 12,582

Rope (3 in. circumf.) .	5,628 lbs., F =	7,858
Do. (4 in. circumf.) .	9,988 „	7,845
Cable (14½ in. circumf.)	89,600 „	5,355
Do. (23 in. circumf.) .	255,360 „	6,066

Notwithstanding the irregularities in the column containing the values of F for ropes, it may be concluded that ropes of a given diameter have less strength on each square inch of their transverse section than those of less diameter; and this is owing, no doubt, to their threads being less twisted together. It may be observed also that those woods whose fibres are nearly straight bear much greater weights suspended from them than those whose fibres have considerable curvature.

According to the experiments of Mr. Barlow it appears that a bar of malleable iron is extended one ten-thousandth part of its length by a direct strain equal to one ton for each square inch in the area of the transverse section: when stretched with ten tons per inch its elasticity was injured, or the bar did not return to its original state.

If the fibres in any material body were exactly rectilinear, so that, a rod being placed on one end in a vertical position, no one of the particles were opposite to the intervals between any two in a transverse section below it, it might be conceived that no force compressing the rod in the direction of its length would produce any other effect than that of diminishing its length. But, as we find that all bodies when so compressed may be bent, and finally broken, such a disposition of the particles is destitute of probability. In fact, when a pillar is compressed by a great weight above it, either the fibres, already curved, have their curvature increased, so that the whole pillar bends; or the particles in some of the transverse sections are forced outwards by lateral pressures arising from those above and below their intervals being thrust between them, and then the pillar swells on its whole periphery. The consequence in either case is, that the cohesion of the longitudinal fibres is impaired or destroyed, and the pillar is at length broken or crushed.

The strength of a pillar when so compressed must evidently depend upon the number of particles in a transverse section; that is, upon the area of such section: but since, besides the displacement of those particles from the longitudinal pressure, their lateral cohesion must be overcome before they can be thrust outwards, it is evident that the strength is not proportional to the area, simply, but to some function of that area. No law on which any dependence can be placed has yet been discovered for the strength of a pillar in such circumstances. Euler, from analytical considerations, concluded that it varies as the square of the area: but late engineers have supposed that the square root of the third power of the area more correctly represents the law of the strength.

The following table of the strength by which materials resist this kind of force, when just crushed by the pressure, is extracted from the account of experiments made by Sir John Rennie; but the weights found from the experiments are here reduced, agreeably to the law last mentioned above, to those which might have crushed the materials, if the latter had been formed into prisms having the area of the transverse section equal to one square inch:—

		lbs.
Elm .	crushing weight	1,284
White deal	„	1,928
Oak .	„	3,860
Chalk .	„	334
Red brick	„	538
Portland stone	„	3,047
Limestone	„	5,903
Aberdeen granite	„	7,276
Cast-iron	„	681,376

If a bar or pillar, resting on one end in a vertical position, and considered as a perfectly elastic body, be compressed by a weight acting vertically above it, the purely mathematical theory gives the following equation for the value of the compressing weight when the pillar begins to bend:—

$$W = \frac{\pi^2 ad^3}{12l^3}\delta$$ (Poisson, *Mécanique*, tom. i., No. 313);

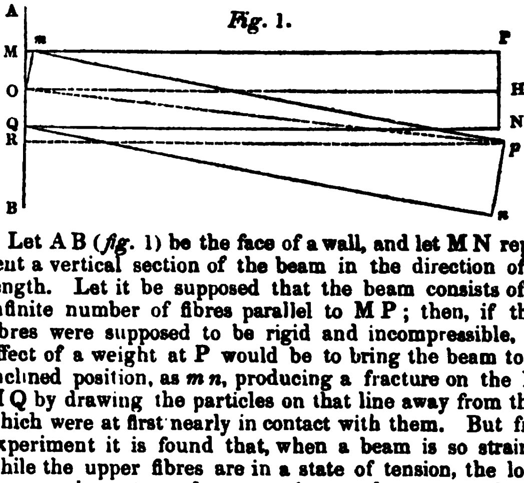
where W = the compressing weight; l = the length of the pillar; a = the area of the transverse section; d = the thickness perpendicularly to the bending surface; δ = the element of deflection; and $\pi = 3{\cdot}1416$. It follows that, when in two bars of like material a and d are respectively equal, the weights which those bars will sustain without bending are inversely proportional to the squares of the lengths.

It is also found, if w be a weight applied as above, and producing a flexure p, measured at the middle of the bar perpendicularly to its length, that $\delta = \frac{4wl^2}{ad^2p}$· this being substituted in the expression for W, the latter becomes $W = \frac{\pi wl}{3p}$. (*Ibid.*, No. 314.)

The most important inquiry concerning the strength of materials is that which relates to a beam or bar supported at its extremities on two props, and strained transversely by a weight acting perpendicularly to its length at a given point between the props.

In order to simplify the investigation, it is usual to imagine that the beam, its breadth and depth being supposed uniform, is made to rest on one prop at the place where the weight may have been applied in the former case, suppose in the middle of its length, and that from the points where the two props were situated weights are suspended equal to the reactions of those props in consequence of the first weight; that is, to half the whole weight in the middle. Then, supposing the deflection of the beam to be very small, so that, in the former case, the beam did not slide on its points of support, the effect of the two weights to break the beam on its single prop will be the same as that of the one weight applied as at first supposed. Again, if a beam of equal dimensions with respect to breadth and depth were fixed at one end horizontally in a wall, the part projecting from the face of the wall being equal in length to half that of the former beam; and if a weight were applied at the opposite end equal to each of the two weights applied to the beam on one prop, the effect of this weight to break the beam at the face of the wall will be equal to that of the two weights to break the beam on the one prop, or of the double weight to break the same beam on two props. The investigation for the case at first supposed is therefore reduced to that of finding the strength of a beam attached at one end to a wall, and strained by a weight at the opposite extremity.

Fig. 1.



Let A B (*fig.* 1) be the face of a wall, and let M N represent a vertical section of the beam in the direction of its length. Let it be supposed that the beam consists of an infinite number of fibres parallel to M P; then, if these fibres were supposed to be rigid and incompressible, the effect of a weight at P would be to bring the beam to an inclined position, as *m n*, producing a fracture on the line M Q by drawing the particles on that line away from those which were at first nearly in contact with them. But from experiment it is found that, when a beam is so strained, while the upper fibres are in a state of tension, the lower ones are in a state of compression; and consequently that there is a certain point O in the depth of the beam at which neither of these effects takes place. A line passing through this point perpendicularly to the plane M N is therefore called the neutral axis of the beam, and the termination of the fracture may be supposed to be at O instead of Q; the fibres below the former point having no effect in resisting the tendency of those above to be broken, yet constituting part of the strength of the beam by the power with which they resist compression, and thus oppose the tendency of the beam to turn about the neutral axis. The position of this neutral axis is uncertain; but Mr. Barlow, from experiment, has found that in rectangular beams of wood (the faces being in vertical and horizontal positions) its distance from the upper surface at M bears to the whole depth M Q the ratio of 1 to $1+\sqrt{3}$, or nearly that of 4 to 11. Therefore, d representing the depth M Q, let O M be represented by $\frac{4}{11}d$.

Now adopting the hypothesis of Leibnitz, which is founded on the elasticity of the fibres, that the force of cohesion in any one fibre is proportional to the tension to which it is subject, or to the distance of that fibre from the axis about which the beam turns in consequence of the strain; that is, from the neutral axis just mentioned: if x be the distance of any fibre above O from the latter place, and f represent the force of cohesion in the fibre at M P, we shall have $\frac{4}{11}d : f :: x : f\frac{11}{4d}x$: and the last term will express the force of cohesion between two particles at a distance above O equal to x. Consequently, dx expressing the indefinitely small depth of a fibre, we have $f\frac{11}{4d}x\,dx$ for the cohesive power of a fibre at the same place. But this power acting at a distance from O equal to x, we have $f\frac{11}{4d}x^2\,dx$ for the momentum of that force; and its integral will express the strength of all the fibres in the vertical section represented by M N. The transverse section of the beam being supposed to be rectangular, the breadth will be constant; let it be represented by b: then the integral of $f\frac{11b}{4d}x^2\,dx$ (between $x=0$, $x=\frac{4}{11}d$), that is $\frac{16b}{363d}fd^3$, or nearly $\frac{1}{23}bd^2f$, will express the strength by which all the fibres above the axis at O resist the strain.

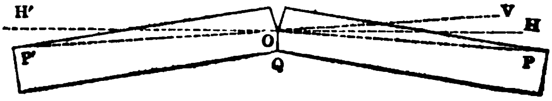
A corresponding expression for the strength arising from the resistance of the fibres below the neutral axis to the force of compression would be the integral of $f'\frac{11b}{7d}x^2\,dx$ (between $x=0$, $x=\frac{7}{11}d$), that is, nearly $\frac{2}{15}bd^2f'$ (f' being the force by which a fibre at Q N would resist compression), and the sum of the two integrals will be the whole strength of the beam to resist a transverse strain. Now the ratio of f to f' is different in different materials; and if we take $f'=\frac{1}{2}f$ (which is the case in some kinds of wood), the said sum will be $=\frac{1}{9}f\,bd^2$ nearly.

But when the beam is strained by a weight W applied at P, so that it take the inclined position mn, if we join O and p, and let fall the perpendicular pR on A B, we shall have W.pR, or (if l be the length of the beam) W.l cos OpR, for the momentum of the weight. Then $W.l\cos OpR = \frac{1}{9}f\,bd^2$ becomes the equation of equilibrium, W representing the weight which will just break the beam; and when $\angle OpR$, or the deflection, is small, its cosine may be considered as equal to unity. It follows that the strength by which beams of the like material resist this kind of strain will vary as $\frac{bd^2}{l}$.

If a perfectly elastic beam or bar were attached horizontally at one end to a wall, and were strained by a weight W at the other end, the mathematical theory would give for the deflection of the opposite end of the beam (that is, the distance to which this end would be drawn in a vertical direction from the original position of the beam) $\Delta=\frac{W.l}{ad^2\delta}$ (Poisson, *Mécanique*, tom. i., No. 310), where $\Delta=$ that deflection; $l=$ the length of the beam; $a=$ the area of the transverse section; $d=$ the depth; and $\delta=$ the element of deflection. Therefore, if Δ be found from experiment on a beam or bar in which W, l, a. d, are given, we may from this equation obtain δ; and subsequently the value of Δ may be found for any beam, the materials being of the same kind. Again, the straining power by which a beam fixed at one end to a wall is dilated in the direction of its length is expressed by $a\delta$D (*Ib.*, No. 308), where D is the element of dilatation. Now, if w be the weight which would produce the deflection δ and dilatation D, we should have $w=a\delta D$; whence $\frac{D}{w}=\frac{1}{a\delta}$; and the first member of this equation being substituted for its equivalent in the above expression for Δ, the latter becomes $\Delta=\frac{D.W.l^2}{wd^2}$; or since the elongation of the whole beam is proportional to the length, and may be represented by D.l, if we put E for this elongation when $w=W$, we shall have $\Delta=E\frac{l^2}{d^2}$. Whence the elongation of an elastic rod by a weight or power acting in the direction of its length is to the deflection of the same rod by a weight or power acting perpendicularly to its length, as the square of the depth or thickness is to the square of the length.

The relations between the strength and strain when a beam or bar, as M N in the preceding figure, is fixed at one end in a wall, and when a beam, as P′M P in the annexed diagram (*fig.* 2), of equal dimensions with respect to breadth and depth, but twice as long, is supported on a prop at its middle point (the weight at each extremity of the latter being equal to that at the extremity of the former), are the same. Also the angle V O P of deflection (O V being in the direction of P′O produced), when a beam is supported on a prop at Q, is equal to $\angle OpR$, or $\angle HOp$, in the preceding figure (O H being drawn perpendicular to the wall, or parallel to the horizon, and the beam M N being equal in every respect to one of the half-beams on the prop). For the angles M O m are equal in both cases; since the weight at P′ produces only the same effect as the reaction of the wall: and hence it follows that the angle H O P of deflection, with respect to the horizontal line H′H, will be equal to only half the angle H O p. The same relation subsists between the deflections when the beam P′M P is supported on the props at the extremities.

Fig. 2.



It will follow, from what was at first stated, that a beam attached at one end to a wall in a horizontal position will bear suspended from the other extremity only half the weight which the same beam will bear on its middle point when made to rest loosely on the two props. If the ends of the beam were prevented from rising on the props, the strength would, on account of the additional weight necessary to produce deflection or fracture at each end, be increased in the ratio of 3 to 2 nearly.

The following table contains a few of the results obtained from experiments made by Messrs. Banks, Barlow, and Tredgold, on wood and iron, when supported loosely on props and subject to a transverse strain at the middle point. The second column contains the length of the beam or bar in feet; the third, the areas of the transverse sections in square inches; the fourth, the breaking weights in pounds; and the last, the deflections at the middle points in inches.

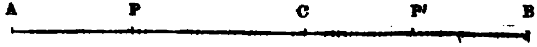
	l	a	W	Δ
Young oak (English)	2	1	482	1·87
Ship timber .	2½	1	264	1·5
Oak (English) .	7	4	637	8·1
New England fir	7	4	420	4·66
Riga fir . .	2½	1	212	1·3
Teak . . .	7	4	820	4·
Cast-iron bars .	3	1	756	
Ditto . .	3	1	869	

Since the strengths of beams attached at one end or supported on props, the other dimensions being the same, vary as the squares of the vertical depths, it follows that the most advantageous position, when the areas of the transverse sections are equal, is that in which the broadest surface is in a vertical position. In this manner girders and joists in edifices are invariably placed.

When a beam or bar is attached at one end to a wall, or when it turns upon its middle point like the great lever of a steam-engine, if it be required that the beam should be equally strong in its whole length, it should be made to taper towards its extremities. When the depth of the beam is constant, the breadth at any point should be proportional to its distance from the extremity. When the breadth is to be constant, the vertical face of the beam should have the form of the common parabola; and when both breadth and depth vary, a longitudinal section of the beam should have the figure of that which is called a cubical parabola.

If a weight be applied at any point in the length of a beam which is supported on two props, the strain produced by it will be the greatest when it is placed in the middle; and the strain varies as the product of the distances of the weight from the points of support. For let A B (*fig.* 3) represent

Fig. 3.



a beam supported at A and B, and let C be any point in it. Imagine a weight W to be applied at any point P; then, by the nature of the lever, A B : P B : : W : the pressure exerted by W on the point A, viz. $\frac{W.PB}{AB}$; and this term expresses the reaction of the prop at A in consequence of the weight at P. Then also $\frac{W.PB}{AB}$ A C is equal to the strain at C produced by this reaction. Again, imagine a weight W′ to be applied at P′; then we shall have, as before, AB : P′A : : W′ : $\frac{W'.P'A}{AB}$, and this last term expresses the reaction of the prop at B in consequence of the weight at P′: also $\frac{W'.P'A}{AB}$ B C is equal to the strain at C produced by this reaction. The sum of these strains is equal to the whole strain at C produced by the two weights. But when P and P′ coincide with C, we have P′ A = A C, P B = BC; and the sum of the two strains is $\frac{W.BC.AC}{AB} + \frac{W'.AC.BC}{AB}$; or, putting W″ for W + W′, we have the strain at C, in consequence of the weight W″ placed there, equal to W″. $\frac{AC.BC}{AB}$; and if W″ be a constant weight applied at any point in A B, the strain will vary as A C, B C. This rectangle, and consequently the strain, is a maximum when C is in the middle of the line.

If a weight be diffused over a beam which is fixed at one end to a wall, it may be considered as acting at its centre of gravity, which, if the diffusion be uniform, will be in the middle of the length of the beam. The momentum of the strain will consequently be equal to half of that which would result from an equal weight attached to the opposite end.

When a body is compressed in a direction perpendicular to the length of the fibres, the points of support being very near and on opposite sides of the place at which the force is applied, the strain to which the body is then subject has been called by Dr. Young the force of detrusion. This species of strain sometimes occurs in the construction of machinery; but few experiments have yet been made to determine the strength by which materials resist it. From these however it appears that the strength is proportional to the area of the transverse section, and that it varies from four-thirds to twice the strength by which the same material would resist a strain in the direction of its length.

Such machines as capstans and windlasses, also axles which revolve with their wheels, are, when in action, subject to be twisted, so that their fibres tend to become curved in oblique directions; and the strain thus produced is called that of torsion. The most natural way of investigating the strength of materials to resist this kind of strain is probably that which was adopted by Dr. Robison: this mechanician imagined the cylindrical body to be composed of an infinite number of concentric hollow cylinders inserted in each other; and, supposing the whole to be cut by a plane perpendicular to the axis, he conceived that two particles in the circumference of any one of the concentric circles would resist the effort to separate them, by a force proportional to their distance from the common axis. Hence, if the radius of the whole cylinder be r, and that of any one of the internal cylinders be x; also, if F′ represent the force of cohesion between any two particles in the outer circumference, we have $r : F' :: x : \frac{F'}{r}x$. The last term expresses the like force in the circumference of the cylinder, whose radius is x, and the momentum of cohesion is $\frac{F'}{r}x^2$. But as all the particles in that circumference exert the same power, and the number of particles is proportional to x, it follows that $\frac{F'}{r}x^3$ will represent the sum of all the forces in the latter circumference, and $\frac{F'}{r}x^3\,dx$ will represent the sum in a hollow cylinder whose thickness, in the direction of the radius, is infinitely small and equal to dx. Then, by the rules of integration, we have for the strength of the whole cylinder the expression $\frac{F'}{4r}x^4$, which, between $x = 0$ and $x = r$, becomes $\frac{F'}{4}r^3$; and hence the whole strength of any cylinder varies as the cube of the radius.

But the area of any section of a cylinder whose radius is r being $= r^2\pi$ (π being the half circumference of a circle when the radius $= 1$), it is evident that $F'r^2\pi$ will represent the lateral cohesion by which all the particles resist being separated by the force of detrusion. Therefore the ratio between the force of detrusion and that of torsion will be as $r^2\pi$ to $\frac{r^3}{4}$; or as 4π to r.

And since the strength under the latter strain depends on the radius, it is evident that a hollow cylinder must be stronger than a solid one; the areas of the material in the transverse sections being equal to each other.

MATHEMATICS (*μάθησις*, or *μάθημα*), a name given in the first instance to a branch of knowledge, not as descriptive of its subject-matter, but of the methods and consequences of learning it. The word *μάθησις*, and the Latin *disciplina*, by which it has been rendered, have been the origin of the vernacular terms *mathematics* and *discipline*, the meanings of which have long since separated. The properties of space and number, the subject-matters of the *μάθησις*, have usurped the name; so that anything which relates to them, however learnt, is called mathematics: the Latin word, on the contrary, still retains the signification of a corrective process; and, in speaking of any branch of knowledge, is applied when power of mind is derived from the methods of learning it, as well as knowledge from the results.

The original use of the word mathematics cannot be gathered, as far as we can find, from any express contemporary authority; a few passages, in which the term is used without explanation, as one of notoriety, being all that can be cited, and mostly from Plato. Later writers, as for instance Anatolius (cited by Heilbronner), A.D. 270, give the derivation above alluded to. But before the time of the last-named writer the meaning of the word had been extended: thus the book of Sextus Empiricus 'against the mathematicians' is, as Vossius remarks, directed as much against grammarians and musicians as against arithmeticians and geometers. And John Tzetzes, in the twelfth century, includes under the *μαθήματα* nearly what the universities afterwards called by the name of arts; calling grammar, rhetoric, and philosophy, the disciplines (*μαθήματα*), and arithmetic, music, geometry, and astronomy, arts (*τεχνάι*), included under philosophy.

The distinction between the old and new meaning of mathematics is most requisite to be kept in mind, because arguments are frequently urged for and against mathematics, in which the discipline is confounded with the communication of facts and processes about space and number; and because it is our intention in the present article, confining ourselves to the most important view of the science, as well as to the etymological meaning of its name, to offer a few remarks on the *discipline* called mathematics.

In the time of Plato, which was probably that of the application of words which imply '*the* discipline' to that one exercise of mind which consists in making deductions by pure reasoning from the self-evident properties of space and number, it is probable that such restriction of the word was easily justifiable. At present we have, besides mathematics, physics, the study of antiquity, grammar, &c., which have all been made disciplines, but no one of which was then entitled to that appellation. Nevertheless it has happened that writers, misled partly by the name of mathematics and partly by the pre-eminence of mathematical reasoning in strictness and connexion, have spoken as if it were the *only* cultivator of the pure reasoning power.

Much discussion has arisen upon the question whether those primary propositions which, from our clear apprehension and willing admission of them, are called self-evident, are notions inherent in the mind, or deductions of early experience. Except to mention this controversy, we have here nothing to do with it. The certainty of these propositions is all that we want, and this is conceded by both sides. The consideration however of the fundamental supports of mathematical reasoning is useful and interesting, and, as a safeguard, even necessary. It is not long since a school of metaphysicians existed, who imagined that because all mathematical definitions are precise, therefore the exact sciences are founded upon definition. It was not to them a necessary result of the constitution of our faculties that the three angles of every triangle make up the same amount, but a consequence of definition, which might have been something else, upon different suppositions. We can hardly undertake to explain what we do not understand, but we recommend every beginner in the subject to seek no knowledge about the character of fundamental propositions until he shall have become well acquainted with their consequences. He must take care to admit nothing which is not, or cannot be made, most evidently true; and he will find that all axioms, as they are called, have the highest sort of certainty, namely, that they cannot be imagined otherwise.

Whatever may be the metaphysical hypothesis to which it is referred, it is certain that there is a real distinction between a mathematical assertion and one of any other kind. If we say that an unsupported bit of lead will fall to the ground, we state a fact of which we are as certain, in the sense of reliance, as we are of the other proposition that two straight lines cannot enclose a space. But in the former proposition, an exception, or even a permanent alteration of the law, is conceivable by the imagination: in the latter the mind would feel sensible of absurdity if it attempted to construct the idea of an enclosure bounded by only two straight lines. No distinctive phrases can be too strong to express the essential difference of these two assertions; but it is a misfortune that all terms which create a sufficient distinction are linked to one or another theory of the human mind. If the mathematical student can receive these terms as indicative of the difference of species, without bending before an hypothesis about the conformation of his own reason, he will do well to adopt them; if, on the other hand, he feel compelled to agree with any one system of mental philosophy, he will neither impede nor advance his mathematical career.

The sciences of which we speak may be considered either as disciplines of the mind, or as instruments in the investigation of nature and the advancement of the arts. In the former point of view their object is to strengthen the power of logical deduction by frequent examples; to give a view of the difference between reasoning on probable premises and on certain ones, by the construction of a body of results which in no case involve any of the uncertainty arising from the previous introduction of that which may be false; to form the habit of applying the attention closely to difficulties which can only be conquered by thought, and over which the victory is certain if the right means be used; to establish confidence in abstract reasoning by the exhibition of processes whose results may be verified in many different ways; to help in enabling the student to acquire correct notions and habits of generalisation; to give caution in receiving that which at first sight appears good reasoning; to instil a correct estimate of the powers of the mind, by pointing out the enormous extent of the consequences which may be developed out of a few of its most inherent notions, and its utter incapacity to imagine, much less to attain, the boundary of knowledge; to methodise the invention of the means of expressing thought, and to make apparent the advantages of system and analogy in the formation of language and symbols; to sharpen the power of investigation, and the faculty of suggesting new combinations of the resources of thought; to enable the historical student to look at men of different races, opinions, and habits, in those parts of their minds where it might be supposed *à priori* that all would most nearly agree; and to give the luxury of pursuing a study in which self-interest cannot lay down premises nor deduce conclusions.

As instruments in the investigation of nature and the advancement of the arts, it is the object of the mathematical sciences to give correct habits of judgment and ready means of expression in matters involving degree and magnitude of all kinds; to teach the method of combining phenomena, and ascending from the complicated forms of manifestation to the simple law which regulates them; to trace the necessary consequences of any law, assumed on suspicion, in order to compare those consequences with phenomena; to construct hypothetical representations of laws, or approximations to laws, which shall sufficiently represent phenomena; to convert processes of known accuracy, but complicated operation, into others which make up in simplicity for a certain amount of inaccuracy, and to devise means for judging of that amount of inaccuracy, and confining it within given limits; to ascertain the most probable result of observations or experiments which are discordant with each other either from errors of measurement or unknown causes of disturbance; to point out the species of experiments which should be made to obtain a particular sort of information, or to decide between two laws which existing phenomena both indicate as of nearly equal credibility; to make all those investigations, which are necessary for the calculation of results to be used in practice, as in nautical astronomy, application of force and machinery, and conduct of money transactions; in a word, though that word by itself would have not presented a sufficiently precise idea, to find out truth in every matter in which nature is to be investigated, or her powers and those of the mind to be applied to the physical progress of the human race, or their advancement in the knowledge of the material creation.

The main branches of mathematical science were formerly stated to be arithmetic and geometry, springing out of the simple notions of number and space. This is too limited a description. Unquestionably the science of numbers, strictly and demonstratively treated, and that of geometry, or the deduction of the elementary properties of figure from definitions which are entirely exclusive of numerical considerations, must be considered as the elementary foundations, but not as the ultimate divisions, of mathematics. To them we must add the science of operation, or algebra in its widest sense,—the method of deducing from symbols which imply operations on magnitude, and which are to be used in a given manner, the consequences of the fundamental definitions. The leading idea of this science is operation or process, just as number is that of arithmetic, and space and figure of geometry: it is of a more abstract and refined character than the latter two, only because it does not immediately address itself to notions which are formed in the common routine of life. It is the most exact of the exact sciences, according to the idea of their exactness which is frequently entertained, being more nearly based upon definition than either arithmetic or geometry. It is true that the definitions must be such as to present results which admit of application to number, space, force, time, &c., or the science, would be useless in mathematics, commonly so called; but it is not the less true that a system of methods of operation, based upon general definitions, and conducted by strict logic, may be made to apply either to arithmetic or geometry, according to the manner in which the generalities of the definition are afterwards made specific.

The common division however of the mathematical sciences will not admit of the threefold separation just described, the science of operation being more or less mixed up with arithmetic in common algebra, and in its application to geometry. We may describe this division as follows:—

1. *Pure Arithmetic*, subdivided into *particular* and *universal*:[*] the former, the common science of numbers (integral and fractional) and calculation; the latter, the science of numbers with general symbols, or the introduction to algebraical methods, restricted to purely numerical processes. The science which treats of the peculiar relations of numbers, and subdivides them into classes possessing distinct properties, is called the *theory of numbers*, and is an extension which frequently requires a higher algebra.

2. *Pure Geometry*, which investigates the properties of figures in the manner of Euclid, that is, with restrictions which confine the student to the straight line and circle as the means of operation and the boundaries of figure. [Geometry, p. 153.] This science includes solid geometry, as far as figures bounded by planes, the properties of the sphere, cone, and cylinder, and of their plane sections; but it does not allow any conic section, except the straight line and circle, to be employed in the solution of problems.

3. *Algebra*, including the general calculus of operations (though this is not an elementary branch), and all methods which can be established without the aid of processes exclusively belonging to the differential calculus. The distinction between it and universal arithmetic is an extended use of operations, preceded by an extended definition of their meaning.

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[*] We have supplied the word particular, as opposed to universal; algebra was sometimes called universal arithmetic, but the phrase never became general, owing to its being obvious to those who studied algebra, that arithmetic, however general its symbols may be, is only a part of algebra.

4. *Application of Algebra to Geometry.*—This includes *trigonometry*, and all those parts of geometry in which problems are numerically solved, and the method of Euclid is abandoned. Thus it includes the conic sections as commonly taught; and in its higher parts is an application of the differential calculus, as well as of algebra.

5. *Differential and Integral Calculus.*—Under this term we include the general theory of limits, that is, all digested methods of operation, in which the limits of ratios are used as algebraical quantities under specific symbols. This distinction is necessary, since the notion of a limit, and even propositions which belong to the differential calculus in everything but form, are contained in the elements of Euclid, and the application of arithmetic to geometry. The *calculus of differences* and the *calculus of variations* are usually placed under this head: the former, in its elementary parts, might be referred to common algebra; the latter is an extension of the differential calculus.

The division of the mathematical sciences into *pure* and *mixed* is convenient in some respects, though liable to lead to mistake. By the former term is understood arithmetic, geometry, and all the preceding list; by the latter, their application to the sciences which have matter for their subject, to mechanics, optics, &c. But considering that in all these subjects a few simple principles are the groundwork of the whole deduction, they might be explained as intended to answer two distinct questions: first, what are the consequences of such and such assumptions upon the constitution of matter? secondly, are these consequences found to be true of matter as it exists, and are the assumptions therefore to be also regarded as true? In the reply to the first question, the science is wholly mathematical; to the second, wholly experimental in its processes, and inductive in its reasonings; and this is the *mixture* from which the joint answer to both questions derives its name, and not from any difference between its mathematics and those of the pure sciences. Again, a science does not take the name of mixed mathematics simply because it is possible to apply mathematical aid in the furtherance of its legitimate conclusions: such a use of terms would be trifling with distinctions, since it would bring political economy, chemistry, geology, and almost every part of natural knowledge, under the same head as mechanics and hydrostatics. The words in question should be reserved to denote those branches of inquiry in which few and simple axioms are mathematically shown to be sufficient for the deduction, if not of all phenomena, at least of all which are most prominent. Taking the leading ideas of the mixed sciences instead of their technical names, we may describe them as relating to motion, pressure, resistance, light, heat, sound, electricity, and magnetism. As disciplines, it is their main object to teach the true method of inquiry into the laws, and, so far as can be known, the causes, of material phenomena; as instruments, it is not necessary to say one word about them. Two only have not been mentioned: the first, astronomy, which belongs to more than one of the preceding; the second, the theory of probabilities, of which, though placed among the mixed sciences, it may be doubted whether its proper place is not in the first list.

The most important question connected with the mathematical sciences is the manner in which they should be taught as disciplines of the mind. This concerns all who consider any branch of knowledge in that light; and, as education spreads, this view of the subject will become of more and more consequence. Vitally essential as these sciences are to the advancement of the arts of life, we feel, in regard to this branch of their utility, in the situation of those who know that they must and will be attended to, because their cultivation is necessary to the supply of wants which all can feel, and the promotion of interests which all can understand. It is not so with the first-mentioned object of their study, but rather the reverse; for the wants of life being as easily supplied by the results of an illogical as of a logical system (provided only that vicious reasoning be not allowed to produce absolute falsehood), the facilities which laxity of reasoning affords in the mere attainment of results will always recommend it to those whose main object it is to apply the fruits of calculation to the uses of life. Such has been, and, we are afraid, will continue to be, the tendency of the great advance which the last century made in application.

All we should positively contend for is the necessity of making the entrance to the study as strict and rigorous as reason can make it, to all who are to receive liberal education. In the higher branches of mathematics many opinions prevail, and it would be impossible to make a formal standard of rigour. Add to this, that with a certain degree of experience in the estimation of reasoning, it may be comparatively immaterial which of several different methods is adopted; either may be rigorous if properly understood, and if the habit of reducing looseness of phraseology, or dangerous abbreviation of logic, to strict definition and formal deduction, shall first have been well formed. To assist in gaining this end, we should propose—

First, that no student should be allowed to enter upon the use of language in mathematical reasoning until he has acquired more acquaintance with the nature of assertion, denial, and deduction, than can be obtained from previous education as now given: this to be done by the study of the elements of logic.

Secondly, that no consideration of facility or practical convenience should prevent the first study of arithmetic and geometry from being strictly demonstrative, and formally rigorous: rigour being defined to consist in explicit statement of every assumption, and logical treatment of every inference.

On the first of the preceding recommendations we shall only observe, that in order to distinguish between accurate and inaccurate inference, an acquaintance with the exact extent of meaning of the several modes of communication is absolutely necessary. This cannot be learnt from the ordinary use of language, which abounds in implications to be suggested by the circumstances of the speaker, the context of the words, or the tone in which they are delivered. Before the phrases of demonstration can be made to convey a meaning limited in both directions, the strict use of language must be made a study; if this be neglected, the words of any book may pass between the teacher and the learner, but no precaution has been taken to secure their conveying the proper meaning, neither too much nor too little.

On the second recommendation, we must first explain that we hold many points of controversy very cheap, as far as they concern the discipline given by the most elementary branches of mathematics. It matters nothing, in our view of the case, whether an axiom be really incapable of proof, or whether the substitution of another would or would not place the science on a more simple basis. The habit to be formed is that of tracing necessary consequences from given premises by elementary logical steps: the premises to be true or false, the consequences to be true if the premises be true, and dubious (not necessarily false) if the premises be false. The only error which, at the stage in question, it is intended to avoid, is the deduction, as a necessary consequence, of that which is not so. The mind of the learner however is allowed to dwell too much at the outset on the absolute truth or falsehold of the conclusions, to the neglect of their connection with the premises: hence it arises that when a process occurs in which it is essential to examine that connection for its own sake, it is the universal complaint that beginners find difficulty and obscurity. From what other cause arises the dislike of the indirect demonstration? [ABSURDUM, REDUCTIO AD.]

Unfortunately for the mental progress of the student, he is often allowed to use premises of an easy form, in cases where a complete preparation for the subject would require more extended first principles and greater prolixity of deduction. To this, as before observed, no objection can be taken in itself, provided that no consequences be admitted except the legitimate ones. But something more *is* admitted: the pupil is presented, in consideration of his attention to one set of premises, with the consequences of another, and is allowed to make believe that he has come fairly by the latter. Thus, by a theory which applies only to the ratio of number to number, he is permitted to draw general conclusions upon all ratios. When, in opposition, we advise that the first studies should be demonstrative and rigorous, we do not imply, for instance, that the more difficult system should in all cases be preferred to the less complete but more simple: we confine ourselves to insisting that whatever the premises may be, the conclusions should really follow; and that if the latter be necessarily of a limited character, the limitation should be stated.

The work of Euclid is preferable, in our opinion, to any system which has been proposed to supply its place; simply because the dependence of conclusions upon premises is more distinct than in any other geometrical writing. The defects with which it abounds are trifles which can be remedied as they are met with; and though there are seldom three propositions together, one or other of which will not call for some remark from the teacher, yet such is Euclid, that these very faults, properly noted, are of more value than the greater elegance and more artificial process of less formally rigorous writers. Of the part relating to PROPORTION we shall treat under that word.

The necessity of a demonstrative system of arithmetic is practically denied, in this country at least, by the use of a set of dogmatical rules. Such training would be less prejudicial if the notions of the student on reasoning were more settled, so that he could receive these rules with some fitting idea of their purpose, and of the extent to which they are to be considered as knowledge. As it is, he has no other view of arithmetic presented to him, and his conceptions of number are allowed to be first fettered, and afterwards led astray, by ideas derived sometimes from the reception of the conventional for the necessary, sometimes from modifications of truth which are convenient in practice though unsound in theory. Such an addition to his stock of mathematical power predisposes him to acquiesce in the shifts by which rigour is avoided in other parts of the science; and an arithmetic from which both sequence and accuracy of thought have been excluded is the asylum of geometry against truth, when the latter becomes too difficult for an unenergetic, that is untrained, power of investigation.

We shall conclude this article with some references to works on the history of mathematics, a subject so connected with that of the other sciences, that it would be impossible to say anything on it in few words. The great work of Montucla, continued (from his papers partly) by Lalande, 'Histoire des Mathématiques,' 4 vols., Paris, 1799-1802, is the most accessible source of information for the reader who desires some detail. The bibliography of Murhard, 'Litteratur der Mathematischen Wissenschaften,' Leipzig, 1797, will be found a useful accompaniment in the verification of dates. The work of Kästner, 'Geschichte der Mathematik,' Göttingen, 1796, is more precise in its account of individual labours than that of Montucla, but does not embrace so large a field. The works of Bossut, namely, the preface to the mathematical part of the 'Encyclopédie Méthodique' and the 'Histoire des Mathématiques,' 2 vols. 8vo., Paris, 1810, are written in an interesting manner; and the latter (which was translated by Bonnycastle) brings some parts of the history later than its predecessors. Cossali's 'Origine dell' Algebra,' 2 vols. 4to., Parma, 1799, is an account of the early Italian algebra: its successor in the same subject, 'Histoire des Sciences Mathématiques en Italie,' Paris, 1838, by M. Libri (of which two volumes only have appeared, four more being understood as intended), bids fair to be very valuable from the number and extent of the citations. Much on the subjects of algebra, logarithms, and trigonometrical tables may be found in Dr. Hutton's Tracts (3 vols. 8vo., 1812), and in the preface of his Logarithms. The work of Montucla, 'Récherches sur la Quadrature du Cercle,' reprinted with additions in 1831, is complete on the subject of which it treats. There is a work on a kindred subject which we have never seen, Reimer, 'Historia Problematis de Cubi Duplicatione,' Göttingen, 1798. Delambre's 'Rapport Historique sur les Progrès des Mathématiques depuis 1789,' Paris, 1810, is the least specific of his historical works, but, points of nationality apart, is accurate. Professor Peacock's article on arithmetic in the 'Encyclopædia Metropolitana,' and his report on Analysis, in the second volume of the 'Transactions of the British Association,' are full of historical information of the most precise character. Some notices of early English mathematicians, enough to guide the reader to sources of information, are contained in the 'Companion to the Almanac' for 1837, and in the 'Magazine of popular Science,' Nos. 18, 20, and 22. The eleventh volume of the 'Memoirs of the Academy of Brussels' contains the 'Aperçu Historique,' &c. of M. Chasles, a history of geometry and a complete account of its modern progress.

Among works of older date, which are often cited, we may notice Ward's 'Lives of the Gresham Professors,' London, 1760; Heilbronner's 'Historia Matheseos Universæ,' Leipzig, 1742, does not deserve that title, but contains an immense quantity of information on the antient part; G. J. Vossius, 'De quatuor Artibus popularibus,' Amsterdam, 1650, contains a large number of dates and short biographical accounts; to Blancanus, 'De Mathematicarum Naturâ Dissertatio,' Bologne, 1615, is appended a chronological list of mathematicians up to the time of Galileo; the 'Scolæ Mathematicæ' of Peter Ramus, Frankfort, 1627, contains many historical notices. The number of writings which might be referred to as incidentally affording information is of course numerous.

MATHEWS, CHARLES, an eminent comedian, was born on the 28th of June, 1776, and educated at Merchant Tailors' School. His father, Mr. James Mathews, was a bookseller in the Strand, and intended Charles, who was his seventh son, to follow the business. A strong and early inclination for the stage however induced the son, after two or three attempts in private, to make his début as an amateur in the parts of Richmond in 'Richard III.,' and Bowkit in 'The Son-in-Law,' at the Richmond theatre, Saturday, Sept. 7, 1793; and on the 19th of June, 1794, he made his first appearance as a regular comedian at the Theatre-royal, Dublin, for the benefit of Mrs. Wells, and in the characters of Jacob in 'The Chapter of Accidents,' and Lingo in 'The Agreeable Surprise.' In 1797 Mr. Mathews married his first wife, Miss Eliza Kirkham Strong, the daughter of a physician at Exeter. She died at York in 1802; and in 1803 Mr. Mathews was united to his second and surviving wife, Miss Anne Jackson, at that time a member with himself of the York company. On the 15th of May in the same year Mr. Mathews made his first bow to a London audience at the Haymarket theatre, and on the 17th of September, 1804, his first appearance at Drury-Lane, in the character of Don Manuel, in 'She would and she would not.' On Wednesday, April 12, 1808, at the Theatre-royal, Hull, he made his first trial of those popular performances, his 'Entertainments' and 'At Homes,' by the recital of his 'Mail-Coach Adventures, or Rambles in Yorkshire.' On the 22nd of July, 1814, Mr. Mathews was severely injured by being thrown out of a tilbury in which he was driving his friend Mr. Terry. The effects of this unfortunate accident he felt to the last day of his life. On the 2nd of April, 1818, he commenced his extraordinary engagement with Mr. Arnold of the English Opera House, and gave his first 'At Home' in London, an entertainment which he repeated thirty-nine nights to overflowing houses. In 1822 he paid his first visit to New York, returned to England in the following year, and in 1824 produced his entertainment entitled 'A Trip to America.' In January, 1828, he accepted a short engagement at Drury-Lane, and in the autumn of the same year became joint proprietor with Mr. Yates of the Adelphi theatre, by the purchase of his deceased friend Mr. Terry's share. In 1834 he again visited America, but was compelled by ill health to return prematurely, having played only thirty nights. On Tuesday, 28th of June, 1835 (his birth-day), he expired at Plymouth, after considerable suffering, aged fifty-nine, and was buried in the vestibule of St. Andrew's church in that town. As a comedian Mr. Mathews ranked deservedly high; but his greatest popularity was certainly achieved by his wonderful talent for personation and imitation, in the exercise of which his kind heart as well as good taste kept him guiltless of offence even to the most sensitive of those whose peculiarities of voice, manner, or person he so happily assumed. In private life Mr. Mathews was universally respected, and with him the stage lost a perfect gentleman as well as a distinguished professor. His memoirs, partly autobiographical, and edited by his widow, have been recently published in 8vo.

MATHI'OLA, a genus of cruciferous plants with tapering pods, converging stigmas thickened at the back, a calyx with two saccate sepals, and compressed seeds arranged in a single row and surrounded by a thin membranous border. It consists of annual and perennial herbaceous plants inhabiting the warm countries bordering the Mediterranean, and extending eastwards into Persia and some of the southern Asiatic provinces of Russia. Between thirty and forty species are known to botanists, among which are those which form the stocks and gilliflowers of gardens, sweet scented biennials much valued for the beauty and variety of their many-coloured flowers. The principal source of these has been Mathiola incana, to which are to be assigned the hoary-leaved, or ten-week stocks; Brompton, and queen's; and M. glabrata, which comprehends the smooth-leaved, or green wallflower-leaved stocks: it is however probable that the numerous varieties now common in gardens under the name of German and Russian stocks have been procured, at least in part, by muling the former species with some of the sad-coloured species of the genus. The latter are called Luperias by De Candolle, and are remarkable for their dingy flowers, which are exceedingly fragrant at night, but at no other time. M. livida, tristis, and L. odoratissima are the best known of them, and are frequently cultivated in greenhouses.

MATILDA, or MAUD, Empress. [Henry I., II.]

MATILDA, Countess of Tuscany. [Gregory VII.]

MATLOCK. [Derbyshire.]

MATRASS, a glass chemical vessel, employed for the purpose of digesting, boiling, and distillation, and sometimes while one is used as the body, another serves as the receiver in the last-mentioned operation. Florence flasks are very commonly used for these purposes, and they answer admirably, on account of the excellent nature of the glass, which is such as to resist the effects of sudden alterations of temperature. Sometimes matrasses are very conveniently formed with flat bottoms, instead of their being round as in oil-flasks.

MATRIX, or GANGUE. Metallic ores are seldom found unmixed in the places in which they occur; they not only accompany each other, but are frequently associated with useless stony bodies, and these are called the matrix, or gangue.

It also happens that ores in some cases become gangues with relation to more precious minerals; those which may be distinguished as metallic gangues are iron pyrites, spathose iron-ore, oxide of iron, hydrate of iron, and blende; the earthy gangues are usually quartz, felspar, limestone, carbonate of barytes, sulphate of lime, sulphate of barytes, and fluor-spar.

MATRONS, JURY OF. When a widow alleges herself to be with child by her late husband, and it is suspected that she is not pregnant, or not so by the husband, a writ de ventre inspiciendo may be obtained out of chancery, on behalf of the next heir, whose rights might be prejudiced by a supposititious, or spurious, child. Under this writ a jury of 'discreet and lawful women' is impannelled, to try, by inspection of her person (et ubera et ventrem tractando), whether the widow is with child or not, and if with child, to inquire of the time of conception, and of that of the expected delivery. If the widow be found to be pregnant, the sheriff, on returning the writ, certifies the court of common pleas to this effect; whereupon the widow, unless she be remarried (in which case she is not to be taken from her husband), is to be kept in a castle, or other safe place, until her delivery, in order, as far as possible, to prevent any child being improperly introduced as the issue of the husband, to the disherison of the heir. (Bracton, lib. 2, cap. 32; Croke, Eliz., 566; 6 Vesey, 260; 21 Viner's *Abr.*, 547.)

In the parliament roll of 9 Edw. II. (1 *Rot. Parl.*, 353, 354), is a curious proceeding, instituted on the 13th July, 1315, by the sisters and coheirs of Gilbert de Clare, earl of Gloucester, who had died on the 30th June, 1314, to recover their inheritance out of the king's hands, notwithstanding the alleged pregnancy of the countess, his widow. At the parliament held in January following (more than eighteen months after the death of the earl), the king's sergeants insisted that it was still the duty of the crown to retain possession of the estate for the benefit of the expected offspring, whose birth had *from natural causes* (permittente naturâ) been so long deferred; and it was not until Easter term, 1316, that the impediment was treated as removed.

A jury of matrons is also summoned to inquire into the fact of pregnancy in cases where a woman convicted of treason or felony, upon sentence of death being pronounced, pleads, in stay of execution, that she is with child. If the matrons impannelled to try this allegation find it to be true, the convict, whether she be married or unmarried, is respited until after her delivery. In some of the cases reported, the matrons have been directed to inquire whether the convict is *quick* with child; in other cases, and those by far more numerous, the inquiry seems to have been general, namely, *pregnant* or not pregnant. (Hawkins, *P. C.*, book ii., cap. 51, sec. 9.) As the child is now known to have the same degree of fœtal life before as after the change of position which occasions the sensation called quickening, the latter form of the inquiry appears to be not only the more humane but also the more correct; more especially as the law has now rejected the distinction between quick and not quick, in cases of attempts to procure abortion. (7 Will. IV. & 1 Vict., c. 85, s. 6.) After delivery the convict is not to be executed without an award of execution by the court. But when called upon to say why execution should not be awarded against her, the convict cannot plead that she is again with child; such further pregnancy being considered not to be a sufficient ground for suspending, for a second time, the execution of the sentence. The gaoler is, under such circumstances, punishable for his negligence. But if the ground of the first postponement was the preservation of the infant, there seems to be no reason why the life of the second child should be sacrificed.

The form of proceeding where a woman alleges herself to be with child by her late husband, which is described in the passage of Bracton already referred to, is evidently taken from the Roman form of proceeding in a similar case, as described in *Dig.* 25, tit. 4, 'De Inspiciendo Ventre, custodiendoque Partu.'

MATSYS, QUINTIN, an eminent painter, born at Antwerp in 1460, is said to have followed the trade of a blacksmith or farrier till he was at least twenty years of age. His quitting his trade to take up painting has been ascribed to different causes. The story that has gained most credit (perhaps because it is the most romantic) is that he fell in love with a young woman whose father was resolved she should marry none but an artist. At all events he appears to have had great talents: his manner is singular, and different from that of any other master; his design is correct and true to nature, and his colouring forcible. His pictures are carefully finished, though rather dry and hard. It is thought by competent judges, that if he had been in Italy, and studied the antique and the great masters of the Roman school, he would have been one of the most eminent painters of the Low Countries. Though he generally took his subjects from ordinary life, he sometimes ventured with success into the higher departments of the art. One instance of this is a 'Descent from the Cross,' painted for the cathedral of Antwerp, and now in the museum of that city. His most remarkable and best known picture is that of the 'Two Misers,' of which there are numerous copies. The picture in the Royal Gallery at Windsor is supposed to be the original, but Dr. Waagen does not think it equal to its reputation. On the other hand he speaks in the highest terms of a 'Mary Magdalen,' half-length, three-quarters the size of life, in the gallery at Corsham House, the seat of Lord Methuen. His drawings are extremely rare. He died at Antwerp in 1529.

MATTER is the name given to every thing which is not mind. Such seems to be the only way of defining the word; and though the definition may appear to assume that mind is not matter, the contrary of which has been contended by the class of writers called materialists [Materialism], yet it does not really do so. For whatever theory may be adopted as to the nature of mind, whether it is considered as a separate principle from matter, or merely as a different manifestation of the same principle, the word *mind* is indifferently retained; and our definition may consequently be at once reconciled with the materialist theory by paraphrasing it thus:—matter is the name given to the substance composing the universe, under all its different modifications, excepting only that one which is known by the name of mind.

Matter then is the name for that out of which all objects external to the mind are thought to be composed, the question being reserved, whether the mind is or is not composed of the same substance. What this substance is, to which the name of matter is given, we do not know, and have no means of knowing. Various speculations have been made as to its nature, and theories formed concerning the manner of its composition; but these have no better basis than conjecture. Other speculations have been made as to whether there is such a thing as matter or not; and some philosophers have seen in the solid world around us nothing but a creation of the mind. [Berkeley; Idealism.]

There is no need to enter here into any of these speculations. It is sufficient to know and say that man, subject to certain affections of his senses, is led to assign those affections to an external cause. This external cause is that which he calls matter. What this matter is in itself he knows not. He knows only its capability of producing in him certain affections, the ordinary affections of the five senses (sensations, as they are called), and those which give the ideas of extension and resistance. Thus, having already supposed something without, he pronounces these to be qualities of that something; ignorant all the while what that something is, and knowing it only as the *substratum* of the qualities.

MATTHEW, ST., the Apostle and Evangelist, was a native of Galilee, and a publican or collector of customs and tribute under the Romans. While employed in his office at the city of Capernaum, he was called by Christ to follow him (*Matt.* ix. 9), and was afterwards chosen to be one of the apostles (*Matt.* x. 3). An account which corresponds in all respects to that of the conversion of Matthew as related by himself is given by *Mark* (ii. 14), and *Luke* (v. 27), respecting a publican named Levi, the son of Alphæus. Grotius and others have supposed that Matthew and Levi were different persons, whose conversion took place at the same time; but if so, why should Matthew relate his own conversion and omit all mention of that of Levi? As the three narratives plainly refer to the same time and place, and as Levi is not mentioned among the apostles, nor in any other passage of the New Testament, we may safely conclude that Matthew and Levi are names of the same person. Perhaps Levi was his proper name and Matthew a surname given him after his conversion, as that of Peter was to Simon. The Hebrew word Matthew (מַתִּיָה) signifies *a gift of Jehovah*, from מַתָּן, *a gift*, from נתן, *to give*.

In the *Acts of the Apostles* (i. 13), Matthew is mentioned with the other apostles as remaining in Jerusalem after the ascension of Christ. His subsequent history is quite uncertain. According to Socrates, an ecclesiastical historian of the fifth century, he went to Ethiopia (Soc., *Hist. Ecc.*, lib. i., c. 19); but according to another tradition, to Parthia. It has been a commonly received opinion that he was put to death at Naddabar, a city in Ethiopia (Cave's *Lives of the Apostles*, p. 178), but Heracleon, a Valentinian of the second century, mentions him among those of the apostles who escaped martyrdom. The passage is cited by Clement of Alexandria (*Stromata*, lib. iv., p. 502 B).

MATTHEW, ST., THE GOSPEL OF, is a canonical book of the New Testament, ascribed by the unanimous consent of the early Christian writers to the apostle Matthew.

It is not easy to determine the language in which this gospel was composed. That it was written in Hebrew (by which we are to understand the Syro-Chaldaic dialect spoken in Palestine in the time of Christ), and that it was composed for the Jewish Christians, is asserted by Papias (Eusebius, *Hist. Ecc.*, iii. 39), Irenæus (*Ibid.*, v. 8), Origen (*Ibid.*, vi. 25), Eusebius (*Ibid.*, iii. 24), and Jerome (*Comment. in Matt.*, *præf.*, and *De Vir. Illust.*, c. 3); and their account is followed by others of the early Christian writers. On the other hand it is argued in favour of a Greek original that these testimonies are inconclusive, for that Papias was a weak and credulous man, and that the other writers merely followed his account; that we find no traces of the actual existence of the Hebrew Gospel of Matthew, for all the quotations in the works of the early fathers are made from the Greek copy which we now have; that explanations are introduced which would be useless to Jewish readers (see *Matt.*, i. 23; xxvii. 33-46); that parallel passages of the Old Testament are generally quoted from the Septuagint; and that the Greek Gospel which we now have bears every mark of being not a translation but an original document. In order to reconcile these facts with the statements of the early writers, Dr. Whitby and others have supposed that there were *two* originals of the Gospel, one written in Hebrew for the Jewish converts, and the other in Greek for general use. They account for the absence of quotations or references to the Hebrew Gospel in the writings of the Fathers by supposing that it was corrupted by the Judaizing heretics to such a degree as to lose all authority, and that in this corrupted state it was the same document as that mentioned by Origen and other Fathers under the title of the *Gospel according to the Hebrews*. [Gospel.]

The date of St. Matthew's Gospel has been the subject of as much dispute as its original language. If it were written at first for the use of the Christians in Judæa, the date would probably be early; and it has been remarked that the exhortations which it contains to patience under persecution would be most acceptable to the Jewish Christians in their persecution by the Sanhedrim soon after the ascension of Christ. None of the early writers, except Irenæus, give any explicit testimony on the subject, but their statements appear to imply that this was the first written of the four Gospels, and also, what indeed Eusebius expressly asserts, that it was composed before Matthew left Judæa. On these grounds, and from the supposed improbability of the Christians remaining long without some written account of the life of Jesus, many critics have assigned it the date of about A.D. 38

But Irenæus says that it was put forth while Peter and Paul were preaching at Rome and laying the foundations of a church there. (*Adv. Hær.*, iii. 1, in Euseb., *Hist. Ecc.*, v. 8.) On the strength of this testimony Michaelis, Lardner, and others have fixed the date at A.D. 61 or 63, and Lardner has drawn an elaborate argument in favour of this date from the internal evidence of the book itself, in which he endeavours to show that Matthew understood many points in the Christian system which the Apostles did not understand till some considerable time after Christ's ascension. But as in these passages Matthew is recording the words and actions of Jesus, and not his own opinions, we cannot see any force in the argument.

Some of the advocates for a double original refer the Hebrew copy to the earlier date, and the Greek to the later.

The genuineness, authenticity, and canonical authority of this Gospel are established beyond dispute by the unanimous testimony of Christian writers from the earliest age, and by its place in the antient versions. But many critics have doubted the genuineness of the first and second chapters, chiefly on account of the difference between the genealogy of Christ in the first chapter, and that given by St. Luke (iii.), and other discrepancies between these chapters and Luke's account of the early life of Christ, and other internal difficulties, and also on the ground that they were omitted in the copies used by the Nazarenes and Ebionites, which however were undoubtedly corrupt. The chief arguments on the other side are, that these chapters are contained in *all* the antient MSS. and versions, that they are referred to and quoted by several of the Fathers, that the particle δὲ at the beginning of the third chapter shows that something had gone before, and that the style of these two chapters agrees with that of the rest of the Gospel, especially in the manner of quoting the prophecies of the Old Testament.

The general scope of St. Matthew's Gospel appears to be to show that Jesus Christ answered to the character of the predicted Messiah. It has been divided into four parts, as follows:—

Part I.—The genealogy, birth, and infancy of Christ. (Chaps. i. and ii.)

Part II.—The preaching of John the Baptist, Christ's baptism by him, and the temptation in the wilderness. (iii., iv. 1—11.)

Part III.—The public ministry of Christ. (iv. 12—xx. 16.)

Part IV.—His journey to Jerusalem, transactions there, his death and resurrection. (xx. 17—xxviii.)

The coincidences and discrepancies between this Gospel and those of Mark and Luke have been spoken of under Luke, Mark, and Gospel.

St. Matthew was an Apostle and an eye-witness of the acts of Jesus, at least of those which were done after his call. His narrative has therefore the highest degree of credibility. His style of narration is simple and effective, and he relates the discourses of Christ with clearness, and often with great energy.

(Lardner's *Credibility* and *Lives of the Apostles and Evangelists;* Cave's *Lives of the Apostles;* Kuinoel, *Comment. in Lib. Hist. N. T. Proleg. in Matt.;* and the *Introductions* of Michaelis, Eichhorn, De Wette, Hug, and Horne.)

MATTHEW OF WESTMINSTER, one of those valuable old writers, the Latin chroniclers of England, who have handed down to us in a simple statement of facts the deeds of the sovereigns and the persons who guided public affairs at a remote period. Matthew spent his life near the antient palace of the kings of England, where the parliaments were usually held and the most important affairs transacted; for he was a monk of the abbey of Westminster, the church of the abbey being the usual place of interment of the kings and their families, and still remains to show of what a splendid establishment it formed a part. Matthew's date is the reign of Edward II. His history closes with the death of Edward I.; little or nothing is known of his personal history.

He entitles his work 'Flores Historiarum.' He begins with the creation of the world, and the first and least valuable half is taken up with affairs of other countries and our own before the Conquest. Two hundred and thirty-six pages in the Frankfort edition contain the history from the Conquest to the death of Edward I. This portion is very highly esteemed.

The reigns of female sovereigns have usually been favourable to our national history. In the reign of Elizabeth many of our best historians were printed, and of some of them more than one edition appeared. In the reign of Anne, Rymer's great collection of treatises and other important historical documents appeared. Matthew of Westminster was published in London in 1567, and again at Frankfort in 1601 in the same volume with Florence of Worcester, another writer of the same class, and a continuation of Matthew to the year 1377, the year of the death of Edward III.

MATTHIAS, Emperor. [Habsburg, House of; Germany, p. 190.]

MATTHISSON, FREDERICK, born at Hohendodeleben, near Magdeburg, in 1761, was a posthumous child, and brought up by his grandfather, a village pastor, until the age of fourteen, when he was sent to the school at Klosterbergen, and afterwards to the university of Halle, to study theology. His natural taste however led him to apply himself more to philology and general literature. Instead therefore of entering the church, he supported himself for some time as a private tutor at Altona, Heidelberg, and Mannheim, after which he resided for two years with his friend Bonstetten near the lake of Geneva. In 1794 he obtained the appointment of reader and travelling companion to the reigning princess of Anhalt-Dessau, and during the next seven or eight years visited Italy, the Tyrol, and part of Switzerland, relative to which countries his 'Briefe' and his 'Erinnerungen' furnish many interesting details, besides numerous sketches and anecdotes of distinguished literary persons and others with whom he became acquainted in the course of his tours. Although somewhat deficient in regard to simplicity of style, those works exhibit him to considerable advantage as a prose-writer; but it was as a lyric poet that he was the favourite of the German public, and will long continue to be admired for the happy delineation of external nature, and the touching melancholy and charm of sentiment which characterise his poems, besides their charms of style and versification. His 'Elegy in the Ruins of an old Castle' is hardly less popular than that of Gray is with us, being one of those productions which are of themselves sufficient to give the writer a lasting reputation. Matthisson also performed a good office for the poetical literature of his country by his 'Lyrische Anthologie,' a collection in twenty volumes, published at Zürich, 1805-7, and containing select pieces and specimens from 202 lyric poets, commencing with Weckherlin, Zingref, Opitz, and other earlier poets, and terminating with Tiedge. These volumes may be considered as a gallery where the specimens of the different masters are arranged chronologically, and exhibit the characteristic qualities of each. Matthisson died at Wörlitz, near Dessau, March 12, 1831.

MATTINS (from the Italian *mattina*, or the French *matin*, morning), strictly the first part in the daily service of the Romish church. Matins or mattins however were divided into two parts, which were originally distinct offices and hours; namely, the *nocturn and matin lauds*. The *nocturns* or vigils were derived from the earliest period of Christianity. We learn from Pliny the younger, as well as from Justin Martyr, Tertullian, and various writers of the first three centuries, that the Christians in those times of persecution held their assemblies in the night, in order to avoid detection. On these occasions they celebrated the memory of Christ's death in the holy mysteries. When persecution had intermitted and finally ceased, although the Christians were able to celebrate all their rites, and did administer the sacrament in the day-time, yet a custom which had commenced from necessity was retained from devotion and choice; and nocturnal assemblies for the worship of God in psalmody and reading still continued. The monastic orders, which, in the fourth century, arose under Pachomius, Anthony, Basil, and others, in Egypt, Pontus, and Syria, tended to preserve this custom of nocturnal vigils; and in the following centuries we find, from the testimony of Cassianus, Augustine, and others, that the same custom remained in most parts of the East and West. In the sixth century Benedict, the great founder of monastic societies in the West, prescribed the same in his Rule; and nocturnal assemblies were common about that time, especially in monasteries. The *lauds*, or more properly *matin lauds*, followed next after the nocturns, and were supposed to begin with day-break. We find allusions in the writings of Cyprian, and all the subsequent fathers, to the morning as an hour of prayer; but whether there was in the third century any assembly of the church for the purpose of public morning worship is uncertain. However, about the end of the third or beginning of the fourth century there was public worship at this hour, as we learn from the 'Apostolical Constitutions,' where we have the order of the service. (Bingham's *Antiquities of the Christian Church*, b. xiii.; Palmer's *Origines Liturgicæ*, 8vo., Oxford, 1832, vol. i., p. 201-3; *Apostol. Constit.*, l. viii., c. 38.)

MATTO GROSSO. [Brazil.]

MATU'TA, the name of a genus of brachyurous crustaceans. [Oxystomes.]

MATY, MATTHEW, M.D., the son of Paul Henry Maty, a Protestant clergyman, was born in Holland in 1718, at Montfort near Utrecht, and was originally intended for the church; but in consequence of some mortifications which his father received from the synod on account of particular theological sentiments, his thoughts, when he grew up, were turned to physic. He took a degree at Leyden; and in 1740 came to settle in England, his father being determined to quit Holland for ever. His earliest patron in England appears to have been Lord Chesterfield. In 1750 he began to publish, in French, an account of the productions of the English press, which he printed at the Hague, under the name of 'Journal Britannique;' a publication which Gibbon praised, as exhibiting a candid and pleasing view of the state of literature in England for the space of six years, from January 1750, to December 1755. It answered its intention, and introduced Dr. Maty to the most eminent literary persons of the country. In 1756, as soon as the establishment of the British Museum was completed, he was appointed one of the first under-librarians of that institution. In 1758 he became a fellow, and in 1765, upon the resignation of Dr. Birch, was chosen Secretary of the Royal Society. In 1772, upon the death of Dr. Gowin Knight, Dr. Maty, by his majesty's appointment, became principal librarian of the British Museum. He died of a lingering disorder, August 2, 1776. His body being opened, the appearances which presented themselves were considered so singular that they were described before the Royal Society by Dr. Hunter, whose account of them was inserted in vol. lxvii. of the 'Philosophical Transactions.' Dr. Maty was an early and active advocate for inoculation; and when a doubt was entertained that a person might have the smallpox, after inoculation, a second time, he tried it upon himself, unknown to his family. Besides various smaller pieces, he published,—1, 'Mémoire sur la Vie et sur les Ecrits de M. Ab. de Moivre,' 12mo., Haye; 2, 'Authentic Memoirs of the Life of Richard Mead, M.D.,' 8vo., London, 1755. At the time of his death he had nearly finished the 'Memoirs of the Earl of Chesterfield,' which were completed by his son-in-law Mr. Justamond, and prefixed to that nobleman's 'Miscellaneous Works,' 2 vols. 4to., 1777. Dr. Maty was Lord Chesterfield's executor. (Nichols's *Anecd. of Bowyer;* Gibbon's *Memoirs*, vol. i., p. 87; *Biographie Universelle*, tom., xxvii., p. 485-487.)

MAUBEUGE. [Nord.]

MAULE'ON. [Pyrenees, Basses.]

MAUNDY THURSDAY, the Thursday preceding Easter, on which the king or queen distributes alms to a certain number of poor persons at Whitehall; so named from the *maunds*, or baskets, in which the gifts were formerly contained. It was also called Shere Thursday, as we read in the 'Festival' of 1511; because antiently 'people would that day shere theyr hedes and clypp theyr berdes, and so make them honest agenst Easter-day.'

The following was the ceremonial of the maundy as practised in 1731. 'Thursday, April 15th, being Maundy Thursday, there was distributed at the Banquetting House, Whitehall, to forty-eight poor men and forty-eight poor women (the king's age, forty-eight), boiled beef and shoulders of mutton, and small bowls of ale, which is called dinner; after that, large wooden platters of fish and loaves, viz. undressed, one large old ling, and one large dried cod; twelve red herrings and twelve white herrings; and four half-quartern loaves. Each person had one platter of this provision; after which was distributed to them shoes, stockings, linen and woollen cloth, and leathern bags, with one-penny, two-penny, three-penny, and four-penny pieces of silver, and shillings; to each about four pounds in value. His grace the lord archbishop of York, lord high almoner performed the annual ceremony of washing the feet of a certain number of poor in the royal chapel, Whitehall, which was formerly done by the kings themselves, in imitation of Our Saviour's pattern of humility.'

James II. was the last of our kings who performed this ceremony of washing the feet in person. In 'Le Guide de Londres pour les Estrangers, recuilli et composé par F. Colsoni,' 8vo., Lond., 1693, p. 33, we read, 'Le Jeudy Saint, le Roy, selon un fort ancienne coutume, lave les pieds à tout autant de viellards qu'il a d'années; et la Reine de meme à autant de vieilles femmes qu'elle a d'annees.' The third edition of this work, 8vo., p. 43, adds, 'Mais le Roy G. III. (Guillaume III.), a laissé l'intendence de cette ceremonie a son grand Aumonier ou un Evéque du Royaume.'

The 'Times' newspaper of April 16th, 1838, records the change in this ceremony as it stands at present. 'The queen's royal alms were distributed on Saturday by Mr. Hanby, at the almonry office, to the maundy men and women placed on the supernumerary lists, owing to the difference of the ages between the late king and her present Majesty. Both men and women received 2*l.* 10*s.*, and nineteen silver pennies (being the age of the queen). To the men, woollen and linen clothing, shoes, and stockings were given; and to the women, in lieu of clothing, 1*l.* 15*s.* each. The maundy men and women also received 1*l.* 10*s.*, a commutation instead of the provisions heretofore distributed.'

The custom of the maundy is of considerable antiquity. Augustine, according to Du Cange, is first quoted for it. In England at least it was not entirely confined to royalty. In the earl of Northumberland's 'Household Book,' begun in 1512, fol. 354, we have an enumeration of 'Al maner of things yerly yeven by my lorde of his maundy, ande my laidis, and his lordshippi's childeren.'

Dr. E. D. Clarke, in his 'Travels in Russia,' 4to., Cambr. 1810, vol. i., p. 55, gives an account of the ceremonial of washing the feet of the apostles, as it is called, on this day at Moscow. 'This,' he says, 'we also witnessed. The priests appeared in their most gorgeous apparel. Twelve monks, designed to represent the twelve apostles, were placed in a semicircle before the archbishop. The ceremony is performed in the cathedral, which is crowded with spectators. The archbishop performing all, and much more than is related of our Saviour in the 13th chapter of St. John, takes off his robes, girds up his loins with a towel, and proceeds to wash the feet of them all until he comes to the representative of St. Peter, who rises, and the same interlocution takes place as between our Saviour and that apostle.'

(Nares's *Glossary*, v. 'Maund;' Brand's *Popular Antiq.*, 4to. edit., vol. i., p. 124-128; *Gent. Mag.*, vol. i., p. 172; Fosbrooke's *Encyclopædia of Antiquities*, p. 702.)

MAUPERTUIS, PIERRE-LOUIS MAREAU DE, was born at St. Malo, 17th July, 1698. Upon quitting the army, in which he held the rank of captain of dragoons, he applied himself assiduously to the study of the mathematics and astronomy, partly under the instruction of M. Nicole. In 1723 he was admitted a member of the Royal Academy of Paris, and in 1727 a member of the Royal Society of London. At this time the error in the measurement of the arc of the meridian conducted by Dominic and James Cassini had not been detected. It is well known that the result of this survey was directly at variance with the conclusion to which Newton had arrived relative to the figure of the earth: and although several of the geometricians of the day were of opinion that the comparison of degrees in latitudes so nearly contiguous (for the measured arc consisted of two conterminous portions, the difference of the mean latitudes of which was little more than 4°) could not be considered decisive, inasmuch as the errors incidental to the survey could not be supposed to be confined within such narrow limits as the small difference of length which the survey was employed to detect; still it afforded to others, who were interested in refuting the Newtonian theory, plausible grounds for disputing the oblate figure of the earth, to which that theory had led. To set the question at rest, Bouguer and La Condamine were sent to Peru; and during their absence Maupertuis, in company with Clairaut, Camus, Lemonnier, and Outhier, were deputed by the Academy to measure an arc of the meridian in Lapland. They were afterwards joined by the Swedish astronomer Celsius, who brought with him from London instruments made by Graham, of a very superior construction to any then in use. The party reached the gulf of Bothnia in July, 1736, intending to fix their trigonometrical stations upon the islands of the gulf; but upon examination, they found the valley of the river Tornea more eligible for the purpose, and, in December following, commenced measuring a base of 7407 toises upon the frozen surface of that river. An account of this survey was published by Maupertuis in 1738: 'La Figure de la Terre,' 8vo., Paris, 1738. The result was that the difference of latitude of the extreme stations, namely, the town of Tornea and the mountain Kittis, was 57′ 29″.6, and that the length of the corresponding arc was 55,023 toises, from which it followed that a degree of the meridian in 66° N. lat. exceeded a degree in the latitude of Paris by 512 toises, and consequently tended to prove that the earth's figure was that of an oblate spheroid. The survey was repeated in the years 1801-2-3, by Svanberg, whose result differed from that of Maupertuis by 226 toises.

Maupertuis was one of the first among his countrymen who defended the Newtonian theory against the attacks of Descartes, and when his opinion was confirmed by the result of his survey, he became an open and strenuous opposer of the Cartesian philosophy. When Frederic II. was about to re-organise the academy of Berlin, he offered the presidency to Maupertuis, who, tired of his stay in Paris, where, says M. Delambre, the reputation of many had a tendency to eclipse his own, eagerly assented to so honourable a proposition. But his residence at the court of Prussia, which dates from 1745, seems to have been chiefly occupied in cultivating the good graces of Frederic, and he showed little interest as to scientific research except such as had reference to his survey in Sweden. His vanity on this point was conspicuous. In the portrait which he had painted of himself he is represented in the act of compressing the poles of the earth. He died at Basle, 27th July, 1759, at the house of two of the sons of John Bernoulli, with whom he had always been on terms of friendship. His latter years were embittered by a dispute with Koenig, professor of mathematics at the Hague and foreign associate of the academy of Berlin, respecting a mechanical principle of considerable importance, which Maupertuis appears to have been the first to promulgate, and from which he deduced the laws of the reflexion and refraction of light, and those to which the collision of bodies are subjected, but of which he was unable to give any general demonstration. This principle, which he designated 'the principle of least action,' he enunciated in terms identical with those employed at the present time (see his *Essai de Cosmologie*, Leyden, 1751, p. 70), although he probably attached to them a somewhat different signification. Koenig endeavoured to show, first, that the same principle had been previously advanced by Leibnitz; secondly, that it was not true. The academy of Berlin, to whose arbitration the dispute was referred, decided in favour of Maupertuis, and ordered the name of Koenig to be erased from their list of associates; but even this decision, added to the support of the celebrated Euler, seemed inadequate to compensate Maupertuis for the raillery of Voltaire, who, although totally incompetent to judge on the scientific merits of the case, had taken the part of Koenig, and published his satirical piece entitled 'Diatribe du Docteur Akakia, Médecin du Pape,' wherein he was too successful in turning into ridicule both Maupertuis and his 'principle.' Frederic, who disliked Maupertuis, laughed at the satire, but ordered it to be burnt by the common executioner, which led to Voltaire's asking and obtaining permission to leave Berlin. (*Vie de Voltaire*, par Condorcet.) The following list of the published works of Maupertuis is given in Quérard's 'Dictionnaire Bibliographique:'—

'Anecdotes, physical and moral,' 12mo., no date. 'Nautical Astronomy, or Elements of Astronomy, alike applicable to a fixed and moveable Observatory,' 8vo., Paris, 1743 or 1751; Lyon, 1756. 'Memoirs read before the royal academies of France and Prussia,' 16mo., Dresden, 1753. 'Memoir on the Moon's Parallax,' 1755. 'Discourse on the different Forms of the Stars, with an Exposition of the Systems of Descartes and Newton,' 8vo., Paris, 1732 and 1742. 'A Latin inaugural and metaphysical Dissertation on the System of Nature,' 12mo., 1751. The same in French, Berlin, 1754. 'Dissertation on the White Negro,' 8vo., 1744. 'Elements of Geography,' 8vo., Paris, 1740. 'Eloge of Montesquieu,' 8vo., 1755. 'Essay on Cosmology,' 8vo., Berlin, 1750. 'Essay on Moral Philosophy,' Berlin, 1749; and London, 1750. 'Disinterested Examination of the different Undertakings for determining the Figure of the Earth,' Oldenburg, 1738; and Amsterdam, 1741. 'Examination of the three Dissertations published by M. Desagulier on the Figure of the Earth,' Oldenb., 1738 (this book, by some attributed to Maupertuis, is supposed to have been written by the Count de Bièvre). 'The Figure of the Earth, as determined by the Observations of MM. Maupertuis, Clairault, Camus, Le Monnier, Outhier, Celsius, &c., near the Polar Circle,' Paris, 8vo., 1738. 'Letter to Madame de Vertillac,' Paris, ——. 'Letter to Euler,' ——. 'Letter of an English Clockmaker to an Astronomer of Pekin,' 12mo., 1740 (a humorous satire against MM. de Cassini on the subject of the measurement of the meridian). 'Letter upon a Comet,' Paris, 1742. 'Letter on the Progress of the Sciences,' Berlin, 1752. 'The Measurement of a Degree of the Meridian between Paris and Amiens, determined by Picart, with the Observations of MM. Maupertuis, Clairaut, Camus, and Le Monnier,' 8vo., 1740. 'Miscellaneous Works,' 12mo., Amsterd., 1744. 'Philosophical Reflections on the Origin of Language and the Signification of Words,' 12mo. 'A Method of superseding the action of the Wind,' 1753. 'Venus physique,' 1745 and 1777. The works of Maupertuis were collected and published at Dresden, in 1752, 4to.; and at Lyon, in 1754 and 1768, in 4 vols. 8vo. Among his memoirs in the Transactions of the French Institute, his 'Balistic Arithmetic,' 1731, and an elegant Commentary upon the 12th section of the first book of the 'Principia,' 1732, deserve particular mention.

(*Life of Maupertuis*, by Delambre, in the *Biographie Universelle*; Montucla, *Histoire des Mathématiques*, &c.)

MAUR, ST. There appear to have been two persons of this name: one a disciple of St. Benedict, who is mentioned in St. Gregory's 'Dialogues,' and who is said to have died in 584; the other, abbot of Glanfeuil, who lived till 640, and was a monk of the order of St. Colomban, and not of St. Benedict. Of the former of these a Life is extant in the great work of the Bollandists. His day was the 15th of January.

(Moreri, *Diction. Historique*, tom. vii., fol., Par., 1759, p. 357; Alban Butler's *Lives of the Saints*, 8vo., Dubl. 1779, vol. i., p. 169.)

MAUR, ST., CONGREGATION OF, a celebrated society of Benedictines in France, who professed to follow the primitive rule of that order. It was first established in 1618. Pope Gregory XV., at the instance of Louis XIII., gave it his approval by his brief dated 17th May, 1621; and Urban VIII. granted it new privileges by a bull dated 21st January, 1627. The report of the sanctity of this congregation induced several bishops, abbots, and monks to submit their monasteries to the direction of its superior, so that the congregation at last became divided into six provinces, of which each contained about twenty religious houses. The most considerable were, St. Denys, St. Germain-des-Prés, St. Remi at Rheims, Marmonstier, St. Pierre de Corbie, Fleuri or St. Benoit sur Loire, Fescamp, and the Trinité de Vendôme. The monks, beside the rule of St. Benedict, had other particular statutes and constitutions, and were governed by a general superior, assistants, and visitors, who held a general chapter every three years at Marmonstier. Those who have any acquaintance with the history and progress of learning in Europe will readily acknowledge the advantages which letters have derived from this famous congregation, whose researches took in the whole circle of sciences, philosophy excepted. Among its more eminent members in the seventeenth century may be enumerated Hugh Menard, Luc d'Acheri, Jean Mabillon, Thierri Ruinart, and Bernard de Montfaucon. Moreri gives a list of the general-superiors of this congregation from 1630 to 1756.

(Moreri, *Diction. Historique*, tom. vii., pp. 357, 358; *Histoire Littéraire de la Congregation de Saint Maur*, 4to., Bruxelles, 1770, by Dom Tassin.)

MAURA, SANTA. [Santa Maura.]

MAURIAC. [Cantal.]

MAURICE of NASSAU. [Nassau, House of.]

MAURITA'NIA or **MAURETA'NIA**, which derived its name from its inhabitants Mauri or Maurusii (Μαυρούσιοι), was bounded on the west by the Atlantic, on the north by the Mediterranean, on the south by the Gætuli, and on the east by Numidia, thus corresponding to the northern part of Marocco and the western part of Algiers. The country of the Mauri was originally separated from that of the Massæsyli by the Molocath (Strabo, p. 827, Casaubon) or Mulucha (Plin., v. 1), the modern *Mulwia* or *Mohalou;* but the Roman province of Mauritania included the country inhabited by both these people. Before the war with Jugurtha, the Romans had little or no knowledge of Mauritania; of which Bocchus was at that time the ruler. (Sallust, *Bell. Jugurth.*, c. 19.) Mauritania was afterwards given by Augustus to Juba II., his paternal kingdom of Numidia having been erected into a Roman province. [Juba.] Juba died about A.D. 17, and was succeeded by his son Ptolemæus, who was put to death by Caligula. Mauritania was shortly afterwards divided into two provinces by Claudius (A.D. 43); which were called respectively Mauritania Tingitana and Mauritania Cæsariensis. (Dion Cassius, lx., p. 771, Stephan.) Tingitana, the western province, which derived its name from Tingis (*Tangier*), was divided from the other province Cæsariensis by the Molocath; and Cæsariensis was separated from Numidia by the Ampsagas (*Wadi-al-Kebir*). Mauritania Cæsariensis was subsequently subdivided into two provinces: the western part retained the name of Cæsariensis, but the eastern was called Sitifiensis, from Sitifi (*Setif*), a town on the borders of Numidia.

Mauritania contained many towns of considerable importance under the Roman empire. Of these, the principal in Mauritania Tingitana were, Rusadir (*Melillah*), a seaport and a Roman colony, west of the Molocath; Tingis (*Tangier*), at the entrance of the Straits of Gibraltar, which received especial marks of favour from Augustus Cæsar (Dion, xlviii., p. 439), and became a Roman colony under Claudius (Pliny, v. 1); Zilis or Zelis (*Arzilla*), made a Roman colony by Augustus under the name of Julia Constantia Zilis, and placed under the same jurisdiction as the province of Bætica in Spain (Plin., v. 1): it was situated a little to the south of C. Spartel, which is called Cotes by Strabo (p. 825, Casaubon), and Ampelusia by Mela (i. 5); Linx, Lixus, or Linga (*Al Araish*), a Roman colony, 32 Roman miles south of Zilis, situated on a river of the same name, which must not be confounded with the great river Lixus mentioned in Hanno's 'Periplus,' which is probably the same as the modern St. Cyprian [Hanno's Periplus]; Banasa, a Roman colony, 50 Roman miles south of Lixus, situated on the Subur (*Seboo*); and, 50 miles south of the Subur, Sala (*Salee* or *Sla*), of which there are extensive ruins.

The chief towns in Mauritania Cæsariensis were: Salda, Sarda, or Saldæ (*Bonjayah?*), a seaport and a Roman colony, which divided the kingdom of Juba from the province of Numidia (Strabo, p. 831); Julia Cæsarea (*Zershal*, see Shaw, p. 40, 41, ed. of 1738), situated on the coast west of Saldæ, a Roman colony, which was originally called Iol (Strabo, p. 831; Pliny, v. 1); Siga (*Takumbrit*), which Pliny (v. 1) erroneously places opposite Malaga in Spain; and in the interior, south-west of Cirta, the important town of Sitifi (*Setif*), a Roman colony.

The physical features, &c. of Mauritania are described under articles the Algiers and Marocco. The best account of the eastern part of Mauritania is in Shaw's *Travels*.

MAURITIUS, the Island of, called also **ISLE DE FRANCE**, is situated in the Indian Ocean, between 19° 45′ and 20° 33′ S. lat., and between 56° and 57° E. long. From north to south, from Cap Malheureux to the Bay of Lemontrees (citronniers), its length is about 36 miles; and its extreme width from Point du Diable to the northern extremity of the Plaine aux Sables (Plain of Sand) is nearly 27 miles, though in general it is little more than 18 miles. The circuit is about 124 miles. The area is about 700 square miles, or nearly the extent of the county of Worcester.

The island is surrounded by a coral reef, generally running parallel to the shores, at the distance of one or two furlongs, and mostly dry at low water. In this reef occur eleven breaks, by the greater number of which vessels of considerable burden may approach the island. The water between the reef and the shores, being less agitated than the open sea, affords facilities of communication between the places along the coast, which is the more important as the shore in several places rises with a steep ascent and to a considerable elevation close to the water-edge. This is especially the case along the western coast. Along the eastern coast the surface is pretty level from Port Souillac to Grand Port, and from the latter to Port Louis, except in the immediate neighbourhood of both places. The interior of the island consists of a great number of lofty hills, which however are mostly isolated, except between Cape Brabant and Port Souillac, where they constitute a small chain, and another chain runs from the mountain of Peter Botte to Cannonière Point. Some of the hills attain a considerable elevation, especially the Brabant mountains, near Cape

Brabant, and the Bamboo ridge, near Grand Port, which probably rise to 3000 feet above the sea-level. The origin of the island is without doubt volcanic, as shown by the irregularities of the surface, the presence of lava, pumice, and other volcanic productions. In the mountains at the back of Port Souillac and Grand Port is a small lake, which is considered to be an extinct crater. The ground is generally covered with loose rocks, from the size of a man's fist to pieces weighing a ton or more, and they are full of holes. The soil is shallow, and by no means distinguished by fertility, which is mainly to be attributed to its dryness and the frequent want of rain. It consists principally of a lumpy reddish mould, evidently impregnated with oxide of iron, and crumbling to dust in the hand.

The rainy season lasts from November to March or April. The rain comes down in torrents for several hours continually, and is accompanied with heavy gusts of wind: thunder and lightning are frequent. Hurricanes as terrific as those of the West Indies sometimes visit the island during this season. They do not occur with any regularity; but five years rarely elapse between their visitations. During this season the wind frequently changes, and sometimes makes the tour of the horizon. In the dry season the wind generally blows from the south-east. It is strong during the day, but calm in the night. During the months of June, July, and August, showers are frequent, but they last only a short time. The island is traversed by numerous watercourses, which run off from the centre towards all points of the compass; but they are only filled with water during the rainy season, when they form numerous cataracts: during the dry season the water is speedily evaporated by the heat of the sun. The mean annual heat is about 76° Fahrenheit. The fall of rain from the 1st of October, 1831, to the 30th of September, 1832, was 38 inches. We have not been able to obtain any further account of the quantity of rain. The highest observed temperature in the year above mentioned was 87°, and the lowest 60° of Fahr.

This island was formerly covered with woods, and even now a considerable part of the native forest is allowed to remain for ornament round the plantations: the hilly districts in the interior are covered with trees. There is however no timber fit for ship-building. The ebony wood is of inferior quality, but the iron-wood and red-wood are valuable. The sago and cocoa-nut palms are common, as also tamarind-trees, mangroves, and bamboos. Yams, cassava or manioc, which was brought from South America, and Indian corn, are cultivated as articles of food; as well as plantains, bananas, and melons, with several European vegetables, as spinach, asparagus, artichokes, cabbages, and peas. Wheat and rice are raised in small quantities, and both articles are imported, the former from the Cape and the second from Madagascar. There are also mangoes, shaddocks, and pineapples. Oranges, grapes, peaches, and apples are of inferior quality.

The French introduced the spice-trees of the Indian islands, but none of them succeeded, except the clove; even the pepper-vine remained barren. They also cultivated sugar, indigo, coffee, and cotton. But since the British have been in possession of the island, all these branches of agriculture have been nearly abandoned, with the exception of sugar. The cultivation of sugar has rapidly increased; in 1830 more than 720,000 hundredweights were exported.

Horses are few, and seldom bred in the island. Mules and asses are more numerous, and principally used for the saddle. Black cattle are scarce, on account of the want of good pasture, the pasture-grounds being few and bad. Cattle are imported in great numbers from Madagascar; goats and sheep are numerous; hogs abound, and form a material part of the food of the people. The forests contain hogs and deer, neither of which are probably indigenous. Fish is abundant along the coast: the turtle has almost wholly disappeared, but all the small sandy islets situated to the north-west of Mauritius afford them in abundance, and they are large and fine. Rats, locusts, and ants are destructive to the plantations and storehouses.

The population amounts to about 100,000, of which number about 76,000 are negro slaves brought from Madagascar and the eastern coast of Africa. The number of coloured free people exceeds 15,000, and among them are Malays, fishermen from the coast of Malabar, Lascars, and Chinese. The Chinese have lately been brought over, and employed in the cultivation of the sugar-cane, instead of the negro slaves. The number of whites amounts to about 9000 individuals: the greater part of them are descendants of French families, and speak the French language.

Port Louis, the capital and only town of the island, is situated near the north-western extremity, on a small bay called Port North-West, or Port Louis. This bay is a narrow inlet of the sea, somewhat more than a mile long, and about five hundred yards broad. A reef runs out from its mouth, passing close to a small island, called Tonnelier Island, a coral rock, near which vessels usually anchor, as the wind continually blows out of the harbour. The harbour is sufficiently capacious for a dozen men-of-war and fifty sail of merchant ships, and during the fine season perfectly safe. At its extreme south-western corner the town is built. The streets are straight but not paved; the principal street runs parallel to the shores of the bay. The houses are all built of wood, with only one floor. The town contains 26,000 inhabitants, of which number 15,700 are slaves, 4000 whites, and the remainder coloured free people. One of the suburbs contains about 3000 Malabar fishermen, and another about 7500 free negroes. There is a library containing more than 60,000 volumes, mostly French books, a good botanical garden, and some docks for the repair of vessels.

On the windward coast of the island is Port Grand, also called Port South-East, which is large, but its entrance is very difficult, being narrowed by several shoals. It can only be entered and left with a fair wind, as it is impossible to tack. It is not much frequented.

The commercial relations of Mauritius extend to Batavia, Bombay, Surat, Muscat, the Persian and Arabian Gulfs, the western coast of Africa, the Cape, and Madagascar, but a considerable portion of its produce comes to England. Besides sugar, small quantities of indigo, coffee, cloves, and some woods are exported. The island receives from England and India silk and cotton goods, and from England besides, cloth, wine, oil, hats, iron, and steel utensils, with some smaller articles. Madagascar supplies the Mauritius with cattle and rice, and receives in return manufactured goods. Arabia and Persia are supplied with sugar from the Mauritius, and send in return dry fruits and some smaller articles.

Mauritius, with the neighbouring island of Bourbon, was discovered by the Portuguese under the command of Mascarenhas in 1505, and the whole group was called the Mascarenhas Islands; but though the Portuguese took possession of Mauritius in 1545, they apparently formed no settlement on it. The Dutch surveyed it in 1598, and called it Mauritius, in honour of Maurice, stadtholder of the republic of the Netherlands. They did not however settle here till they had formed an establishment at the Cape in 1640, about which time they fixed themselves on the shores of Port South-East. From unknown reasons they abandoned the island in 1708. Between this year and 1715 it was only inhabited by a few negroes who had been brought there by the Dutch as slaves, and had run away from their masters and concealed themselves in the mountain forests. In 1715 the French took possession of the island, formed a settlement at Port North-West, and called the island Isle de France. They remained in the undisturbed possession of it to the year 1810, when it was taken from them by the British, who since the peace of 1814 have retained it in their possession.

(*A Voyage to the Island of Mauritius*, by a French Officer; Tombe's *Voyage aux Indes Orientales;* Prior's *Narrative of a Voyage in the Indian Seas;* Grant's *History of Mauritius.*)

MAURO'LICO, or MARULLO, FRANCIS, abbot of Messina, was born at that place, September 16, 1494, and died there, July 21, 1575. Several accounts, which do not conceal the age which he attained, state that he was prematurely sacrificed to excess of study. His life was written by his nephew of the same name, and was published at Messina in 1613; we have not seen this work, but it is much used, and freely quoted, in the Abbé Domenico Scina's 'Elogio,' Palermo, 1808, which contains a full but flattered account of the life and writings in question. Maurolico taught mathematics publicly at Messina, and lived in habits of close friendship with Cardinal Bembo. These, and his being obliged, much against his will, to suppress a part of his dissertation on comets, on account of the offence which some passages gave to certain Venetian noblemen, are the only circumstances of his personal life which are worth recording.

The printed works of Maurolico are numerous, and those which he wrote still more so; a list of all (but without titles or dates for the printed works) is given by the Abbé Scina. Among the former must be mentioned an edition of Autolycus with commentaries, Messina, 1558, folio; of ARCHIMEDES, 1670 (misprinted 1570 in the article cited) and 1681 (or 1685?): the Phenomena of Euclid, 1588, and an edition of Theodosius and Menelaus in the same year, which contains a table of secants, being the first introduction of these lines; 'Opuscula,' printed at Venice, 1575, containing treatises on the sphere, the calendar, astronomical instruments, gnomonics, music, and arithmetic; treatise on Cosmography, 1543. Other works have been stated as printed, but we have only inserted those which have good authority.

Maurolico will be remembered by his geometrical writings, particularly his manner of treating the conic sections, by his optical theorems, and by his arithmetical works; but the interest which attaches to his writings connects them rather with the general history of the science than with his own biography, as there are no very prominent discoveries to record. In his arithmetic he proceeds upon geometrical principles, as his eulogist states (and with confirmatory descriptions and citations), but at the same time with an attempt to generalize operations into rules, and to present them in a form closely approaching to the modern algebra, to the spirit of which they approach, without the language. It is to be remembered that before the time of Vieta the method of expressing general formulæ, which now constitutes the foundation of algebraical language, did not exist; and it seems to us, from such parts of Maurolico's writings as we have seen cited (the works themselves are very scarce), that the transition from the arithmetic of Euclid to that of Maurolico is an approach to algebra of a character which deserves more attention than it has met with from historians. These writers, so far as algebra is concerned, do not even mention the name of Maurolico, a circumstance which must be explained probably by the latter not being in the line of investigation of Cardan, Tartaglia, and those who lie in the direct track between the Hindu algebra and that of Vieta. Nevertheless the propositions of Maurolico on the summation of series, and the methods by which they were deduced, form a very curious step in the progress of arithmetical inquiry.

M. Chasles, in his lately published work on the history of geometry [GEOMETRY, page 156] carries his opinion of Maurolico as an algebraist, to a startling degree of novelty. 'Analysis is infinitely indebted to this geometer, who nevertheless is very little cited on the subject. It is he who first introduced the use of letters instead of numbers, and who gave the first rules of the algorithm of algebra.' Not having examined Maurolico ourselves, we can only say that neither Wolff, nor Cossali, nor the Abbé Scina, could find this out; the last expressly speaks of Maurolico as having 'the spirit of algebra, without the language.' Perhaps however the assertion of M. Chasles may provoke some attention to the subject, and excite an inquiry into the extent of the claim which Maurolico really has to be considered as one of the founders of algebra; an inquiry which, terminate how it may, has been yet hardly begun.

MAURUS TERENTIA'NUS, a Latin grammarian, who is said to have been born at Carthage. The time in which he lived is uncertain. Vossius supposes him to have been the same Terentianus who is addressed by Martial as the prefect of Syene in Egypt (*Epigram*, i. 87); and he at all events lived during or before the time of St. Augustine, since he is mentioned by the latter in terms of the highest respect. (*De Civitate Dei*, vi. 2; *De Utilitate Credendi*, c. 17)

The only work of Maurus which has come down to us is entitled 'De Litteris, Syllabis, Pedibus, et Metris Carmen.' It is included in the 'Grammatici Veteres,' edited by Putschius, Hanover, 1605; and has been also edited by D. J. V. Lennep, Leyden, 1825, and by Lachmann, Leipzig, 1836.

MAUSOLE'UM is now used as a general term applied to a sepulchral chapel or edifice erected for the reception of a monument; but it originally designated the magnificent structure raised by Artemisia as the tomb of her husband Mausolus, king of Caria, at Halicarnassus, B.C. 352. Of this monument, once reckoned among the wonders of the world, no remains now exist; but from Pliny's description (xxxvi., 5) it appears to have been nearly square in its plan, measuring 113 feet on its sides, and 93 on each of its ends or fronts, and to have been decorated with a peristyle of thirty-six columns (supposed by Hardouin to have been 60 feet high, or upwards), above which the structure was carried up in a pyramidal form, and surmounted at its apex by a marble quadriga executed by Pythis, who, according to Vitruvius, was joint architect with Satyrus in the building. It was further decorated with sculptures and reliefs by Scopas, Bryaxis, Timotheus, and Leochares. The entire height was 140 feet.

The mausoleum erected at Babylon by Alexander the Great, in honour of Hephæstion, appears to have been still more magnificent, and somewhat extravagant in its decorations, as far as can be gathered from the account given of it by Diodorus (xvii. 115). It was adorned below by the gilded rostra, or beaks, of two hundred and forty ships, and every successive tier or story was enriched with a profusion of sculpture, representing various animals, fighting centaurs, and other figures, all of which were gilt; and on the summit were statues of sirens, made hollow, in order that the singers who chanted the funereal dirge might be concealed within them.

Those of Augustus and Hadrian at Rome were structures of great magnitude and grandeur, and resembled each other in being circular in plan. The first stood in the Campus Martius, where remains of it yet exist in the two concentric circles forming the first and second stories of the building, and the vaulted chambers between, which supported the first or lowest terrace. Of these terraces there were three; consequently four stages in the building, gradually decreasing in diameter, the uppermost of which was crowned by a colossal statue of the emperor. The terraces themselves were planted with trees. From traces of something of the kind that yet remain, it is conjectured that there was originally an advanced portico attached to the building in the same manner as that of the Pantheon, though considerably smaller in proportion to the rest of the plan, as it could not have been carried up higher than the first stage of the building. According to Hirt's representation of it, in his 'Baukunst bei den Alten,' it was a Corinthian hexastyle, advanced one intercolumn before the side-walls connecting it with the circular edifice behind it.

Hadrian's mausoleum, now converted into the Castello di St. Angelo, in which shape it is familiar to almost every one, is a work of most massive construction, and originally presented an unbroken circular mass of building, erected upon a larger square basement, lofty in itself, yet of moderate height in proportion to the superstructure, the latter being about twice as high as the former. This nearly solid rotunda, which was originally coated with white marble, had on its summit numerous fine statues, which were broken to pieces and the fragments hurled down by the soldiers of Belisarius upon the Goths, who attempted to take the building by storm. Neither are any remains now left of the uppermost stage of the edifice, which assumed the form of a circular peripteral temple, whose diameter was about one-third of the larger circle. According to tradition, its peristyle consisted of the twenty-four beautiful marble Corinthian columns which afterwards decorated the basilica of San Paolo fuori delle Mura (partially destroyed some few years ago by fire, but now nearly restored); and its tholus or dome was surmounted by a colossal pine-apple in bronze, now placed in the gardens of the Vatican.

Such places as Henry VII.'s Chapel and the Pantheon of the Escurial may also be considered as mausoleums; but the term is generally restricted to a detached edifice erected merely as a private burying-place or to contain tombs. There are several structures of the kind in the parks of our nobility; among the most remarkable is that at Castle Howard, the seat of the earl of Carlisle, and one of Hawksmoor's best works, a noble circular edifice in the Roman-Doric style, elevated upon a basement, and crowned by a dome: plans, sections, &c., of this structure have been beautifully engraved by Moses. The marquis of Rockingham's mausoleum by Carr is another ornamental structure of the kind, composed of three stories, Doric, Ionic, and Corinthian. We may also mention those at Cobham in Kent, and Brocklesby in Lincolnshire, by the late James Wyatt. The mausoleum of Louisa, queen of Prussia, at Charlottenburg near Berlin, has a Grecian-Doric portico, but is not so remarkable as a building as for containing the sarcophagus on which is the recumbent figure of that princess, the chef d'œuvre of Rauch's chisel.

MAWES, ST. [CORNWALL.]

MAWMOISINE, or MALVOISINE, WILLIAM DE, was bred in France, and has been thought by some to have been a native Frenchman. He afterwards came to Scotland, where he was made one of the *clerici regis*, and archdeacon of St. Andrew's, in which latter capacity he was present at the baptism of Prince Alexander, afterwards King Alexander II. He was made chancellor of Scotland 6 Id. September, 1199, about which time also he was elected bishop of Glasgow, and consecrated the following year by special precept from the pope. (Fordun, viii. 61.) In the year 1202 he was translated to the see of St. Andrew's, when he seems to have resigned the office of chancellor. In September, 1208, he dedicated a new cemetery at Dryburgh Abbey. (2 Chalm., *Caled.*, 339.) He afterwards made a visit to the Continent; and having returned, we find him and the bishop of Glasgow, in 1211, possessed of legatine powers from Rome, and assembling at Perth a great council of the clergy and people, to press upon the nation the pope's will and command that an expedition be undertaken to the Holy Land. (Fordun.) In 1214 he attended the coronation of King Alexander II. (Id., ix. 1), and is said to have set the crown upon the king's head. The next year he went with the bishops of Glasgow and Moray and the mitred abbot of Kelso to the Fourth Lateran Council, where the doctrines of Wycliffe were condemned, and seems to have remained abroad till 1218. From the Continent he brought with him into this country various orders of monks and mendicants, till then unknown here, and had convents of Black Friars erected at Aberdeen, Ayr, Berwick, Edinburgh, Elgin, Inverness, Montrose, Perth, and Stirling, and monasteries for the monks of Valliscaulium at Pluscardine, Beaulieu, and Ardchattan. He wrote lives of the popish saints Ninian and Kentigern. It was to him and in his time that Pope Innocent III. sent the decretal letters which we find in the 'Corpus Juris Canonici' (*Decret.*, Greg., b. iii., tit. 49, c. 6), to the king of Scots, and (b. iii., tit. 24, c. 9; b. iv., tit. 20, c. 6; and b. v., tit. 39, c. 28), to the bishop, archdeacon, and abbot of St. Andrew's, respectively.

But zeal for the church was by no means this prelate's only passion; for we find that on one occasion, noticed by Fordun (viii. 62), he deprived Dunfermline Abbey of the presentation to two churches, because the monks had failed to provide him wine for supper. Fordun adds that the monks had indeed supplied wine; but the bishop's own attendants had drunk it all up. It may be that the name of Malvoisine was originally but a mere soubriquet, from his malmsey bibbing propensity, as if it were 'William of the Malmsey-butt.'

He continued bishop of St. Andrew's till his death (Keith's *Bishops*), which happened on the 9th July, 1238 (3 Chalm., *Caled.*, 616); and he is remembered in a composition respecting tithes, anno 1297 (2 Connell, *On Tithes*, 413).

MAXE'NTIUS, MARCUS AURELIUS VALERIUS, son of Maximianus, the colleague of Diocletian in the empire, was living in obscurity when, after his father's abdication, and the elevation of Constantine to the rank of Cæsar, he became envious of the latter, and dissatisfied with the neglect of Galerius towards him Accordingly he stirred up a revolt among the prætorian soldiers at Rome, and was proclaimed emperor, A.D. 306. Galerius, who was then in the East, sent orders to Severus Cæsar, who had the command of Italy, to march from Milan to Rome with all his forces, and put down the insurrection. In the mean time Maximianus, who lived in retirement in Campania, came to Rome, and was proclaimed emperor as colleague with his son, A.D. 307. Severus, on arriving with his troops near Rome, was deserted by most of his officers and soldiers, who had formerly served under Maximianus, and were still attached to their old general. Upon this he retired to Ravenna, which he soon after surrendered to Maximianus, on being promised his life and liberty; but Maximianus put him to death. Maximianus proceeded to Gaul to form an alliance with Constantinus, leaving Maxentius at Rome. Galerius soon after arrived in Italy with an army; but not finding himself strong enough to attack Maxentius in Rome, and fearing the same fate as that of Severus, he made a precipitate retreat. Maximianus, returning to Rome, reigned for some months together with his son, but afterwards quarrelled with him, and took refuge with Galerius, who acknowledged him as emperor. There were then no less than six emperors, Galerius, Maximianus, Constantinus, Maxentius, Licinius, and Maximinus Daza. In the following year, 309, Maxentius was proclaimed consul at Rome, together with his son, M. Aurelius Romulus, who in the next year was accidentally drowned in the Tiber. Maxentius possessed Italy and Africa; but Africa revolted, and the soldiers proclaimed as emperor an adventurer of the name of Alexander, who reigned at Carthage for three years. In the year 311 Maxentius sent an expedition to Africa, defeated and killed Alexander, and burnt Carthage. Proud of this success, for which he had the honour of a triumph, Maxentius made great preparations to attack Constantine, with whom he had till then preserved the appearance of friendship. Constantine moved from Gaul into Italy, advanced to Rome, and defeated Maxentius, who was drowned in attempting to swim his horse across the Tiber, A.D. 312. [CONSTANTINUS, FLAVIUS VALERIUS.]

Coin of Maxentius.
British Museum. Actual Size. Gold.

Coin of Licinius.
British Museum. Actual Size.

Coin of Licinius Junior.
British Museum. Actual Size.

MA'XIMA AND MI'NIMA. These Latin words, which simply mean 'greatest' and 'least,' are used to imply, not the absolute greatest and least values of a varying quantity, but the values which it has at the moment when it ceases to increase and begins to decrease, or vice versâ. Thus if it be said that the height of the barometer was a maximum at ten o'clock, it means that up to that hour the barometer rose, and then began to fall; in which case it would still be said to have been a maximum, even though it should afterwards rise, and stand at a greater height than at ten o'clock. Thus it is possible that there should be several maxima and minima in one day, and even that one of the minima should be greater than one of the maxima: that is, at one moment when the fall ceases and a rise begins, the barometer may then be higher than it was at another time when a rise had ceased and a fall begun.

The theory of maxima and minima is, mathematically speaking, very simple. It is obvious, from the definition of a differential coefficient, that if y be a function of x, and if x be increasing, then when y also increases, $\frac{dy}{dx}$ is positive; and when y diminishes, $\frac{dy}{dx}$ is negative. If the words increase and diminution have their full algebraical sense, this proposition is true whatever the sign of y may be. It follows that when increase ceases and diminution begins, $\frac{dy}{dx}$ changes from positive to negative, and when diminution ceases and increase begins, it changes from negative to positive. But as a quantity cannot change its sign without becoming either nothing or infinite; it follows, first, that y can only be a maximum when x has such a value that $\frac{dy}{dx}$ is nothing or infinite; secondly, that there is not then a maximum unless the latter changes from positive to negative, when x increases through that value; nor a minimum unless the same differential coefficient changes from negative to positive, in the same case.

Thus when $y = a + x - x^2$, the differential coefficient of which is $1 - 2x$, we see that the latter changes sign when x changes from less than $\frac{1}{2}$ to greater than $\frac{1}{2}$; and the change of sign is from positive to negative. There is therefore a maximum when $x = \frac{1}{2}$, and this maximum is $a + \frac{1}{2} - \frac{1}{4}$, or $a + \frac{1}{4}$.

When $\frac{dy}{dx} = 0$ (which is by far the most common case), and there is a maximum, it changes sign from + to −, or diminishes, algebraically speaking: therefore $\frac{d^2y}{dx^2}$ is negative. Similarly, when $\frac{dy}{dx} = 0$, and there is a minimum, $\frac{d^2y}{dx^2}$ is positive. But when $\frac{dy}{dx}$ is infinite, and there is a maximum or minimum, this additional rule does not apply.

Works on the differential calculus give the development of this theory and examples. We shall only here add one of the rules for determining the maximum or minimum when there are two distinct variables.

When z is a function both of x and y, two variables independent of one another, there may be a maximum or minimum when $\frac{dz}{dx}$ and $\frac{dz}{dy}$ are both nothing, both infinite, or one nothing and the other infinite. When they are both nothing, which is the only case in which this theory is of any practical application, it must be determined as follows, whether there is any maximum or minimum, and which it is. Find the values of x and y which make $\frac{dz}{dx} = 0$, $\frac{dz}{dy} = 0$, and with any pair of these values find the value of the expression

$$\left(\frac{d^2z}{dx\,dy}\right)^2 - \frac{d^2z}{dx^2} \cdot \frac{d^2z}{dy^2}.$$

If this be negative, or nothing, there is a maximum or minimum; if it be positive, there is a mixture of the two which can only be satisfactorily explained by illustrations drawn from the theory of curved surfaces. When the expression is negative or nothing, there is a maximum if $\frac{d^2z}{dx^2}$ and $\frac{d^2z}{dy^2}$ be both negative, and a minimum if they be both positive.

The usual method of establishing all the preceding formulæ, namely, by the application of Taylor's theorem, applies only to the cases in which the differential coefficients become nothing, and not to that in which they become infinite. It is also frequently stated that there is always a maximum or minimum where a differential coefficient vanishes, which is not true.

MAXIMIA'NUS, MARCUS VALERIUS, a native of Pannonia, born of obscure parents, served in the Roman armies with distinction, and was named by Diocletian his colleague in the empire, A.D. 286. The remainder of his life is given under DIOCLETIAN, CONSTANTINE, and MAXENTIUS. He was put to death at Marseille, by order of Constantine, for having conspired against his life, A.D. 310.

Coins of Maximianus.
British Museum. Actual size.

MAXIMIA'NUS, GALE'RIUS VALE'RIUS, was surnamed Armentarius, on account of having been a herdsman in his youth. The events of his life are narrated under DIOCLETIAN, CONSTANTIUS I., and CONSTANTINUS. According to the historians, he died (A.D. 311) of a loathsome disease, which was considered by his contemporaries and himself as a punishment from heaven for his persecution of the Christians.

GAL VAL MAXIMIANVS NOB CAES
GENIO AVGG ET CAESARVM
KA

Coin of Galerius Valerius Maximianus
British Museum. Actual Size.

MAXIMILIAN. [HABSBURG, HOUSE OF.]

MAXIMI'NUS, CAIUS JULIUS VERUS, was originally a Thracian shepherd. He was of gigantic size and great bodily strength. He entered the Roman army under Septimius Severus, and was rapidly advanced for his bravery. Alexander Severus gave him the command of a new legion raised in Pannonia, at the head of which he followed Alexander in his campaign against the Germans, when the army being encamped on the banks of the Rhine, he conspired against his sovereign, and induced some of his companions to murder him in his tent, as well as his mother Mammæa, A.D. 235.

Maximinus, being proclaimed emperor, named his son, also called Maximinus, Cæsar and his colleague in the empire. He continued the war against the Germans, and devastated a large tract of country beyond the Rhine, after which he repaired to Illyricum to fight the Dacians and Sarmatians. But his cruelty and rapacity roused enemies against him in various parts of the empire. The province of Africa revolted, and proclaimed Gordianus, who was soon after acknowledged by the senate and the people of Rome, A.D. 237.

But Capellianus, governor of Mauritania for Maximinus, defeated Gordianus and his son, who fell in the struggle, after a nominal reign of little more than a month. [GORDIANUS, MARCUS ANTONIUS AFRICANUS.] Rome was in consternation at the news, expecting the vengeance of Maximinus. The senate proclaimed emperors Clodius Pupienus Maximus and Decimus Cælius Balbinus, but the people insisted upon a nephew of the younger Gordianus, a boy twelve years of age, being associated with them. Maximus marched out of Rome with troops to oppose Maximinus, who had crossed the Isonzo and laid siege to Aquileia. Maximinus experienced a brave resistance from the garrison and people of that city, which excited still more his natural cruelty, and the soldiers, being weary of him, mutinied, and killed both him and his son, A.D. 238. Maximinus the father, then sixty-five years old, was a ferocious soldier and nothing else, and wonderful tales are related of his voracity, and the quantity of food and drink that he swallowed daily. His son is said to have been a handsome but arrogant youth. (Capitolinus, in *Historia Augusta.*)

Coin of Maximinus.
British Museum. Actual Size. Copper.

MAXIMI'NUS, DAIA, or DAZA, an Illyrian peasant, served in the Roman armies, and was raised by Galerius, who was his relative, to the rank of military tribune, and lastly to the dignity of Cæsar, A.D. 303, at the time of the abdication of Diocletian and Maximianus, when he had for his share the government of Syria and Egypt. After the death of Galerius, A.D. 311, Maximinus and Licinius divided his dominions between them, and Maximinus obtained the whole of the Asiatic provinces. Both he and Licinius behaved ungratefully towards the family of Galerius, their common benefactor. Valeria, the daughter of Diocletian and widow of Galerius, having escaped from Licinius into the dominions of Maximinus, the latter offered to marry her, and on her refusal banished her with her mother into the deserts of Syria. He persecuted the Christians and made war against the Armenians. A new war having broken out between Licinius and Maximinus, the latter advanced as far as Adrianople, but was defeated, fled into Asia, and died of poison at Tarsus, A.D. 313.

Coin of Maximinus.
British Museum. Actual Size.

MA'XIMUS, CLODIUS PUPIENUS. [BALBINUS.]
MAXIMUS PLANU'DES. [PLANUDES.]
MA'XIMUS MAGNUS. [GRATIAN; THEODOSIUS.]

Coin of Maximus Magnus.
British Museum. Actual Size. Gold.

MA'XIMUS TY'RIUS, a rhetorician and Platonic philosopher, lived in the latter half of the second century, during the reigns of the Antonines and of Commodus. He resided principally at Athens, but sometimes visited Rome: he does not seem to be the same person as the stoic Claudius Maximus, who was one of the philosophical friends of the emperor M. Aurelius, though some critics have been of this opinion. (*Life of Aurelius*, by J. Capitolinus, c. 3.)

There are extant forty-one dissertations (διαλέξεις or λόγοι) of Maximus Tyrius on various points connected with the Platonic philosophy, which are written in an easy and pleasing style, and more commendable for the expression than the matter. The following examples will give some idea of the subject of these dissertations:—'On Plato's opinion respecting the Deity;' 'Whether we ought to return Injuries done to us;' 'Whether an Active or a Contemplative Life is to be preferred;' 'Whether Soldiers or Husbandmen are more useful in a State:' 'On the Dæmonium of Socrates;' 'Whether Prayers should be addressed to the Deity.' &c.

The best editions of Maximus Tyrius are by Stephanus, Paris, 1557; by Heinsius, Leyden, 1607, 1614, reprinted at Oxford, 1677; by Davis, Cambridge, 1703, reprinted at London with notes by Markland, 1740. The dissertations have been translated into French by Morel, Paris, 1607, by Forney, 1764, and by Dounais, 1802; into Italian by Petro de Bardi, Venice, 1642; and into German by C. T. Damm, Berlin, 1764. There is, we believe, no English translation of this author.

There were several other antient writers of the name of Maximus, of whom the most celebrated was Maximus of Ephesus, who initiated Julian into the Eleusinian mysteries, and had subsequently great influence in the councils of that emperor.

MA'XIMUS, THE GREEK, a celebrated personage in Russian church history, was a native of Arta in Albania, where he was born towards the end of the fifteenth century. After studying at Paris, Florence, and other cities then distinguished as seats of learning, he entered the cloister of Mount Athos, where he took the monastic vows; but the grand-duke Vassili Ivanovitch, having desired the patriarch of Constantinople to send two persons to arrange and describe a vast number of Greek manuscripts and books that had recently been discovered in some part of the palace, the choice fell upon Maximus for one of them. He accordingly set out for Moscow, and was astonished to meet with such a prodigious store of Greek literature. He was directed by Vassili to examine the books, and to select such as were most deserving of translation; but as he was then wholly ignorant of the Slavonic tongue, he had first to prepare a Latin version, which was afterwards rendered by others into Slavonian. It was thus that the translations of a Psalter with a commentary, and Chrysostom's 'Homilies on St. John,' were produced. Desirous of returning to his convent, it was only at the instances of the Tzar, who wished him to revise the earlier translated books of the Greek church, that he remained and undertook that task, for which he was then qualified by having obtained in the interim a competent knowledge of Slavonian. The diligence with which he executed it tended however only to raise up numerous enemies against him, among the rest Daniel, the metropolitan; for the corrections he deemed it requisite to make were so numerous as to give great offence to the more zealous. What more immediately tended to his disgrace was the firmness with which he opposed Vassili's divorce from his first wife Salome (on account of barrenness), and his marriage with the princess Helena Glinski. He was condemned by a synod, excommunicated as a heretic, and imprisoned in the Otrotch monastery at Tver, in 1525; in this confinement he was treated with great rigour till the death of the metropolitan Daniel; after which the bishop of Tver interceded for him and obtained some mitigation of the severity used towards him. At length the next Tzar, Ivan Vassilivitch, consented to his being removed to the monastery of St. Sergius, where he continued until his death in 1556. A great number of works are extant by him (chiefly in manuscript) on a variety of subjects, dogmatical, polemical, philosophical, &c.; from which considerable information has been derived with regard to the opinions and prejudices of the clergy and people in that age; nor was he at all timid in reproving the abuses and vices of the times. This alone would account for the persecution which he drew down upon himself; but after his death even those who had been among the more violent against him, admitted his innocence, nor was it long before his memory came to be regarded as that of a holy man and a martyr.

MAXWELL, ROBERT, LORD, son of John, third Lord Maxwell, who was killed at Floddon, in September, 1514. He had been knighted, and appointed Stewart of Annandale, on the resignation of his father, on the 10th of June preceding; and in 1517 he was appointed warden of the West Marches. In 1524 he was provost of Edinburgh, and in that capacity chosen one of the lords of articles for the commissioners of boroughs: a solitary instance, it is supposed, of a peer being so elected. He was afterwards chosen one of the privy-council; and on the 17th of November, 1533, appears in the sederunts of the Court of Session as an extraordinary lord of session. In 1536 he was appointed one of the lords of the regency to whom the government of the kingdom was entrusted during the absence of King James V. on his matrimonial expedition to France; and the next year he was himself despatched to negotiate the marriage of Mary of Lorraine. He is said to have advised the expedition which terminated at Solway Moss, but was so incensed at the command of the army being given to Oliver Sinclair, that in common with most of the Scots nobility he mutinied and yielded himself up a prisoner to the English, who had a force much inferior to their opponents. On the death of King James V. he was ransomed and allowed to return to Scotland, in the hope that he would further the projects of King Henry VIII., in reference to the marriage of the young queen of Scots. In the first parliament of Mary, which met in March, 1543, he presented to the lords of articles one of the most important acts of the time, which had undoubtedly considerable effect in accelerating the progress of the Reformation. This was a writing, or as we should now term it, a *Bill*, for an act of parliament to allow the reading of the Scriptures in the vulgar tongue. The lords of articles found the proposal reasonable; and it was accordingly brought into parliament, and passed into a law notwithstanding the protest and opposition of the lord chancellor and the whole hierarchy of the kingdom. Towards the end of the same year, Beaton became chancellor, and Lord Maxwell was apprehended, but he contrived to make his escape almost immediately after. He died on the 9th of July, 1546.

MAY, the fifth month of our present year, was the second in the old Alban calendar, the third in that of Romulus, and the fifth in the calendar of Numa Pompilius. In the Alban calendar it consisted of twenty-two days; of thirty-one in the calendar of Romulus; and of thirty in that of Numa. Julius Cæsar restored to it the odd day of which Numa had deprived it, and of which it still keeps possession. Its etymology is doubtful. Ovid, in the fifth book of his 'Fasti,' proposes three derivations: one from *majestas;* another from *majores*, a term which signified the *patres*, or governing body of the city of Romulus; and the third from *Maia*. The Roman month was under the protection of Apollo; and on account of the celebration of the Lemuria, marriages undertaken during its course were considered ill-omened. (Ovid, *Fasti*, v. 483-490.)

Our Saxon ancestors, after the Romans, called it *Maius-month;* and, in their native language, *Tri-milchi*, three-milk month, when cows were milked three times a day.

MAY-DAY and MAYING. It was antiently the custom, observes Brand, for all ranks of people to go out a-maying early on the first of May. Bourne (*Antiq. Vulg.*, ch. xxv.) tells us that, in his time, in the villages in the north of England, the juvenile part of both sexes were wont to rise a little after midnight on the morning of that day, and walk to some neighbouring wood, accompanied with music and the blowing of horns, where they broke down branches from the trees, and adorned them with nosegays and crowns of flowers. This done, they returned homeward with their booty about the time of sunrise, and made their doors and windows triumph in the flowery spoil.

There was a time when this custom was observed by noble and royal personages as well as the vulgar. Chaucer, in his 'Court of Love,' says that early on May-day, 'Fourth goth al the court, both most and lest, to fetche the flowris fresch, and braunch, and blome.'

It is on record that King Henry VIII. and Queen Katherine partook of this diversion; and historians also mention that he, with his courtiers, in the beginning of his reign, rose on May-day very early to fetch May or green boughs; and they went, with their bows and arrows, shooting to the wood. Shakspere ('Henry VIII.,' act v., scene 3) says, it was impossible to make the people sleep on May morning; and ('Mids. Night's Dream,' act iv., scene 1) that they rose early to observe the rite of May. The court of King James I. preserved the observance of the day, and it was long continued by the populace, as Spelman's 'Glossary' remarks, under the word 'Maiuma.'

Two or three minor observances still remain to be slightly noticed. The may-pole, decked with garlands, round which the rustics used to dance in this month, yet stands in many of our villages through the whole circle of the year; and chimney-sweepers with their Jack-in-the-green continue to dance in the streets of London. A may-pole formerly stood in the Strand, upon the site of the church by Somerset House, but was taken down in 1717.

Misson, in his 'Travels' (see Ozell's *Translation*, p. 307), notices a custom which has now gone by for forty years. The country girls who served London with milk, accompanied by a fiddler and a garland of plate (hired from a silversmith) adorned with flowers, danced before the doors of their customers.

Most of the rites here enumerated had, no doubt, their origin in the heathen observances practised at this season of the year in honour of Flora, the deity who presided over fruits and flowers. (Hospinian, *De Festis Judæorum et Ethnicorum*, fol. 100.)

Polydore Virgil notices the prevalence of May customs in Italy. An account of some of those observed in France will be found in the 'Mémoires de l'Académie Celtique,' tom. iii., p. 446; and Dr. E. D. Clarke, in his 'Travels,' vol. i., 4to., Cambr., 1810, p. 110, notices the promenades and other observances on the first of May at Moscow, among the sights there most interesting to a stranger. See also Brand's *Popular Antiquities*, 4to. edit., vol. i., p. 179-204.

MAY-WEED (*Anthemis arvensis*, or Wild Chamomile), a troublesome weed in corn, which is difficult to eradicate, as it is propagated both by seed and by the low running branches which strike into the soil and take root. It flowers in May, as its name denotes, and sheds its seed long before the corn is reaped. The only certain mode of extirpating it is by great care in clearing the land when it is fallowed or prepared for turnips, ploughing it in as soon as the flowers appear, and never allowing it to go to seed. In the alternate system it is soon got rid of by the hoeing of the green crops; clover also kills it when the land is in good heart, and in the convertible husbandry it is destroyed while the land is in grass, and mown. It is a sure sign of a slovenly husbandry when the land is covered with May-weed. It often infests farms which have been neglected by outgoing tenants, and it is indispensable to get rid of it before any attempt at improvement is made. A good clean fallow is the surest means of destroying this as well as all other annuals: by repeated harrowings the seeds are first brought to the surface, where they vegetate, and are afterwards destroyed. The time to do this is in dry weather, interspersed with occasional showers, as in the months of April, May, and June.

MAY, THOMAS, an early English dramatist and historian, was born in 1595. He was the son of Sir Thomas May, who was descended from an antient family in the county of Sussex. Having finished his education at Sidney College, Cambridge, he came to London, and made the acquaintance of several persons of distinction.

In 1637 May was opposed to Sir William Davenant as candidate for the office of laureate, which the death of Ben Jonson had left vacant. Sir William was successful, and his success so exasperated May, that although hitherto a courtier, he became hostile to the king's party, and wrote a history in favour of the parliament. In 1650 he was found dead in his bed. It is supposed that he was strangled by the tightness of his nightcap-strings. He was buried in Westminster Abbey, near John Cambden the historian; but his body was taken up after the Restoration, and removed to a large pit in the church-yard of St. Margaret's, Westminster, and his monument in the abbey pulled down.

Besides a history of parliament, he wrote a history of Henry II., and made a translation of Lucan's 'Pharsalia, with a continuation both in Latin and English. His plays are supposed by some to be five in number, and these five are named 'Agrippina,' 'Antigone,' 'Cleopatra,' 'The Heir,' and 'The Old Couple.' The last two are comedies, and are printed in Dodsley's Collection. Phillips and Winstanley ascribe to him two other plays, called 'The Old Wife's Tale,' and 'Orlando Furioso,' but the dates assigned to the first publication of these pieces, if correct, render the supposition impossible.

MAYBOLE, a parish and market-town in the district of Carrick and county of Ayr. The town is pleasantly situated upon a small eminence surrounded by hills, and its direct distance is about 5 miles from the sea-coast and 70 south-west by west from Edinburgh. It was erected into a burgh of barony by a charter of James V., dated 24 Nov., 1516, but it was not till the commencement of the following century that the burgesses appear to have availed themselves of the privilege thus conferred upon them of electing their own magistrates. The management of the affairs of the burgh is vested in a council, consisting of seventeen members, who hold their office during life. The revenue, derived from landed property and an annual tax called 'stint,' averages 65*l.* per annum, which is about equal to the expenditure. The streets are cleansed and kept in repair at the expense of the turnpike-road trust-fund of the county. None but burgesses can legally carry on any manufacture or trade within the burgh; the charge for admission into their body is 1*l.* 1*s.* or 10*s.* 6*d.*, according as the applicant is a stranger or the son of a freeman. There are however no manufacturing establishments, although the chief part of the inhabitants are employed in hand-loom weaving for the Glasgow houses. The principal building is the church; it is large, and surmounted by a steeple in very bad taste. The population of the parish in 1831 was 6287, of which it is estimated that rather more than one-half were resident within the boundary of the burgh. There are in all thirteen schools, and one of these, called the 'subscription school,' is chiefly supported by the Irish inhabitants. There are also a savings' bank and several philanthropic institutions.

In the tavern of the 'Red Lion' is shown the room where Knox, and Kennedy, the abbot of Crossraguel, accompanied by eighty of the nobility and gentry of the country, assembled, the former to impugn the mass, the latter to defend it; and the inhabitants have since 'instituted a "Knox Club," which holds triennial festivals, at which men of all parties meet to testify their gratitude for their deliverance from the domination of Rome, and their secure enjoyment of Protestant principles, achieved for them by Knox and his coadjutors.'

(*New Statistical Account of Scotland; Parliamentary Report on Scotch Burghs*, &c.)

MAYENCE. [Mainz.]

MAYENNE. (River and Town.) [Mayenne.]

MAYENNE, a department in the western part of France, bounded on the north by the departments of Manche and Orne, on the east by that of Sarthe, on the south by that of Maine et Loire, and on the west by that of Ille et Vilaine. Its form approximates to that of a parallelogram, having an average length of 50 or 52 miles from north by east to south by west, and an average breadth of 38 miles from east to west. Its area is estimated at 1994 square miles, being below the average area of the French departments, and almost equal to that of the English county of Norfolk. The population in 1831 was 352,586; in 1836 it was 361,765, showing an increase in five years of 9179, or between 2·5 and 3·0 per cent., and giving more than 181 inhabitants to a square mile. In density of population it is above the average of France, but rather below the English county with which in area we have compared it. Laval, the capital, is on the Mayenne, 149 miles in a direct line west-south-west of Paris, or 169 miles by the road through Dreux, Alençon, and Mayenne, in 48° 4′ N. lat., and 0° 48′ W. long.

The northern part of the department is the most elevated. The principal range of the Armorican chain of mountains, and the branch from it which separates the basin of the Loire from that of the Vilaine, skirt the western border, the hills gradually subsiding as they proceed southward. Another branch of the Armorican chain skirts the eastern border, subsiding into the plain sooner than the western branch, to which it is parallel. These two branches enclose the valley watered by the Mayenne and its tributaries. The department is almost entirely occupied by the rocks of earlier formation, being included in the great primitive district of Bretagne. There was in 1834 one coal-mine in the department, giving employment to above a hundred men, and yielding about 5000 tons annually. There were also five mines of anthracite (besides two others not worked), giving employment to more than 350 men, and yielding annually 18,000 tons. Some iron-ore is procured; the number of iron-works in 1834 was five, having eight furnaces for smelting pig-iron and fifteen forges for making bar-iron. Charcoal was the fuel almost exclusively employed. Freestone, slates, and marble are quarried.

The principal river is the Mayenne, which rises just beyond the boundary of the department, near the north-eastern corner, and flows westward (sometimes in this department, sometimes in that of Orne), 22 miles, to the neighbourhood of Lassay; from thence it flows southward 55 miles through the valley described above, to the boundary of the department, 26 miles beyond which it falls into the Loire below Angers. Its whole course is about 103 miles, of which it is navigable for 50 miles, viz. from Laval; 24 miles of the navigation are in this department. The official returns make the total navigation 59 or 60 miles, of which about half is in this department. The feeders of the Mayenne are none of them navigable in this department; the principal are the Varenne, the Colmont, the Ernée, and the Oudon, which join the Mayenne on the right bank, and the Jouanne, which joins on the left. The Erve, which waters the east side of the department, falls into the Sarthe, which just touches the south-east corner. There are many large pools (the chief are in the upper part of the Oudon and the Vicoin, a small feeder of the Mayenne), and many brooks.

The number of Routes Royales, or government roads, in 1837, was five, having an aggregate length of 157 miles, viz. 107 in repair, 44 out of repair, and 6 unfinished. The principal road is that from Paris to Rennes and Brest, which enters the department on the north-east, runs south-west by Pré-en-Pail to Mayenne, and from thence south by west by the valley of the Mayenne to Laval, where it turns off to the west and quits the department. Roads from Laval run southward by the valley of the Mayenne through Château-Gonthier to Angers (Maine et Loire), south-east by Meslay to La Flèche (Sarthe), and eastward to Le Mans (Sarthe). Roads from Mayenne lead northward to Domfront (Orne) and Caen (Calvados), and westward to Fougères and St. Malo (Ille et Vilaine). There are also several departmental roads, having an aggregate length of 178 miles, viz. 109 miles in repair, 17 out of repair, and 52 unfinished. The bye-roads and pathways have an aggregate length of 2500 miles.

About two-thirds of the soil of the department are under the plough. Wheat is not much cultivated; rye, barley, oats, and especially buckwheat, are more commonly raised. The northern part of the department is sterile, the centre of moderate fertility, but the southern part produces abundant harvests. Much hemp and flax are grown, and there are extensive orchards, especially of apple and pear trees, from the fruit of which a great quantity of cider and perry is made. There are few vineyards, and the wine which they produce is of ordinary quality; the department lies almost entirely beyond the line within which the vine can be cultivated to advantage. Among the vegetables cultivated is a gigantic variety of the cabbage, which grows above the height of a man. The pools produce a plant, 'the water chesnut,' the fruit of which, enveloped in a husk, floats on the surface of the water, and has, when roasted, the flavour of a chesnut. Meadows and grass lands, including the heaths and other open pastures, are extensive, occupying from one-fifth to one-sixth of the soil; the number of cattle reared is considerable, especially cows, from whose milk excellent butter is made; there are large flocks of sheep, the wool of which is in good repute; the horses are of small size; swine and poultry are numerous, and a vast number of bees are kept all over the department. The woodlands of the department are not extensive.

The peasantry are simple-minded but ignorant. Education is in a very low state, and superstition is predominant. The inhabitants however are religious, sincere, and honest. They are neither such industrious nor such skilful farmers as those in the neighbouring department of Sarthe, but are more regular and better tenants; buckwheat is still a favourite crop with them; trefoil is very little regarded. In the troubled times of the Revolution this department swarmed with Chouans, or royalist partisans; but on the subsidence of those troubles the peasantry returned to their ordinary pursuits, and at present in no part of France are the roads safer, property more respected, and political excitement less violent.

The department is divided into three arrondissements, as follows:—

	Area in sq. miles.	Population in 1831.	Population in 1836.	Communes.
Laval, central .	703	117,534	122,755	92
Mayenne, north .	820	162,164	164,618	110
Château-Gonthier, south .	471	72,888	74,392	73
	1994	352,586	361,765	275

There are 27 cantons, or districts, each under a justice of the peace.

In the arrondissement of Laval are, Laval (population in 1831, 15,826 town, 16,401 whole commune; in 1836, 17,810 commune), on the Mayenne [Laval]; Montsurs, on the Jouanne; Evron (pop. 1846 town, 3750 whole commune), on the Dinard, a feeder of the Jouanne; Sainte-Suzanne, on the Erve; St. Ouen and Loiron, in the country west of the Mayenne; and Meslay, on the road from Laval to La Flèche. Evron is a busy place, with a good weekly market and ten yearly fairs, situated in an excellent wheat district. The town has a tolerably handsome market-house, a Benedictine abbey, now occupied by the Sœurs de la Charité, and a conventual church, with a fine choir. Sainte Suzanne is a small town of about 1000 inhabitants, on a high hill. It was once a place of strength. It has the ruins of an old castle, and some old ramparts yet more in decay, vitrified in one part like the vitrified forts of Scotland. The French writer who describes this remarkable phenomenon (Vaysse de Villiers) contends for its being the effect of lightning; but as the place was occupied by the Northmen, to whom, under the name of Danes, the vitrified forts of Scotland are ascribed, the walls of Sainte-Suzanne may probably be ascribed to them. Meslay is a small place of about 1200 inhabitants, consisting chiefly of one street, well paved and lined with neat well-built houses. The neighbourhood produces abundance of corn.

In the arrondissement of Mayenne are Mayenne, Ambrières, Lassay (population 1676 town, 2807 whole commune), Couptrain, and Pré-en-Pail (pop. 3344 whole commune), on or near the Mayenne; La Poôté (pop. 3291 whole commune), Vilaine or Villaines-la-Juliel (pop. about 1200), and Bays, in the country east of that river; Goron, on the Colmont; Ernée (pop. 3645 town, 5467 whole commune) on the Ernée; and Fougerolles, Landivy, Mantaudin, and St. Denis, in the north-west corner of the department. Mayenne is situated on the slope of two hills which face each other, and are separated by the river Mayenne. The town, properly so called, is on the right bank, where the hill is highest; the part on the left bank is a suburb which contains about one-third of the whole population of the place; the two are connected by a bridge. The principal line of street is that which descends one hill, crosses the bridge, and ascends the other; this constitutes the road from Paris to Rennes by Fougères; the more frequented road by Laval just passes through the eastern extremity of the suburb. This principal street is neither wide nor straight, and the slope on the side of the town is so steep that in summer it requires a team of twelve, and in winter sometimes of thirty horses and oxen to draw up heavily laden carriages. Near the summit of the hill the street widens so as to form a place or opening divided by a modern town-hall into two parts, one of which is adorned by a fountain. At the summit of the hill on a slate rock is the antient castle of the dukes of Mayenne, at present occupied as the town prison. The linen-hall or market is separated from this castle by a terrace planted with trees and used as a promenade. The town and suburb have each a parish church. The houses are mostly antient, but the streets are very clean. The population of Mayenne in 1831 was 8758 for the town and suburb, or 9797 for the whole commune; in 1836 it was 9782 for the commune. The principal manufactures are of linens, calicoes, and handkerchiefs. There are three weekly markets: one for linen, cattle, and general commodities; another for corn, and a third for provisions: there are eight yearly fairs. The linen manufacture, which is the staple, is carried on not only in the town but in the surrounding districts, and employs 8000 persons; the raw material is chiefly foreign flax. There are, two or three miles west of the town, at Fontaine Daniel, a calico manufactory employing 500 persons; and about the same distance south, the wrought-iron forges of Aron. The town has a subordinate court of justice, an hospital, and a high school. Lassay has handsome market-houses and an antient château. Much business in cattle and in flax is done at its weekly market and its two yearly fairs. Pré, or Prez-en-Pail, has a considerable weekly cattle-market. Ernée is laid out with tolerable regularity, and is pretty well built. It is the residence of several wealthy families who occupy handsome houses; it has a large market-place, in which is an antient market-house. The town has no manufacture, and the district round it is purely agricultural.

In the arrondissement of Château Gonthier are, Château-Gonthier (pop. of the commune in 1831, 6143, and in 1836, 6226) on the Mayenne [CHATEAU-GONTHIER]; Baillé on the Erve; Grez-en-Bouère and St. Denis, in the country east of the Mayenne; and Craon (pop. 2550 town, 3610 whole commune) and Cossé-le-Vivien, on or near the Oudon. Craon has narrow and crooked streets, and plainly built houses. The market-house is large. The chief trade of the place is in flax. There is good society at Craon; Volney was a native of this place. Cossé-le-Vivien with 1000 to 1200 inhabitants, is situated in a fertile district, and is the seat of a considerable trade in linens.

The chief manufacture of the department is that of linen, including sail-cloth and table-linen. Flax spinning and weaving form the occupation of a large portion of the working class in the arrondissement of Mayenne, the sterile soil of which affords little encouragement to agriculture; but the rate of wages is low, and the intervals of depression to which manufactures are liable occasionally throw the work-people into great distress. Laval and Mayenne are the chief seats of this manufacture; but the population of the arrondissement of Laval is more agricultural than that of Mayenne. The decline of the linen manufacture, induced by the extended use of cotton fabrics, has led to the introduction of the manufacture of calicoes and cotton handkerchiefs into both those towns. Some woollen stuffs and paper are also made. These manufactures, with wood for fuel and for building ships, iron, marble, slates, and various articles of agricultural produce, constitute the chief articles of export.

The department is comprehended, with that of Sarthe, in the diocese of Le Mans; the bishop of which is a suffragan of the archbishop of Tours. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Angers: and is comprehended in the fourth military division, of which the head-quarters are at Tours. It sends five members to the Chamber of Deputies.

This department was comprehended, in the most antient historic period, in the territory of the Diablintes, the Arvii, and the Andes or Andecavi, three Celtic nations, which under the Roman domination were comprehended in the province of Lugdunensis Tertia. The antient name of the river Mayenne in a Romanized form was Meduana. Nœodunum (afterwards Diablintes) and Vagoritum, the respective chief towns of the Diablintes and the Arvii, were within the limits of the department. Of the first, now the village of Jublins, there are important remains. There are the walls of a Roman station forming nearly a square of 600 or 700 feet each way, with towers on the sides and at the corners. The walls are scarcely more than seven or eight feet high, and about nine feet thick; composed of layers of square stone, alternating with three tiers of brick, and the whole united by a very hard cement. It is one of the most firmly built and best preserved Roman forts in France. Within the enclosure are the traces of buildings probably occupied by the garrison of the fort. A subterraneous apartment was discovered near the fort about seventy years ago, but covered up again to stop the troublesome visits of the curious. It had a mosaic floor and painted walls. An antient well has also been discovered, and medals and rings have been dug up. There is at Jublins a granitic rock presenting a resemblance to a chair, supposed to be a Druidic monument. It is popularly called 'the Devil's chair.' There are some remains of a town supposed to be Vagoritum, now called Arvé, or Erve, on the river Erve. From this name it has been inferred with great probability that the town, like the other chief towns in Gaul, took at a later period the name of the people to whom it belonged. The first syllable of the name Vagoritum appears to be preserved in that of the Vaige, a small stream flowing parallel to the Erve, about a mile or two from it. In the middle ages the department was comprehended chiefly in the province of Maine, but a small part of it in that of Anjou. [ANJOU; MAINE.] This part of France suffered much in the Vendéan war.

MAYER, TOBIAS, was born at Marbach, a town of Würtemberg, on the 17th of February, 1723. His father was a civil engineer, and held the appointment of inspector of the water-works (inspecteur des eaux) at Esslingen. From him young Mayer received some elementary instruction in the mathematics, but it could not have been much, since we read that he was left an orphan and unprovided for at a very early age. To gain a livelihood he began teaching the mathematics, and at the age of twenty he studied the principles of gunnery, probably with a view of entering the army. In the year 1746 he took an active part in the establishment of the Cosmographical Society of Nürnberg, to whose Transactions he afterwards contributed several interesting memoirs. Among these is one, published in 1750, 'On the Libration of the Moon,' in which, besides treating the subject in a very able manner, he then for the first time employed 'equations of condition,' which are now of such extensive and important application. [CONDITION.] In 1751 he became director of the observatory at Göttingen, and at the same time or subsequently was appointed professor of economy in that university, which appointment was probably a sinecure, since it does not appear that he ever taught any subject but the mathematics and their application. At Göttingen, during the remainder of a very short life, he laboured with the most praiseworthy zeal to promote the sciences of geography, navigation, and astronomy. His 'Zodiacal Catalogue' was 'deserving of all confidence' (Delambre), and comprised 998 stars, including those whose correct positions are of most importance to the astronomer. In 1755 he published his 'Lunar Tables' in the 'Acts of the Academy of Göttingen,' and a copy of them was forwarded to the London Board of Longitude. By order of the board the accuracy of the tables was rigorously tested by Dr. Bradley, who was able in no instance to detect an error greater than 1′ 30″ (the error of the other tables then existing sometimes amounted to 10′), and even part of this he was of opinion might be fairly attributed to his own observations. (See Dr. Bradley's *Letter to the Secretary of the Admiralty*, dated 10th February, 1756.) These tables were printed by the Board of Longitude in the year 1767, and likewise the 'Solar Tables' by the same author in the year 1770. After the death of Mayer the British parliament, at the recommendation of the Board, paid his widow the sum of 3000*l.* The original resolution of the Board, dated 9th of February, 1765, recommends that a sum 'not exceeding 5000*l.*' should be awarded; and Delambre states that a further sum of 2000*l.* was subsequently paid; but this is a mistake. The act of parliament awarding the 3000*l.* is that of 5 Geo III., c. 20; and the later acts relating to the Board of Longitude make no further mention of Mayer's widow. To Mayer is also due the discovery of the principle of the repeating circle, which was afterwards so fully developed by Borda, and employed by him in the measurement of the arc of the meridian. [BORDA; REPEATING CIRCLE.] Mayer died at Göttingen on the 20th of February, 1762. His éloge was spoken by Kaestner (Gött., 4to., 1762). In 1801 a simple monument was erected to his memory at Göttingen, the place of his interment.

The following list of his published works is given by M. Delambre from the 'Eloge' of Mayer by Kaestner:—'Description of a new Globe of the Moon' (Nürnberg, 1750); 'Terrestrial Refractions;' 'Geographical Maps;' 'Description of a new Micrometer;' 'Observations of the Solar Eclipse of 1748;' 'Conjunctions of the Moon and Stars observed in 1747-8;' 'Proofs that the Moon has no Atmosphere;' 'Motion of the Earth explained by a Change in the Direction of Gravity;' 'Determination of the Latitude of Nürnberg, with other Astronomical Observations;' 'Memoir on the Parallax of the Moon, and upon the Distance of that Satellite from the Earth, as deduced from the Length of the second Pendulum;' 'On the Transformation of Rectilinear Figures into Triangles;' 'Inclination and Declination of the Magnetic Needle, as deduced from Theory;' 'On the Inequalities of Jupiter.' In addition to the above there appeared at Göttingen, in 1775, in folio, edited by George Lichtenberg, his successor at the observatory of Göttingen, the first volume of what was intended to be a complete edition of Mayer's works. This, which is the only volume that has been published, consists of six memoirs entitled, 1, 'A Method of determining more correctly the Variations of the Thermometer: a Formula for determining the mean Temperature of different Latitudes, and the Period of the Year corresponding to the greatest Intensity of Heat and Cold;' 2, 'Observations made with his mural Quadrant of six feet radius;' 3, 'An easy Method of calculating the Eclipses of the Sun;' 4, 'A Memoir on the Affinity of Colours,' wherein he recognises but three primitive colours; 5, his 'New Catalogue of Stars;' 6, 'A List of Eighty Stars,' in which he believed he had detected a motion, in addition to that resulting from the precession of the equinoxes.

('Notice of the Life of Mayer,' by M. Delambre, in the *Biog. Univ.*; Hutton's *Mathematical Dictionary*; and Montucla, *Hist. des Math.*)

MAYNOOTH. [KILDARE.]

MAYO, a maritime county of the province of Connaught, in Ireland, bounded on the east by the counties of Sligo (from which it is separated by the river Moy) and Roscommon, on the south by the county of Galway, and on the west and north by the Atlantic Ocean. According to the ordnance map of Ireland, constructed for the Irish railway commissioners in 1836, it lies between 53° 27′ and 54° 19′ N. lat., and between 8° 31′ and 9° 20′ W. long., and extends from Achil Head on the west to the junction of the Sligo and Roscommon boundaries at Ballaghadereen on the east, 72 statute miles, and from the centre of Loch Corrib on the south to Downpatrick Head on the north, 58 miles. The length of the coast-line from the mouth of the river Moy on the north-east to the head of the Killery Harbour on the south-west, exclusive of the minor indentations of the shore, is about 250 statute miles. The area, as ascertained by the ordnance survey, has not yet been made public. According to the map constructed under the superintendence of the Society for the Diffusion of Useful Knowledge, it contains 1,023,273 English acres, or 1598 square statute miles. According to Mr. Griffith's estimate, it consists of

Cultivated land . .	871,984	statute acres.
Unprofitable bog and mountain	425,124	„
Water	57,940	„
Total	1,355,048	statute acres,

or 2117 square statute miles, being next to Cork and Galway, the third largest county in Ireland. In 1831 the population was 367,956.

Mayo has a very diversified surface, embracing a part of the great inland plain which extends across the centre of the island, together with a large extent of wild and mountainous country interposed between the western verge of that plain and the sea. The mountain region consists of two principal districts, separated from one another by Clew Bay, a capacious inlet of the Atlantic, which, running inland to a distance of fifteen miles, by from seven to eight miles in width, meets the western extremity of the plain at Westport. The mountain groups lying south of Clew Bay cover the entire barony of Murrisk, and stretch beyond the bounds of the county into the highlands of Joyce Country and Connemara. [GALWAY.] The area which they cover within the limits of Mayo is about fifteen miles by twenty, and is bounded on the north by the level land about Westport and by Clew Bay, on the west by the Atlantic Ocean, on the south by the long narrow inlet of the great Killery Harbour and the Joyce Country mountains, and on the east by the flat country constituting the basin of lochs Mask and Carra. The most easterly of the various mountain groups comprised within these limits is constituted by the Furmnamore and Partry Mountains, which, extending in a north-easterly direction from the head of the Killery, form a continuous range of fifteen miles in length, rising abruptly over the western shores of the above-mentioned lakes. The elevation of Furmnamore, rising about midway between the Killery Harbour and Loch Mask, is 2210 feet. The other chief summits of the range are Bengorriff, near its southern extremity, 2038 feet, and Slieve Bohaun, terminating it on the north, 1294 feet.

On both sides of the chain are bold ravines, traversed by streams descending on the one hand into Loch Mask, and on the other into the valley of the Owen Errive river, which runs southward into the head of Killery Harbour, and also into the valley of the Ayle. The Ayle, running northward through the first part of its course, dips underground immediately on emerging from the mountain district, and, passing eastward round the terminus of the range for two miles under the limestone-rock of the plain, rises again and flows southward, along the opposite side of the mountain, into the head of Loch Mask. One of the sources of the Owen Errive is the Lake of Glenawagh, which lies in what is locally termed a *prison*, being a bowl-shaped hollow in the northern side of Furmnamore, surrounded by perpendicular precipices 1500 feet high. West of the valley of the Owen Errive lies the group of Muilrea, skirting the northern shore of the Killery, and extending inland in a direction generally parallel to that of the range of Slieve Partry. Muilrea Mountain, which rises immediately over the northern entrance to the harbour, is the highest ground in the county, being 2682 feet in altitude. Next in the range, eastward, is Benberry, 2610 feet; between which and Bengorm, 2224 feet, lie the romantic lakes of Doologh and Delphi, with the shooting-lodge of the Marquis of Sligo. These heights, as they trend eastward, are broken into numerous lateral valleys, of which the most considerable is Glen Lawr, watered by the main branch of the Owen Errive. Above Glen Laur the highest point of the range is 2429 feet. Northward from the immediate group of Muilrea the centre of the district of Murrisk rises into undulating hills of from 900 to 1200 feet in height, the general slope of the country being towards the north-west, in which direction most of the streams rising in the interior make their way through openings in the hilly country to the sea. The northern verge of Murrisk, bordering on Clew Bay, is occupied through a length of ten miles by the range of Croagh Patrick, running parallel to the shore. Croagh Patrick, locally called the Reek, rises immediately from the water's edge in the centre of the range to an altitude of 2610 feet, presenting a very perfect conical outline on every side, and forming by much the most conspicuous feature in the surrounding scenery. The general character of this district is sterile, though among the undulating hills of the central part there are extensive tracts of coarse pasture. The only place having the character of anything more than a hamlet throughout the entire tract is the little village of Louisburg, near the coast on the north-west.

The mountainous district lying north of Clew Bay is of considerably greater area, extending upwards of forty miles from east to west, by thirty miles from north to south. Separated from the range of the Ox mountains in Sligo by the valley of the Moy and the low basin of Loch Conn, thus standing insulated in the north-western part of the county, it nevertheless corresponds, in the direction of its principal groups, both with the range above mentioned on the east, and with that of the Slieve Partry mountains on the south. The Croagh Moyle mountains, forming the most advanced group towards the plain, appear as a continuation of the Sligo highlands, running in a direction from north-east to south-west, from the valley of the Moy to the head of Clew Bay at Newport. The highest point of this range is 1655 feet. Corresponding in direction with the Croagh Moyle range is the group of Nephin, which extends from Loch Fyough, near the northern shore of Clew Bay, at a distance of about five miles from the exterior range, to the western shore of Loch Conn. The chief summits of this range, commencing from the west, are, Buckorgh, 1922 feet, Bereen Curragh, 2295 feet, and Nephin, 2646 feet; the last, being the highest ground in this district, forms an object of great grandeur, rising abruptly over the western verge of Loch Conn. In the intermediate valley bounded by these ranges, which constitutes the principal pass northwards from Newport, lie Loch Beltra, the waters of which run south-westward to Clew Bay at Newport, and Loch Lavalla, which discharges itself north-eastward into Loch Conn, the latter lying within the mountain-pass of Barnna-gee. Northward from the range of Nephin lies a vast tract of comparatively level but extremely desolate moorlands, bounded towards the east by the fertile valley of the Moy, and westward by the nearly semicircular amphitheatre of the Tyrawley and Nephin Beg mountains. A subordinate and nearly parallel ridge of low elevation divides this tract into two portions, the waters of one of which flow eastward by the Deel river to Loch Conn, and those of the other, passing through a gap in the centre of the range, run westward by the Owenmore river to the head of Blacksod Bay. The altitude of that part of the chain north of this gap is from 900 to 1200 feet; south of the valley of the Owenmore the heights are loftier and of a more striking outline, being broken into lateral valleys and defiles, and containing many small lakes surrounded by striking precipices. The chief heights here are Slieve Cor, 2368 feet, Nephin Beg, 2012 feet, and Cushcamcurragh, 2262 feet; the last rises immediately over the shore of Clew Bay, from which point the range takes a westerly direction, occupying the entire promontory of Corraun Achil, and beyond it, rising again into very bold eminences throughout the large island of Achil, which is separated from the mainland by a very narrow sound running up between Clew Bay and Blacksod Harbour. The surface of Achil Island is extremely mountainous, and its shores are perhaps more precipitous than any equal extent of coast in the British islands. At Minaun, on the south side of the island, the cliffs, which are slightly overhanging, have an altitude of 1000 feet and upwards; and at Keem Head, which terminates the island westward, the whole side of the mountain, which appears to have been rent asunder by some convulsion of nature, constitutes one shelving precipice of 2222 feet, springing immediately from the water's edge. The island is of a triangular shape, the northern and eastern sides being fourteen and twelve miles in length respectively, and the base, which faces the offing of Clew Bay towards the south-west, being fifteen miles in length. The northern side of the island constitutes the southern boundary of Blacksod Bay, a great arm of the Atlantic included between the wild district of Erris, which stretches westward from the chain of the Nephin Beg mountains on one side, and the low peninsula of the Mullet on the other. The Mullet, extending fifteen miles in length, is connected with the mainland of Erris by an isthmus five miles long by one mile on an average in breadth, which separates the head of Blacksod Bay from the head of the Bay of Broadhaven, included between the Mullet and the mainland in a similar manner on the north. The thriving little town of Belmullet is situated on the narrowest part of the isthmus, where it is only 400 yards wide. The peninsula is better tilled and less desolate than the mainland; there is a considerable village on it, called Binghamstown, near the head of Blacksod Bay; and Major Bingham, the chief proprietor, has a permanent residence farther south. The southern part of the peninsula is low and sandy, but the surface is varied on the north by some inconsiderable eminences, of which Slieve More, 432 feet in height, rising over the western entrance to Broadhaven, is the chief. From its comparatively level surface and the facilities for procuring sea-weed and sand for manure, this remote district possesses great capabilities of improvement; but the immense tract of bog and mountain interposed between it and the market-towns of the interior has hitherto been a great obstacle to traffic. Nevertheless the town of Belmullet, which has sprung up since 1825, now consists of two streets of slated houses and a neat square, and has a yearly increasing export of grain. During the period of railway speculation in Ireland, a few years ago, Belmullet was much spoken of as the terminus of a great western railway, by which it was proposed to open the vast desolate tract lying between it and the valley of the Moy, but the design has not been encouraged. Nothing can exceed the bleakness and sterility of the entire tract lying between the shores of Blacksod and Broadhaven bays and the valley of the Moy. On the western side of the Tyrawley and Nephin Beg chain are numerous lakes, of which the greatest is Loch Carrowmore, five miles in length, which discharges its waters by the Owenmore river, famous for its salmon, into Tullaghan Bay, an arm of Blacksod Harbour. Between Tullaghan Bay and the Nephin Beg mountains lies the district of Ballycroy, where some herds of the red deer still survive. This part of Mayo has recently become pretty well known, as the scene of an interesting work entitled 'Wild Sports of the West.'

The remainder of the country, consisting almost wholly of open undulating plains, is divided by a low range of eminences running south of Castlebar into two principal districts, the waters of one of which run northward by the Moy to the sea at Killalla, and those of the other southward to lochs Mask and Corrib, and so to the sea at Galway. The district immediately surrounding Westport, the waters of which run westward to Clew Bay, is comparatively of inconsiderable extent. The valley of the Moy from the sea to Foxford, which is situated fifteen miles above the mouth of the river, is open, and contains much improved and improvable land, especially in the neighbourhood of Killalla [KILLALLA] and Ballina. Ballina, the third town in the county, about six miles above the æstuary of the Moy, is situated partly in the county of Mayo and partly in the county of Sligo, the portion on the right bank of the river, which is within the latter county, being called Ardnaree. Ballina is of recent origin, there having been no town here prior to 1729, when Lord Tyrawley gave the first impulse to industry in this district by the establishment of a cotton factory. The prosperity of the town has however been mainly owing to the enterprise of various traders who have been induced to settle here since the beginning of the present century in consequence of the local facilities for carrying on the grain and provision trades. In the vicinity of the town are numerous seats of resident gentry. Between Ballina and the range of Nephin is Loch Conn, a fine sheet of water eight miles in length by from one to four in breadth, communicating on the south, by a very narrow strait in the neck of land called the Puntoon, with Loch Cullin, a sheet of smaller dimensions, through which it discharges its waters into the river Moy close to Foxford.

The little town of Crossmolina, on the high road from Ballina to Belmullet, stands at the head of Loch Conn, and is surrounded by a tolerably fertile tract of country. The valley at Foxford is contracted by the approaching ranges of the Croagh Moyle and Slieve Gamph mountains, the latter constituting the western extremity of the Sligo group. Southward from this point the features of the valley are lost in the wide extended plain which opens inland. The hill of Slieve Carnon, rising to a height of 855 feet, is the only considerable eminence in this district. Running nearly north and south, it separates the vale of Castlebar on the west from the open tract spreading eastward into Roscommon, the former being watered by streams terminating in Loch Cullin, and the latter by the numerous and widely extended feeders of the Moy. The main stream of the Moy, rising in the county of Sligo, runs westward through an open upland valley bounded on the north by the line of the Ox mountains, and on the south by low undulating hills of from 600 to 700 feet in height, skirting the northern verge of the great plain. This vale is thinly inhabited, and much encumbered with mountain bogs; towards its western extremity however, near the point where the Moy, after receiving its tributaries from the southern plain, turns northwards, there is a good deal of cultivation round the small town of Swineford. Southward from the low range mentioned as bounding the valley of the upper Moy the country is more thickly inhabited and more productive. Under these eminences on the eastern verge of the county is the small town of Ballaghadereen. The immediately surrounding district is bleak and swampy, but the bogs disappear on travelling westward and southward into the pastoral tract extending from the Roscommon border on the east, to the vicinity of Castlebar on the west, and from the

Slieve Carnon on the north to the borders of Galway on the south This tract, embracing a very large extent of country, is named generally the Plains of Mayo, though the locality to which the name strictly applies is confined to the rich grazing lands immediately south of Slieve Carnon. The small town of Ballyhaunis is situated on the eastern verge of these plains, Claremorris near the centre, Hollymount on the south, and Ballyglass and Balla on the west. In the neighbourhood of the four last towns are numerous seats of resident nobility and gentry, among which Castlemacgarret, the residence of Lord Oranmore, near Claremorris, is the most conspicuous. The tracts of bog are also more numerous here than in the northern and central portion of the plain, occupying most of the valleys, and in several instances insulating the demesnes of the gentry. The country nevertheless, from the closeness of the demesnes and the quantity of timber, particularly about Hollymount and Ballyglass, has a rich appearance, which is considerably heightened by the vicinity of lochs Mask and Carra on the west, and by the extended mountain background on the west and north. South from Loch Carra and Hollymount an open fertile district extends along the eastern shore of Loch Mask, stretching inland without any incumbrance of unprofitable land as far as the border of Galway. This tract contains numerous private seats, and the small towns of Ballinrobe, situated on the river Robe near the point where it enters Loch Mask; Cong, situated on the narrow neck of land dividing Loch Mask from Loch Corrib; and Shrule, a poor village on the Galway border near Headford. The structure of the isthmus on which Cong is situated is very remarkable, the entire waters of lochs Mask and Carra passing by a subterraneous channel, which can in some places be approached by natural caves in the limestone rock at a depth of forty feet from the surface, to the lower basin of Loch Corrib. The scenery in this neighbourhood is very striking from the extent of water on all sides, and the grand mountain boundaries rising immediately over the western shores of both lakes.

The district surrounding the head of Clew Bay contains the towns of Westport and Newport, the former situated on a small stream running into the south-eastern angle of the bay, and the latter on the river which discharges the waters of Loch Beltra into its north-eastern angle. Westport is a well built and handsome town; two of the principal streets run parallel to the river, the borders of which are laid out as a public walk, with rows of trees. Westport House, the residence of the marquis of Sligo, by much the finest mansion in the county, stands in the immediate vicinity of the town, between it and the sea. From Westport to Newport the head of Clew Bay is studded over with green pasturable islands, varying in size from a few acres to half a mile in length, and in number amounting to 170. The shore along the head of the bay is also good arable and pasture land, and is worn into numerous peninsulas and low promontories, many of them wooded, which greatly increases the picturesque effect. On one of these promontories is the residence of Sir Samuel O'Malley, Bart., a considerable proprietor; and at Newport also, close to the shore, is the seat of Sir Richard O'Donel, another owner of large tracts in the neighbourhood. The whole scenery of this district is remarkably striking; the beauty of the head of Clew Bay, with its labyrinth of islands, in particular, would appear to have been generally known from an early period, as they are distinguished as 'the Fortunate Islands,' in an Italian map of the sixteenth century.

The only harbour generally frequented on the northern coast is that of Killalla, formed by the embouchure of the river Moy. The bay is a square of about five miles each way, with a range of sandhills extending across the bottom. In this range there are two openings, one forming the bar of the Moy, and the other that of Killalla harbour. Formerly vessels for Ballina entered by the Killalla bar, and sailed by the lagoon at the back of the sandhills to the pool of Moyne, where they discharged by lighters; but since the execution of some improvements in the Moy a few years since, the navigation has been direct; and vessels of 200 tons now sail up to within a mile of Ballina. From Killalla bay westward the coast for a distance of twenty miles rises in lofty cliffs, affording very little shelter for craft of any kind. There are coves at Balderig, Port Terlin, and Port-a-cloy, where yawls can be kept, but these places, being open to the north and in immediate connection with the main sea, are always exposed to a heavy ground-swell. The last, which is a narrow inlet bounded by steep cliffs of several hundred feet in height on both sides, has a depth of twenty-four fathoms at its mouth, and four fathoms close in-shore. This ironbound coast continues to Benwee Head, between which and the north-eastern extremity of the Mullet is the entrance to Broadhaven. This bay consists of an outer and an inner harbour, the entrance to the latter being somewhat less than half a mile in width, in four fathoms water. The landlocked basin within runs up seven miles to Belmullet, and affords good anchorage throughout. The only use to which this fine harbour has been turned is the protection of a few row-boats employed in the fishery. The western shore of the Mullet has no shelter for vessels of burthen further than that afforded in western gales by an open anchorage under the lee of the Inniskea islands in the offing. The shores of the great bay of Blacksod Harbour afford numerous excellent roadsteads and several sheltered spots well adapted for landing cargoes. Of these the principal are Tarmon harbour, Elly harbour, and Salleen harbour, on the shore of the peninsula; Belmullet and Cleggan, at the head of the bay; and Tallaghan bay and the sound of Achil, on the shore of the mainland. The side of Achil facing the offing of Clew Bay is mostly a cliff with no shelter for any larger craft than boats, which may be drawn up on the beach in one or two coves. The southern shore of Corraun Achil is also for the most part ironbound. Neither is there any good shelter on the opposite coast of Murrisk bounding the lower part of Clew Bay on the south; but the upper end abounds with a multitude of safe and excellent anchorages, among the numerous islands between the creeks of Newport and Westport. The mouth of the bay also being covered for one-third of its breadth by Clare Island, the whole basin enjoys a considerable shelter from the prevalent run of the sea. The remainder of the coast of Murrisk between Clew Bay and the Killery possesses no harbours, but there is anchorage in westerly winds in four fathoms water under the lee of Innisturk Island in the offing. Innisbofin, another island constituting part of this county, although lying more off the coast of Galway, possesses a tolerable harbour, which was esteemed of such importance in the time of the Commonwealth as to be made the site of a small blockhouse, the ruins of which still remain. The Killery harbour has been described under the head GALWAY. Small piers have been constructed from time to time, at costs varying from 100*l.* to 2000*l.*, at Killalla, Belmullet, Salleen, Tarmon, Bullsmouth, Achil Sound, Clare Island, Oldhead, Innisturk, and Bundurra.

The only navigable river in the county is the Moy. An extended system of inland navigation has been proposed [CONNAUGHT], but, as yet, there are no canals within the county.

In no part of Ireland has the want of good roads been more felt, or have their advantages been more fully exhibited than in Mayo. In 1802 there was no road whatever passable for wheel-carriages in winter through western Tyrawley and the entire of Erris, a tract equal in area to many of the inland counties, and the district about Ballina was very ill supplied with means of communication. Roads have now been constructed, partly by government and partly by grand jury assessments, through both these districts, the chief lines being from Castlebar to Belmullet through the centre of Tyrawley, and from Killalla and Ballina eastward by Swineford towards the terminus of the Royal Canal. Other good roads, from Castlebar to Ballina by the Puntoon, and from Ballina by Crossmolina to Belmullet, have also been recently constructed. The district of Murrisk has also been opened by a new and excellent road from Westport to the head of the Killery harbour, where it joins the line of government road through Connemara. The western parts of Murrisk are still unprovided with sufficient means of communication, and part of the district lying along the base of the Slieve Partry mountains next to Loch Mask is altogether impassable for carriages. The champaign part of the county is in general well opened, the principal line of road being that which leads from Westport and Castlebar through Hollymount towards Tuam.

From the vicinity of the Atlantic and the quantity of wet surface exposed, the climate of the western districts is damp and ungenial. The level part of the country, having the protection of so great a barrier of mountain in the direction of the prevalent winds, and lying open towards the east and south, enjoys a climate as mild as most of the midland counties. From the remains of submarine forests on the coast and the quantities of bog-timber found on the sides of the most exposed mountains in Murrisk and Erris, it would appear that trees formerly flourished throughout the western district, where it is found very difficult at present to rear plantations even in the most sheltered spots.

Geology.—The geological structure of Mayo resembles, in its general features, that of Galway, exhibiting an arrangement of primary and secondary rocks skirting a limestone basin. As usual, the champaign district and the field of limestone are co-extensive, the primary and secondary formations being confined to Erris and western Tyrawley on the north, and to Murrisk on the south. It has been remarked that in many of the western bays of Ireland the rock which forms the bed or bottom of the bay consists of the flœtz limestone, while the projecting promontories situated to the north and south of each are composed of primary or transition rocks. This observation is strikingly illustrated in Clew Bay, where the sea reaches to the verge of the limestone plain between lofty promontories of primary rock on each side, the structure of the bottom of the bay being manifested by a multitude of limestone islands rising round its upper extremity. The eskers which occur throughout the limestone plain near Westport exhibit traces of a current setting towards Clew Bay. Near Loch Conn and Killalla they indicate a current running northward in the line of the Moy. The verges of the plain are, as is usual in similarly situated districts, traversed by numerous subterraneous channels, remarkable instances of which occur at Cong, and in the courses of the rivers Ayle and Owendaff, the latter of which has a subterranean course of two miles near Shrule, where it forms the county boundary. The Mullinmore also, a stream descending from Nephin, runs underground for about three miles.

The southern half of Murrisk, embracing the Furmnamore, Partry, and Muilrea groups, belongs to the grauwacke series; towards the plain in the valley of the Ayle, a tract of yellow sandstone lies between the clay-slate of this formation and the flœtz limestone. Patches of limestone also occur in some places in this valley. The northern division of Murrisk consists mainly of mica-slate with protrusions of granite and quartz, bordered along the north-western coast towards Clew Bay by a tract of old red sandstone, which rises again on the southern and eastern side of the opposite island of Clare, overlying the granite of which the nucleus of that island consists. Of the quartz protrusions in the mica-slate field of northern Murrisk, the chief is the peak of Croagh Patrick. The exterior ranges of the northern mountain district consist chiefly of old red sandstone interposed between the mica-slate of the primary field of Tyrawley and Erris and the flœtz limestone of the champaign. This tract evidently belongs to the same formation which shows itself in the north-west of Murrisk and in Clare Island. It constitutes the southern portion of Corraun Achil, a portion of the range of Nephin Bay, and the entire group of Croagh Moyle, from which, sweeping northward between the base of Great Nephin and Loch Conn, it forms the boundary between the mica-slate field and the limestone of the valley of the Moy throughout the whole extent of Tyrawley. The mica-slate field, as it stretches northward, recedes, and near the coast constitutes but a small portion of the district about Broadhaven. The limestone tract has a corresponding extension in that direction, occupying the greater part of north-eastern Tyrawley, but nowhere reaching to the sea, from which it is separated by an extensive field of yellow sandstone and conglomerate reaching from the north-east of Erris to Killalla. Throughout the great mica-slate field, comprising all Erris, the Mullet, the island of Achil, and southern Tyrawley as far eastward as great Nephin, granite and quartz protrusions are of frequent occurrence, generally constituting the loftiest and most striking elevations of the different mountain-chains. Granite again rises on the opposite side of the valley of the Moy in the Slieve Gamph mountains over Foxford, supporting flanks of mica-slate as in the opposite range of Nephin. Throughout the primary district iron-ore is abundant, and bloomeries have been worked near Tallaghan bay and in the valley of the Deel, but are now given up from want of fuel. Indications of coal are said to have been observed in Slieve Carnon, and deposits of manganese occur near Westport, but at present there are no mining operations carried on in this county beyond the quarrying of slates. Marble susceptible of a good polish has been raised in several parts of the barony of Murrisk.

Soil, &c.—The soils of the champaign tract are in general similar to those of other limestone districts: the best lie about Balla, Claremorris, and Hollymount on the south, and round Ballina on the north. Towards the Sligo and Roscommon borders the soil is light and moory; it is light also throughout the greater part of the tract bordering on Galway, but of a deep and rich quality near Cong and along the eastern shore of Loch Mask.

The tillage lands in the immediate neighbourhood of Westport have been for the most part reclaimed from a comparatively moory state; but more northward towards Newport the soil is naturally sweet, and produces large crops of the best oats. Throughout both mountain districts, north and south of Clew Bay, cultivation only occurs in detached patches. In Murrisk however and Tyrawley are good tracts of upland pasture which answer well for the breeding of young cattle, though not equal to the fattening of stock. The common fence throughout the north and west of the county is the dry stone-wall, or in the moory parts sod-ditches. In the central district and towards the borders of Galway sod-ditches and quickset-hedges are general, but wherever stones can be easily had, dry walls are preferred by the country farmers. The following table exhibits the sales of grain in the principal market-towns in the under-mentioned years. The oats grown in Mayo are of a superior quality, but the wheat is in general inferior to that of Galway:—

	Wheat. (tons.)		Oats. (tons.)		Barley. (tons.)	
	1826.	1835.	1826.	1835.	1826.	1835.
Newport	..	12	1,283	1,000	76	275
Castlebar	..	..	638	1,426	50	76
Claremorris	..	..	1,800	2,000	..	..
Ballaghadereen	..	..	..	407	..	..
Ballyhaunis	..	..	..	445	..	..
Ballinrobe	..	1709	..	..	..	153
Westport	600	1400	13,000	15,720	400	100
Ballina	..	23	3,688	7,609	193	142
Killalla	..	..	5,100	3,218	250	315

The coast fishery, which might be rendered very productive, gave occasional occupation, in 1836, to 3768 fishermen. The craft employed consisted of 4 half-decked vessels, 12 open sail-boats, and 677 row-boats. The principal fishing-bank on the north lies between Downpatrick Head and Broadhaven, at about 3 miles from the shore, in 30 to 45 fathoms water, where turbot, sole, cod, ling, haddock, and hake are taken. Between the Stags of Broadhaven (insular rocks in the offing of that bay) and the island of South Inniskea is another bank, in 18 to 30 fathoms water, on which the same fish abound. From 40 to 50 miles due west of Achil Head some fish are taken [Galway]; but this fishery, requiring vessels of a better sort than are here in use, has been almost wholly abandoned. Blacksod Bay and Clew Bay also contain extensive fishing-banks for turbot, sole, plaice, &c., and vast quantities of oysters and lobsters may be taken on the shores of both. The herring-fishery is chiefly prosecuted, in the season, near the mouth of the great Killery harbour.

The principal river fisheries in the county are those of the Moy, Ballycroy, and Newport rivers. The salmon-fishery on the first lets for 1500*l.* per annum; the others are preserved by the proprietors. In the Newport river salmon are in perfect order all the year round.

The condition of the labouring classes is somewhat better in the remote and thinly-inhabited tracts than in the plain. From 6*d.* to 8*d.* a day for 100 working days in the year is the average rate of wages in most parts of the county; but in some districts the working days do not average more than 30 in the year. There is much wretchedness among the peasantry of the north-eastern parts of the county; and although the people of the mountainous western districts, in years of ordinary productiveness, are rather better provided with the necessaries of life than the residents on the plain, they have occasionally, especially in Erris and Achil, been reduced to an extremity of distress scarcely ever experienced in any other part of Ireland, by failures in their crops.

There is a large number of resident gentry: of the nobility, the marquis of Sligo and Lord Oranmore are the only residents.

The manufacture of linens is carried on to a considerable extent by the country people: the cloth is generally sold green by the small manufacturers, and bleached in other counties. At Belclare near Westport are factories on a large scale for linen and cotton fabrics. There is also throughout the county the usual home manufacture of friezes and coarse woollens. In 1831 there were in Mayo 16 bleachers, 10 reed-makers, 1730 weavers, 5 brewers, 11 corn-dealers, 8 tobacconists, 3 maltsters, 58 millers, and 154 coopers.

Mayo is divided into the baronies of *Erris* (half barony) on the north-west, containing only hamlets and villages: *Tyrawley* on the north, containing the towns of Ballina, population (independent of the portion in Sligo) 5510; Killalla, pop. 1125; and Crossmolina, pop. 1481: *Gallen* on the north-east, containing the towns of Foxford, pop. 1068, and Swineford, pop. 813: *Castello* on the east, containing the town of Ballaghadereen, pop. 1147: *Clanmorris* on the south-east, containing the town of Claremorris, pop. 1476: *Kilmaine* on the south, containing the town of Ballinrobe, pop. 2604, and the village of Shrule, pop. 507: *Carra* in the centre, containing the town of Castlebar [CASTLEBAR], pop. 6373, and village of Minola, pop. 450: *Murrisk* on the south-west, containing the town of Westport, pop. 4448: and *Burrishoole* on the west, containing the town of Newport, pop. 1235.

Castlebar is the only corporate town in the county: its charter bears date the 11th of James I. The corporation is now extinct.

Westport is a place of considerable commercial activity. The exports of corn, meal, provisions, and other agricultural produce, in 1836, amounted to 11,800 tons, of the value of 87,805*l.*: the imports in the same year, consisting principally of coals, iron, sugar, flax-seed, tallow, and salt, amounted to the value of 28,517*l.*

Ballina has also a large and increasing trade in agricultural produce. The exports in 1836 amounted to nearly 9000 tons of corn and meal and 500 tons of provisions, of a value, including a small export of kelp, hides, and feathers, of 70,568*l.* The imports in the same year were to the value of 13,532*l.*

The exports from Newport in the same year amounted to the value of 2269*l.*, and consisted wholly of corn. There do not appear to have been any imports. In the same year the exports from Belmullet amounted to the value of 2940*l.*

Prior to the Union Mayo was represented by four members, two for the county and two for the borough of Castlebar. The representation is now limited to the two county members. In 1837 the constituency consisted of 1350 voters. The assizes are held at Castlebar; and quarter-sessions at Castlebar, Westport, Ballina, Claremorris, and Ballinrobe. On January 1, 1836, the police force of the county consisted of 7 chief constables of the first class, 2 second-class ditto, 46 constables, 203 subconstables, and 15 horse, the cost of maintaining which establishment amounted, for the year 1835, to 10,142*l.* 13*s.* 1*d.*, of which 4853*l.* 16*s.* 4*d.* was chargeable against the county. The total number of prisoners charged with criminal offences who were committed to the county gaol in the year 1836 was 1115, of whom 1002 were males and 153 were females. Of these 230 males and 11 females could read and write at the time of their committal, 306 males and 42 females could read only, 437 males and 85 females could neither read nor write, and of the remainder the instruction could not be ascertained. The district lunatic asylum is at Ballinasloe, in the county of Galway. The county infirmary is at Castlebar, and there are dispensaries in all the towns and large villages. In 1836 there were four newspapers published in this county, to which 50,925 stamps were issued during that year. There are seven barracks in the county, affording accommodation for 1200 men, but they are only partially occupied at present.

Population.

Date.	How ascertained.	Houses.	Families.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort .	27,970	..	..	..	..	..	..	140,000
1813	Under Act of 1812 . .	43,702	..	..	..	..	..	..	237,371
1821	Under Act 55 Geo. III., c. 120	53,051	56,026	..	..	..	146,137	146,975	293,112
1831	Under Act 1 Will. IV., c. 19 .	62,367	65,207	52,688	4,895	7,644	179,595	186,733	366,328

History, &c.—This county formed part of the grant made by King Henry II. to William Fitz-Adelm de Burgho about the year 1180. It would appear that the new possessor had very soon made a permanent settlement, as in the 24th year of the reign of King Henry III., the then king of Connaught made a journey to England to complain of the invasion of his territory by the family of the Burkes. The lord-justice of Ireland was on that occasion commanded to 'root out that unjust plantation, which Hubert, earl of Kent, had, in the time of his greatness, planted in those parts;' but the command was never acted on, Richard de Burgho having obtained a new grant of all Connaught after the death of O'Connor, the then king. There is very little known of the subsequent proceedings of the settlers until the period of the great rebellion succeeding the assassination of William de Burgho, earl of Ulster, in A.D. 1333. [BELFAST.] About this time Mayo was a county, as appears by a roll of the 49th Edward III., preserved in the chancery of Ireland. It fell away however from all subjection to the English law immediately after the murder of the earl; for some of the younger branches of the Burke family, seeing that the entire province of Connaught would be inherited by his infant daughter (who afterwards married Lionel, duke of Clarence, and so gave the crown its title to the inheritance in the person of Henry VII.), seized upon the counties of Galway and Mayo, and, to avoid the consequences of their usurpation, not only cast off all allegiance to the English law, but renounced their English names and habits, identifying themselves and their followers in all respects with the native Irish. The name chosen by Edmund de Burgho, who seized on Mayo, was MacWilliam *Oughter*, or MacWilliam 'the farther,' to distinguish his family from that of MacWilliam *Eighter*, or 'the hither,' who had in like manner usurped Galway.

All the followers of the family in the county followed his example. The D'Exeters, or D'Exons, took the name of MacJordan; the Nangles, or family of De Angulo, took that of MacCostello; and of the inferior families of the De Burghos, some took the names of MacHubbard, MacDavid, MacPhilben, &c. From this time till the reign of Queen Elizabeth the MacWilliam of the day continued to exercise the authority of an independent potentate. Many families from Galway and Ulster put themselves under the protection of the successive chiefs, and it is probably to this period that the first introduction of many of the most prevalent names at present in the county—Blake, Brown, Kirwan, Macdonnell, &c.—is to be referred. The first step towards a return to English law and manners was made in 1575, when the then MacWilliam, accompanied by the O'Malley and a number of the clan Donnell, came to Galway and made his submission, consenting to pay 250 marks per annum for his country, and to allow his followers to hold by English tenure. This chieftain is described by Sir Henry Sidney, who received his submission, as unable to speak English, though conversing fluently in Latin. The county was shortly after again declared shire ground. The Burkes however soon began to repine under the new government, and, after many complaints, broke into rebellion, in which they were joined by the clan Donnells, Joyces, and other families in the south of the county. To appease these tumults Sir Richard Bingham marched to Ballinrobe on the 12th July, 1586, and having razed several castles of the Burkes and Macdonnells, and given the rebels, who had been joined by a body of 2000 Scottish islesmen, a signal defeat at Ardnaree, on the Moy, succeeded in restoring the county to tranquillity. The old families of Mayo, in general, took part in the rebellion of 1641 and the succeeding wars, and very extensive forfeitures were the consequence. The forfeitures consequent on the war of the Revolution extended to 19,294 acres, of an estimated total value, at that time, of 37,598*l.* 3*s.* The families of Burke, Browne, and Dillon were those chiefly affected. During these troubles however Mayo was not the scene of any military operations of importance; the only memorable event of that kind, since the battle of Ardnaree, being the invasion, by the French, under General Humbert, in 1798. The invading force consisted of 1100 rank and file only; but such was the alarm caused by their unexpected descent, that they easily carried the towns of Killalla and Ballina; and, being joined by a large body of the peasantry, defeated General Lake, at the head of 6000 men, before the town of Castlebar. [Castlebar.] The surrender of the invading force at Ballinamuck however soon restored tranquillity. [Leitrim.]

The antiquities of the county are chiefly ecclesiastical. There are round towers at Killalla, Turlogh, Meelick, and Balla. At Cong are the remains of a splendid abbey, originally founded in the seventh century, and re-edified by O'Connor in the twelfth. An archiepiscopal crozier of surprisingly beautiful workmanship, made by command of Turlogh O'Connor, the father of Roderick, the last native king of Ireland, and preserved at Cong until very recently, is now in the possession of the Royal Irish Academy. At Ballyhaunis are the ruins of a largely endowed abbey founded by the family of Nangle. Very fine remains of a Franciscan friary at Moyne, founded by William de Burgho, are still standing. Rosserk abbey, in the same neighbourhood, built by the Joyces in the fifteenth century, is another very striking ruin. Rathbran, also near the Moy, but of which all traces have now disappeared, was a foundation of the Jordans, the remains of whose castles are very numerous throughout the barony of Gallen. The remains of Ballintubber abbey, seven miles from Ballinrobe, are among the most elegant specimens of early architecture in Ireland. It was founded by Cathal O'Connor about the latter end of the twelfth century. Numerous other remains of religious houses founded by the families of De Burgh, O'Malley, and Nangle, throughout the county, are enumerated.

The military antiquities are not in general of much extent or interest. Carrig-a-Nile, near Newport, is said to have been a stronghold of Grace O'Malley, a daughter of that MacWilliam who submitted in 1575, still commonly known in Ireland by the name of Giana Naile, and celebrated for her exploits against the English, especially by sea. Doona Castle, on the shore of Tullaghan bay, was another seat of the O'Malleys, and is still a place of considerable extent: so also is Inver Castle, on the shore of Broadhaven, which probably belonged to the same family. On a detached rock, near Downpatrick Head, are the remarkable ruins of Doonbriste, or 'Broken Castle,' so called from certain remains of an antient building on the cliff, corresponding exactly with other ruins situated on the summit of a detached rock, standing in the sea about 300 yards off, which is hence inferred to have parted from the mainland in some convulsion of nature. None of the other feudal remains are worth notice.

The county expenses are defrayed by grand jury presentments. The amount levied in 1835 was 27,051*l.* 14*s.* 7½*d.*, of which 6003*l.* 14*s.* 1½*d.* was for repayment of government loans, 5565*l.* 7*s.* 9*d.* for police, 9457*l.* 9*s.* 6½*d.* for public institutions, and salaries, &c., and 6025*l.* 3*s.* 2½*d.* for the construction and repair of roads and bridges.

(*Statistical Survey of Mayo*, Dublin, 1802; Frazer's *Guide through Ireland*, Dublin, 1838; *Second Report of Railway Commissioners for Ireland*; Cox's *History of Ireland*; *Parliamentary Reports and Papers*.)

MAYOR. [Boroughs of England and Wales.]

MAYOW. [Chemistry.]

MAYPU. [Chile.]

MAZANDERAN. [Persia.]

MAZARIN, Cardinal. [Anne of Austria; Louis XIV.]

MAZEPPA, Hetman (that is, commander-in-chief) of the Cossacks of the Ukraine, has become celebrated by a poem of Lord Byron, which has for its subject his extraordinary adventure. He was the son of a Polish gentleman in Podolia, and served for some time as a page at the court of King John Casimir (who reigned 1648—1668), where he acquired some education. On his return to his native province he carried on an intrigue with the wife of one of his neighbours. Being surprised by the offended husband, he was bound by his orders, according to the current story, to one of those wild horses which roam in a half savage state about the Ukraine, and the animal was turned loose. The frightened horse ran with his unwilling burden, till it reached the country of the Cossacks, where Mazeppa, who was in a senseless state, was released from his dangerous position. Being restored to health by the kind treatment of the Cossacks, he entered into their service, and rose by degrees to the rank of their supreme commander. This romantic story of the horse seems scarcely credible, and one might reasonably doubt if a man could escape with his life under such circumstances. The point has at last been settled in a satisfactory manner by the contemporary memoirs of Passek, which were lately published in Polish. According to that author, Mazeppa was bound by the offended husband to the same horse on which he had come to pay his addresses to the wife. The horse, being let loose, carried its master back to his own house, and the shame which Mazeppa felt at having been exposed in such a manner induced him to leave his native land and retire among the Cossacks. Whatever may have been the reasons which induced Mazeppa to take that step, he soon distinguished himself by his bodily strength, great courage, natural abilities, and some acquirements, so that he became general-adjutant and secretary of Hetman Samoilowich, and after his death in 1687 was chosen to fill his place.

The Cossacks of the Ukraine, who were organised by King Stephen Battory (who died in 1586), rebelled against Poland in 1648, and being unable to maintain themselves as an independent nation, they submitted to the czar of Muscovy in 1654, on condition that all their liberties and privileges should be preserved. But the Muscovites soon began to encroach on their liberties, and attempted to convert the Ukraine into a province and govern it like the other parts of their empire. Mazeppa, who was much in favour with Peter the Great, to whom he had rendered many eminent services, was strongly attached to the liberties of his adopted country, and is said to have made strong but useless representations against their violation. The victories of Charles XII. of Sweden induced Mazeppa, notwithstanding his great age, for he was then about seventy, to enter into a negotiation with him for the independence of the Ukraine, which Charles promised to establish if Mazeppa would join him with his forces. The negotiation was discovered by two colonels of the Cossack army, named Iskra and Koczubey, who reported it to Peter the Great. Peter was however so confident in Mazeppa's fidelity, that he gave up both the colonels as calumniators to Mazeppa, who ordered them to be beheaded.

According to his agreement with Mazeppa, Charles turned from the high road to Moscow, which he was pursuing, to the south, in order to join Mazeppa and spend the winter in the rich Ukraine, but the disasters which befell his army on a march during the severe winter of 1708-9 reduced it to a wretched condition; whilst the designs of Mazeppa being discovered, his capital, Baturin, was taken, after a desperate resistance, by the troops of Peter, and Mazeppa, being deserted by his army, joined Charles with an inconsiderable force. After the battle of Pultava he retired with Charles to the Turkish territory, where he died soon after.

MAZZUOLI. [Parmigiano.]

MEACO, or KIO. [Japan.]

MEAD, RICHARD, M.D., was born near London in 1675, and after studying in some of the most celebrated of the continental schools, took the degree of Doctor of Medicine at Padua in 1695. On his return to England, obtaining considerable reputation in his practice, he was appointed in 1703 physician to St. Thomas's Hospital, and in 1711 anatomical lecturer at Surgeons' Hall. He was also elected a Fellow of the Royal College of Physicians, and was physician to George II. On the death of his chief patron, the celebrated Dr. Radcliffe, Mead became the most renowned physician of the day, and was obliged to relinquish all his public offices. He employed the greater part of the wealth which he obtained from his practice, in the patronage of science and literature, and in collecting pictures, and a very valuable library, of which he bequeathed the greater part to the College of Physicians. He died in 1754.

Mead's principal works are, 'A Mechanical Account of

Poisons,' London, 1702; 'De imperio solis et lunæ in corpora humana, et morbis inde oriundis,' 1704; 'A short Discourse concerning Pestilential Contagion,' 1720, which was written at the request of the secretary of state, in reference to the contagious nature of the plague then raging at Marseille, for the prevention of which Mead recommended the most rigorous measures of quarantine and disinfection. Some papers on Grecian coins struck in honour of physicians, from which he inferred many interesting facts in the history of medicine, and on which he had a long discussion with Dr. Conyers Middleton. 'On the Scurvy,' 1749; this was published as an appendix to the account of the method of ventilating the holds of ships then lately invented by Sutton. 'On Small-pox and Measles,' 1748; containing a full account of inoculation, of which he had witnessed the first experiments in this country on some condemned prisoners. 'Medicina Sacra, seu de Morbis insignioribus qui in Bibliis memorantur,' 1748; 'Monita et Præcepta Medica,' 1751, containing a general summary of his medical experience. All these works, both individually and collectively, passed through several editions in this country, as well as in Germany, France, and Italy.

(*Authentic Memoirs of the Life of Richard Mead*, by Matthew Maty, M.D., 8vo., London, 1755.)

MEADOW SAFFRON. [COLCHICUM.]

MEADOWS are properly low grounds on the banks of rivers, which, being kept moist by their situation, and also occasionally flooded by the rise of the waters, are best adapted for the growth of grass, and are generally mown for hay. Some meadows of great extent, belonging to a community or district, in which every inhabitant has a right to send his cattle to graze, under certain regulations, are never mown.

When the number of those who have a right of common pasture is not very great, they frequently agree among themselves to abstain from depasturing the meadows in spring, and, dividing them into portions, each makes hay of his share; after which the cattle are admitted in common for the remainder of the season. Thus a common meadow is converted into a *Lammas meadow*, that is, a meadow which becomes a common pasture after the 1st of August, this being the time when it is supposed that all the hay has been made and secured.

When meadows are private property they become much more valuable. The flooding is encouraged or prevented, according to circumstances, and in many cases artificial irrigation is adopted. [IRRIGATION.] If they are exposed to be too often inundated, they are protected by dams and sluices.

The herbage of low wet meadows is generally coarser and less nutritious than that of those which lie higher: hence upland hay, as it is called, is preferred for the better sort of cattle. Good grass land, to which the floods never rise, is often called meadow land when the natural herbage is permanent, and frequently made into hay.

Upland meadows are very valuable wherever there is a demand for good hay. A considerable degree of attention is required to make them most productive. Not being annually recruited by flooding, they would soon degenerate if some pains were not taken to keep up their natural fertility. This may be done in various ways: the most obvious is to recruit them frequently with the richest animal and vegetable manure, which, being spread over the surface at a time when showers are abundant, that is, either early in spring or immediately after midsummer, is washed down to the roots of the grass. A rapid growth is thus produced, which is soon perceived by comparing the appearance of a meadow which has been manured with that of one left in its natural state. It has been asserted by many agricultural authors that the produce of hay is greater when the meadows are mown every year, provided they be occasionally manured, than when mown and depastured alternately. But the productiveness of a meadow depends entirely on the circumstances of soil and situation. A meadow, the soil of which is naturally of a rich nature, and adapted to produce fine grasses, may be mown year after year without any perceptible change in the quality of the hay; while another of inferior quality requires to be occasionally cropped close, to check the growth of the coarser grasses, and to allow the finer to rise. As to the effect of taking off the hay by mowing it, compared with that of the bite of cattle, there is little difference, except that in pasturing the grass is repeatedly cropped close to the ground as soon as it rises to such a height that the teeth of the cattle can sever it. It consequently spreads by the roots, and the pile becomes closer. The urine of the cattle greatly promotes luxuriant vegetation in rainy weather, but in hot dry weather it does more harm than good. The dung, when dropped on the grass, is of little or no value compared with what it would be if mixed up with straw, earth, or peat, or diffused through water in a tank. It is therefore an excellent practice to employ women and children to collect the fresh dung in the pastures, and to carry it to a heap of earth where it may be covered up, or to a tank where it may be diluted with water.

Of late years the practice of *soiling* has been extensively adopted; that is, all the grass is mown and carried every day, in a green state, to cows or horses tied up in a stable. By this means all the advantage of mowing for hay is obtained, besides an abundant supply of rich manure, which can be applied to the land in a liquid and diluted state, when its effect is powerful and certain. So much more fodder is produced from the land by the system of soiling, that arable fields are converted into artificial and temporary meadows, in which the different species of grasses are sown, in order to be cut green or made into hay; and when, from the nature of the soil, the herbage degenerates, the field is ploughed up again, greatly improved by this change of cultivation. [GRASS LAND.]

When a natural meadow has been neglected, and the grass is of an inferior quality, and mixed with rank weeds and moss, it requires much care to restore it to its original fertility. In most cases the shortest method and the best is to plough it up, clean and manure it during a course of tillage, without taking very exhausting crops from it, and then to lay it down again in a clean and enriched state, by sowing the best sort of grass seeds; or, which is preferable, by inoculating, or planting in it small tufts of grass from some rich meadow, which will soon increase, and produce a new and improved sward. But where the soil is a very stiff clay, with only a small depth of good mould over it, there is some danger in breaking the old sward, for it will take a long time and much manure to reproduce a proper covering of grass. In this case it is a preferable practice to scarify the meadow, by means of instruments which do not go deep, but only tear up the surface. If this is done early in spring, when the ground is moist, and the whole surface is brought to resemble a fallow field, good grass seeds may be immediately sown. If rich manure, mixed with lime or chalk, is then spread over the land, and the whole well harrowed and rolled, the old and young grass will spring up together, and show a wonderful improvement in a very few months. It is prudent to mow this renovated meadow before the seeds of the grasses are formed, contrary to a common notion that in a thin meadow the seed should be allowed to shed, in order to increase the number of plants. The notion is good, but it should be done by sowing seed produced on other ground: for the ripening of the seed tends to exhaust the soil. If the grass be cut before the flower is faded, the roots will soon spread, and produce a new and improved sward.

It must be observed that it is not indifferent what cattle are turned into the meadow after hay-making. Horses invariably produce coarse weeds by their dung and urine: cows may be depastured in autumn, as long as the surface is dry; but sheep are far more advantageous, and may be kept in the meadows at all times, if they are not too wet for the health of the sheep, and if there is no danger of their having the rot. As soon as the surface becomes soft by the autumnal rains, all heavy cattle should be excluded: every tread of a horse or cow at this time destroys a portion of good grass, and makes a hollow, in which the water remains, killing the finer grasses, and producing rushes and aquatic plants.

The meadows which are to be mown should be shut up early in spring, and those which are soft and wet should have nothing larger than a sheep in them from November till after hay-making time the next year.

MEAN. By the mean of two or more quantities is meant an intermediate quantity determined by mathematical rules. There are more ways than one of finding a mean, but the two principal results of this kind are called the *arithmetical* and the *geometrical* means. The names are not properly expressive of the distinction between them, but they are established by use.

An arithmetical mean is the simple AVERAGE, formed by adding the quantities together, and dividing by the number of quantities. A geometrical mean is the square root of the product of the quantities. Generally, let there be a number of quantities, x_1, x_2, x_3, &c., and let $\phi(x_1, x_2, x_3, \&c.)$ be a function of them which is symmetrical, that is, which is not altered when any two of them are interchanged; then if y be found from the equation

$$\phi(y, y, y, \&c.) = \phi(x_1, x_2, x_3, \&c.),$$

y may be called a species of mean.

The arithmetical mean, or average (which is always to be understood when the word mean is mentioned, unless the contrary be specified), is taken to be the most probable result of a number of discordant quantities, which would have been the same but for errors of observation or experiment. Thus if three measures of the same length give 122, 123, and 123·4, the mean of which is 122·8, it is presumed that 122·8 is more likely to be the real length which was attempted to be measured than any other. We confine ourselves in the present article to pointing out how it may be ascertained what degree of probability belongs to such results.

In assuming the average as the most probable result, it is presumed that any one measurement is as likely to err one way as the other; that is, as likely to be too small as too great. If nothing but results be known, this presumption is justifiable; but if it be known that there is more tendency to error of one sort than the other, the most probable result cannot be ascertained until it is found out by how much the average of a very large number of observations would be affected by this tendency. Say it is known that in the long run the average will be increased ·3 above the truth by a greater tendency to measure too much than too little; then 122·8 − ·3, or 122·5, is the most probable result of the preceding three observations.

It is obvious that when observations nearly agree with each other, the average must be nearly the truth required, and the nearer the agreement of the observations, the more nearly. If the observations do not agree well, the average is still more likely than anything else, but not so likely as before.

We now show how, having a number of observations, to determine the probability that the truth lies within a given degree of nearness to the average. A table must be used, which we here give to a greater extent than we should otherwise do, on account of succeeding articles. Let M be the average of a number of observations, and let M + m and M − m be the limits of which it is required to know what is the chance of the truth being between them. Take the difference between M and each of the results of observation, and add the squares of these differences. Multiply 100 times the number of observations by m, and divide by the square root of twice the sum just found: take the number nearest to the result in the column marked A, and opposite to it, in the column marked B, will be found the number of chances out of 10,000 for the degree of nearness required.

A	B	A	B	A	B	A	B	A	B	A	B
1	113	36	3893	71	6847	106	8661	140	9523	174	9861
2	226	37	3992	72	6914	107	8698	141	9539	175	9867
3	338	38	4090	73	6981	108	8733	142	9554	176	9872
4	451	39	4187	74	7047	109	8768	143	9569	177	9877
5	564	40	4284	75	7112	110	8802	144	9583	178	9882
6	676	41	4380	76	7175	111	8835	145	9597	179	9886
7	789	42	4475	77	7238	112	8868	146	9611	180	9891
8	901	43	4569	78	7300	113	8900	147	9624	181	9895
9	1013	44	4662	79	7361	114	8931	148	9637	182	9899
10	1125	45	4755	80	7421	115	8961	149	9649	183	9903
11	1236	46	4847	81	7480	116	8991	150	9661	184	9907
12	1348	47	4937	82	7538	117	9020	151	9673	185	9911
13	1459	48	5027	83	7595	118	9048	152	9684	186	9915
14	1569	49	5117	84	7651	119	9076	153	9695	187	9918
15	1680	50	5205	85	7707	120	9103	154	9706	188	9922
16	1790	51	5292	86	7761	121	9130	155	9716	189	9925
17	1900	52	5379	87	7814	122	9155	156	9726	190	9928
18	2009	53	5465	88	7867	123	9181	157	9736	191	9931
19	2118	54	5549	89	7918	124	9205	158	9745	192	9934
20	2227	55	5633	90	7969	125	9229	159	9755	193	9937
21	2335	56	5716	91	8019	126	9252	160	9763	194	9939
22	2443	57	5798	92	8068	127	9275	161	9772	195	9942
23	2550	58	5879	93	8116	128	9297	162	9780	196	9944
24	2657	59	5959	94	8163	129	9319	163	9788	197	9947
25	2763	60	6039	95	8209	130	9340	164	9796	198	9949
26	2869	61	6117	96	8254	131	9361	165	9804	199	9951
27	2974	62	6194	97	8299	132	9381	166	9811	200	9953
28	3079	63	6270	98	8342	133	9400	167	9818	210	9970
29	3183	64	6346	99	8385	134	9419	168	9825	220	9981
30	3286	65	6420	100	8427	135	9438	169	9832	230	9989
31	3389	66	6494	101	8468	136	9456	170	9838	240	9993
32	3491	67	6566	102	8508	137	9473	171	9844	250	9996
33	3593	68	6638	103	8548	138	9490	172	9850	260	9998
34	3694	69	6708	104	8586	139	9507	173	9856	270	9999
35	3794	70	6778	105	8624						

Suppose, for example, that seven observations give 10·03, 10·71, 10·98, 10·26, 10·30, 10·72, 10·81, the average of which is 10·54, differing from the respective observations by ·51, ·17, ·44, ·28, ·24, ·18, and ·27, the sum of the squares of which is ·7239, twice which is 1·4478, the square root of which is 1·203. Let it be required to find the chance of the truth lying between 10·54 + ·06 and 10·54 − ·06, we have then to multiply 700 by ·06, which gives 42, and to divide by 1·203, which gives 34·9. Opposite to 35 in the column A is found 3794, so that 3794 out of 10,000, or 3794 to 6206 is the chance of the result lying between the limits given: that is, nearly 31 to 19 against it. If the limits proposed had been 10·54 + ·1 and 10·54 − ·1, 700 multiplied by ·1 and divided by 1·203 would have given 58·2. Opposite to 58 in the table we find 5879, so that it is 5879 to 4121, or about 59 to 41, in favour of the result lying between 10·64 and 10·44.

In the preceding rule it is supposed that all the observations are equally trustworthy, or that there is no circumstance which would beforehand lead us to suppose that any one is more likely to be true than another. If this be not the case, no rule can be applied except one which depends on the observer's judgment. He must make the different observations reckon as different numbers of observations, allowing any one observation to count as more than one, if he believes it to be better than the rest. Thus suppose three observations to give 26, 28, and 29, and that it is thought there is reason to prefer 28 to the others, and 29 to 26, so that 28 ranks in the observer's mind as being as good as a mean of eight observations, 29 of six, and 26 of four. It must then be considered that there have been 8 + 6 + 4, or 18 observations, of which 8 have given 28, 6 have given 29, and 4 have given 26. These numbers, 8, 6, and 4, are called the *weights* of the several observations 28, 29, and 26, and the alteration in the preceding rule is as follows:—In forming the average, multiply each observation by its weight; add the result, and divide by the sum of the weights. Thus 8 × 28 + 6 × 29 + 4 × 26 = 502, which divided by 8 + 6 + 4, or 18, is 27·89, the most probable result. In finding the probability of the truth lying within given limits on one side or the other of this most probable average, let the average be M as before, and the limits M + m and M − m; take the difference between M and each of the results of observation, multiply the square of each difference by the weight of its observation, and add the results. Multiply 100 times the sum of the weights by m, and divide by the square root of twice the sum just found; take the number nearest to the result in the column marked A, and opposite to it in the column marked B will be found the number of chances out of 10,000 for the degree of nearness required. Thus if in the preceding instance we ask what is the chance of the truth lying between 27·89 + ·2 and 27·89 − ·2, we observe that 27·89 differs from the several results by 1·89, ·11, and 1·11, the squares of which multiplied by 4, 8, and 6, and the results added together, give 21·7778, twice which is 43·5556, the square root of which is 6·600. And 100 times the sum of the weights, or 1800, multiplied by ·2, is 360, which divided by 6·6 gives 54·6. Opposite to 55 in column A we find 5633 in column B; that is, we have 5633 to 4367, or about 56 to 44 in favour of the truth lying between the limits specified.

The inverse problem is as follows: given the observations, required the limits of difference from the average between which it is a given chance, a to b, that the truth shall lie. In both cases the first process is to turn $a:(a+b)$ into a decimal fraction of four places, and to take the numerator of such fraction.

Look for the numerator in column B, find the number nearest to it, and take out the number corresponding in column A. Multiply this by the square root used in the direct rule, and divide by 100 times the number of observations, or, if they are not equally good, by 100 times the sum of the weights. The quotient is the answer required. But when, as most frequently happens, an even chance is the given chance, use 47·7 instead of the number found in column A.

In the first of the given instances it is required to know within what limits it is 99 to 1 that the truth is contained. Here 99 :(99 + 1) is ·9900, and looking for 9900 in column B we find 9899 opposite to 182 in column A. Multiply 182 by 1·203, which gives 218·946, which divided by 700 gives ·313, so that it is 99 to 1 that the truth lies between 10·54 + ·313 and 10·54 − ·313.

In the second instance, required the limits within which it is an even chance that the truth is contained. Multiply 47·7 by 6·6, and divide by 1800, which gives ·175; and it is an even chance that the truth lies between 27·89 + ·175 and 27·89 − ·175.

The amount of departure from the average within which, on one side or the other, it is an even chance that the truth shall lie, is called the *probable error* of the observation or average of observations to which it refers. When the probable error of any one observation is given, that of the average is found by dividing it by the square root of the number of observations. Thus if there be 100 observations, of each of which it is an even chance that it is within ·1 of the truth; then the square root of 100 being 10, and ·1 ÷ 10 being ·01, it is an even chance that the average of the hundred observations is within ·01 of the truth.

For further account of the matters contained in this article, see PROBABILITIES, THEORY OF; OBSERVATION; RISK. For description of methods without demonstration, see Lardner's 'Cabinet Cyclopædia,' Essay on Probabilities. For demonstration, see the works of Laplace or Poisson on Probabilities, the article 'Probabilities' in the 'Encyclopædia Metropolitana,' or Mr. Galloway's article on the same subject (published separately), in the 'Encyclopædia Britannica.' The table may be found to greater extent in the first and two last articles cited, and also in the Berlin 'Astronomisches Jahrbuch' for 1834.

MEANDRI'NA, a genus of Lamelliferous corals. [MADREPHYLLIŒA.]

MEASLES (*Morbilli, Rubeola*) is the popular name of a contagious disease, characterised by an eruption on the skin, and affecting chiefly children.

The etymology of the word measles is uncertain, but its application to the disease we are treating of was probably borrowed from an appearance so denominated in pork, to which the eruption bears resemblance. Measles is ushered in by more or less fever, a running from the nostrils and eyes, with some inflammation of the latter, sneezing, hoarseness, a dry cough, difficulty of respiration, and occasionally slight soreness of the throat. From three to six days after the commencement of these symptoms a rash begins to appear, which first shows itself in distinct, red, and nearly circular spots, having some resemblance to flea-bites: these spots gradually coalesce and form small slightly elevated patches of an irregular figure, but approaching nearest to that of semicircles or crescents. The patches first show themselves on the forehead and face, and gradually extend downwards to the trunk and extremities. At the commencement of the eruption the catarrhal symptoms and fever are somewhat augmented, and during its height the whole face is often swollen and the eyelids thereby closed; on its decline, which begins on the fourth or fifth day, the fever ceases, and from those parts of the body previously covered by eruption the cuticle separates in small bran-like scales. A diarrhœa now commonly supervenes, and affords relief to the other symptoms. This however is the period when the danger, which is a consequence rather than a concomitant of measles, commences. The cough, which has continued throughout the active period of the disease, now assumes a more serious character; the expectoration, which hitherto has been simply mucus, indicative of the inflammation being confined to the mucous membrane of the bronchial tubes, becomes bloody, or mixed with pus, showing either that inflammation has attacked the proper substance of the lungs, or that tuberculous deposits have taken place in these organs, constituting pulmonary consumption. If the patient happily escape these dangers, others, less fatal indeed, but scarcely less to be dreaded, not unfrequently show themselves, among the most severe of which are obstinate ophthalmia and inflammation of the internal parts of the ear, the former not unfrequently terminating in partial or total loss of vision, and the latter in deafness. It must be confessed however that this is a picture, rather of what may and occasionally does happen, than of what takes place in the majority of instances; such severe terminations of the disorder are confined chiefly to the ill-fed and ill-clad children of the poor, and to the more sickly ones of the opulent. Measles frequently occurs as an epidemic, in this country usually at the beginning of spring. These epidemics vary considerably in character, being sometimes benign, at other times very fatal, and occasionally they are observed to prevail in conjunction with small-pox; like the latter disease, measles rarely attacks the same individual twice. Experiments have been made to determine how far inoculation with the blood of the parts on which the eruption appeared might succeed in moderating the violence of the disease thus artificially produced; but the cases in which it was tried were not sufficiently satisfactory to warrant its general adoption. Measles, before the outbreak of the rash, may be mistaken for severe catarrh; the eruption itself is liable to be confounded with that of Roseola, Scarlatina, Strophulus, Lichen, Urticaria, incipient small-pox, &c.; but the crescentic shape of the patches and the catarrhal character of the other symptoms can hardly fail to remove any doubt as to the nature of the disease. With respect to the treatment, little is required during the eruptive stage of the disorder, which is seldom attended with danger. It is chiefly necessary to open the bowels, to confine the patient to a light vegetable diet, with cold acidulated aqueous drinks, and to maintain a cool temperature in the room, which should be moderately darkened. Where the skin is dry and hot, sponging it with cold water has been recommended and practised with benefit. The old practice of confining the patient in heated chambers, and covered with an overwhelming quantity of bedclothes, is now justly abandoned: the free use of the lancet during the eruptive period of the disease is likewise laid aside, and its employment restricted to those cases in which any of the vital or important organs are threatened or attacked by inflammation. Should this take place, bloodletting by lancet, cupping, or leeches, aided by blisters and such medicines as act most efficaciously in reducing inflammation, must be had recourse to. Cases in which the vital powers are low, to which the name Rubeola Putrida has been applied, of course will require an opposite mode of treatment, as the exhibition of bark, the mineral acids, and wine, together with a nutritious diet and a pure atmosphere: these too are the remedies which prove most serviceable in checking the diarrhœa, if injuriously protracted.

MEASURE. One number or magnitude is said to measure another, when the first is contained an exact number of times in the second. [INCOMMENSURABLE; PROPORTION.]

MEASURES. [STANDARDS; WEIGHTS AND MEASURES.]

MEATH, formerly distinguished as **EAST MEATH**, an Irish county in the province of Leinster; bounded on the north by Monaghan, on the north-east by Louth, on the east by the Irish sea, on the south-east by the county of Dublin, on the south by Kildare, on the south-west by King's County, on the west by West Meath, and on the north-west by Cavan. Its form is very irregular. Its greatest length is from the coast of the Irish Sea near Gormanstown on the east, to the bank of Lough Sheelin, or Shillin, on the west, 47 statute miles; its greatest breadth, at right angles to the length, is from the border of the county of Monaghan on the north, to the junction of the three counties, Kildare, King's County, and Meath, on the south, 39 or 40 miles. The area of the county of Meath is estimated at 488,758 statute acres, or nearly 764 square miles.* The population by the census of 1831 was 176,826, giving 231 inhabitants to a square mile. In size it may be compared with the English county of Westmoreland; in amount of population, with Northampton; and in density of population, with Durham. Trim, the assize town, is about 25 miles north-west of Dublin.

Surface; Coast-line; Geological Character.—The loftiest elevations are in the western part of the county, just to the south of the Cross-Water stream, which separates this county from Cavan. The principal hill is Sliebhnalliagh, near the village of Loughcrew, between Oldcastle and Crossakeel. There are considerable elevations also in the north-east part of the county, on the north bank of the Boyne about Slane and Newtown Fortescue. Various other parts of the county are hilly, but not so much as the districts just mentioned. (*Maps subjoined to Irish Railway Commissioners' Second Report; Population Returns.*)

The coast has a tolerably straight outline running south by east from the mouth of the Boyne to the boundary of the county of Dublin near Gormanstown. The shore is low, skirted by sand-banks or hills, and broken by one or two small streams which flow into the sea.

The county of Meath is for the most part included in the great central carboniferous limestone district of Ireland; the whole of the southern part of the county, and considerable portions of the north and west, are occupied by this formation. The limestone districts are comparatively low and flat, as they usually are in Ireland, while in England they have, from their ruggedness and elevation, given to their component rocks the distinctive designation of mountain limestone. A part of the Meath limestone-beds belongs to the calp or black shale series, composed of alternations of impure black argillaceous limestone with black shale containing balls of grey ironstone. From beneath the beds of the calp series, those of the lower limestone crop out. It is probable that from beneath these the lowest series of the carboniferous limestone beds are found cropping out near the limits of the limestone district; this lowest series consists chiefly of a yellow sandstone, sometimes interstratified with dark-grey shale and dark-grey limestone; in some localities it contains very thin beds of impure coal.

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* We take this from the 'Parliamentary Returns.' The table given with Mr. Larkin's Map published by the grand jury of the county, A.D. 1817, makes the area 566,657 statute acres; and that subjoined to the Map of Ireland published by the Society for the Diffusion of Useful Knowledge, 575,413 acres.

The hilly parts of the county belong to the transition district, which extends from the coast of the county of Down into the counties of Longford and Roscommon. The rocks of this district are greywacke-slate, fissile clay-slate, flint-slate, and chlorite-slate. A small tract, insulated in the midst of this transition district, is occupied by the rocks of the limestone formation already described, and by a small coal-field, the beds of which rest upon the limestone. This coal-field is partly in the county of Monaghan, partly in that of Cavan, but chiefly in Meath. Many trials have been made, but no coal worth working has been found. (*Irish Railway Commissioners' Second Report*, Appendix; and *Geological Map.*) Limestone and marl are abundant.

Rivers.—The county belongs almost entirely to the basin of the Boyne; a small portion in the northern part of the county belongs to that of the Dee; the heights about Slane separating the two. The southern and south-eastern borders are watered by the affluents of the Liffey, or by some smaller streams which flow into the sea between the Liffey and the Boyne.

The Boyne touches the border of the county at its south-western extremity, and after dividing it for a few miles from the county of Kildare, passes within the boundary and flows in a winding channel north-east by Trim to Navan, where it receives the Blackwater, its chief tributary. The Menagh (which skirts the south-western border of the county till its junction with the Boyne at the spot where the latter first touches the border), the Blind, the Blackwater (which divides Meath on the south side from the county of Kildare), and the Deel, all small streams, join the Boyne before it receives the greater Blackwater. From the junction of the last, the Boyne flows east-north-east by Slane to the border of the county, and from thence along the border (separating Meath and Louth) into the sea at Mornington, below Drogheda. The length of that part of the Boyne which is in the county of Meath or upon the border is about 56 miles. It is navigable in the natural bed of the stream to above Drogheda (where it is crossed by a bridge), and afterwards partly in the natural bed and occasionally by a lateral cut or canal, to the junction of the Blackwater at Navan, about 23 miles from its mouth. The Blackwater touches the border of the county on the north-west side at the junction of the Crosswater, a small brook which, as well as the Blackwater itself, separates Meath from Cavan. The Blackwater soon quits the border and flows east-south-east, 18 miles, into the Boyne at Navan. It passes near the town of Kells. It receives a considerable stream, to which the maps give no name, from the border of the county near Moyonalty. The continuation of the Boyne navigation to Trim, and the making of the Blackwater navigable to Kells, would be of the greatest advantage to the county.

The Nobbor rises from some bogs and small lakes on the northern side of the county near Kilmainham; it flows in a winding course, first south-east, then north-east until it quits the county to enter that of Louth, where it unites with the Dee. Its length in this county is about 18 miles.

Lakes.—There are several small lakes. Lough Sheelin, which separates the counties of Meath and West Meath from that of Cavan, is of an oval form, 5 miles long from north-east to south-west, and about 2½ miles broad. It contains a small islet, called Church Island, with the ruins of an old church in it. Lough Bawn, 1½ mile long, but very narrow, and some smaller lakes, are on the western border of the county. The lake of Kilmainham, formed by an expansion of the river Nobbor, is about one mile long and above a quarter of a mile broad. Bogs are numerous, but the aggregate of their extent is small: the largest bog is on the border of the county south-west of Athboy; it is partly in Meath and partly in West Meath. (*Railway Commissioners' Reports;* Larkin's *Map.*)

Canals, Railroads, and other Communications.—The Royal Canal enters the county near Kilcock (Kildare county), and runs for some miles just within the border, occasionally quitting it for the adjacent county of Kildare. It is carried by an aqueduct over the smaller Blackwater and by another aqueduct over the Boyne, soon after crossing which it enters West Meath. About 14 or 15 miles of this canal are within the county. It opens a communication with Dublin at one end, and the Shannon, near the town of Longford, at the other.

A railroad from Dublin to Drogheda, for which an act has been obtained, is to cross the county from south to north along the coast. The lines laid down by the government commissioners for the railroads from Dublin to Enniskillen and Armagh respectively also cross this county. They coincide in the first part of their course, entering the county on the south side near Dunboyne, about 8 miles from Dublin, and running from thence north-west about 20 miles to Navan. Here the lines separate; that to Armagh running north about 17 miles, till it enters the county of Louth; and that to Enniskillen continuing to pursue a north-western direction about 16 miles, till it enters the county of Cavan. Surveys have been laid before the commissioners for the following railway lines across this county. One from Dublin to Sligo and Galway crossing the county from Kilcock (county Kildare), nearly parallel to the Royal Canal, into the county of West Meath. A branch from this by Trim passes to the Enniskillen line at Kells; and a branch from the Enniskillen line near Kells runs westward into the county of West Meath, joining the Sligo line at Longford. A line collateral to the Armagh line and to the east of it passes near Ratoath and Slane, and another line runs from Navan to Drogheda.

The principal coach-road is that from Dublin to Drogheda, Dundalk, Newry, and Belfast, with a branch to Armagh. From Dublin to Drogheda this road has two branches, one near the coast through Gormanstown, the other more inland. There are well frequented roads from Dublin to Virginia, Cavan, and Enniskillen, through Dunshaughlin, Navan, and Kells; from Dublin to Granard by Trim and Athboy, with a branch by Old Castle to Killyshandra; and from Dublin to Longford, Carrick on Shannon, and Sligo by Clonard, in the south-west part of the county. A considerable number of passengers travel by the Royal Canal from Dublin and Kilcock to Mullingar in West Meath. The principal roads for the conveyance of goods are from Dublin by Navan and Kells to Virginia; and from Drogheha (one of the principal ports of Ireland) by Slane to Kells, and by road to Navan. The land traffic on this latter line would probably be greater but for the communication between the towns of Drogheda and Kells by means of the navigation of the Boyne. There is considerable traffic also from Dublin to Trim and Athboy, and from thence to Oldcastle; also from Kells to Oldcastle on one hand, and to Bailyborough (county Cavan) on the other. (*Railway Commissioners' Second Report.*)

The county appears to be on the whole tolerably well provided with roads.

Soil; Agriculture; Condition of the People.—This county has very few mountain-wastes, and the proportion of bog is small. The land is for the most part flat rich pasture-land. There are a few fine domains, especially those of the marquis of Conyngham and of the Lambert family, near Slane, and that of the marquis of Headfort, near Kells; and there are many gentlemen's houses scattered through other parts of the county. The soil is for the most part a loam of the richest character, and in many places of such depth that the turning up of a fresh portion of the soil by ploughing deeper than usual is considered as an efficient substitute for manuring. In some baronies animal manure alone, or mixed with bog-stuff or peat, is chiefly used; in others 'marl-sand,' a valuable mixture of calcareous matter and alluvial deposit, is used; and also lime. The farms vary in size from 2 acres to 3000 acres, but are on the average larger than in most other parts of Ireland; the grazing farm average about 150 acres; and tillage farms 20 to 50. The mode of farming, though very slovenly and defective, bears some resemblance to that of England. Summer fallows though coming into disuse, have been considered necessary, owing to the rank luxuriance of the weeds. The rotation of crops in small farms is, usually, fallow or potatoes with manure; second year, wheat; third year, oats; and, frequently, fourth year, oats. Larger farmers sow clover the fourth year, which remains one year or more, and is followed by oats; a few sometimes grow barley instead of wheat the second year. The practice of growing potatoes as a preparation for wheat, instead of leaving the land fallow, is increasing. Flax is seldom grown in large quantities for sale, but small patches for domestic use are general: a strong kind of dowlas and some sheetings are made from it in the country. Turnips, mangel-wurzel, vetches, rape, grey and white peas, beans, and cabbages, are cultivated, but not generally; turnips are grown only by the wealthier farmers, who unite grazing with tillage, and are chiefly used for feeding sheep; cabbages succeed well, but the expense of transplanting, and the liability to depredation, are great objections to this crop. The whole quantity of land devoted to green crops is small, in consequence of the abundance of the natural pastures, which are of unequalled richness, and have led the farmers to give their chief attention to grazing. The growth of clover and vetches is however gaining ground.

The quantity of cattle fattened in the pastures of the county is considerable; but as the rent of land is too high to admit of its being used to breed stock, the cattle which the graziers intend to fatten are collected from various parts. The English long-horned breeds were introduced many years ago, and some of the best specimens in Ireland are to be found in Meath. The breeds most in request are the Durham 'short-horned' and the Hertford breed for fattening, and the Ayrshire for milch cows. After being bled, the cattle are turned out until they are fit for the butcher. The pastures are opened in May for grazing the stock designed to be fattened in the ensuing summer. The best-conditioned of the heifers, which are half fat, are put to the forwardest grass, and supply the Dublin market in June, July, and August, when beef bears the highest price. The season for slaughtering cattle to supply shipping with salt provisions commences in September, and after its commencement the graziers rely chiefly on the northern buyers, who purchase the cattle at the fairs in or near the county, and sell the beef for home consumption, or salt and barrel it for exportation.

Meath, in regard to the quality of its grazing land, is the first county in Leinster, and grazing is carried on on a large scale. Many persons fatten from 300 to 500 cows in a season, besides bullocks and sheep. Oxen are frequently employed in the plough.

On many farms the landlord supplies land, horses, and a succession of cows in milk; the tenant furnishes labour and utensils, and pays for making the hay used by the cows. The skim-milk is mixed with the butter-milk, and sold to the retailers of Dublin, who vend it to the poor. From December to May the dairy-cows are fed on hay, straw, or a mixture of both, and are housed at night.

There are large flocks of sheep kept by the more extensive farmers; the small farmers rarely keep any. A good deal of mutton is fattened, but few of the sheep are bred in the county. They are chiefly purchased at the fair of Ballinasloe (county Roscommon) in October; some of these are fed during the winter on rape and turnips, and are sold at Dublin in the spring; the rest are turned out into the pastures previously used for the summer stock of cattle, and are fed in addition with hay. In May and June, after shearing, or perhaps in July or August, they are fat enough for the Dublin market.

From the low price of corn and the rise of the value of wool and stock consequent on the more rapid and certain communication with England, grazing has been for some years increasing.

The horses are generally inferior. Every farmer who holds a hundred acres and upwards keeps one or two mares, which he breeds from, and works to within about a fortnight of the time of their dropping their foals: these he rears, and in the spring before they are three years old he either sells them in the halter or works them in his own team; from which time to the day of their death they lead a life of hardship, and often of starvation. Bad feeding and hard working in their youth prevent their growing to their full size.' A large, long, blood horse, which sells for a high price, is much reared in this county.

Pigs are of a good breed, and are nearly or quite as common as in most other parts of Ireland. Poultry is abundant and cheap. Bees are kept in several districts.

Draining appears to be better understood in Meath than in many other parts, though there is much need of its being further extended. Under-drains are constructed on a peculiar but efficient plan.

Wood is not abundant, ground being too valuable to be occupied by plantations, except about noblemen's and gentlemen's demesnes for the purpose of ornament. Plantations for this purpose are however numerous, and timber-trees are common in the hedge-rows. Oaks are scarce; the beech, elm, ash, sycamore, poplar, and alder are more plentiful. There are several nursery-grounds, especially a very extensive one near Navan. From the small extent of the bogs and the deficiency of wood, fuel is scarce, and the poor often suffer severely from the want of it. (Wakefield's *Account of Ireland.*)

The population is most dense in the northern and western parts of the county, where there are 200, and in one part (the barony of Morgallion) 240 inhabitants to a square mile. In the south-western parts, and around Slane, and on the coast, the proportion is about 170 inhabitants to a square mile. In the central and southern parts the population is thinner, varying from 110 to 140 persons to a square mile. The disproportion between the demand and supply of labour varies. In some parts there are no destitute poor, the residence of the proprietor furnishing employment, and the limitation or decrease of the number of cabins repressing the increase of population; but this absence of destitution in some spots is counterbalanced by the throngs of unemployed and destitute poor on the edges of commons and bogs, in poor villages, and in the suburbs of towns. In the baronies of Upper and Lower Kells, which are among the most densely peopled, from one-fourth to one-tenth (the proportion varying in different parishes) of the labourers are in constant work, about one-tenth are almost constantly out of employment, and the remainder are employed from two to eight or nine months in the year. Men's wages are about 10*d.* per day, except in winter, when they fall to 8*d.*, and in harvest, when they rise to 1*s.* 3*d.* or 1*s.* 6*d.*; boys under sixteen years earn usually about 4*d.*, in winter 3*d.*, and at harvest 6*d.* to 8*d.*; women earn 4*d.* to 6*d.*, and in harvest 6*d.* to 10*d.*, but have no work at all in winter Wages are not usually paid in kind, except to herds and shepherds, who have meal, potatoes, or grass for a cow or several sheep, to the amount of about half their wages. In harvest-time it is usual to pay the labourers partially in food. From low wages and insufficient food, combined perhaps with other causes, the peasantry are neither so skilful nor persevering in labour as the English. The cottiers generally keep a pig, though in many cases a pecuniary loss is incurred: the reason for this apparently unprofitable practice was shrewdly stated to the commissioners for inquiring into the condition of the Irish poor, by a peasant, who observed that 'his pig was his savings' bank; for that he was obligated to save every penny that he could to feed him, and he did not so much miss it a little at a time; and that it came in again all in a lump, when he sold him to pay his rent.' The wives of the labourers generally rear fowls, and they make a trifle by the sale of the eggs and chickens.

The only home manufactures are a little coarse linen, sometimes, though rarely, a little coarse frieze coating, and the knitting of coarse worsted stockings, which last branch of industry is still pretty commonly done by girls, widows, and old women, who earn at this work about 1*s.* 3*d.* a week. Spinning and weaving, from the cheapness of manufactured goods, have almost entirely ceased.

Potatoes form the chief food of the labourer: oatmeal is used in summer by those in good employment, and on some particular occasions they have an egg, a herring, or a morsel of bacon as a treat. Small farmers eat herrings, eggs, and butter; but no meat, except sometimes a little of their own bacon. The cabins of the peasantry are wretched. Of furniture they have scarcely anything: the master of the house (with his wife, if married) sleeps on a frame of rough wood, split poles, stout sticks, &c., raised off the floor by stone blocks or other supporters, and called a bedstead; the rest of the family sleep on the floor; the only bedding is straw rushes, or, in a very few cases of unusual luxury, a piece of coarse sacking tick filled with chaff. An old threadbare blanket, often full of holes, pieces of old carpet with the day clothes of the family, form the night covering. The most miserable habitations are in the suburbs of towns and around bogs. Cases of bastardy are very rare, and incur general opprobrium; but this opprobrium falls too heavily and exclusively on the weaker party. Drunkenness is rare among the labourers and their wives; more frequent among the small farmers and tradesmen. (*Report of the Commissioners for inquiring into the Condition of the Irish Poor.*)

There is no return of the quantity of corn sold in the principal markets for the ten years last before 1836.

Divisions, Towns, &c.—Meath is divided into eighteen baronies, which, with their relative position, and population in 1831, are as follows:—

1.	Deece, Lower	Central	3,931
2.	Deece, Upper	S.	5,294
3.	Demifore or Half Foure	W.	13,717
4.	Duleek, Lower	E.	10,020
5.	Duleek, Upper	E.	8,941
6.	Dunboyne	S.E.	2,698
7.	Kells, Lower	N.W.	13,666
8.	Kells, Upper	N.W.	20,462
9.	Lune	W.	12,212
10.	Morgallion	N. and Central	11,990
11.	Moyfenragh, Lower	S.	11,893
12.	Moyfenragh, Upper	S.W.	8,631
13.	Navan, Lower	Central	16,234
14.	Navan, Upper	Central	4,857
15.	Ratoath	S.E.	6,685
16.	Skreen or Skryne	Central	8,683
17.	Slane, Lower	N.	9,647
18.	Slane, Upper	N.E.	7,265
		Total	176,826

Population.

Date.	How ascertained.	Houses.	Families.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort	22,468	..	..	..	..	..	..	112,400
1813	Under Act of 1812	25,921	..	..	..	..	..	..	142,479
1821	Under Act 55 Geo. III., c. 120	27,942	30,125	..	..	..	79,778	79,405	159,183
1831	Under Act 1 Will. IV., c. 19	29,796	31,632	22,396	4,575	4,661	88,993	87,883	176,826

The towns are—the assize, market, and post town of Trim, the market and post towns of Athboy, Duleek, Kells, Navan, Oldcastle, and Slane; the post towns of Ashbourne, Clonard, Clonee, Crossakeel, Dunshaughlin, Enfield, and Nobber; and the ex-parliamentary borough of Ratoath.

Trim, Athboy, Kells, and Navan, and the village of Duleek, were all formerly parliamentary boroughs.

Trim is partly in the barony of Upper Navan, but chiefly in that of Lower Moyfenragh, 32 English miles from Dublin. It is a very antient town: on the conquest of this part of Ireland by the English, it was conferred, with the rest of the county, on Hugh de Lacy, who made it a free borough. His son Walter gave it a charter of incorporation: and as the head of the lordship of the De Lacys, it acquired importance, and several of the early Irish parliaments were held here. In the civil war of 1642, the Catholics who held it were expelled, and the Parliamentarians garrisoned it under Sir Charles Coote; but he being killed, the place appears to have been lost, for in 1649 it was held by a royalist garrison, which quitted it on the approach of Cromwell, intimidated by the massacre of the garrison of Drogheda.

The town is pleasantly situated on the river Boyne: many of the houses are neatly built, and the environs are pleasant. There is an old bridge over the river, and an antient castle of venerable appearance; the keep, a massy pile strengthened by four round towers at the corners, is yet standing, as well as several of the outworks. The church is modern, except the tower, which is of great antiquity. There are some remains of an antient abbey; and a handsome Corinthian column erected in honour of the Duke of Wellington.

The population of the town in 1831 was 3282; 400 of them Protestants, the rest Catholics: that of the outparts of the parish, which is extensive, was 2644: together, 5926. The place has been declining for years, and presents on the whole a very impoverished appearance. It has no extensive trade or manufacture; the principal traffic is with Dublin and Navan. The market, which is on Saturday, has increased: there are five yearly fairs. The assizes are held here, and the quarter-sessions for the division twice in the year. The county court-house and gaol are here. The town returned members to the Irish parliament, but was disfranchised at the Union. The corporation consists of a portreeve, burgesses, and freemen, who are all now members of the Established Church. The living is a vicarage, united to several other benefices, and the town is at the head of a Roman Catholic district or union. Trim is the head-quarters of the constabulary police, and the residence of the inspecting magistrate.

Athboy is in the barony of Lune, 7 miles north-west of Trim, and 36 from Dublin. It is an antient borough: the municipality received a charter from Henry IV.; and Elizabeth conferred on the place the elective franchise, which it lost at the Union. The corporation then fell into disuse, and is now extinct. The town has a population of 1959; the outparts of the parish (which is extensive) of 3358: together, 5317.

There are four fairs in the year. The town is the chief station of the constabulary force for the district: petty sessions are held weekly. There are extensive flour-mills, but the town is poor, and does not seem to be improving. The living is a vicarage attached to the union of Athboy; the parish is also the head of a Roman Catholic union. There are a dispensary, almshouses for twelve poor widows, and several schools.

Duleek is partly in the barony of Upper Duleek, but chiefly in that of Lower Duleek, on the Nany or Nannywater. There were antiently three religious houses, of two of which the ruins yet remain; and the town was the seat of a bishopric, ultimately merged in that of Meath. There were, in 1831, 233 houses and 1217 inhabitants in the town; and 733 houses and 4190 inhabitants in the whole parish. There was formerly an extensive manufacture of ticking, but it is now much diminished. There is a market on Thursday, and there are four yearly fairs. Races are held in the neighbourhood. Petty sessions are held here, and the town is one of the stations of the county constabulary force. Duleek returned members to the Irish parliament, but was disfranchised at the Union, and the corporation became extinct. The parish is part of a union, both in the Established and Catholic churches. The parish church is a modern building; the Catholic chapel is a handsome Gothic edifice, and has a school-room adjoining. There are in the parish several public schools and a dispensary. There are in the town two stone crosses, and in the parish another elaborately carved.

Kells is in the barony of Upper Kells, nearly 40 miles from Dublin through Navan. It is a town of great antiquity, and, previous to the arrival of the English, had a monastery of regular canons. It was fortified by the English with a castle and walls. The monastery, which had been plundered, was endowed with new grants by Hugh de Lacy; and Walter de Lacy, son of Hugh, founded another monastery for Crouched friars. The town became flourishing, but the dissolution of the monastic establishments and the repeated wars which desolated the country caused its decay.

Kells is pleasantly situated on the south bank of the Blackwater. The principal street is very broad; the streets generally are well kept, and the town presents an appearance of neatness. The population of the town, in 1821, was 3618; in 1831 it had increased to 4326: the population of the whole parish was 6839. The market, which is held on Saturday, has so increased as to have rendered an enlargement of the market-place necessary. The quarter-sessions for the division are held twice in the year at Kells, twice at Navan. There are a bridewell and a fever hospital. It is the station of a chief constable and fifteen others of the county constabulary police.

There is a corporation, consisting of a sovereign, two provosts, and twenty-four burgesses; with a recorder and other officers. The sovereign, the provosts, and a few of the burgesses constitute the common-council or managing body: they have no jurisdiction. Kells returned members to the Irish parliament from the time of Elizabeth to the Union. The parish is at the head of a parochial union, both in the Established Church and among the Catholics. The parish church is an antient building; near it is an antient round tower, unroofed, about 90 feet high. There are two fine old crosses, one in the church-yard and one in the street near the market-place; also an antient stone roofed cell or chapel.

Navan is in the barony of Lower Navan, 29 miles from Dublin, and at the junction of the Blackwater with the Boyne. The principal streets are kept in repair by the county. There are two bridges, one over the Blackwater and the other over the Boyne. There are a court-house, containing rooms for holding the sessions and a suite of assembly-rooms; a bridewell, a county infirmary, and a fever hospital. The parish church is a neat modern building; the Roman Catholic chapel is an extensive building of Grecian architecture. The population of Navan, in 1831, was 4416; that of the whole parish 5292. The town is in the centre of a great corn district, and has an excellent corn-market on Wednesday; there is a market also on Saturday; there are four yearly fairs. There are several corn-mills, a linen yarn-mill, and a woollen manufactory near the town. Some sacking and packing canvas are made. The corporation consists of a portreeve and twelve burgesses, with a town-clerk and other officers. The portreeve acts as a justice of the peace for the borough conjointly with the county magistrates. Navan returned members to the Irish parliament from the time of Elizabeth till the Union. Petty sessions are held here every fortnight, and the quarter-sessions for the division twice in the year. The parish is at the head of a union, both in the Established and Catholic churches. There are several schools; one of them a Catholic seminary for youths designed for the priesthood or either of the learned professions.

Oldcastle is in the barony of Demifore or Half Fowre, 58 miles from Dublin. The town comprehends 237 houses, and a population of 1531; the whole parish has 778 houses, and a population of 4718. There are a church, a plain modern building; a large but plain Catholic chapel; and a Primitive Methodist chapel. There is a large school-house for a Lancasterian school, capable of containing 1000 children. This school has an endowment of 800*l.* a year. Petty sessions are held here every fortnight; and the market, which is on Monday, is one of the largest yarn-markets in the county. There are extensive corn-mills near the town. There are three considerable yearly fairs. There are considerable limestone quarries and large flour-mills in the parish. The living is a rectory not united; the parish is included in a Catholic union.

Slane is in the barony of Upper Slane, 28 miles from Dublin. In the early ages of Christianity it was the seat of a bishopric. The town is pleasantly situated on the north bank of the Boyne, over which there is a bridge. The surrounding country is rich; and the houses are chiefly modern and of neat appearance. Slane Castle, the seat of the marquis Conyngham, is on the bank of the river just above the town. The population of the town, in 1831, was 896; of the whole parish, 2516. The parish is the head of a Catholic union: the living in the Established Church is a rectory, in the gift of the crown. There are several schools. There is a group of tumuli in the neighbourhood; the largest is a mound 70 feet high, and having at the top an irregular area, 300 feet in circumference. This mound, when opened, was found to conceal the entrance to a gallery leading to a remarkable excavation or cavern. Slane is one of the stations of the county constabulary force.

Ashbourne is a small place in the barony of Ratoath, 13 or 14 miles from Dublin on the road to Londonderry. It is a small place containing 60 houses and a population of 473. It has a Catholic chapel, a neat modern building.

Clonard, in the barony of Upper Moyfenragh, 33 miles from Dublin, was a place of note in antient times. It had an abbey which became the seat of a bishop, whose diocese was augmented, previous to A.D. 1152, by the addition of the bishoprics of Trim, Ardbraccan, Dunshaughlin, and Slane. This diocese was afterwards designated the diocese of Meath, but the cathedral continued to be at Clonard till A.D. 1206. The abbey had previously been repeatedly plundered by the Danes or the natives; and about A.D. 1175 Hugh de Lacy erected an Augustinian monastery, probably on its ruins. Clonard was the scene of conflict in the war of 1641 and the insurrection of 1798. It is a station of the county constabulary police, though a mere village or hamlet of 10 houses and 66 inhabitants. There is a large Catholic chapel in the village, the parish church is half a mile distant.

Clonee is in the parish and barony of Dunboyne, just within the boundary of the county, about 9 miles from Dublin, on the road to Navan. Clonee is a station for the county constabulary force. The population in 1831 was 217.

Crossakeel is about 46 miles from Dublin. It is in the parish of Kilskyre, or Kilskeer, and in the barony of Upper Kells. Petty-sessions are held here once a fortnight and it is a station of the county constabulary force: there are three yearly fairs. The parish church is in the village, and there is a dispensary. The population of the village in 1831 was 290; of the whole parish, 4537.

Dunshaughlin, in the barony of Ratoath, 17 miles from Dublin, was formerly a corporate town. It is now a post town or village of 157 houses and 913 inhabitants for the town, or 261 houses and 1940 inhabitants for the whole parish. It has a parish church of modern erection, and a Catholic chapel. The petty-sessions are held every fortnight, and the quarter-sessions for the division, twice in the year: it is a station for the county constabulary force. There is a dispensary in the town, and there are two public schools.

Enfield is in the parish of Rathcore and in the barony of Lower Moyfenragh, 26 miles from Dublin, near the Royal Canal. It is a station of the county constabulary. It had in 1831, 45 houses and 302 inhabitants.

Nobber is in the barony of Morgallion, 40 miles from Dublin. It was antiently a fortified town, and was regarded as of importance. It now contains 58 houses and 371 inhabitants; the whole parish has 671 houses and 3952 inhabitants. The church is a plain neat building; the Catholic chapel is also a neat building of modern erection; and there is a school-house. Near Nobber is a large Danish camp, and in the churchyard are the remains of a structure, supposed to have belonged to the Knights of St. John of Jerusalem. There is a well attended cattle and pig fair. Nobber is a constabulary police station. Carolan, the celebrated Irish harper, was born here.

Ratoath is in the barony of Ratoath, 15 miles from Dublin. It was a parliamentary borough previous to the Union, by which it was disfranchised. There were in 1831, 96 houses and 552 inhabitants in the town, or 283 houses and 1779 inhabitants in the whole parish. There are three yearly fairs, but no market; a trifling manufacture of sacking and of linen is carried on. It is one of the stations of the county constabulary force.

Ecclesiastical and Legal Divisions.—The county is for the most part included in the diocese of Meath; but small portions are comprehended in those of Armagh and Kilmore; all these dioceses are in the ecclesiastical province of Armagh. The county is included in the home circuit. The assizes are held at Trim. The Easter and Michaelmas sessions for the two divisions of the county are held at Kells and Dumshaughlin; the Hilary and Midsummer sessions, at Trim and Navan. Before the Union Meath sent 14 members to the Irish parliament, two for the county, and two each for Trim, Kells, Navan, Athboy, Duleek, and Ratoath; at present it sends only the two county members, who are elected at Trim.

The police force of the county on 1st January, 1836, was, 1 magistrate, 7 chief constables, including subinspectors (of whom 5 were of the first and 2 of the second class), 58 constables, and 266 subconstables, with 9 horses. The cost of maintaining the constabulary for 1835 was 11,893*l.* 13*s.* 4*d.*, of which amount 6197*l.* 3*s.* 4*d.* was chargeable against the county.

The county-gaol at Trim has been much improved, as respects the male side of the prison, but much is yet requisite to be done to bring the discipline of the prison to what it should be. It is clean; the prisoners generally are classified, and considerable advance has been made in the system of instruction in trades. There are two schools in the prison, and a treadmill. The bridewells at Navan and Kells are both tolerably extensive prisons, containing sixteen cells, two day-rooms, and two yards; they have every means of classification required by the Prison Act. (*Appendix to Fourteenth and Fifteenth Reports of Inspectors-General*, 1836.) The number of persons committed for criminal offences in 1836 was—for offences against the person 85 (44 convicted, 41 acquitted or discharged); for offences against property committed with violence 28 (convicted 9, acquitted or discharged 19); for offences against property without violence 107 (convicted 54, acquitted or discharged 53); for malicious offences against property, such as arson, killing or maiming cattle, and the like, 4 (1 convicted, 3 acquitted or discharged); for forgery and offences against the currency 4 (2 convicted, and 2 acquitted or discharged); for other offences 105 (45 convicted, 60 acquitted or discharged): making a total of 333 persons committed, of whom 155 were convicted and 178 acquitted or discharged. There was no person executed. Of the persons committed, 277 were males (1 of them under 16 years) and 56 females (1 under 16): 71 could read and write, 54 could read only, and 110 were entirely ignorant; of 98 the degree of instruction they had received could not be ascertained.

The lunatic asylum for the counties of Meath, Louth, Dublin, and Wicklow, is the Richmond Lunatic Asylum at Dublin. Of 284 patients in that institution on 1st January, 1837, 30 belonged to this county. The county infirmary is at Navan, and there were, in 1833, fever hospitals at Kells and Navan, and nineteen dispensaries at different places in the county, supported in nearly equal proportions by private subscriptions and grand-jury presentments.

History; Antiquities.—Meath appears to have been included by Ptolemy in the territory of the Βλανιοι (Blanii), or 'Εβλανοι (Eblani), a nation whose sway extended over the neighbouring counties of Dublin and Wicklow, and whose name may be traced in the first syllable of the province of Lein-ster. At an early period Meath constituted one of the kingdoms into which Ireland was divided, and comprehended, it is likely, not only the present counties of East Meath and West Meath, but also the whole or part of those of Longford, Cavan, and King's County. Teamor, now Tarah Hill, near the Boyne, between Dunshaughlin and Navan, was the residence of the sovereign of Ireland and the seat of the supreme government, and the place where St. Patrick made his first efforts for the conversion of the Irish to Christianity. It is probable that the kingdom of Meath was erected in the second century of the Christian æra as the immediate domain of the Irish monarchs; or if not then first erected into a kingdom, was placed under the immediate government of the Irish monarchs, while the rest of the island owed them only feudal obedience. At a subsequent period the government of Meath was separated from the monarchy, which was so far weakened by the separation as to become little more than a nominal supremacy; the kings of Meath ranked as subordinate princes, but they constituted one of the two lines of the great family of the Hy-Nialls, by which the supreme government was alternately possessed. Teamor ceased to be the seat of the national government.

In the invasions of the Northmen, or Danes, the kingdom of Meath suffered severely. Turges, a Danish leader, in the early part of the ninth century, established himself at Lough Rive (Ree?), and after cruelly ravaging the kingdoms of Connaught and Meath, was seized and put to death, probably at Lough Uar, near Mullingar in the present county of West Meath, by Melaghlin, or Malachi, king of Meath, who afterwards acquired the supreme power. The Northmen however soon renewed their attacks, and civil dissensions diverted the Irish from resisting the common foe. For several centuries Meath was exposed to their ravages, or those of other Irish princes with whom the kings of Meath were at war.

Traces of this period of confusion exist in the numerous camps and earthworks that overspread the district; and the frequent destruction of monasteries and towns recorded in the annals of the religious houses is another attestation of the prevalent ruin. The last king of Ireland of the Hy-Niall family was Melaghlin II., who, though reduced to abdicate the supreme authority for a time in favour of Brian Boromy, king of Munster, resumed it upon the death of that prince (who fell in battle against the Northmen at Clontarf near Dublin, A.D. 1014), and reigned till his own death, A.D. 1022, about 150 years before the invasion of Ireland by Henry II.

Before the invasion of the English, Dermond, or Dermod MacMurchad, king of Leinster, had reduced O'Melaghlin, or Melaghlin, king of Meath, and other princes, into a state of subjection; but having roused indignation by the abduction of the daughter of Melaghlin, who had married O'Ruarc, or O'Rourke, king of Breifne, or Brehny (now the county of Leitrim), he was expelled by Melaghlin and others, aided by his own subjects, and compelled to flee to England, where he engaged the Anglo-Normans in the conquest of his native island. Richard, earl of Strigul or Chepstow, commonly called Strongbow, the leader of these auxiliaries, took possession of Meath (A.D. 1171), which was conferred by Henry II. as a county palatine (or feudal lordship, the holder of which had several regal rights), on Hugh de Lacy, who was appointed governor of the English pale or district. Hugh de Lacy built a strong fortress at Trim, which was burned, A.D. 1173, in an attempt which the Irish made, under their king Roderick, to reconquer the country. The Irish were however repelled, and the ruined castle of Trim was restored. De Lacy parcelled out his territories among his followers, whom he created barons, whence is derived the subdivision of counties into baronies.

Meath however appears to have passed again into the power of the natives; for in 1178 De Lacy, who had been reappointed governor of Ireland, and held that office for a short time, restored the English power there. (Gordon's *Hist. of Ireland.*) In the general rebellion excited by the petulance of Prince (afterwards King) John, whom his father Henry II. sent over as governor, Meath was preserved to the English by the valour of William Petit, who defeated the Irish invaders (A.D. 1186). About the same time Hugh de Lacy was assassinated by one of the work men employed on a castle he was then erecting at Durrogh, in what is now King's County. His son, Hugh de Lacy the Second, who appears to have succeeded him in his county of Meath, was afterwards appointed governor of Ireland, in which office however he was soon superseded, agreeable to the policy, at least the practice, of that day, which seldom allowed a governor to retain office any length of time. De Lacy, in his character of earl of Meath, was engaged as auxiliary (A.D. 1200) in a contest between two Irish princes for the sovereignty of Connaught; and having been reappointed by King John lord-justice or governor of Ireland, he was defeated by John De Courcy, the Anglo-Norman earl of Ulster, whom he was commissioned to arrest and send over to England. He succeeded however in getting De Courcy into his hands by treachery and sending him over to England. He afterwards received the earldom of Ulster as his reward.

The ambition and power of Hugh de Lacy, now earl of Ulster, and of his brother Walter, who appears to have succeeded him in the earldom of Meath, having excited the jealousy of John, that king visited Ireland in person (A.D. 1210), and spent some months in reducing the fortresses in Meath and Ulster belonging to those nobles, who had fled to France, and did not obtain restoration to their estates and honours without the payment of a heavy fine. Meath seems at this time to have lost its privilege as a palatine county, and to have been made subject to the jurisdiction of the king's officers. The De Lacys acted a conspicuous part in the feuds of the Anglo-Norman lords of the Pale, and Meath suffered from these intestine commotions. Upon the decease of Earl Walter, Meath came to his two daughters, who divided his inheritance between them. West Meath, which fell to the elder, who was married to Sir Theobald Verdon, appears to have been so neglected, and fell into such a state of anarchy, that it did not obey the English laws for above a hundred years. (Baron Finglas's *Breviat.*, temp. Henry VIII.) East Meath, the portion of the younger daughter, married to Sir Geoffry Genneville, was also wrested from its owners, either by native chieftains or Anglo-Norman rivals.

The English dominion, never fully established, appears rather to have decayed during the reigns of the later Plantagenet and the Lancastrian princes, and the civil war of the Roses. The native Irish renewed their incursions; and in A.D. 1329, the English under Lord Thomas Butler sustained a severe defeat from them near Mullingar in West Meath. Richard, duke of York, lord-deputy in the reign of Henry VI., erected castles along the border of Meath and other counties in order to repress them. The Irish chieftains appear to have levied a tribute upon the English settlers, in consideration of leaving them in quiet, similar to the black mail levied by the Scotch Highland chieftains upon the neighbouring Lowland lairds and tenantry. The county of Meath paid at one time a yearly pension to the O'Connors of 60*l.*

In the reign of Henry VIII., when the power of the English began to revive, Meath was invaded by an Irish chieftain, Con Buckah O'Niall, or O'Neal (A.D. 1520); but he quickly withdrew on the approach of the earl of Surrey, lord-deputy. In a rising in favour of the Papacy, which took place at the Reformation, the Irish broke into Meath, destroyed Navan, and, after mustering their forces at Tarah Hill, set out to return home, but were overtaken and entirely routed (A.D. 1539). In A.D. 1540 the natives assembled in West Meath, with a view to break into the English pale; but dispersed on learning that preparations had been made to resist them. Just at the close of the reign of Henry VIII., the antient county of Meath was divided; and West Meath, including the present counties of West Meath and Longford, and part of King's County, was erected into a separate county. Cavan, which was partly formed out of Meath, was erected into a separate county by Sir John Perrot, lord-deputy in the reign of Elizabeth. In the great rebellion of 1641, Meath was again the scene of hostilities. Trim was entered by the English troops, who designed to make it a military post; and an attempt of the Irish to surprise the garrison was defeated by a bold and successful sally (A.D. 1642). Sir Charles Coote, one of the best officers of the English, and commander of the garrison, fell in the action. In 1643 negotiations for peace between the English and the insurgents were carried on at Trim. In 1647 Trim was besieged by the insurgents under their general Preston, who, having learned that Col. Jones, the parliamentary governor of Dublin, was on his march to relieve the place, set out in order to surprise the capital, but was met on the road and entirely defeated. Trim served as a place of retreat to some of the Royalists on their defeat at Rathmenes near Dublin, in 1649: but after the storming of Drogheda, and the massacre of the garrison by Cromwell in the same year, Trim was surrendered by the Royalists without resistance.

In the war of the English revolution the battle of the Boyne was fought (A.D. 1690) close upon the border of this county, between Drogheda and Slane. The two armies subsequently crossed the county from north to south, that of James in retreat, that of William in pursuit. In the rebellion of 1798 some outrages were committed at Dunboyne by a party of insurgents, who were very shortly defeated at Ratoath; but the victors having separated, the vanquished party rallied and cut off part of them at Clonee Bridge. Some further outrages were committed at Dunshaughlin, and immediately a considerable part of the population of the county rose in rebellion: a body of men, 4000 according to some accounts, took post on Tara Hill, where they were defeated with considerable slaughter by the troops and yeomanry. Part of the fugitives took refuge in the bogs, from which they continued for three weeks to make excursions for plunder and devastation.

There are several remains of antiquity in the county. At Tarah, or Taragh, once the seat of the Irish monarchs, are considerable earthworks. Two splendid torques, or collars of pure gold, were dug up here in 1813. There are considerable ruins of the castles of Scurlogstown, Dunmoe, Athlumley, and Asigh. Slane Castle and one or two others have been fitted up as residences. There are round-towers at Kells and at Donoughmore near Navan. There are numerous ruins of antient monastic edifices: those of the monastery at Duleek, supposed to be the most antient monastic edifice built of stone and mortar in Ireland, present some remarkable traces of rude architecture. The front of the antient cathedral at Clonard yet exists, and there are several stone crosses. The ruins of Bective Abbey are extensive and picturesque.

(Wakefield's *Ireland; Parliamentary Papers;* Harris's *Hibernica;* Gordon's and Cox's *History of Ireland.*)

MEATH, WEST, or as it is sometimes written in one word, **WESTMEATH**, is an inland county of the province of Leinster in Ireland, bounded on the north by the county of Cavan in Ulster, from which it is separated by Lough Sheelin or Shillin; on the north-east, east, and south-east by the county of Meath; on the south by King's County; on the west by the county of Roscommon in Connaught, from which it is separated by Lough Ree and the river Shannon; and on the north-west by the county of Longford. The greatest length is, from east-north-east to west-south-west, from the county of Meath near Clonmellon, to the bank of the Shannon opposite Athlone, 45 miles: the greatest breadth, at right angles to the length, is from the neighbourhood of Kinnegad to that of Rathowen, both on the mail-road from Dublin to Sligo, 25 miles. The area is estimated in the Population Returns for 1831 at 370,053 English statute acres, or 578 square miles. The population in 1831 was 136,872, giving nearly 237 inhabitants to a square mile. In area it can scarcely be compared with any English county; it is larger than Monmouthshire, and less than Hertfordshire; in amount of population it is rather below Hertfordshire, but in density rather exceeds it.

Surface, Geological Character, and Hydrography.—The county is for the most part a gently undulating surface, not rising in any part to a very great height. Knock Eyne, or Ion, on the border of Loch Deveragh, is about 850 feet high; Benfore, or Ben of Fowre, near the village of Fowre, not far from Lough Lane or Lene, is 760 feet high. These, with the other principal elevations, are in the northern part of the county. The whole belongs to the central carboniferous limestone district of Ireland. There are two small districts, one just round Moate-a-Grenogue, and the other in the same neighbourhood, but rather more to the south-west, which are occupied by the yellow sandstone, a formation consisting of quartzy sandstone conglomerate, of varying grain, which passes into sandstone. These beds are considered to belong to the same period as the carboniferous limestone, of which series of formations they constitute the lowest members.

The western side of the county belongs immediately to the basin of the Shannon, which forms its western boundary, separating it from the county of Roscommon. Lough Ree, the largest of the series of lakes into which that river expands, is also on the western border. This noble sheet of water is 15 miles long from north to south, and of a varying breadth, above 7 miles in one part. Its outline is exceedingly broken and irregular, and its surface studded with a number of small islands finely wooded. Those adjacent to Westmeath are, Innismore, or Inchmore, containing 104 acres, once the site of a monastery; Hare Island, 57 acres, with the ruins of an abbey; Innisturk, or Inchturk, 24 acres; and Innisboffin, or Inchboffin, 27 acres, formerly the site of an abbey; besides a number of smaller islands. An inlet at the southern extremity of Lough Ree, connected with it by a straight so narrow as properly to constitute it another lake, is almost entirely enclosed within the county. This subordinate lake, which is about two miles long from east to west, and in one part above a mile and a half wide, contains a large island called Friar's Island, well wooded at its western extremity. The streams which flow into the Shannon or into Lough Ree are all small. Two of the principal rise about 3 miles west of Moate-a-Grenogue; one of them flows in a circuitous channel north-west into the inlet of Lough Ree: the other flows due west into the Shannon near Long Island, below Athlone. Another stream, which rises three miles north of Moate, and several other streams in the north-west, flow into the Inny, which joins Lough Ree on the border of the county of Longford. There are several small lakes on this side of the county; some of these communicate by small streams with Lough Ree; others have no visible outlet. Bogs also are numerous, though none of them are of any great extent.

The central part of the county is drained by streams that empty their waters into several inland lakes, which are connected by small streams with each other, and ultimately with the river Shannon. The northernmost of these is Lough Sheelin, or Shillin, on the north border of the county, from which lough a small stream communicates with Lough Keinal, also on the border. From Lough Keinal the connecting stream flows southward, first along the border, separating West Meath from Longford, and then through the county into Lough Deveragh. This fine sheet of water extends 5 or 6 miles in length from north-west to south-east, and has a breadth varying from 2½ or 3 miles near the north-west end, to little more than a quarter of a mile near the south-east extremity. The banks are hilly, and some of the loftiest elevations in the county are in the surrounding district. There are plantations or other woodlands on some parts of the shore. The district north of the Lough, extending as far as Lough Keinal and Lough Shillin, is almost entirely bog, especially the tract through which the connecting stream flows. Lough Deveragh receives some small streams; and others, including the Glore, which is the outlet of a small lake (Lough Glore), north-east of Lough Deveragh, fall into the connecting stream.

From the north-western extremity of Lough Deveragh another stream flows south-west into Lough Iron, a shallow lake of about 3 miles long from north-west to south-east, and about half a mile broad. Several streams flow into the connecting stream between Lough Deveragh and Lough Iron or into the latter lake, and carry off the superfluous water of small lakes or bogs. Lough Glyn on the north-west border toward Longford, and Lough Gar, are thus connected with this central system.

A small brook forms the communication between Lough Iron and Lough Owhel, or Hoyle, 3½ miles long from north-west to south-east, and about 1½ miles broad. The banks rise gently from the lake, and are fertile and well wooded. On a small islet in the lake is a rude chapel with a burial-ground, once much resorted to by pilgrims. A supply of water is drawn from Lough Hoyle for the Royal Canal. From Lough Hoyle a small stream flows in a winding channel southward past Mullingar into Lough Ennel, 4½ or 5 miles long from north-east to south-west, and above 2 miles broad at the widest part. This lake, sometimes called Belvidere, is studded with small islands. A number of streams flow into this lough.

These lakes communicate with the Shannon by two different streams. The Inny flows from the north-western extremity of Lough Iron to the border of the county, which it skirts, and then into the county of Longford, to which it may be considered as chiefly belonging. It flows into Lough Ree. The Brosna flows from the south-west extremity of Lough Ennel by Kilbeggan into King's County, to which it chiefly belongs. It receives a number of small streams, drains the southern parts of the county, and falls into the Shannon in the neighbourhood of Banagher.

All that part of the county which we have described is included in the basin of the Shannon, though for convenience the central lake-district has been described separately. The eastern side of the county belongs to the basin of the Boyne. A number of small streams rise on that side of the county and flow eastward into that river: the most important is the Deel, one branch of which rises near Mullingar, and another is the outlet of a small system of lakes near the north-east border of the county. The lakes of this system are Lough Bawn, the White Lake, and some very small ones on the borders; and Lough Lene, Lein, or Lane, and Lough-a-Deel within the border: Lough Lene, the largest of the group, is about 2½ miles long from west-north-west to east-south-east, and nearly a mile broad. Its waters are peculiarly clear, and it contains several islets.

The eastern and south-eastern sides of the county abound with bogs, and some of them are of very considerable extent. The lakes of West Meath abound in pike and trout: the latter are very fine, and form an important article of food.

This county is among the most picturesque in Ireland. It is considered to be excelled only by Kerry, Fermanagh, Wicklow, and Waterford.

Agriculture.—The landed estates in the county are not very large, but there are a number of gentlemen of moderate fortune. In the eastern parts the soil is a heavy loam from 7 to 12 inches deep; the northern parts, which are hilly and adapted for sheep-walks, are chiefly devoted to grazing black cattle. In the western parts the soil is generally light; there is a great deal of bog. The farms do not commonly exceed 100 acres or thereabouts, and in many cases are as small as 15, 10, 7, or even 3 acres. The resident gentry usually farm a considerable portion of their own estates. The average rent of arable land is from 1*l.* 5*s.* to 1*l.* 10*s.*; land of good quality will sometimes let for 2*l.*, that of inferior quality sometimes for not more than 1*l.* The system of 'con acres,' or lands let to the cottiers for the purpose of growing a single crop of potatoes, is prevalent in almost all parts of the county. (*Appendix to the Report of Commissioners for Inquiring into the State of the Irish Poor.*) The chief crops raised by the farmer are oats and potatoes; a very little wheat, some barley, flax, rape, and clover are grown. Fences, except in the neighbourhood of demesnes, are generally neglected; in some parts they consist simply of earthen banks without anything growing upon them. Dairy farming is practised to some extent in this county, but not to such an extent as the nature of the soil would warrant. A considerable quantity of good butter is made, which is sent by Dublin to England. The long horned cattle are much valued; some of the best specimens are grazed in this county, and all the stock participate in the blood. Sheep are not a favourite stock, but there are some excellent ones of the long-woolled breed. Pigs, as usual, are generally kept. The breed of horses is superior; many are brought from Connaught and reared for sale in Dublin. Wood is not plentiful; there are some small copses and underwoods, the remains of antient forests; and some thriving young plantations. The following table shows the sales of grain in the years 1826 and 1835:—

Market.	Barrels of Wheat of 20 Stone.		Barrels of Oats of 14 Stone.		Barrels of Barley of 19 Stone.	
	1826.	1835.	1826.	1835.	1826.	1835.
Mullingar . .	None	None	7800; average of these and the intermediate years.		4500; average of these and the intermediate years.	
Clonmellon . .	markets not established	200	markets not established	5,000	markets not established	None.
Castletown Delvin		300		900		None.
Ballinacargy .	None	300	28,000	25,000	2,500	2,500
Coolnahea . .	None	None	2,000	1,900	350	250
Rathowen . .	400	50	4,000	2,000	150	None.
Moate	Average from 1826 to 1830			4,800		
,,	Average from 1831 to 1836			4,900		

No return was received from the markets of Castle Pollard and Kilbeggan. No wheat appears to have been sold at Moate either in the years 1826 and 1835 or in the interval between them. Collinstown is not noticed. The name Coolnahea in the tables is, we suspect, an error. We know not with what place to identify it.

The manufactures of the county are not important; they consist chiefly of the most necessary articles. The returns of 1831 give 285 adult males as engaged in manufacture, 92 in that of linen (chiefly coarse), 22 in that of cotton, 20 in that of friezes and other woollens, chiefly coarse, and 2 in the silk manufacture. The remainder were not specified. To these must be added 820 weavers, returned among the retail tradesmen and handicraftsmen; but what fabric they produced is not stated.

Communications.—The Shannon is navigable for steamboats conveying goods and passengers, or acting as steam-tugs to other vessels, throughout that part which borders on this county. The Royal Canal, which connects Dublin and the east coast with the upper part of the Shannon at Tarmonbarry, crosses this county from east to north-west, passing near Killucan and Mullingar. A branch from the Grand Canal between Philipstown and Tullamore in King's County, to Kilbeggan, is partly in this county.

The principal roads are those from Dublin to Longford and Athlone respectively. The Longford road enters this county from that of Meath near Kinnegad, and runs north-west by Mullingar and Rathowen into the county of Longford. A branch from this at Mullingar takes a rather more westerly direction from Ballinacargy to Ballymahon. The Athlone road branches from that to Longford just after it enters the county at Kinnegad; and runs westward by Rochford Bridge, Tyrrell's Pass, Kilbeggan and Moate, to Athlone. The road from Dublin to Granard runs through the northern part of the county by Castle Pollard. The principal traffic is carried on by the canals and by the Athlone road; but the number of passengers is rather the greatest by the Longford and Athlone roads. Many however travel by the Royal Canal to Mullingar, and by the branch of the Grand Canal to Kilbeggan.

Divisions, Towns, &c.—West Meath is divided into 12 baronies, whose relative situation and amount of population are as follows:—

		Population in 1831.
Brawney. . .	W. .	7,396
Clonlonan. . .	S.W.	12,830
Corkaree. . .	Central.	6,630
Delvin. . . .	E. .	9,984
Demifore, or Half Fowre.	N. .	15,559
Farbill. . . .	E. .	8,746
Fartullagh. . .	S.E. .	8,903
Kilkenny West. .	W. .	11,159
Moyashel and Magheradernan, or Magheradernon.	Central.	12,732
Moycashel. . .	S. .	16,167
Moygoish. . .	N.W.	11,702
Rathconrath. .	N.W.	15,064
		136,872

Population.

Date.	How ascertained.	Inhabited Houses.	Families.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort .	13,693	..	..	..	..	..	..	69,000
1813	Under Act of 1812 . .	no return	..	..	..	..	..	..	no return
1821	Under Act 55 Geo. III., c. 120	23,478	..	..	..	..	..	..	128,042
1831	Under Act 1 Will. IV., c. 19	23,803	25,331	16,824	3,694	4,813	67,700	69,172	136,872

The county town is Mullingar; the parliamentary borough and market-town of Athlone is partly in this county, partly in that of Roscommon; and there are the market and post towns of Kilbeggan, Moate, Rathowen, Castletown-Delvin, Ballinacargy, Clonmellon, and Castle Pollard (of these Kilbeggan is a corporate town); the market-town of Collinstown; and the post towns of Kinnegad, Ballymore, Tyrrell's Pass, Killucan, Rochfort Bridge, and Drumcree. Athlone is described elsewhere. [ATHLONE.]

Mullingar is in the barony of Moyashel and Magheradernan, but the parish extends into that of Fartullagh; it is nearly 50 miles from Dublin by Maynooth, Clonard, and Kinnegad. It was one of the towns founded by the English settlers of Meath. In the war of the Revolution the town was fortified by General Ginkel, and became the rendezvous of William's army, preparatory to the siege of Athlone. The town is surrounded on three sides by the Royal Canal, and consists of a principal street, about half a mile long, and some smaller ones. The number of houses in 1831 was 727 for the town, or 1538 for the whole parish. Those in the town are chiefly of stone. The church is a tolerably spacious building, erected in the present century, with a handsome tower and spire. There are a handsome Catholic chapel and one or two Dissenting meeting-houses. The county court-house is convenient; there are a county gaol, erected within the last few years, and an older prison, now used only for females; a county infirmary, an hospital, barracks for a thousand men, and a neat and commodious market-house in the centre of the town. The population of the town of Mullingar in 1831 was 4295, that of the whole parish 8845. The assizes for the county, the quarter-sessions for the division, and petty-sessions for the district, are held, and a portion of the county constabulary have their station here. The Royal Canal gives the town the benefit of water-carriage; and considerable business is done at the market (which is held on Thursday) in corn, butter, and frieze coating. There are four yearly fairs for cattle; one of them is a considerable horse-fair. The town is not incorporated; but a charter of King Charles II. granted to the lord of the manor several privileges, and to the freeholders the privilege of sending two members to parliament; this last was abolished at the Union. The living is a vicarage in the diocese of Meath, and in the patronage of the crown. The parish is at the head of a Catholic union.

Kilbeggan is in the barony of Moycashel, 56 miles from Dublin, on the road to Athlone. It was the scene of a conflict in the rebellion of 1798 between a party of insurgents and the regiment of Northumberland militia. The town contains 350 houses; the whole parish 732: half of those in the town are well built, and have slate roofs. The church was originally part of an antient monastic institution, dissolved at the Reformation. There are a handsome Catholic chapel and a Methodist meeting-house. The market-house is a neat building. The population in 1831 was 1985 for the town, or 4039 for the whole parish. The trade of the town is considerable: distilling, brewing, milling, and snuff-making are carried on; much butter is sold at the market, which is held on Saturday, and there are four yearly fairs. A branch from the Grand Canal recently made bids fair to increase the prosperity of the town. Kilbeggan was incorporated by James I; the corporation consists of a portreeve, twelve burgesses, and an unlimited number of freemen. The portreeve has jurisdiction in the borough conjointly with the county magistrates. There is a borough court for the recovery of debts; petty sessions for the district are held here. The town formerly sent two members to the Irish parliament, but was disfranchised at the Union. The living is a perpetual curacy; the parish is, in the Catholic arrangements, united with an adjoining one.

Moate-a-Grenogue is in the barony of Clonlonan, 66 miles from Dublin, on the road to Athlone. In the war of the English Revolution a party of the Jacobites were defeated here by William's army under General De Ginkel, and compelled to flee to Athlone. The town consists almost entirely of one street, and comprehended, in 1831, 304 houses, the greater part slated, the rest thatched. The population of the town in 1831 was 1785. The trade of the place appears to be diminishing; the manufacture of cottons and linens has much declined, and several breweries and distilleries have been discontinued. There is a market on Thursday, one of the most important for oats in the county; and there are several yearly fairs. The quarter-sessions for one division of the county are held here, and also petty sessions for the district. There is a convenient court-house and a small bridewell attached to it. A party of the county constabulary have their station here. The town is in the two parishes of Kilcleigh and Kilmanaghan, chiefly in the former, the parish church of which is in the town. There are a Catholic chapel and several dissenting places of worship; also a dispensary.

Rathowen is in the barony of Moygoish, 64 miles from Dublin, on the Longford road, and 13 or 14 miles from Mullingar. The town contained, in 1831, a parish church, a Catholic chapel of the union in which the parish is concluded, a market-house, and 107 houses, almost all thatched. The population was 605 for the town, or 2170 for the whole parish of Rathaspect, in which it is situated. There is a market on Tuesday, chiefly for oats, and two fairs in the year. It is one of the stations of the county constabulary.

Castletown Delvin is in the barony of Delvin, 50 miles from Dublin. An old castle, built here by De Lacy, lord of Meath, was for a time the residence of the Nugents, who built also the castle of Clonin or Clonyn in the parish. Of the castle built by De Lacy the ruins remain: the walls form a quadrangle with towers at the corners. There are several other castellated ruins in the neighbourhood. Clonin was burnt during the civil war of Charles I. on the approach of Cromwell. The name of Clonyn is retained by the present residence of the marquis of Westmeath. The town consisted in 1831 of a single street of 77 houses, with a population of 419. There are a parish church, a plain old building, but in good repair, and a Catholic chapel. The market lately established is on Friday, and there are three fairs in the year. Petty-sessions are held, and a body of the county constabulary have their station here. The living is a vicarage in the diocese of Meath. The parish is at the head of a Catholic parochial union. There is a dispensary.

Ballinacargy, or Balnacarrig, is in the barony of Moygoish, 58 miles from Dublin. The town had, in 1831, 46 houses, neatly built and roofed with slate. It is in the parish of Kilbixy, and the Roman Catholic chapel for the parish is in the town. There are a market on Wednesday, the largest in the county for oats and barley, and a market on Saturday for provisions; also two yearly fairs. Petty-sessions are held here, and the town is one of the stations of the county constabulary. There are a dispensary and a free school.

Clonmellon is in the barony of Delvin, close upon the border of the county. It is a neat little town, comprehending, in 1831, 179 houses, and a population of 960. There are a considerable corn-market on Tuesday, lately established, and two yearly fairs. Petty-sessions are held, and a portion of the county constabulary are posted here. The parish church of Killua, in which parish the town is situated, is near the town; it is a neat building, with a spire.

Castle Pollard is in the barony of Demifore, 54 miles from Dublin, about 2 miles north-east of Lough Deveragh, and about the same distance west of Lough Lane. It consists of five streets meeting in an open space or square, in which stands the market-house. It contained, in 1831, 291 houses, and a population of 1618. The parish church of Rathgarrue, or Rathgarth, or Rathgraff (in which parish the town stands), a modern building, is not far from the town. The tower and part of the old church, with the churchyard, in which is the school-house, are also near the town. There are a Catholic chapel, a dispensary, a fever hospital, a savings'-bank, and a parochial school. There are a market on Wednesday and four yearly fairs. Petty-sessions are held, and a party of the county constabulary have their station in the town. Kinturk, the seat of the Pollard family, Pakenham-hall, the seat of the earl of Longford, and other demesnes, are near the town. The old castle of Kinturk, which gave name to the town, is entirely demolished.

Collinstown is a little place on the road from Dublin to Granard. It is at the junction of four roads forming a cross, and has only twenty or thirty houses, chiefly thatched, with a market-house in the centre of the town, and a Roman Catholic chapel near it. It is in a pleasant district of diversified scenery, near the southern extremity of Lough Lane. There are a market on Saturday and two yearly fairs. There are petty-sessions held, and a body of the county constabulary posted in the town. The town is in the parish of St. Feighan of Fowre.

Kinnegad is in the barony of Farbill, about 11 miles from Mullingar, and 37 from Dublin. It is in a great thoroughfare, just at the separation of the roads from Dublin to Longford and Athlone, and consists of one principal street. It has 123 houses, with a population of 670. The church is a neat Gothic building of modern date; there are a Catholic chapel, a school-house, and a market-house. No market is held, though there is a charter for one, and there is only one yearly fair. The living is a perpetual curacy detached from the parish of Killucan.

Ballymore is in the barony of Rathconrath, 15 miles from Mullingar, and 73 from Dublin. There formerly existed here a monastery for Premonstratensian canons and Benedictine nuns, who occupied different portions of the same building. The church of this monastery was for a short time the cathedral church of the diocese of Meath. In the civil war of 1641 Ballymore was a principal military station of the English; and in the war of the Revolution the Irish were posted here, until beaten from the town by General De Ginkel. A garrison of a thousand men in Fort Ballymore, in an island of the neighbouring Lough Shodie or Seudie, surrendered themselves prisoners of war shortly after. The town, which is partly in Killure parish, but chiefly in that of Ballymore, consisted, in 1831, of 121 houses, chiefly small houses or cabins, forming one long street. There are a parish church and a Catholic chapel. There was formerly a market, but it is now discontinued. There are two yearly fairs. Petty-sessions are held, and the county constabulary have a station in the town. Not far from the town is a round tower, the only remains of a castle, said to have belonged to the De Lacys.

Tyrrell's Pass is in the barony of Fartullagh, about 51 miles from Dublin, on the road to Athlone. The town takes its name from having been for many years the seat of the Tyrrell family. There are some remains, near the town, of their castle. The town consists of about 80 houses, chiefly well built, with slated roofs, forming one principal street. There is an area in the centre of the town, formerly used as a market-place, but the market is now discontinued. The parish church of Clonfadd (in which parish the town is partly situated) and a Methodist meeting-house are in the town. There are a savings' bank, a charitable loan fund, and a dispensary. There are two cattle fairs, which are well attended.

Killucan is in the barony of Farbill, 42 miles from Dublin. It takes its name from an abbey founded by St. Lucian, the church of which subsequently became parochial. The De Lacy family had a castle here, of which the foundations and some of the outworks are still discernible. Four yearly fairs are held in the town; petty sessions are also held, and there is a station of the county constabulary. The town had, in 1831, 29 houses and 206 inhabitants; the whole parish 1491 houses. The parish church is a modern structure. There are in the parish two Catholic chapels, four public schools, and a 'flax society,' which gives employment to about 100 poor women.

Rochfort Bridge, or, as it is sometimes called, Beggar's Bridge, is in Fartullagh barony, and about 47 miles from Dublin, on the road to Athlone. It contained, in 1831, only 27 houses and 171 inhabitants. The parish church of Castlecost, in which the place stands, and a national school, are in the town. The county constabulary have a station here.

Drumcree is in Delvin hundred. It contains the parish church of Kilcumney (in which parish the town is), a parish school-house, and a dispensary. It had, in 1831, 37 houses and 197 inhabitants.

The village of Fore or Fowre, or, more accurately, of St. Feighan of Fowre, is in the barony of Demifore, not far from Lough Lane. Though now only a small village, it was antiently of importance. A monastery for regular canons was founded here in the seventh century, and is said to have contained, a few years after its foundation, 3000 monks. This monastery, after having been repeatedly destroyed by fire, was re-founded in the beginning of the thirteenth century by Walter de Lacy, for Benedictine monks. There are still some remains of the abbey, and there is an antient and massive building, supposed to have been a hermitage. In the fifteenth century considerable pains were taken to fortify the town, which had acquired the privileges of a corporate borough. There are the ruins of several square towers, two of the gates, and traces of the town wall, the extent of which shows its former size. Fowre was a borough by prescription, and returned two members to the Irish parliament, until it was disfranchised by the Union. The village had, in 1831, 19 houses and 119 inhabitants.

Ecclesiastical and Legal Divisions.—The county is almost entirely in the diocese of Meath; a small portion on the north-west side is in the diocese of Ardagh, which was till lately held by the archbishop of Tuam, but is now to be permanently united to the diocese of Kilmore. Both Kilmore and Meath are in the ecclesiastical province of Armagh.

West Meath is included in the home circuit: the assizes are held at Mullingar, where are the county court-house and gaol. Quarter-sessions for the county are held at Mullingar and Moate-a-Grenogue, where are a court-house and a bridewell.

West Meath returned ten members to the Irish parliament, two for the county, and two each for Mullingar, Athlone, Kilbeggan, and Fowre. At present it returns three to the Imperial parliament, viz. two for the county, who are elected at Mullingar, and one for the borough of Athlone.

The police force of the county, on the 1st of January, 1836, consisted of 1 magistrate, 7 chief constables, including sub-inspectors (viz. 4 of the first and 3 of the second class), 50 constables, and 222 subconstables, with 9 horses. The expense of maintaining the constabulary for 1835 amounted to 10,051*l.* 4*s.* 9*d.*, of which 5480*l.* 16*s.* was chargeable against the county.

The county gaol at Mullingar has lately experienced a very extensive change for the better. A commencement has been made of the system of instruction in trades. But the discipline of the female side still requires very much attention: the accommodation is very insufficient, and there is no classification. There are two schools in the prison, and a tread-mill for those sentenced to hard labour. The Moate bridewell is on a tolerably large scale, with every accommodation requisite for classifying the prisoners, and is clean and well kept. (*Appendix to Fourteenth and Fifteenth Reports of Inspectors-General*, 1836.)

The number of committals for criminal offences in 1836 was, for offences against the person, 282 (of whom 184 were convicted, 98 acquitted or discharged); for offences against property committed with violence, 43 (20 convicted, 23 acquitted or discharged); for offences against property committed without violence, 164 (112 convicted, 52 acquitted or discharged); for malicious offences against property, arson, &c., 22 (8 convicted, 14 acquitted or discharged); for forgery and offences against the currency, 7 (2 convicted, 5 acquitted or discharged); for other offences, 243 (226 convicted, 17 acquitted or discharged): making a total of 761 persons committed, of whom 552 were convicted and 209 acquitted or discharged. Only one person was executed. Of the persons committed, 633 were males (5 of them under sixteen years) and 128 females (2 under sixteen); 342 could read and write, 118 could read only, and 296 were entirely ignorant. Of 5 the degree of instruction they had received could not be ascertained.

The Lunatic Asylum for the counties of West Meath, King's, Queen's, and Longford, is at Maryborough, in Queen's County: of 131 patients in this institution on the 1st of January, 1837, 28 belonged to this county. The county infirmary is at Mullingar. There were, in the year 1833, a fever hospital at Castle Pollard, and fourteen dispensaries in different parts of the county, supported in equal proportions by grand jury presentments and private contributions.

History and Antiquities.—This county was included in the kingdom of Meath, of which it formed the western division. In common with the rest of that kingdom it suffered severely both from the ravages of the Danes and from civil dissensions, and was included in the county palatine of Meath, granted by Henry II. of England to Hugh de Lacy, one of the Anglo-Norman barons who assisted in the reduction of the county. [MEATH.] It was the scene of frequent hostilities for several centuries between the native Irish, who were not entirely expelled or subdued, and the English, and was, for above a century before its formation into a separate county, in a state of anarchy, in which the English laws ceased to be observed. West Meath was separated from Meath or East Meath in the 34th of Henry VIII.; at its first separation it included Longford, which was not detached from it and formed into a separate county until the reign of Elizabeth. King's County, which was partly taken from West Meath, had been formed A.D. 1557, in the 5th of Philip and Mary.

The great insurrection of 1641 is said to have been planned and agreed upon at the abbey of Mullifarnham in this county, which being much resorted to for religious purposes, and therefore less liable to suspicion, was chosen by the conspirators as their place of meeting.

In 1648 Athlone, in which the partisans of Renunccini, the papal nuncio and head of the extreme Catholic party, had endeavoured to maintain themselves, was taken by the confederate royalists under Lord Clanrickarde and General Preston.

In the war of the English revolution West Meath was the scene of some important operations. [ATHLONE.] An extensive change of the landed property of the county resulted from the confiscations which followed these wars. The older families have disappeared almost entirely from the grand-jury list.

In the Rebellion of 1798 the county was but little disturbed, though many of the peasantry had furnished themselves with pikes. In September of that year, during the invasion of Ireland by the French detachment under General Humbert, the insurgents assembled and joined those of the neighbouring counties in an attempt to seize Granard, in which they were repulsed. They were put down by a subsequent defeat at Brumbrusna, near Multifarnham.

There are many vestiges of antiquity scattered through the county. There are numerous ruins of antient castles, including some erected by the De Lacys. Sonnagh Castle, one of these, stands on the verge of a small but picturesque lake. Of monastic buildings there are several ruins; and some churches, formerly conventual, are still used for divine worship by Catholics or Protestants.

(Wakefield's *Ireland; Parliamentary Papers;* Harris's *Hibernica;* Gordon's and Cox's *History of Ireland.*)

MEATH, DIOCESE OF. Several small bishoprics (of which the principal were Duleek, Clonard, Kells, Trim, Ardbraccan, Dunshaughlin, Slane, and Fowre) gradually coalesced into one see, which, at the end of the twelfth century, received the name of Meath, and was further augmented, A.D. 1568, by the addition of the bishopric of Clonmacnois. The diocese comprehends nearly the whole of the counties of Meath; West Meath; a considerable part of King's County; small portions of Cavan, Longford, and Kildare; and part of the county of the town of Drogheda. It extends in length from east to west from the sea to the Shannon, 80 English miles; and has a medium breadth from north to south of 25 English miles. There is no cathedral; neither are there a dean and chapter. The only dignities are the deanery of Clonmacnois and the archdeaconry of Meath. The want of a chapter is supplied by a synod, of which every incumbent is a member, and the archdeacon president. The diocese is included in the province of Armagh: it is not affected by the Act 3 and 4 William IV., c. 37. The bishop has precedence of all the other Irish bishops. His residence is at Ardbraccan near Navan.

The number of parishes is given by Dr. Beaufort (1792) at two hundred and twenty-four, and part of another; the number of benefices at ninety-nine; and of churches at seventy-seven. In 1834 the number of parishes was two hundred and twenty; of benefices, one hundred and five; of which forty-seven were unions of two or more parishes; of churches, one hundred; of other episcopal places of worship six; of Presbyterian meeting-houses, three; of other Protestant dissenting places of worship, eighteen; and of Catholic chapels, one hundred and fifty-six: giving a total of two hundred and eighty-three places of worship of all denominations. The population of the diocese in 1834 was 404,059; of whom 377,562 were Catholics, 25,626 members of the Establishment, 672 Presbyterians, and 199 other Protestant dissenters.

There were at the same time 578 daily schools, in which were 28,885 children under instruction, being in the proportion of 9·05 per cent. to the whole population of the diocese: in the relative number of children under instruction as compared with the population, Meath ranks twelfth among the thirty-two dioceses of Ireland. Of the above-mentioned schools, 45 were in connection with the National Board. (*First and Second Reports of the Commissioners of Public Instruction in Ireland.*)

The lands belonging to the see comprise 29,269 statute acres, of which 20,266 are of profitable land. The average yearly revenue of the bishopric, for the three years preceding 1832, was 5220*l.* 10*s.* 6*d.*

There is a Roman Catholic bishopric of Meath. The bishop is a suffragan of the Roman Catholic archbishop of Armagh. There were in this diocese, in 1834, 66 parish priests, including the bishop, who officiates at Mullingar, where is the cathedral, a handsome and spacious Gothic edifice of modern erection; and 60 coadjutors or curates.

MEAUX, a town in France, capital of an arrondissement in the department of Seine et Marne. It is on the bank of the Aube, 23 miles in a direct line east by north of Paris, or 27 miles by the road.

The original name was Latinized as Iatinum; and it was the capital of the Meldi, a Celtic people who were included in the Roman province of Lugdunensis Quarta or Senonia. Toward the overthrow of the Roman empire, Iatinum assumed the name of Meldi, whence the modern Meaux. In the early history of the Franks it was a place of considerable consequence. It was included in the possessions of the counts of Champagne, and was united to the domains of the crown by the marriage of Philippe IV. le Bel, A.D. 1284, with the countess of Champagne. It was one of the places in which the reformed faith early met with a favourable reception; but it afterwards came into the hands of the League, from which it revolted to join Henri IV. It was the chief town of Brie Champenoise.

The town is divided by the Marne into two unequal parts, and the canal of the Ourcq passes by the foot of its antient walls, which have been planted with trees and converted into promenades. The streets are not well laid out, but the houses are tolerably good. The principal building is the cathedral, commenced in the eleventh century. The architecture is Gothic; the magnificent choir contains a marble statue of Bossuet, who was bishop of this see. There are two parish churches and a Protestant church. The Palais de Justice, or court-house, was built by the antient counts of Champagne. There are good barracks for cavalry. The population in 1831 was 8481 for the town, or 8537 for the whole commune; in 1836, 7809 for the commune. The inhabitants manufacture cottons, leather, glue, saltpetre, vinegar, and earthenware; and carry on a considerable trade in corn, especially oats, sent to Paris, flour, cheese (called from the district Brie cheese, and accounted very excellent), wool, cattle, poultry, wood, and coal. The old bridge across the Marne, from the great fall of the water which the bridge causes, impedes the navigation, which is carried on here by a very antient navigable cut, called the Cornillon Canal. There is a well-attended weekly market, and there are four yearly fairs. There are a subordinate court of justice, and a court for commercial suits; several government offices, two hospitals, two seminaries for the priesthood, a high school, a Protestant Bible Society, a public library of 11,000 volumes, another library at the bishop's palace, a museum, and a society of agriculture, science, and arts.

Meaux is the seat of a bishopric, established in the fourth century, and now having for its diocese the department of Seine et Marne. The bishop is a suffragan of the archbishop of Paris.

The arrondissement of Meaux has an area of 463 square miles: the population in 1831 was 93,417; in 1836 it was 90,965. It is subdivided into seven cantons or districts, each under a justice of the peace, and comprehends 161 communes. Millstones and marble are quarried in it; and there is a considerable stratum of gypsum in the neighbourhood of Meaux.

MECCA. [Arabia.]

ME'CHAIN, PIERRE-FRANÇOIS-ANDRE', was born 16th August, 1744, at Laon, a town of France, in the present department of Aisne. After quitting the school 'des ponts et chaussées,' where the limited means of his parent had enabled him to pursue his studies only for a short time, he engaged himself as mathematical tutor, and devoted his leisure to the cultivation of astronomy. Shortly after this an accident brought him under the notice and patronage of Lalande. The necessity of affording some pecuniary assistance to his father obliged Mechain to dispose of an astronomical instrument which, by rigid economy, he had recently been able to purchase. Lalande became the purchaser, and, after acquainting himself with the past history of Mechain, procured for him a government appointment as hydrographer, in which he was engaged in the construction of marine charts, and, jointly with M. Bretonnière, in the survey of the French coast between Nieuport and St. Malo. His attention however appears to have been chiefly directed to the theory of eclipses, and of comets, of which he discovered eleven, and computed the orbits of twenty-four. To his memoir on the comet of 1532, which it was expected would re-appear in 1789 or 1790, the prize of the Academy of Sciences was awarded, and the same year (1782) he was admitted a member of that society. In 1791 the National Convention having determined upon employing the length of the arc of the meridian comprised between Dunkirk and Barcelona as the basis of their new measures, the measurement of the southern portion of this arc, between Rodez and Barcelona, was, at the recommendation of the Academy, confided to Mechain. The northern portion was allotted to M. Delambre, to whose account of the entire survey (*Système Métrique*, Paris, 1806-7-10, 3 vols. 4to.), containing many interesting particulars relative to Mechain, we refer the reader. It will be sufficient here to state that Mechain experienced his share of the difficulties and annoyances which have usually attended such operations, and that the breaking out of the French revolution, which prevented his return from Spain, and the consequent anxiety for his family whom he had left behind, brought upon him a melancholy state of mind from which he never wholly recovered. His skill as an observer is particularly mentioned by Delambre, and also the accuracy of all his calculations connected with the survey. Of this Mechain himself was unconscious. He had employed the repeating circle, an instrument which he regarded as absolutely infallible, and finding a difference of three seconds between his observations at Barcelona and Montjouy, he attributed it wholly to his own incapacity. Upon his return to Paris, which he reached with much personal risk, fearing to divulge this discrepance, he refused to deliver his papers to the Academy. The subject continuing to prey upon his mind, he applied, after several years, to the French board of longitude, and urged them to prolong the measurement of the arc from Barcelona to the Balearic Islands. To this the Board consented, but being unwilling to dispense with his services at the Paris Observatory, they suggested that Mechain should not be the conductor of the survey. This however would have been to relinquish the chief object of his application. He obtained permission to depart, but soon after his arrival in Spain he was attacked by an epidemic disorder, of which he died on the 20th of September, 1805, at Castellon, a town of Catalonia.

Before his departure he entrusted all the manuscripts referring to his previous expedition to M. Delambre. They have since been arranged and deposited in the Paris Observatory, together with so much of his correspondence as related in any way to the survey.

His published works are few. They consist of papers printed in the 'Connaissance des Temps,' subsequently to 1785, in which year he succeeded Jeaurat as editor of that ephemeris, and several memoirs in the Transactions of the French Institute, commencing with the year 1782. These memoirs refer chiefly to the cometary theory and eclipses.

(Delambre's Notice of the Life of Méchain, in the *Biog. Univers.*; Hutton's *Mathematical Dictionary*, &c.)

MECHANICS is the science in which are investigated the actions of bodies on one another, either directly or by means of machinery.

These actions may be simple pressures without motion; as when one body being supported in any manner, another is placed upon it, either vertically or in some oblique position: or they may be such as are accompanied by motion, and these may arise either from the mutual attractions which all bodies in nature exercise upon each other, or from the collisions of bodies in motion with others which may be previously in motion or at rest.

The term is particularly applied to the mutual actions of solid bodies: the actions of fluids on solids form, in part, the subjects of hydrostatics and hydrodynamics; but these, as well as pneumatics, are now frequently included under the general name mechanics. When bodies are at rest and the actions are such as to maintain them in that state, the laws of the actions constitute that branch which is called statics; but when motion is concerned, the laws and phenomena constitute what is called dynamics.

In all the branches of general mechanics the investigations are founded on experiment and are conducted by geometrical or algebraical processes; hence the science forms one of the departments of experimental philosophy, and also of mixed mathematics: this last denomination is applied to mechanics because in the latter are involved several qualities of bodies which do not enter into the researches of pure science, such as mass or quantity of material, inertia, hardness, elasticity, time, space, and power or force. The last-mentioned term is used to express the cause of the actions of bodies on one another; but we have no other conception of it than that it is productive of motion or of a tendency to motion; or that it arrests an actual motion or renders a tendency to motion ineffectual. When opposing forces act on a body so as to destroy each other's effects and keep the body unmoved, that body is said to be in a state of equilibrium; and this state is distinguished from that of mere rest, since the latter implies the absence of any cause by which the body might change its place.

The invention of simple machines for moving masses of any material which it might be beyond the unaided power of man to transport to a distance, must have taken place in the earliest ages of the world. Human ingenuity would readily suggest the application of a rod or bar of wood or iron, for the purpose of lifting a heavy body from the ground; and very little experience would suffice to shew that rolling or pushing a block of stone up sloping ground was a much easier operation than that of raising it vertically by the strength of men's arms. Thus may have arisen the employment of the lever and inclined plane; and from these, subsequently, the wheel and axle, the pulley, the wedge, and the screw were derived. The simple means here indicated would be sufficient, with the aid of manual labour, to build up the most massive cyclopean edifice; and even the vast materials which form the roofs of the Egyptian temples may have been raised to their places by means of inclined planes, formed of earth for the purpose, on the exterior of the walls, and afterwards removed.

The steps by which the art of constructing machines advanced have not been distinctly recorded; and the work of Vitruvius on architecture is almost the only source from whence can be obtained an account of such as were in use in and before the time of that engineer (the age of Augustus or Vespasian). From the descriptions there given it appears that among the mechanical powers then in use were the lever, the windlass, and the assemblage of pulleys Vitruvius also mentions some ingenious contrivances for transporting heavy blocks of stone from the quarries, and a forcing-pump, the invention of which he ascribes to Ctesibius, for supplying the public fountains. He describes a complex machinery, consisting of wheels driving each other by cogs or teeth, which was applied to carriages or ships for the purpose of measuring the distances travelled or sailed; and he enters fully into the construction of engines for throwing darts or masses of stone. The muscular strength of men was then employed as a moving power in turning mills: wheels impelled by river currents acting on float-boards (pennæ) gave motion to machinery for grinding corn; and wheels turned by men walking on them were used for raising water by buckets or otherwise. Vitruvius generally mentions the names given by the Greeks to the machinery; and it might, without great risk of error, be presumed that much of that which he describes was in use among the latter people at, or even before, the time when the Parthenon was raised. There are no distinct intimations of the existence of windmills till the twelfth century. The expansive force of steam can only be said to have become a moving power at the end of the seventeenth century, and then it was employed merely to raise water. Its general application to machinery must be dated from the year 1768.

In tracing the progress of discovery concerning the mathematical theory of mechanical action, we shall have little to notice till we come to the sixteenth century; for the antients, who devoted themselves with so much ardour to the researches of pure science, almost entirely neglected the application of the latter to subjects which appeared to them to terminate in mere practical utility. It must be observed however that Aristotle, who left no department of nature untouched, has noticed, in his mechanical questions, the equilibrium of unequal weights on the unequal arms of a balanced lever, though he gives a very unphilosophical reason for the fact. But in his 'Physics' he states correctly that if two forces move with velocities reciprocally proportional to their intensities, they will exert equal efforts: this may apply to a well-known property of the lever, but it may have been meant to refer only to the effect of two unequal bodies moving with unequal velocities, and striking each other or a third body.

Sicily enjoys the honour of having given birth to the first philosopher who can properly be said to have been a theoretical mechanician: we allude to Archimedes, who died about 212 B.C., and in whose works there is direct evidence of an effort to determine the principle of equilibrium in machines. Commencing, in the treatise whose Latin title is 'De Æquiponderantibus,' with the axiom that two equal weights balance each other on a lever (of uniform dimensions), when at equal distances from the fulcrum, he supposes the weights to be divided into an equal number of equal parts, and that the parts are removed to equal distances from the point of support; observing then that the equilibrium still subsists, he proceeds, by the method of exhaustions, to show that it always will take place provided the bodies are inversely proportional to their distances from the fulcrum. Archimedes thence concludes that there must exist in every one body, considered as an assemblage of smaller bodies, a centre of force (that is, a centre of gravity) corresponding to the fulcrum in the former case; and he proceeds, by the analysis of that day, to investigate the seat of the centre of force in a triangle, a parabola, and a paraboloid.

This philosopher has obtained eternal celebrity by the contrivances which he is said to have adopted for the defence of Syracuse. No precise account is given of the machinery which he employed to raise up and destroy the galleys of the enemy, and the effects are probably exaggerated. The vessels must have been close to the walls, and it is conceivable that, by hooks at the ends of chains which were suspended from levers on the ramparts, the rigging, or some parts of the turrets erected as usual on the decks, in order to enable the assailants to pass over the parapets, might be caught; then, the levers being raised by the force of men or otherwise, the vessels or the turrets would be easily overturned.

During about 1800 years, which elapsed between the time of Archimedes and that of Cardan, we have no other notices concerning the theory of mechanics (beyond those which occur in the writings of the former mathematician), than such as are contained in the 'Mathematical Collections' of Pappus, which amount merely to a statement that the antients had reduced the theory of every machine to that of the lever, and an unsuccessful attempt to explain the cause of the equilibrium of a body on an inclined plane. It is remarkable moreover that both Cardan and, subsequently, the marquis Ubaldi (the latter of whom published, in 1577, a treatise in which he explains at length the combinations of pulleys, and reduces their theory to that of the lever) should also have given erroneous solutions of the problem concerning that equilibrium. The discovery of the true theory of the inclined plane was however, about the same time, made by Stevinus, a native of Flanders. This mathematician and engineer supposed a chain of uniform dimensions to be placed on a doubly inclined plane, having a common summit and base, the chain being perfectly free to slide on the planes, and its ends hanging vertically to equal distances below the base; then, in order to prove that the chain would remain at rest, he shows that if any motion should take place, it might continue for ever; and this he concludes to be absurd. As the argument holds good when one of the two planes is in a vertical position, Stevinus infers that, when a body is in equilibrio upon a plane, the retaining power is to the weight as the height of the plane is to its length; and he further shows that if three forces act on any point, they hold the latter in equilibrio when they are proportional to the three sides of a triangle formed by lines drawn parallel to the directions of the forces. It should be remarked however that Stevinus demonstrates the law in that case only in which two of the forces are at right angles to each other. He died in 1635.

To Galileo we are indebted for the first reduction of mechanical propositions to purely mathematical formulæ. In order to demonstrate the equilibrium of a body on an inclined plane, he imagined the weight and the sustaining power to be applied to the ends of a bent lever whose arms were of equal length and perpendicular to the vertical and slant sides of the plane; then reducing the lever to a straight one, between the lines of direction of the weight and power, it was easy to prove that the forces in equilibrio on the plane were also in equilibrio on the lever, and were to one another as the length to the height of the plane.

But the most important discoveries of Galileo were those which relate to the times of descent, the spaces descended, and the velocities acquired when bodies fall by the action of gravity. He made observations on the motions of pendulums, and determined that the times of their vibrations are proportioned to the square roots of their lengths; he also gave theorems for the composition of two motions, when both are uniform, when both are accelerated, and when one is uniform and the other accelerated. Nor should we omit to state that he was the first to obtain expressions for the strength of materials in resisting the strains to which they are subject. It deserves notice moreover that Galileo, in opposing the arguments of one of his contemporaries concerning the law of the descent of bodies by gravity, makes a supposition that the spaces descended with the accelerated motion may be divided into equal parts, each so small that the motion during the time of describing it may, without sensible error, be considered as uniform; an hypothesis corresponding exactly to that which, agreeably to the principles of the modern analysis, is now employed in investigations concerning variable motions.

The theory of the motions of fluids was, apparently, first cultivated in Italy by Castelli, who wrote on the subject in 1638; and about the same time Torricelli, having discovered the existence of a space void of air in the upper part of a tube filled with mercury, its open end being immersed in a vessel of that fluid, was enabled to refute the antient notion that nature *abhorred* a vacuum. The latter was subsequently led to the conclusion that the pressure of the atmosphere is the cause of the support of a column of mercury in a tube, and also of the ascent of water in pumps. Both of these writers were pupils of Galileo; and, soon after the time of this philosopher, the French mathematicians Descartes, Pascal, Fermat, and Roberval, prosecuted with ardour the new science, as that of mechanics was called. Among the fruits of their researches may be named the determination of the centres of oscillation and percussion in a body or system of bodies vibrating about a fixed axis. The impulse given by Galileo, being thus continued by a succession of men of talent both in Italy and France, caused the science to advance with an accelerated movement, and soon put it in a condition to embrace all the subjects of terrestrial physics.

The mechanics of that age was not however entirely emancipated from the trammels of a false philosophy; and the theory of Descartes, concerning the communication of motion when bodies strike each other, is remarkable on account of the metaphysical principle which it involves. In speaking of the collision of bodies, he gives as a reason why the same momentum should exist after as before the impact, that it depends on the divine immutability. God having created a certain quantity of motion to serve as the cause of all the operations of nature, that quantity, he conceives, can never be increased or diminished. Yet there is some reason to think that Descartes had better notions concerning the phenomena of collision, for he states correctly, in one of his letters, that the motion of a body when it strikes another which is at rest becomes divided between the two masses, and that the resulting velocity is diminished as the mass is augmented. The chief feature in the physics of Descartes is his supposition that the planets revolve about the sun in vortices of æther, the particles of which, having acquired a certain degree of centrifugal force, act on the planets and prevent them from falling together in the centre of the system. He supposed that the like vortices surround each planet; but the particles of æther, having less specific gravity than the bodies on the surface of the planet, the tendency of these bodies to that surface prevails over the force by which the æther causes them to recede from thence.

The laws of the collision of bodies, which had been in vain attempted by Descartes, were at length, and nearly at the same time, discovered by the English mathematicians Wallis and Sir Christopher Wren, and by Huyghens on the Continent. The first of these, in his treatise 'De Motu' (1670), divides bodies into such as are hard and such as are elastic, and he explains the phenomena attending the shock of bodies of both kinds. In that of hard bodies he adopts as an hypothesis that the body struck destroys as much motion in the striking body as the latter communicates to it; and in elastic bodies he considers the forces of compression and restitution to be proportional, in each, to the velocity before the shock. The name of Huyghens is become celebrated from the discovery of the properties of cycloidal curves, and the attempt to make the lower extremity of a clock-pendulum vibrate in an arc of that kind, in order that the times of vibration might be equal, whatever were the extent of the arc described. This attempt did not succeed; but, being led in the course of his inquiries to investigate the position of the centre of oscillation in a compound pendulum, Huyghens found that when several pendulous bodies descend by gravity and afterwards re-ascend by the acquired velocities, in whatever way they may act upon each other, their common centre of gravity cannot rise higher than the point from whence it descended. This proposition is considered as proved from the fact that, if it were otherwise, the centre of gravity might by mechanical means be made to rise continually higher, and thus perpetual motion might ensue: but this is impossible.

In 1687 Newton's great work concerning the mathematical principles of natural philosophy was first published, and from that time the mechanical sciences, which had hitherto been confined to the action of bodies on each other at the surface of the earth, were made to comprehend the laws of planetary motion. The 'Principia,' as the work is called, commences with the three well known axioms in philosophy, or laws of motion. Assuming then as an hypothesis, that all the bodies of the universe and all the particles of every body exert on each other mutual attractions; assuming also that the planetary bodies were originally put in motion by impulsive forces; the rotations of these bodies on their axes, their revolutions in their orbits, and all the perturbations by which their movements are varied, are explained by means of the elementary theorem for the composition and resolution of motions. The oscillations of pendulums, the theory of projectiles, the movements of fluids, and the resistance opposed by the latter to the motions of bodies immersed in them, are also in the same work investigated at length.

Contemporary with Wallis, Wren, and Newton in England, were, on the Continent, the celebrated Leibnitz and the two elder Bernoullis, all of whom contributed greatly to the advancement of mechanical science by their investigations concerning the laws of motion in terrestrial bodies; and to the rivalry as well as the talents of these great men we owe some of the most important discoveries in that branch of learning. At this time the fluxional or differential calculus was discovered, and had acquired an algorithm; and they who adopted its principles appear to have been anxious to show its superiority over the antient geometrical analysis, by proposing to their opponents problems which could scarcely be solved by the latter method. With some such views Leibnitz proposed the determination of that curve along which a body descending would describe equal vertical spaces in equal times; James Bernoulli proposed to find the figure assumed by a flexible cord or chain when suspended at the extremities [Catenary]; and John Bernoulli, to find the curve of swiftest descent. [Cycloid.] Numerous other problems of the like nature were given out among the parties, and the solutions could not fail, if no other benefit arose, of carrying the new calculus to a considerable degree of perfection.

From the time of Newton mechanical science was, till lately, but little cultivated in this country; but on the Continent a succession of illustrious men continued to prosecute the investigation of subjects connected with it, and by the employment of analytical processes they rendered comparatively easy the application of its principles to the researches of physical astronomy.

The mathematicians who may be considered as the immediate successors of Newton were chiefly Euler, D'Alembert, and Clairaut; and in the works of the first of these are investigated all the circumstances attending the phenomena of rectilinear and curvilinear motion when a body in vacuo or in a resisting medium is subject to any forces whatever. But the most remarkable event in the history of the sciences, after the discoveries of the English philosopher, was the solution of the celebrated problem of the three bodies; or that whose object is to determine the motions of a body when attracted by and revolving about another, and continually disturbed by the attraction of a third. This was, at the same time (about 1752), and independently of each other, accomplished by the three learned men above named, and it now constitutes the basis of the whole planetary theory. The 'Mécanique Analytique' of La Grange, which was published in 1788, and the 'Mécanique Céleste' of La Place (1798 to 1825), contain the last accessions which the mechanical sciences have since received; and these sciences now comprehend the laws of force or motion, from the properties of the simple lever to the phenomena of the heavenly bodies.

It may have been seen above that the first general principle in mechanics is that of the equilibrium of bodies on a lever; and a knowledge of it may be ascribed to Archimedes. The extension of the principle to all the mechanical powers was long an unsolved problem, and the solution may be said to have been first made known to the world by the discovery of Stevinus relating to the sustaining power on an inclined plane. A second general principle may be conceived to be that of the composition of motions or forces; and its discovery is to be ascribed to Galileo. Daniel Bernoulli (about 1726) was the first to demonstrate the rule of the composition of forces independently of motion; but the application of the principle as a means of obtaining general equations of equilibrium seems to have been first made in the 'Projet d'une Nouvelle Mécanique,' which was published by Varignon in 1687.

La Grange treats as a third principle in mechanics that of *virtual velocities*. By this is meant those which bodies in equilibrio would have at the first instant of their motion, in the event of the equilibrium being disturbed. Indications of this principle are found in the writings of Galileo, Wallis, and Descartes, but John Bernoulli is thought to have been the first who showed its utility in resolving statical problems. [Virtual Velocities.] A general method of solving mechanical propositions was discovered by D'Alembert, and it may be thus enunciated. If there be impressed on bodies motions which they are forced to change in consequence of their mutual actions, those motions may be considered as compounded of the motions which the bodies do really take, and of those which are destroyed. Whence it results that these last must be such that if they alone existed the bodies would be in equilibrio. In order to avoid the decompositions of motions which this principle requires, an equation is frequently made between the general analytical expression for a force and the expression for those forces which produce the observed motions. [Forces, impressed.] The manner of estimating the value of a mechanical force is various; and a difference in the expression of the value gave rise to disputes which continued during nearly all the first half of the eighteenth century. [Force.]

Besides the principles above mentioned there occur in mechanical investigations several others, which it will be proper to state briefly in this place.

That which is called the *preservation of living forces* is a consequence of the discovery of Huyghens concerning the movement of the centre of gravity in a compound body. For the space described by that centre is expressed by the quotient arising from the sum of the products of the mass of each body into the distance it passes over, divided by the sum of the masses; and since the spaces descended by bodies when acted on by gravity are proportional to the squares of the velocities, it follows that the sum of the products of the mass of each body into the square of its velocity is constant, whether the bodies move jointly in any manner, or whether they descend freely through equal vertical spaces.

The preservation of the centre of gravity is a principle which contains the discovery of Newton, that the motion of the common centre of gravity of several bodies is not affected by the mutual attractions of the bodies. It was subsequently extended by D'Alembert, who shows that if the bodies are solicited by a constant accelerative force in directions either parallel to each other or tending to a fixed point, the centre of gravity must describe the same line as if the bodies were free.

The preservation of areas seems to have been discovered simultaneously by Euler, Daniel Bernoulli, and the Chevalier D'Arci, about 1750. According to the latter it is an extension of Newton's theorem that the radii vectores of revolving bodies describe equal areas in equal times, and it consists in this: that the sum of the products of the masses of revolving bodies into the areas described by their radii vectores about a fixed point is proportional to the time. Or the sum of the products of the masses into the velocities and into the perpendiculars let fall from the fixed point on the lines of direction of the motions is constant.

The principle of least action originally signified, that when bodies act on each other, the sum of the products of the masses into the velocities and spaces described is a minimum. But considered in the most general sense, agreeably to the extension given to it by La Grange, the principle consists in this: that in trajectories described by bodies subject to central forces, the integral of the velocity multiplied by the element of the orbit is always a maximum or a minimum.

A general outline of that part of mechanics which relates to the equilibrium of solid bodies is given under the word STATICS; and the details of the subjects may be seen under LEVER, WHEELS, &c. The part of mechanics which relates to bodies in motion appears under the words referred to in the article DYNAMICS.

MECHELEN, called Malines by the French, is a large well-built town in the province of Antwerp, in 51° 2′ N. lat. and 4° 29′ E. long. It stands in a fertile plain on the river Dyle, by which it is intersected. The streets are wide, well paved, and kept remarkably clean. The large square, called La Place d'Armes, and the market-place, are in particular deserving of mention. The cathedral, dedicated to St. Rombaud, the patron saint of Mechelen, is the most remarkable building in the town. Its tower is 348 feet high, and contains a fine peal of bells: it was built in 1451. The other principal buildings are the arsenal, which contains a cannon-foundry; the town-house, the archiepiscopal palace, and the church of the Jesuits. Mechelen contains a college, an academy of painting, a society of fine arts, and a large building which serves as an asylum for 800 widows and aged women.

It appears that as early as the fifth century Mechelen was the capital of a lordship, which was afterwards given in 754 by Pepin to one of his relatives. It was subsequently destroyed by the Normans, and rebuilt in the year 890. In 910 it was ceded by France to the bishop of Liége. At this time it occupied only the left bank of the Dyle, but was extended on the other side of the river in 970. Mechelen was sacked by the Spaniards in 1572, and by the army of the Prince of Orange in 1578. It was taken in 1706 by the Duke of Marlborough; and by the French in 1746, but was restored at the peace of Aix-la-Chapelle. In 1792 it was again taken by the French, who in 1804 destroyed its fortifications.

This town is the seat of an archbishopric, created in 1559 by pope Paul IV. The archbishop is the head of the Catholic church in Belgium, and has for his suffragans the bishops of Namur, Tournay, Aix-la-Chapelle, Trèves, Ghent, Bruges, Liége, and Mayence.

Mechelen carries on an important trade by means of vessels of considerable burthen, which ascend the Schelde and the Dyle at high-water, the influence of the tide being felt a few miles above this town. The principal articles of commerce are corn, oil, hemp, flax, and hops. The lace manufactured at Mechelen has long been in high repute, and bears a great price. There are manufactories of hats, shawls, coarse woollens, and paper, cotton-mills, dye-houses, breweries, distilleries, and tanneries. It has recently acquired additional importance from the circumstance of its being the central point at which the several railroads of Belgium meet. It is about midway between Brussels and Antwerp, and distant from both about thirteen miles. The population of Mechelen in 1836 was 22,895. (Van der Maelin's *Dictionnaire Géographique de la Province d'Anvers.*)

MECHLIN. [MECHELEN.]

MECHLOIC ACID. This acid was formed in 1835 by Couerbe, by passing chlorine gas over fused meconin. When purified by solution in potash, and precipitation from it by nitric acid, it exists in the state of colourless prismatic crystals, soluble in cold water, but more so in hot: alcohol and æther dissolve it sparingly. It melts at about 257°; at 376° it is volatilized; and by a strong heat it is decomposed. It is stated by its discoverer to be composed of

Chlorine	5·43
Organic matter	94·57
	100·

The organic matter consists of

Hydrogen	4·070
Carbon	49·404
Oxygen	46·526
	100·

MECKLENBURG, which consists of the two grand-duchies of Mecklenburg-Schwerin and Mecklenburg-Strelitz, is situated in Northern Germany, between 53° 8′ and 54° 2′ N. lat., and 10° 40′ and 13° 45′ E. long., and is bounded on the north by the Baltic, on the east by the Prussian provinces of Pomerania and Brandenburg, on the south by Brandenburg and the Hanoverian principality of Lüneburg, on the west by Lauenburg and the territory of Lübeck. The area (according to Hempel) is 5880 square miles, namely, Mecklenburg-Schwerin 4788, and Mecklenburg-Strelitz 1092. The greatest extent of Mecklenburg, from north to south, or from the peninsula of Fischland to the great Wentower Lake, is 94 miles, and the greatest breadth, from east to west, 127 miles.

Divisions.—Mecklenburg-Schwerin is divided into circles or districts. I. *Mecklenburg* (251,476 inhabitants): chief towns, Schwerin, the capital (13,035 inhabitants); Parchim (5690 inhabitants); Ludwigslust, the residence of the grand-duke (nearly 5000 inhabitants). II. *Wenden* (140,482 inhabitants): chief town Güstrow (8620 inhabitants), one of the handsomest towns, and the fourth in size in the grand-duchy. It was for many centuries the residence of the princes, and has several remarkable public edifices, especially the cathedral, which contains some costly monuments of the princes; the palace, which Hempel says is unquestionably the finest princely residence of the middle ages in Mecklenburg, was converted in 1817 into a house of correction. III. *The Principality of Schwerin:* chief town Bützow (3600 inhabitants). IV. *The District of Rostock:* chief town Rostock (29,000 inhabitants). V. *The Lordship of Wismar* (11,420 inhabitants): chief town Wismar (10,000 inhabitants). [SCHWERIN; ROSTOCK; WISMAR.]

Mecklenburg-Strelitz is divided into. I. *The Lordship or Circle of Stargard* (69,762 inhabitants): chief towns, New Strelitz (5767 inhabitants); New Brandenburg (6000 inhabitants); Friedland (4500 inhabitants); Old Strelitz (3090 inhabitants). II. *The Principality of Ratzeburg*, lying quite detached from the grand-duchy, on the frontier of Lauenburg and the lake of Ratzeburg, near Lübeck (14,080 inhabitants). [STRELITZ; RATZEBURG.]

The surface of the country, being a part of the low land of Northern Germany, may be described generally as a plain. There is a ridge or chain of hills which, commencing in the Silesian mountains, traverses the country, and extends in a north-west direction into Holstein. On both sides of this ridge there is some heath, moor, and sand, but a great portion of the land is fertile, and in parts covered with considerable forests. The soil is partly loamy and heavy, partly of a middling quality, and partly sand. The first, which is about one-third of the whole, is very fertile; the second is of very different degrees of quality; the last is everywhere poor, and frequently covered with heath. In Mecklenburg-Schwerin there are sixty-two lakes at least 1½ miles long, besides many smaller ones. Lake Müritz, which is the largest, is 18 miles long and 8 broad. In Mecklenburg-Strelitz the county of Stargard alone contains fifty-three lakes at least 1¼ miles long: the largest is the Tollen Lake, 7¼ miles long. Some of the rivers fall into the Baltic, and others into the Elbe. Of the former the principal are the Trave, Stepenitz, Recknitz, Peene, and Warnow; the last is one of the chief rivers; the length of its course is about 100 miles. At Rostock it suddenly expands to a breadth of 2400 feet, and falls into the sea at Warnemunde. The Elbe only washes the frontier at two places, near Dönitz and Boitzenburg, which lie on its banks. The rivers that fall into the Elbe are, the Elde, which has a course of above 100 miles, and the Havel. The coast of the Baltic, which is but little indented, is generally steep, and high above the sea; and where it is lower, the country is protected from the incursions of the sea by sand-hills. Though Mecklenburg, on the whole, is not a picturesque country, there are some spots of very pleasing appearance about many of the lakes, especially Lake Malchin, and near the sea-coast. The climate is healthy and temperate; but the weather is variable, and the winter often very cold.

Natural Productions.—Agriculture is the chief employment of the inhabitants. Wheat (most of which is exported), rye, barley, oats, peas, and vetches are very abundant. The forests produce oak, beech, and fir timber of excellent quality. There is a good breed of horses, horned cattle, and sheep, which are highly esteemed in other countries. Swine too are abundant. In some parts there is much game, such as wild boars, stags and deer, bustards, partridges, snipes, wild geese, and ducks. The geese of Mecklenburg are celebrated for their size and good quality. Fish abound both in the sea and all the lakes. The country is poor in minerals, and no mines of any kind are worked.

Trade and Manufactures.—The manufactures are inconsiderable, but they are improving, and great pains are taken to promote the woollen manufacture. Favourably situated as the country is between the Baltic and the Elbe, its commerce is far more important than its manufactures, yet by no means so extensive and profitable as might be expected; for the laws allow the importation and exportation of almost all articles, and the duties are low. The vicinity of Hamburg and Lübeck, and the heavy duties imposed by the Prussian tariff, are great checks on the trade of Mecklenburg. The *Revenue* of Mecklenburg-Schwerin is considerable, amounting to 2,617,000 rix-dollars per annum, of which nearly 1½ millions are produced by the domains. The revenue of Mecklenburg-Strelitz is stated at 400,000 rix-dollars, but is probably higher, for the domains alone yield 300,000 rix-dollars.

Religion and Education.—The great majority of the inhabitants are Lutherans. There are in Mecklenburg-Schwerin 4000 Jews and 590 Roman Catholics, and in Mecklenburg-Strelitz 800 Jews and 50 Roman Catholics. The Calvinists are only 250 in both states. The sovereigns are the heads of the church. There appears to be a very inadequate religious instruction, since, according to Hempel (the most recent and the best authority), there are in Mecklenburg-Schwerin 464 Protestant churches with only 322 officiating clergy, and in Mecklenburg-Strelitz 150 churches with 68 clergymen. Education was formerly very much neglected. The schools for the people were few and ill conducted. The learned institutions were better, and the university of Rostock has had many eminent professors. Considerable improvements were made by duke Frederick, who in 1782 founded a seminary for schoolmasters; but a thorough reform was left for his successor Frederick Francis, who during his long reign devoted his unceasing attention to this object. The improvement in Mecklenburg-Strelitz has been equally great. The university of Rostock has only about 120 students.

The military force of Mecklenburg-Schwerin is 3298 men, and that of Mecklenburg-Strelitz 742 men. Their contingents to the army of the Confederation exceed their ordinary establishment, that of Mecklenburg Schwerin being 3580, and a reserve of 1740 men, and that of Mecklenburg-Strelitz 718 men and a reserve of 359 men. Both form part of the second division of the 10th corps of the army of the Confederation. Their respective contributions to the treasury are 1333⅓ florins and 666⅔ florins. In the full council Schwerin has two votes and Strelitz *one*; in the select council they have together one vote, viz. the 14th.

Form of Government.—The co-operation of estates in the affairs of the country may be traced to the remotest periods. The constitution, in its present form, is founded on compacts entered into between the princes and the estates in 1523, 1572, 1621, and especially on that of 1755. The grand-dukes have the whole executive power; but share with the estates the legislative power and the right of imposing taxes. The grand-dukes indeed govern their respective dominions independently of each other, but the estates of the two grand-duchies are inseparably united by a compact made in 1523, called the Landes-Union. The clergy, formerly the first estate, having been excluded after the Reformation, the assembly has since consisted of two estates: the first is called the equestrian order, which includes all the owners of noble estates (whether they are noblemen or not). They have great privileges and immunities, and are rich and powerful. There are now 572 landowners who have seats and votes in the assembly. The second estate consists of the deputies of the forty-four towns. They meet annually at Sternberg and Malchin alternately. In general above 200 members attend. The grand-duke alone has the right of introducing such measures as he deems necessary, which is done by what are called 'propositions.' The estates have the right to accept or reject them, and they may likewise represent what they consider as grievances, and petition for their being remedied.

The history of the country is rather intricate, in consequence of the frequent changes in the reigning family by the formation of new branches and the extinction of others, which occasioned continual partitions of the territory. Mecklenburg was inhabited by the Heruli and the Vandals. On their emigrating to the south they were succeeded by Sclavonian (Wendish) tribes, of whom the most powerful were the Obotriti, to whose prince Heinrich Burewin, son of Pridislaus (who had embraced the Christian religion), Henry the Lion gave his daughter Matilda. Pridislaus was declared in 1170 a prince of the empire, and was the ancestor of the succeeding sovereigns of Mecklenburg. These princes received the ducal title from the emperor Charles IV. in 1340, and assumed that of grand-duke on joining the German Confederation in 1815.

(Hassel: Stein; Horschelmann; and chiefly Hempel, *Geog. Statist. Hist. Handbuch des Mecklenburger Landes*, Güstrow, 1837.)

MECONIC ACID, a substance which is found only in opium, in which it exists in combination with the alkali morphia. It was first noticed by Seguin in 1804, and a few years after, more particularly described by Sertuerner, who named it *mecon* (*μήκων*), poppy. Meconate of lime is one of the results of a peculiar process for obtaining morphia from opium; this is put into ten times its weight of water at 200°, and hydrochloric acid is added until it is dissolved; the solution is to be filtered, and on cooling it deposits bimeconate of lime in the state of light, scaly, or acicular crystals; these are again to be dissolved in hot and very dilute hydrochloric acid, which separates the remainder of the lime, and on cooling, the meconic acid crystallizes. They are to be freed from colouring matter by subsequent treatment, and meconic acid has then the following properties: it acts on litmus paper, and has a sour taste; it is soluble in four times its weight of water, and also in alcohol. The crystals do not alter by exposure to the air, but when heated to 212° they lose 21·5 per cent. of water, and become opaque. Although when heated even to near 250° the acid is not totally decomposed, yet the boiling solution gives out carbonic acid gas, and a brown substance is formed which is metameconic acid. When strongly heated, it is totally vaporised and decomposed. When mixed with a solution of chloride of gold, and heated, it is decomposed, and metallic gold is precipitated; this acid possesses the characteristic property of forming a purplish-red coloured solution with the persalts of iron, and this is regarded as one of the best tests of its presence, and also of that of the opium from which it is derived.

According to Liebig, meconic acid consists very nearly of

Two equivalents of Hydrogen .	2
Seven equivalents of Carbon .	42
Seven equivalents of Oxygen .	66
Equivalent	100

The salts which contain this acid are called *meconates*; we shall briefly state the properties of the more important of them:—*Meconate of Ammonia* crystallizes in quadrilateral prisms, dissolves in one and a half times its weight of water, yields water when heated, and afterwards sublimes without decomposing. *Meconate of Potash* crystallizes in tables and leaves, contains water of crystallization, and is soluble in twice its weight of cold water. *Meconate of Soda* crystallizes in fine needles, which contain much water of crystallization, and are soluble in five times their weight of water. *Meconate of Lime* forms acicular crystals, which contain water of crystallization, and are soluble in eight times their weight of water. When the acid is in excess the salt crystallizes in prisms, and is difficultly soluble in water. *Meconate of Magnesia* when neutral is only slightly soluble, but the supersalt dissolves readily; it crystallizes in flattened needles, which are brilliant and transparent, and have an acid and bitter taste. *Meconate of Barytes* is slightly soluble in water. *Meconate of Iron* is a colourless and very soluble salt, which becomes red by exposure to the air, and more rapidly by the addition of nitric acid. The *Permeconate of Iron* is also a soluble salt, and is of a fine red colour, which is destroyed by heat, by sulphurous acid, and protoxide of tin; the remaining metallic meconates are not important.

Metameconic Acid.—It has been above mentioned that when a solution of meconic acid is heated to ebullition, that carbonic acid is evolved, and a brownish solution results; this consists of colouring matter and metameconic acid. When a meconate, as of potash or lime, is boiled with hydrochloric acid, no colouring matter results, and yet metameconic acid is formed.

This acid is soluble in sixteen times its weight of boiling water, and separates on cooling in hard anhydrous grains, which, like the meconic acid, redden the persalts of iron, but they differ from it in every other respect.

It is formed by the mere separation of carbonic acid, by subtracting one equivalent of which from meconic acid we obtain the acid in question:—

	H.	C.	O.
Meconic acid .	2	7	7
Carbonic acid .		1	2
Metameconic acid .	2	6	5

Its saline combinations have been but little examined.

Pyromeconic Acid is obtained by heating meconic acid, which yields about one-fifth of its weight. It is purified by pressure between folds of blotting paper, and crystallization from solution in water. It is fusible between 248° and 257°, and then flows like oil; it is entirely soluble at a moderate temperature, and is more soluble in alcohol even than in water. It turns the persalts of iron red, and its salts are generally soluble in water. It is formed by the separation of four equivalents of carbonic acid and one equivalent of water, from two equivalents of meconic acid, thus:

	H.	C.	O.
Two equivalents of Meconic acid .	4	14	14
Four equivalents of Carbonic acid .		4	8
One equivalent of Water . .	1		1
Pyromeconic acid .	3	10	5

MECONIN, a neutral principle existing in opium, first noticed by Dablane, and more particularly examined by Couerbe. To obtain it, an infusion of opium, from which the morphin has been precipitated, is to be evaporated, and the crystallized matter, obtained after being pressed, is to be treated with boiling alcohol; the solution contains narceia and colouring matter, from which it is to be separated by subsequent operations.

The properties of meconin are, that it is colourless, inodorous, is at first tasteless, but afterwards acrid; it is soluble in water, alcohol, and æther, and crystallizes well in any of them; the crystalline form is a six-sided prism with dihedral summits; it fuses at 194°, and is volatilized at 310°, without undergoing any change of properties. It is soluble in about 265 parts of cold water, and 20 of boiling water. Sulphuric acid gives it a fine green colour, while nitric acid by its action converts it into a peculiar crystalline matter. Chlorine renders it of a blood-red colour, forming mechloic acid. It does not act either as an acid or an alkali.

According to Coucrbe it consists of—

Four equivalents of hydrogen	4	or	4·44
Nine equivalents of carbon	54		60·00
Four equivalents of oxygen	32		35·56
	90		100·

MEDAL. Numismatists have usually given the name of medals to those coins that have been struck or cast for particular purposes and on extraordinary occasions, in commemoration of victories, treaties, coronations, and similar important events, or in honour of remarkable persons; in distinction to those which have been issued and generally circulated as money.

The words *medaglia* and *medaglione* first occur in Italian writers, from whom the English and French have evidently taken their *medal* and *medaille*. The derivation seems to be from the Greek *μέταλλον* (metal); of which medals are always made.

A reference to medals, in connection with numismatics, has been made in the article on coins [COIN], to which a few observations must now be added respecting them independently of their relation to the general subject.

Though we have proof in the specimens that have reached our times that the antients were not less successful in the medallic than in the other arts of design, it does not appear that works of this class were sought after and preserved with the care bestowed on productions of the sister arts. None of the classic writers give any account of collections of medals and coins among the Greeks, and it is not until a somewhat late period that we find any distinct notice of a taste for them arising in Italy. Augustus, according to Suetonius, was the first who showed any interest in the subject; he was in the habit of presenting to his friends medals of foreign countries and princes as valuable marks of his favour.

Greek medals and medallions are very rare, few being known of earlier date than the establishment of the Imperial power at Rome, and when Greece was under Roman dominion. Some of Sicily are not however so scarce; they are of very fine design and workmanship, and deserve the careful attention of the connoisseur. The design of the finest of these is a head, usually of Ceres, with spoils in the exergue, and on the reverse a Victory crowning a figure in a car Many of great excellence and in high preservation are contained in our collection of coins in the British Museum. The Roman medallions differ from the Greek (we mean in this place Greek medals of the Imperial periods) in their greater substance or thickness. Those from the time of Julius Cæsar to Hadrian are very scarce, and are, in consequence both of their rarity and their quality, of high value. The larger bronze medallions of the antients are often of exquisite workmanship, and the devices are uncommon. Some are composed of two sorts of metal; the centre being of copper, with a border or ring of compound metal running round it, or *vice versâ*, the copper being the outside ring. It often happens that the inscriptions on these medals extend over both the metals.

Among the peculiarities which distinguish modern from antient medals may be mentioned the introduction of portraits of illustrious characters who were not of princely or regal houses. It is remarkable that while busts are found of many celebrated poets, historians, and philosophers of antiquity, their portraits never occur on medals. When, after the long interval of darkness in which literature and art were enveloped, from the decline of the Roman empire to the seventh or eighth century, taste began again to appear, and, with the other arts, die-engraving revived, it was employed in transmitting to posterity the portraits of eminent individuals. Petrarch seems to have been the first who, in modern times, made coins subservient to the illustration of history and biography. The emperor Charles IV. had expressed a wish that he would write the lives of eminent men, and would place him among them. Petrarch boldly told the prince he would do so whenever his life and conduct merited it. It was after this that he presented to Charles a collection of gold and silver coins bearing the representations of distinguished men. Pinkerton says that Angelo Poliziano was the first writer who adduced medals as authorities for antient orthography and customs. He refers in his 'Miscellanea,' written about the year 1490, to some coins in the Medici collection.

The earliest examples of modern medals and medallions seem to be of the fifteenth century, though there is one remarkable exception to this in a medal of David II., king of Scotland. It is of gold, and was probably executed during that prince's captivity in England some time between the years 1330 and 1370. From the fifteenth century there is a succession of medals in most European countries. A gold medal of the council of Florence, dated 1439, is one of the earliest. A still earlier one, if the date 1415 is correct, is of John Huss; but some doubts have been entertained of its authenticity. Vittore Pisano, a painter of Verona, is celebrated as the restorer of the art at that period; but the medal alluded to of David of Scotland seems to prove it was practised before his time. Pisano's medals are very large and are all cast. They are usually inscribed 'Opus Pisani Pictoris.' It is curious that he should always refer to his being a painter while exercising a totally distinct branch of art.

The Papal medals are among the finest of a continued series. They commence properly with Paul II., who began to reign in 1464; those of pontiffs who lived prior to that date having been added to the collection by successors. Some of the medals of a later period are valuable examples of the art, in which great improvements took place under Alexander VI. His successors Julius II., Leo X., and Clement VII., had many of their medals designed by Raffaello and Giulio Romano, while Benvenuto Cellini and other distinguished artists were employed to engrave them. A German family, named Ermerani, or Hermerani, of eminence as medal engravers, settled in Italy about the middle of the seventeenth century, and executed many of the Papal medals. This talent was not, it appears, confined to the men of this family; Venuti says each of the daughters also produced a fine medal.

The German medals commence in 1453, and are very numerous. The Sicilian medals appear as early as 1501. The first modern satirical medal is of that time, and was published by Frederick II. against his adversary Ferdinand king of Spain. It bears on one side the head of Ferdinand, with the inscription FERDINANDVS R. AR. VETUS VULPES ORBIS; on the reverse a wolf carrying off a sheep, with JUGUM MEUM SUAVE EST ET ONUS MEUM LEVE. Many others might be mentioned of this description. The employment of medals for the conveyance of satire is not confined to the moderns. Examples of it occur among the Romans, but they are rare.

The Spanish medals begin in 1503. The earliest of Venice appear in 1509; and those of Denmark in 1516. The first Dutch medals seem to be of 1566, and they are remarkable for the elaborate views, maps, and plans that are engraved on many of them. It has been observed among the distinctions of antient and modern medals, that in the former, when buildings are represented, the simple elevations only are given, while in the latter perspective views are exhibited. The Dutch indulged very freely in the satirical vein, and for which they eventually paid very dearly, as it contributed, in no small degree, to bring on them the whole hostile power of France under Louis XIV., who is said to have been highly exasperated at the publication of a medal in which Van Heubingen, the Dutch ambassador, was represented as Joshua (his name) arresting the progress of the sun, under which type the flatterers of Louis designated that monarch.

The French medals do not exhibit any remarkable excellence till this reign. The popularity of Louis XIV. gave an impulse to the art, and we find his entire life illustrated (with more respect however to the national glory and the prince's vanity than to historical truth) by medals; some of them are well designed and finely executed. The medallic history of Napoleon deserves notice in the series of medals of France. It is of great extent, and is, for the most part, honourable to French art.

The series of English coins and medals is one of the most perfect. The first medal is of 1480. It is of a large size, and is executed in the early Italian manner. On one side is a portrait with IO. KENDAL. RHODI. TURCUPELLARIUS; on the reverse the arms of Kendal, with the inscription, TEMPORE OBSIDIONIS TURCORUM. MCCCCLXXX. It was found in Knaresborough forest, but it is believed to be of foreign, probably Italian, workmanship. The next English medal is of the time of Henry VIII. It is of gold, and bears the king's portrait on one side, with an inscription on the reverse. The first coronation medal appears in the reign of Edward VI. The medals of Queen Mary are numerous, and very interesting from the devices they bear. The Scotch coronation medal of Charles I. is of gold, and was struck at Edinburgh. It is remarkable as being the first struck in Britain with a legend on the edge. Specimens of this medal in gold are very scarce. The medals of the Commonwealth and of Charles II. are by Simon. Those of Queen Anne are interesting from their being charged with the achievements of the great duke of Marlborough. Soon after this a Genevese artist, of the name of Dassier, was employed upon the medals of the kings of England, and executed many portraits of royal and other illustrious characters.

The study of medals is, in its class, of great importance. It is indispensable to the historian and the antiquary, and hardly less valuable to the man of taste. To the former, medals often afford information that cannot be obtained by other means, in the inscriptions, legends, and allegories with which they are charged; while to the artist and connoisseur many of them offer not only exceedingly beautiful examples of art, but, if their authenticity can be depended on, a series of medals of any nation is one of the best authorities that can be consulted for the state of the arts of design of any particular period.

It would be an almost endless task to enumerate the works that have been written on medals. The earliest treatise on the subject is that of Eneas Vico. It is dated 1548. The publications of Pinkerton in two volumes, of Eckhel, an introduction to the study of medals by Millin, of Barthélémy, Mionnet, and others, may be consulted for general information; while, for a more extended acquaintance with the subject, reference must be made to the voluminous illustrations which have emanated from those who have described in detail the various celebrated public and private collections. Some remarks on the manner of engraving dies for medals and coins will be found in the article on Intaglio. [INTAGLIO.]

MEDALLION, a medal of an extraordinary size. Medallions were never used as current coin; whereas it is probable that medals were *sometimes* allowed to pass in circulation as money.

MEDALLION, in architecture, any circular or oval tablet bearing on it objects represented in relief, as figures, heads, animals, flowers, &c.

MEDE, JOSEPH, was born at Berden in Essex, in the year 1586. When only ten years old he lost his father, but his education was well provided for by his relations. While a boy at school he met accidently with a copy of Bellarmine's Hebrew grammar, and soon gained a considerable acquaintance with that language. In 1602 he entered Christ's College, Cambridge, and took his degree of master of arts in 1610. At this time his learning is spoken of as extraordinary. During the earlier part of his residence at college he is said to have been troubled with sceptical opinions, which however he soon shook off. His first work was a treatise, 'De Sanctitate Relativa,' addressed to Dr. Andrews, bishop of Ely, which procured for him the patronage of that prelate, who requested him to become his domestic chaplain. This offer Mr. Mede declined, and was soon after made a fellow of his college and reader of the Greek lecture of Sir Walter Mildmay's foundation. He appears to have been remarkably skilful and successful as a tutor.

In 1618 he took his degree of B.D. He refused the provostship of Trinity College, Dublin, which was twice offered him, in 1627 and 1630, through the influence of archbishop Usher. The extent of his ambition seems to have been to pursue his studies without interruption in the retirement of his college. There he spent the remainder of his life, and died in 1638, in his fifty-second year.

Mr. Mede was distinguished for his meekness, modesty, and prudence, and his liberality was such that he devoted the tenth of his scanty income to charitable uses. His learning was diversified and profound. In his younger years he studied astrology, but afterwards abandoned the pursuit. He was well acquainted with mathematics, medicine, and the various branches of philosophy, and was deeply versed in history and antiquities, and in the literature and sciences of the East, into the abstrusest parts of which he searched for illustrations of the prophecies of Scripture.

His chief work is the 'Clavis Apocalyptica,' containing a system for explaining the Apocalypse, which has been followed more or less by nearly all subsequent writers on the prophecies, and is recommended by bishop Hurd in his tenth sermon on the study of the prophecies, as being the first rational attempt to explain the Apocalypse. This work has been translated by Mr. T. Bransby Cooper, 8vo., Lond., 1833.

Mede's whole works were collected after his death by Dr. Worthington, in one vol. fol., Lond., 1672, with a life of the author prefixed. There is also a recent edition of his 'Apostacy of the Latter Times,' 12mo., Lond., 1836.

MEDE'A. (Zoology.) [CILIOGRADA, vol. vii., p. 165.]

ME'DIA (Μηδία, מָדַי), a country of antient Asia. It is difficult to determine its boundaries, as they differed at various times. In the time of Strabo it was divided into two divisions, Great Media and Media Atropatene. Great Media, which is a high table-land, is said by all antient writers to have had a good climate and a fertile soil; an account which is fully confirmed by modern travellers. It was separated on the west and south-west from the low country, watered by the Tigris and Euphrates, by a range of mountains known to the antients under the name of Zagros and Parachoatras. Xenophon however appears to include in Media all the country between the Tigris and Zagros. (*Anab.*, ii. 4, § 27.) On the east it was bounded by a desert and the Caspian mountains (the modern Elburz mountains); and on the north and north-west by the Cadusii, Atropatene, and the Matieni, thus answering for the most part to the modern Irak Ajemi. Atropatene, which corresponds to the modern Azerbijan, extended as far north as the Araxes (Aras); it was much less fertile than Great Media, and does not appear to have been included in the Media of Herodotus. It derived its name from Atropates, who successfully opposed the Macedonians, and established an independent monarchy, which continued till the time of Strabo (p. 522, 523, Casaubon), notwithstanding its proximity to the Armenian and Parthian dominions.

The principal town of Great Media was Agbatana, or Ecbatana (Hamadan), the summer residence of the Persian kings. [ECBATANA.] South-west of Ecbatana was Baptana, or Bagistana [BESITTOON], situated on the great commercial road which, beginning at Ctesiphon, passed through the Median gates of the mountain-range called Zagros, and terminated at Ecbatana. This commercial road, which is determined by the physical character of the country, has continued in use to the present day. In the north-east of Great Media, near the Caspian gates, was the town of Rhagæ, afterwards called Europus by the Macedonians, and Arsacia by the Parthians, which was founded, or rather colonized, by the Macedonians under Seleucus Nicator. (Strabo, p. 524.) This town, of which the ruins are still visible at Rai, is frequently mentioned in the apocryphal book of Tobit, as the place where many of the Jews resided, who had been carried away captive by Shalmaneser. There are several passes through the Elburz mountains, to the south-east of Tehran, in the neighbourhood of Rai. Near Rhagæ was the Nisæan plain, celebrated for its breed of horses, which were considered in antient times the best in Asia. Arrian informs us that there were 50,000 horses reared in this plain in the time of Alexander, and that there were formerly as many as 150,000. (Herodot., iii. 106, vii. 40; Arrian, vii. 13; Strabo, p. 525; Ammian., xxiii. 6.)

The mountainous country in the south-western part of Great Media was inhabited by several warlike tribes, who maintained their independence against the Persian monarchy. Strabo mentions four tribes in particular (p. 524): the Mardi, bordering on the north-west of Persis; the Uxii and Elymæi, east of Susiana; and the Cossæi, south of Great Media. The king of Persia was obliged to pass through the country of the latter whenever he visited Ecbatana, and could only obtain a free passage by the payment of a considerable sum of money. The Cossæi were defeated by Alexander, but they never appear to have been completely subdued by the Macedonians.

The chief town of Atropatene was Gaza, or Gazika, as it is called by Ptolemy, at no great distance from the modern Tauris, or Taubreez. North-west of Gaza was a salt lake, called Spauta, or Martianus (Shahee, or Ourmia). In the north-east of Atropatene, near the Caspian Sea, there were many nomad tribes, which appear to have formed no part of the Median nation. The most powerful of these tribes were the Kadusii, or Gelæ, whence the modern name of that part of the country (Ghilan) is probably derived.

According to Herodotus the Medes were originally divided into six tribes, the Busæ, Parataceni, Struchates, Arizanti, Budii, and Magi (i. 101). They were originally called Arii (Herodot., vii. 62); which word appears to contain the same root as Ar-tæi, the antient name of the Persians (Herodot., vii. 61). It is not improbable that this name was originally applied to most of the Indo-Germanic nations. Tacitus speaks of the Arii as one of the most powerful of the German tribes (*Germ.*, 43); and India proper is called, in the most antient Sanskrit works, Arrya-varta, 'holy land.' The same name was retained in the province of Ariana, and is still employed in the East as the proper name of Persia (Iran).

Media originally formed part of the Assyrian empire, but its history as an independent kingdom is given so differently by Herodotus and Ctesias (whose account is preserved in Diodorus), as to render it probable that the narrative of Ctesias must refer to a different dynasty in eastern Asia. Ctesias makes the Median monarchy last 282 years; and as Media was conquered by Cyrus about B.C. 560, it follows that the Median monarchy would commence, according to his account, about B.C. 842. Herodotus, on the contrary, assigns to the Median monarchy a period of 128 years, which, including the 28 years during which the Scythians had possession of the country, would place the commencement of the Median monarchy B.C. 716. The founder of the Median monarchy was Arbaces, according to Ctesias, who reckons eight kings from him to Astyages.

According to the account of Herodotus there were four kings of Media: 1, Deioces, who reigned B.C. 710-657. 2, Phraortes, B.C. 657-635, greatly extended the Median empire, subdued the Persians, and many other nations, but fell in an expedition against the Assyrians of Ninus (Nineveh). 3, Cyaxares, B.C. 635-595, completely organised the military force of the empire, and extended its boundaries as far west as the Halys. In an expedition against Nineveh, he was defeated by the Scythians, who had made an irruption into southern Asia, and was deprived of his kingdom for 28 years. After the expulsion of the Scythians, he took Nineveh, and subdued the Assyrian empire, with the exception of the Babylonian district (Βαβυλωνίης μοίρης). 4, Astyages, B.C. 595-560, who was dethroned by his grandson Cyrus, and Media reduced to a Persian province. The history of the rise of the Persian monarchy is related very differently by Xenophon, who also makes a fifth Median king, Cyaxares II., succeed Astyages.

The Medes revolted during the reign of Darius II., the father of the younger Cyrus, about B.C. 408, but were again subdued. (Herodot., i. 130; Xenoph., *Hellen.*, i. 2, § 19.) They do not appear after this time to have made any further attempt at recovering their independence. On the downfal of the Persian empire they formed a part of the kingdom of the Seleucidæ, and were subsequently subject to the Parthians.

ME'DICI, FAMILY OF. The early history of the family of the Medici is obscure, although some authors have traced their genealogy from the age of Charlemagne. But it must be remembered that these genealogies were made after the elevation of this family to supreme power in Florence It appears however, from authentic monuments, that many individuals of this family had signalised themselves on various important occasions. Giovanni de' Medici, in the year 1251, with a body of only one hundred Florentines, forced his way through the Milanese army, then besieging the fortress of Scarparia, and entered the place with the loss of twenty lives. Francesco de' Medici was at the head of the magistracy of Florence in 1348, at the time when the black plague, which had desolated so large a portion of the world, extended its ravages to that city. Salvestro de' Medici acquired great reputation by his temperate but firm resistance to the nobles, who, in order to secure their power, accused those who opposed them of being attached to the party of the Ghibelines, then in great odium at Florence. The persons so accused were said to be *ammoniti* (admonished), and by that act were excluded from all offices of government. In the year 1379, Salvestro, being chosen chief magistrate, exerted his power to reform this abuse, which was not however effected without a violent commotion, in which several of the nobility lost their lives. After the death of Salvestro, his son, Veri de' Medici, continued to hold a high rank in the republic, and was in great favour with the populace.

The founder however of that greatness which his posterity enjoyed for several ages was Giovanni de' Medici, the great-grandfather of Lorenzo the Magnificent. By a strict attention to commerce, he acquired great wealth; by his affability, moderation, and liberality, he ensured the confidence and esteem of his fellow-citizens. Without seeking after the honours of the republic, he was honoured with them all. The policy by which the house of Medici attained its political power is indicated in the charge given by this venerable old man on his death-bed to his two sons, Cosmo and Lorenzo: 'I feel,' said he, 'that I have lived the time prescribed me. I die content; leaving you, my sons, in affluence and in health, and in such a station, that whilst you follow my example, you may live in your native place honoured and respected. Nothing affords me more pleasure than the reflection that my conduct has not given offence to any one; but that, on the contrary, I have endeavoured to serve all persons to the best of my abilities. I advise you to do the same. With respect to the honours of the state, if you would live with security, accept only such as are bestowed on you by the laws and the favour of your fellow-citizens; for it is the exercise of that power which is obtained by violence, and not of that which is voluntarily given, that occasions hatred and contention.' He died in the year 1428, leaving two sons, Cosmo, born in the year 1389, and Lorenzo in 1394, from the latter of whom is derived the collateral branch of the family, which in the beginning of the sixteenth century obtained the absolute sovereignty of Tuscany.

Even in the life-time of his father, Cosmo had engaged not only in the extensive business by which the family had acquired its wealth, but also in the affairs of state. Such was his authority and reputation, that in the year 1414, when Balthasar Cossa, who had been elected pope, and had assumed the name of John XXIII., was summoned to attend the council of Constance, he chose to be accompanied by Cosmo de' Medici, among other men of eminence, whose characters might countenance his cause. By this council, which continued nearly four years, Balthasar was deprived of his pontifical dignity, and Otto Colonna, who took the name of Martin V., was elected pope. Cosmo did not desert in adversity the man to whom he had attached himself in prosperity. At the expense of a large sum of money, he redeemed him from the hands of the duke of Bavaria, who had seized upon his person; and afterwards gave him an hospitable shelter at Florence during the remainder of his life. The successful pontiff, instead of resenting the kindness shown to his rival, soon afterwards paid a public visit to Florence, where, on the formal submission of Balthasar, and at the request of the Medici, he created him a cardinal, with the privilege of taking the first place in the sacred college. The new-made cardinal died in 1419, and it was rumoured that the Medici at his death possessed themselves of immense wealth which he had acquired during his pontificate. This rumour was afterwards encouraged by those who well knew its falsehood. The true source of the wealth of the Medici was their superior talents and application to business, and the property of the cardinal was scarcely sufficient to discharge his debts and legacies.

The authority which Cosmo and his descendants exercised in Florence, during the fifteenth century, consisted rather in influence than in any definite power. Cosmo exerted this influence with great prudence, yet owing to the discontent of the Florentines with the result of the war against Lucca, a party arose, headed by Rinaldo de Albizi, which, in 1433, after filling the magistracies with their own adherents, seized Cosmo, and committed him to prison. He was afterwards banished to Padua for ten years, and several other members and friends of the Medici family were treated in the same way. From Florence Cosmo proceeded immediately towards Venice, where he was received with marked respect by the government; and after a short stay there he went to Padua. Upon an application to the Florentine state by Andrea Donato, the Venetian ambassador, it was consented to that he might reside on any part of the Venetian territories, but not to approach within one hundred and seventy miles from Florence. The affectionate reception which he had met with at Venice induced him to fix his abode there. Within a year of Cosmo's retreat, Rinaldo was obliged to quit Florence; and Cosmo was recalled, and returned amidst the acclamations of the people. The gonfaloniere, or standard-bearer, the executive officer who had pronounced his sentence, with a few others of his party, were put to death on the occasion. Measures were now taken to restrict the choice of magistrates to the partisans of the Medici, and alliances were formed with the neighbouring powers for the purpose of supporting and perpetuating the new system of administration in Florence. The subsequent life of Cosmo de' Medici was an almost uninterrupted course of prosperity. The tranquillity enjoyed by the republic, and the satisfaction which he experienced in the esteem and confidence of his fellow-citizens, enabled him to indulge his taste for the promotion of science and the encouragement of learned men. Though a private citizen, he surpassed almost all the princes of Europe in his munificent patronage of literature and the fine arts. He assembled round him some of the most learned men of the age, who had begun to cultivate the Greek language and philosophy. He established at Florence an academy expressly for the explanation of the Platonic philosophy, at the head of which he placed the celebrated Marsilius Ficinus. By means of foreign correspondence, he collected the Greek, Latin, and Oriental MSS., which formed the basis of the Laurentian library; nor was he less liberal in his encouragement of the fine arts. During the retirement of his latter days, his happiest hours were devoted to the study of letters and philosophy, and the conversation of learned men. He also endowed numerous religious houses, and built an hospital at Jerusalem for the relief of distressed pilgrims. The spirit of his administration was moderate, he avoided all appearance of state which might excite the jealousy of the Florentines; and, by way of increasing his interest among them, he confined the marriages of his children to Florentine families. By this prudent conduct and his benevolence, he acquired the title of 'father of his country,' which was inscribed upon his tomb; an appellation which, as it was founded on real merit, has ever since been attached to the name of Cosmo de' Medici. He died August 1st, 1464. Cosmo de' Medici married Contesina Bardi, of a noble and illustrious family, which had been long distinguished at Florence. By her he had two sons, Giovanni and Piero; and he had a natural son by a mistress.

Giovanni de' Medici was one of the Florentine ambassadors who were sent, in 1455, to take the necessary oaths to Calixtus III., who had succeeded Nicholas V. He was Cosmo's favourite son, on whom all his future hopes and expectations rested; but he died prematurely in 1463. Giovanni married Cornelia de Alessandri, by whom he had only one son, who died an infant. Piero de' Medici succeeded to Cosmo's fortune and authority at Florence: Cosmo, in the decline of life, had recommended to his surviving son to employ one Diotisalvi Neroni as his minister, whom he believed to be attached to the Medici interests; but the ambition of Neroni, and the disaffection of some former friends of the Medici, had nearly proved fatal to Piero's administration. It was the intention of the conspirators to surprise Piero at one of his country residences; but one of the conspirators went and communicated the plot to him. Piero, by an expeditious return to the city, at the head of a chosen troop of his friends, baffled the designs of his enemies. Most of the conspirators saved themselves by flight; and though, with the assistance of the Venetians, they afterwards made a stand, they were finally compelled to evacuate Tuscany. Piero died Dec. 3, 1469, leaving by his wife, Lucretia Tornabuoni, two sons and two daughters, Lorenzo, Giuliano, Bianca, and Giovanna.

At the death of Piero de' Medici, his two sons inherited his property; but Lorenzo succeeded him as head of the republic, and upon him the title of Magnificent was afterwards conferred. From the time of Cosmo's death, in 1464, on account of the infirmities of his father, Lorenzo had been introduced to a knowledge of public affairs, although then only in his sixteenth year. With this view he was sent to visit the principal courts in Italy. Upon the accession of Sixtus IV. to the papal throne, he went, with other citizens of Florence, to congratulate the new pope, and was invested with the office of treasurer of the holy see; and while at Rome took every opportunity to add to the remains of antient art which his family had collected. One of the first events after he undertook the administration of affairs was a revolt of the inhabitants of Volterra, on account of a dispute with the Florentine republic. By the recommendation of Lorenzo, force was used, and the result was the sack of Volterra. In 1472 he re-established the academy of Pisa, to which city he removed in order to complete the undertaking: he selected the most eminent professors, and contributed a large sum from his private fortune, in addition to that granted by the state of Florence. Lorenzo, who was, or affected to be, an admirer of Plato, took an active part in the establishment of an academy for the cultivation of the Platonic philosophy, and instituted an annual festival in honour of Plato. Whilst Lorenzo was thus dividing his time between the administration of the state and the promotion of literature, the Pazzi a numerous and distinguished family in Florence, formed a conspiracy to assassinate Lorenzo and his brother. Giuliano was killed, but Lorenzo escaped. The people, who were attached to the Medici, collecting in great numbers, put to death or apprehended the assassins. Salviati, archbishop of Pisa, was hung through the windows of the palace, and was not allowed to divest himself even of his robes; and Jacopo de' Pazzi, with one of his nephews, shared the same fate. The name and arms of the Pazzi family were suppressed, its members were banished, and Lorenzo rose still higher in the esteem and affection of his fellow citizens. Sixtus IV., who was a party to this conspiracy, excommunicated Lorenzo and the magistrates of Florence, laid an interdict upon the whole territory, and, forming a league with the king of Naples, prepared to invade the Florentine dominions. Lorenzo appealed to all the surrounding potentates, and he was zealously supported by his fellow-citizens. Hostilities were commenced, and carried on for two campaigns. At the close of 1479, Lorenzo took the bold resolution of paying a visit to the king of Naples, and, without obtaining any previous promise of security, trusted himself to the mercy of his enemy. The result of this confidence was a treaty of mutual defence and friendship between the king of Naples and Florence, and Sixtus afterwards consented to a peace. The death of Sixtus IV. freed Lorenzo from a dangerous enemy, and he found a friend in his successor Innocent VIII. Lorenzo now secured to the republic of Florence a degree of tranquillity and prosperity which it had scarcely ever known before; and by procuring the institution of a deliberative body, of the nature of a senate, he corrected the democratical part of its constitution.

Lorenzo distinguished himself above all his predecessors by the encouragement of literature and the arts. His own productions are sonnets, canzoni, and other lyric pieces; some longer works in stanzas, some comic satires, carnival songs, and various sacred poems. Many of the lighter kind were popular in their day. Although the ancestors of Lorenzo laid the foundation of the immense collection of manuscripts contained in the Laurentian library, Lorenzo has the credit of adding most largely to the stock. For the purpose of enriching his collection of books and antiquities, he employed learned men in different parts of Italy, and especially his intimate friend Politian, who made several journeys in order to discover and purchase the valuable remains of antiquity. Two journeys were undertaken at the request of Lorenzo into the East by John Lascaris, and the result was the acquisition of a great number of manuscripts. On his return from his second expedition, Lascaris brought two hundred MSS., many of which he had procured from a monastery at Mount Athos; but this treasure did not arrive till after the death of Lorenzo, who in his last moments expressed to Politian and Pico of Mirandola his regret that he could not live to complete the collection which he was forming. On the discovery of the art of printing, Lorenzo quickly saw and appreciated its importance. At his suggestion, several Italian scholars devoted their attention to collating the manuscripts of the antient authors, for the purpose of having them accurately printed. On the capture of Constantinople by the Turks, many learned Greeks took refuge in Italy; and an academy was established at Florence for the purpose of cultivating the Greek language, partly under the direction of native Greeks, and partly under native Italians. The services of these learned men were procured by Lorenzo, and were amply rewarded by his bounty. 'Hence,' as Roscoe observes, 'succeeding scholars have been profuse of their acknowledgements to their great patron, who first formed that establishment, from which (to use their own scholastic figure), as from the Trojan horse, so many illustrious champions have sprung, and by means of which the knowledge of the Greek tongue was extended, not only through Italy, but through France, Spain, Germany, and England, from all which countries numerous pupils attended at Florence, who diffused the learning they had there acquired throughout the rest of Europe.'

Lorenzo also augmented his father's collection of the remains of antient art. He appropriated his gardens in Florence to the purpose of an academy for the study of the antique, which he furnished with statues, busts, and other works of art, the best in their kind that he could procure. The higher class of his fellow-citizens were incited to these pursuits by the example of Lorenzo; and the lower class by his liberality. To the latter he not only allowed competent stipends while they attended to their studies, but gave considerable premiums as rewards of their proficiency. To this, institution, more than to any other circumstance, Roscoe ascribes the sudden and astonishing advance which, toward the close of the fifteenth century, was evidently made in the arts, and which, commencing at Florence, extended itself to the rest of Europe. In 1488 Lorenzo lost his wife; and on the 8th of April, 1492, he sunk under a slow fever, and expired in the forty-fourth year of his age. Leoni of Spoleto, his physician, a person of great eminence in his profession, is said to have hastened his death by mistaking his case.

By his wife, Clarice Orsini, Lorenzo had a numerous family: three sons (Piero, Giovanni, and Giuliano) and four daughters arrived at the age of maturity. Piero was born Feb. 15th, 1471, Giovanni in 1475, and Giuliano in 1478. Giovanni was afterward known under the name of Leo X.; and Giuliano, having allied himself by marriage to the royal house of France, became Duke of Nemours.

Of Giuliano, the brother of Lorenzo, Roscoe preserves an interesting anecdote. Shortly after the attempt at assassination, he says, 'Lorenzo received a visit from Antonio da San Gallo, who informed him that the untimely death of Giuliano had prevented his disclosing to Lorenzo a circumstance with which it was now become necessary that he should be acquainted: this was the birth of a son, whom a lady of the family of Gorini had borne to Giuliano about twelve months before his death, and whom Antonio had held over the baptismal font, where he received the name of Giulio. Lorenzo immediately repaired to the place of the infant's residence, and, taking him under his protection, delivered him to Antonio, with whom he remained until he had arrived at the seventh year of his age. This concealed offspring of illicit love, to whom the kindness of Lorenzo supplied the untimely loss of a father, was destined to act an important part in the affairs of Europe. The final extinction of the liberties of Florence, the alliance of the family of Medici with the royal house of France, the expulsion of Henry VIII. of England from the bosom of the Roman Church, and the consequent establishment of the doctrines of the reformers in this island, are principally to be referred to this illegitimate son of Giuliano de' Medici, who through various vicissitudes of fortune at length obtained the supreme direction of the Roman see, and under the name of Clement VII. guided the bark of St. Peter through a succession of the severest storms which it has ever experienced.'

Piero, the eldest son of Lorenzo, succeeded him in the administration of Florence. Politian said that his father had a favourable opinion of his capacity, but it soon appeared that he was unequal to the task of government. With the view of obtaining the sovereign power at Florence, he formed a more intimate connection with the pope and the king of Naples. On the entrance of the French into Italy under Charles VIII. he deserted his allies. As soon as the French king reached the confines of the Florentine state, Piero had a secret interview with him, in which he was lavish in his offers to promote the interest of the king, and as a pledge of his fidelity surrendered to him the important fortress of Sarzana, with the town of Pietra Santa, and the cities of Pisa and Leghorn. Charles undertook to restore these places as soon as he had accomplished the conquest of the kingdom of Naples. On his return to Florence after this disgraceful compromise, Piero was refused admittance into the palace of the magistrates, and, finding the people were so highly exasperated against him as to endanger his personal safety, he hastily withdrew himself from his native place to Venice. The miseries which the inhabitants of Italy experienced in consequence of the French invasion belong to the general history of Italy. The plundering of the palace of the Medici, and the dispersion of that invaluable library which had been collected by the care of the Medici, were among the misfortunes that befel Florence. The French troops, which had entered the city without opposition, led the way to this act of barbarism, in which they were joined by the Florentines themselves, who openly carried off or purloined whatever they could discover that was rare or valuable. Besides the numerous manuscripts, the plunderers carried off the inestimable specimens of the arts which the palace of the Medici contained, and which had long made it the admiration of strangers and the chief ornament of the city. Exquisite pieces of antient sculpture, vases, cameos, and gems of various kinds, were lost amidst the indiscriminate plunder, and the rich accumulations of half a century were destroyed or dispersed in a single day.

The subsequent history of Piero was a continual succession of mortifications and disappointments. In 1504, when Italy was invaded by Louis XII., Piero entered into the service of the French, and was present at the engagement in which they were defeated by the Spaniards with great loss, upon the banks of the Garigliano. In effecting his escape he attempted to pass the river; but the boat in which he, with several other men of rank, had embarked, being laden with heavy cannon, sunk in the stream.

Of the subsequent restoration of the Medici to Florence, an account is given in the life of Leo X., as well as, under Cosmo I., of the assassination of Alessandro, and the final extinction of the republic, when Cosmo was elevated to the rank of duke of Florence, and afterwards to that of grand-duke of Tuscany. For more minute details of the house of Medici, the several works may be consulted from which this notice has been chiefly derived.

(*Modern Universal History*, 8vo., vol. xxxvi.; Noble's *Memoirs of the House of Medici*, illustrated with genealogical tables; Tenhove's *Memoirs of the House of Medici*, translated from the French by Sir R. Clayton, 2 vols. 4to., Bath, 1797; Roscoe's *Life of Lorenzo de' Medici*, 2 vols. 4to., Lond., 1796; and his *Life and Pontificate of Leo X.*, 4 vols. 4to., Liverp., 1805.)

The genealogy of the Medici to the present time is given in a splendid work but little known, entitled 'Famiglie celebri Italiane,' di P. Litta, still in progress. The Medici and their descendants are comprised in 'Fascicolo XVII.,' in seven parts, folio, Milan, 1827-30.

MEDICINE. The earliest records of the practice of medicine are extremely obscure. Among the Jews it appears to have been entirely confined to the priests, and the whole art seems to have consisted in the prevention of contagion by isolation and cleanliness, and the administration of a few uncertain remedies. The Egyptians, according to the account of Herodotus, must have made some little progress; purging medicines and emetics were well known to them and much used; and such was the subdivision of labour, that there were physicians for every separate complaint, some for the eyes, others for the head, others for the teeth, others for the abdominal parts, and others for diseases which did not manifest themselves by outward visible symptoms. (Herod., ii. 84.) It appears however that in the time of Darius the son of Hystaspes, the Greeks possessed at least more skill than the Egyptians. (Herod., iii. 129.) The Greeks probably derived their knowledge of medicine, with that of many other arts, from Egypt, whence Chiron, the Centaur of their fables, is said to have first introduced it among them. His pupil Æsculapius [Æsculapius] so much improved the art, that he was deified; and Machaon and Podalirius, his sons, accompanied the Grecian army to the siege of Troy. From circumstances mentioned in the 'Iliad,' it would appear that their practice was almost entirely confined to the treatment of wounds, and that charms and incantations formed a considerable portion of the means which they employed. The descendants of Æsculapius were for many years the chief practitioners of medicine: they were called Asclepiadæ, and were the priests of the temples erected in honour of their progenitor, to which the sick were accustomed to resort for advice and the application of remedies.

In the sixth century before the Christian æra, medicine, with other sciences, began to be more philosophically studied in Greece, and among the first of those who devoted much of their time to the investigation of the structure and functions of the animal body was Pythagoras. His pupils Democritus and Heraclitus appear also to have added considerably to the knowledge both of anatomy and of practical medicine, and their contemporary Herodicus first introduced the practice of gymnastic exercises, which afterwards formed so large a part of medical treatment. [Gymnastics.] But the most remarkable man in the history of medicine in Greece was Hippocrates, one of the Asclepiadæ, who was born at Cos (where one of the chief temples was erected), B.C. 460, and was the pupil of Heraclitus and Herodicus. [Hippocrates.] The improvements which he made in medicine (and many of which are detailed in the article referred to) were so considerable, that for many centuries his successors appear to have been content to follow him in reverential imitation. His sons Thessalus and Draco, and his son-in-law Polybius, were the most renowned of his descendants, and they are generally regarded as the founders of the medical sect or school which was called the Hippocratean or Dogmatic sect.

The establishment of the Alexandrian school of philosophy forms the next most important epoch. The science of medicine was assiduously cultivated, and the human body was first dissected in Alexandria by Erasistratus and Herophilus. [Herophilus.] The former was the pupil of Chrysippus, a violent opponent of the Hippocratic school, and a bold innovator in medicine, with whom probably originated the schism in consequence of which, for some centuries, every physician ranged himself in one of two sects, the Dogmatists and the Empirics. The Dogmatists held that disease could not be securely treated, except on the foundation of a knowledge of the healthy structure and actions of the body, and of the influence of remedies, and the effects of disease upon it; while the Empirics maintained that such knowledge was not only unnecessary, but unattainable, and that simple experience should be the only guide to practice. The progress of the science was greatly arrested by the observation of facts being neglected in the ardour with which each party argued its own cause, and the dispute only seemed to cease with the introduction of a new sect.

During the early periods of the Roman empire medicine seems to have been little cultivated, and, according to Pliny (xxix. 1), Rome was for 600 years without professed physicians, though not entirely without medical knowledge. The first individual of any eminence who practised medicine in Rome was Asclepiades of Bithynia [Asclepiades], who lived in the century before the commencement of the Christian æra; but he does not appear to have advanced the knowledge of the science. He was succeeded by his pupil Themison, the founder of a sect called Methodics, who held doctrines nearly intermediate between those of the Dogmatists and of the Empirics. A large majority of succeeding physicians attached themselves to this sect, and among them were Soranus and Aurelianus, whose writings are the principal that remain of this period.

About two centuries later the Methodics were divided into numerous sects, as the doctrines of particular physicians became more generally received. The chief of these sects were the Pneumatics and the Eclectics. The former are represented by their most eminent writer, Aretæus [Aretæus], who lived in the reign of Vespasian, and the chief points of their doctrines are detailed in his life. Of the Eclectics, the most celebrated was Archigenes, of Apamea, who practised at Rome in the time of Trajan. But the most remarkable writer of this age was Celsus, in whose work, 'De Medicinâ,' the progress and condition of medicine previously to and during his life are amply detailed. [Celsus.] He was the first native of Rome who is known to have studied medicine, and the only one who did so with success. In his time medicine, which, as a science, might be said to have had its origin with Hippocrates, had made considerable progress; the several sects of its professors differed rather in their pretensions than in any important point of knowledge; the philosophical learning, which some sought and others despised, was almost entirely hypothetical, and had relation only to the doctrines of the mutual actions of imaginary atoms, elements, and spirits, but all had been alike engaged in the study of practical medicine, and their accumulated experience had by this time formed a very considerable amount of useful knowledge.

The individual whose history forms the next chief epoch in the history of medicine is Galen; but it will be unnecessary to repeat what has already been said of his doctrines and practice. [Galen.] For a long time after his death physicians were chiefly occupied in commenting on his works, and imitating, as closely as they could, his practice. His writings were regarded as ultimate authority, and everything that seemed opposed to them was at once rejected. From the time of Galen to the seventh century the only names of any repute (and theirs is but small) are Sextus Empiricus, Oribasius, Ætius, Alexander Trallianus, and Paulus of Ægina; and after the death of the last of these, no medical work of the least merit was published in the Greek language.

From the seventh to the twelfth century the only nation in which medicine made any progress, or was even prevented from retrograding, was the Arabian. It appears that in he conquest of Alexandria some books were saved from the burning of its magnificent library, and that among them were the writings of Hippocrates and Galen. The latter were soon translated into Arabic and diligently studied; and all the earliest Arabian works on medicine, as those of Ahrun in the eighth, and Serapion in the ninth century, are little more than transcripts of those of Galen. One of the most illustrious of the Arabian school was Rhazes, who was born in the ninth century, and whose works contain many original observations, of which the most remarkable relate to some important diseases, unknown to, or at least not described by former writers, as smallpox and measles. In those parts of his writings which relate to pharmacy Rhazes describes some of the earliest of what are called chemical remedies, which were doubtless suggested by the recent origin of the systematic practice of chemistry among his countrymen. After Rhazes was Ali-Abbas, and after him Avicenna, who attained the highest repute of all. He was born in 980, and has left voluminous writings, which however appear to show that his fame is deserved only when he is placed in comparison with his contemporaries. Neither Avicenna nor the later writers, Mesue and Albucasis, contributed anything of importance to the progress of medicine. Avenzoar and Averroes were disciples of the Arabian school, and, though natives of Spain, wrote in the Arabic language. The former was the preceptor of the latter, and lived in the eleventh century, and his works are among the few that exhibit even slight departures from the doctrines of Galen. The circumstances which chiefly mark the period of the Arabian school of medicine are, the more correct description of several diseases, the first records of some new and important ones, and the introduction of several valuable remedies, both from the vegetable productions of the tropical and oriental countries, and from the chemical processes which were then first brought into general use. But the physicians adhered too carefully to the doctrines of Galen to make much progress in their science; and anatomy, physiology, and pathology appear to have been almost entirely neglected.

From the decline of the Arabian school in the twelfth century to the beginning of the fifteenth, the history of medicine presents few circumstances of interest. The dissection of the human body was first publicly practised by Mondini at Bologna, about the year 1315; and at about the same time lived Gilbert, the first English writer on medicine who acquired any repute. Between the twelfth and fifteenth centuries several of the most important universities were founded, with a school of medicine attached to each: that of Salerno was established in the twelfth century, that of Montpelier in the thirteenth, those of Bologna, Vienna, and Paris in the fourteenth, and in the fifteenth those of Rome, Padua, Pavia, and several other cities in Italy. By means of these, and by the impetus which, with all other sciences, it received from the invention of printing, medicine again commenced a forward course. In this country it derived the greatest advantages from Linacre [Linacre] and the establishment of the college of physicians, to whose members, in succeeding years, several of the most brilliant discoveries are due.

In the fifteenth century the sect of chemical physicians arose, and their doctrines, under the bold advocacy of Paracelsus, who publicly burnt the writings of Galen, obtained considerable credit and numerous supporters. Their main assertion was that the operations of the living body are entirely governed by the same chemical laws as obtain in inorganic matter; and the works of all the writers of the fifteenth century are filled with arguments in support either of this doctrine or of the more antient tenets of Galen. The Galenists were of course the more learned party, who were well versed in the antient books; while the chemists were chiefly those who were more practically skilled in the arts of that newly discovered science. Neither party can be said to have much advanced the knowledge of medicine; but in the middle of the sixteenth century the most important improvement commenced in the diligent and accurate study of anatomy by Vesalius [Vesalius], who, disregarding the general obloquy which he incurred, carefully studied the structure of the most important parts of the human body.

From the time of Vesalius, the study of anatomy was diligently pursued, and in the early part of the seventeenth century was rewarded by several of the most interesting and important discoveries; as that of the circulation by Harvey [Harvey], of the absorbents by Asellius, of the process of respiration by Malpighi [Malpighi], and numerous others. Among the most celebrated men of the seventeenth century, may be enumerated Glisson, Bartholin, Rudbeck, Fabricius, Hooke, Sylvius, Willis, Riolanus, Fallopius, and Bellini. All of them were employed in the diligent pursuit of anatomical and physiological knowledge; and, somewhat later, Sydenham again introduced a truly Hippocratic mode of observation of the phenomena of disease in its symptoms, causes, and effects, and in the influence of remedies upon it. By the combined efforts of the anatomists and the practical physicians, medicine in this century made the most remarkable progress, although it was in some measure checked by the attempted application of the laws of mechanics (then, from the discoveries of Newton and others, the dominant science) to the explanation of all the phenomena of the living body. The iatro-mathematicians, as those who supported this theory were called, were long engaged with the chemists, who had already conquered the Galenists; and to these rival sects was then added that of the Vitalists, founded by Van Helmont [Helmont, Van], which at last obtained complete ascendancy over both. The Vitalists held that there is in the living body a principle (upon which different members of the sect conferred different hypothetical appellations) which presides over and directs all the processes of the living body, and is directly opposed to the influence of chemical and mechanical agents. Stahl, Hoffmann, and Boerhaave were of this school, though each considerably modified the opinions of its founder.

Among the pupils of Boerhaave were Van Swieten and Haller. The former adopted the hypothetical spirit of the school too closely to add much of real value to medical science; but the latter may be fairly considered to have done more for it than any other single individual. Before the time of Haller, the cases of Harvey, Glisson, Malpighi, and others, who devoted themselves to the simple observation of facts and the evident deductions from them, were exceptional; but since his time, the exceptions have rather been those who, with a comparative neglect of observation, have endeavoured only to find or support some theory by which all the phenomena they met with might seem explained. Haller's contemporary Cullen [Cullen], though he yielded much more to theory, was of eminent service in the study of practical medicine; and his opponent Brown is acknowledged to have introduced many useful lessons in the same branch of the study.

With the gradual oblivion of the hypotheses of both Cullen and Brown, the theoretical study of medicine may be considered to have entirely ceased, and in the present day we may certainly be said to be without any general medical theory. From the time of Haller, medicine has acquired more and more nearly the character of a science of simple observation and the patient investigation of facts. Its history would therefore consist of little more than a recital of successive discoveries, each perhaps small when compared with the vast amount of knowledge still unexplored, yet altogether so numerous that even a sketch of them could not be here introduced. The reader must therefore be referred to the several articles on the different branches of medicine and its collateral sciences, and to the lives of those who have been most conspicuous for their discoveries.

MEDICK, a corruption of Medicago, is a name given to different plants belonging to the Papilionaceous division of the Leguminous order. Black medick is Medicago Lupulina; purple medick is M. sativa, or lucerne; yellow medick is M. falcata. They are all agricultural plants, and of considerable value, but lucerne is the only one generally cultivated. [Lucerne.] Black medick, also called black nonsuch, is sometimes sown by farmers in dry gravelly soil as the commencement of a pasturage; unless sheep-fed, it lives only for a couple of years, but during that time it affords a crop, and when it dies off, the perennial grasses sown with it cover the land and take its place; but if closely fed by sheep or other animals, it becomes a true perennial, and forms a valuable part of the herbage. Its name is derived, not from the colour of the flowers, for they are yellow, but from that of the pods, which are curved, black, and clustered together at the ends of the branches. That it should be supposed to be the same as hop-trefoil would have scarcely been credible, did we not possess evidence of the fact in one of the best of our English works on agriculture; this latter plant resembles it in the leaves and flowers; but the latter, when the pods are ripe, cover them over in such a way as to produce the appearance of a head of hop-flowers. Yellow medick is only grown in very poor soils in some parts of Europe; in England it is not an agricultural plant, but is found wild on the tops of old walls and on antient ruins, which it clothes with a green herbage, and thus evinces its fitness for the most sterile places, where there is room for its long roots to extend themselves. Tree medick (Medicago arborea) is a large bush in the south of Italy, and was doubtless the plant called Cytisus by the Romans.

MEDINA. [ARABIA.]

MEDITERRANEAN (or *Midland-Sea*), the name of the sea between the Straits of Gibraltar to the west and the Dardanelles and Syria to the east. This sea was antiently called The Sea, or the Great Sea, by the Jews. The Greeks do not seem to have had any general name for the Mediterranean: Herodotus calls it 'this sea' (i. 185); and Strabo calls it 'the sea within the columns,' that is, within the Straits of Gibraltar (121, 491, Casaub.). Mela calls the whole sea by the name 'our sea' (*nostrum mare*), and observes that different parts have their several names. Pliny appears to have no general name for it. The term Mediterranean is not applied to this sea by any classical Latin writer. It was called *bahr-roum*, or the sea of Rome, by the Arabs.

The Mediterranean is comprised between the parallels of 30° 15′ and 45° 50′, and the meridians of 5° 30′ W. and 36° 10′ E. The distance from Gibraltar to the farthest shore of Syria is 2000 miles, and the narrowest part, between Sicily and Africa, is 79 miles across. The Mediterranean, including the islands, occupies an area of 734,000 square miles. The surface of country of which it receives the drainage is very difficult to estimate, but may be assumed to exceed this quantity. On the shores of this sea have been transacted the most important events in the history of mankind, and its character seems to mark it as the theatre best adapted to the complete and rapid civilization of the race. From the great diversity of soil and productions, under a varied and favourable climate, the colonists, from whatever points they first proceeded, would soon acquire those different habits under which their several energies and capabilities would be developed. The comparative shortness of the distances of the several places, by rendering navigation easy and pleasant in small and imperfect vessels, would, by facilitating intercourse from an early period, tend to diffuse and to promote civilization; while commerce, by bringing together men of different habits, manners, and languages, and thus circulating practical information, would supply the materials for the perfection of the arts and sciences.

As a notice even of a cursory kind, of countries and cities whose history is connected with almost every history in the world, would greatly exceed our limits, we shall confine ourselves almost entirely to those points which concern our subject as a *sea*, referring the reader for all specific local information to the particular names. We shall therefore take a short view of the shores, beginning at Syria and proceeding along Asia Minor to Gibraltar, and return along the coasts of Africa to Egypt, noticing some remarkable historical points, the commerce, winds, currents, and the saltness of the water, and introducing slight references to the navigation, antient and modern, and the principal naval actions.

The shores of Syria, the general name of the country between Anatolia and Arabia, are mountainous between Tripoli and Tyre, but present in many places a large extent of low and flat coast. The climate is excessively hot in summer, and the winter often severe. The chief ports are Alexandretta, Beyrout, and Tripoli. The trade is carried on in small coasting vessels, but under the oppressive and ignorant government of the Turkish pashas it is very small. Tyre, and Sidon, afterwards still more famous, are reduced to fishing villages. Though the country was antiently inhabited above Mount Carmel by the Phœnicians, but few antient monuments have been found bearing inscriptions.

The coast of Anatolia, the west portion of Asia Minor, is mountainous, rising in some parts very near the sea to 7000 and 8000 feet. It is now a Turkish province. About 20 leagues from the nearest coast of Syria is the island of Cyprus, where the greatest number of Phœnician inscriptions have been found, though none of a date prior to three centuries before Christ. The island of Candia, the name given by the Venetians to the antient Crete, is highly fertile, productive, and beautiful, but has little trade. The city of Candia stands in the port of the same name; Suda is a fine port. The island of Rhodes, celebrated for the first code of maritime laws, for its schools in the time of the Romans, and in the wars of the Knights of Jerusalem against the Turks, is situated off the south-west corner of Asia Minor, and is now in the hands of the Turks. It produces wine, fruit, and pine-timber.

The numerous islands in the sea called the Ægean Sea, between Greece and Asia Minor, forming the Grecian Archipelago, are in general verdant and picturesque, and afford delightful sailing in summer, but they are subject to very heavy squalls. The sides of the islands being steep, and the water very deep, there are in general no anchorages but in particular places. Delos, celebrated for its temple and oracle, was long an emporium of commerce, and was at one time noted for its trade in slaves. It declined in the wars of Mithridates. Scio, a high and beautiful island, covered with the gardens of the Greek merchants, of whom it was the favourite resort, was devastated by the Turks in 1822. Milo is the residence of the pilots of the Archipelago. The Archipelago and its coasts contain many high mountains, as Athos, 6774 feet high, and many others. Smyrna, a place of high antiquity, is the great commercial entrepôt of this part of the world. The chief exports are silk, drugs, and fruits, for which ships carry manufactured goods, sugar, corn, &c. Tenedos, opposite the site of Troy, retains its antient name.

On the opposite side of this sea is Salonica, a large city of 70,000 inhabitants, at the head of a bay. The anchorage is good and the trade considerable, but there is no harbour. The islands Spezzia, Hydra, and Poros, which are near the coast of the Morea, have become distinguished of late years for maritime enterprise.

The coast of the Morea, the antient Peloponnesus, is mountainous, some of the summits exceeding 6000 feet. The country is verdant and of an agreeable aspect, but not well wooded; the productions are numerous, but the trade small. It was given up by the Turks in 1830, to form a part of the new kingdom of Greece. Corinth, at the head of an arm of the sea, and on the isthmus which joins Livadia to the Morea, formerly renowned as one of the most splendid and luxurious of cities, is now a small town exhibiting a few remains of its antient architecture. Athens, beyond the isthmus, is the most populous town of Greece, and has been increasing in importance since the commencement of the reign of Otho, the first king of Modern Greece. It is not a place of much trade.

The coast of Albania, including the antient Illyricum, is more mountainous and rugged: the natives are barbarous, and more athletic than those to the southward. It is now part of the kingdom of Greece; it has but little trade. The known harbours are Antivari, Dulcigno, Durazzo, Valona, Parga, and Prevesa. Off this coast and the Morea lie the Ionian Islands. The principal one, Corfu, the antient Corcyra, is the seat of government, which is carried on in the name of the Republic of the Seven Islands, and which is placed under the protection of Great Britain by the treaty of Vienna, 1814. Corfu is picturesque, fertile, and wooded. Cefalonia has a more dreary aspect: it contains a mountain 5380 feet high, which is a conspicuous seamark. Inside Cefalonia is Ithaca, now called Teaki, the native place of Ulysses. The fertile island of Zante, famous for its currants, is to the southward. Proceeding to the northward we enter the Adriatic, the entrance of which is 40 miles broad. The shores of Dalmatia and Istria afford numerous fine harbours, and are covered towards the interior with extensive forests of timber, much of which is fine oak. In Dalmatia is Ragusa, formerly a republic, and a neutral port, and whose flag, prior to the French revolution, was known even to our own shores. Above Ragusa the eastern shores are studded with islands affording good anchorage.

The Greeks, especially the Hydriotes, are active sailors. They employ small vessels, half-decked, which both sail and pull, but they seldom venture to sea except in fine weather or with a fair wind. The trade to the Black Sea is chiefly carried on in Greek bottoms.

Trieste, the chief port of Austria, is a large and handsome city, and a place of great trade. It exports wool, tobacco, and the produce of the mines of Hungary. It is a free port.

Venice, founded in the fifth century upon numerous small low islands at the mouth of the Po, celebrated as the entrepôt of the commerce between Europe and the Levant, which was at its maximum about the fourteenth century, is still a place of considerable trade, though its wealth and commerce have declined. The chief exports are corn, timber, silk, glass, &c. It has very fine and extensive fisheries. Off Malamocco, the port of Venice, is a bar, across which line-of-battle ships built there have been conveyed in a kind of floating-dock called a camel. During the melting of the snows in spring the freshes of the Po render the waters nearly fresh or brackish to a considerable distance at the head of the Adriatic. This sea is subject to hard northerly gales, called *boras*, especially in winter, which last three days, giving warning of their approach. These winds are very dangerous on the Italian or western shore to leeward. The coasting trade of the Adriatic is chiefly carried on in Austrian vessels and those of the Papal States. The vessels employed are mostly trabaculos, a kind of lugger, and seltees, small vessels of one mast. The chief ports of the coast of Italy which bounds the west side of the Adriatic are Ancona and Brindisi. Ravenna, formerly celebrated as a port, is now five miles inland.

The kingdom of Naples, which forms the south part of Italy, is remarkably fertile, and abounds in beautiful scenery. Its chief exports are olive-oil, silk, and wine. Naples, the capital, would become a place of great trade, but for the system of duties and commercial restrictions. The bay of Naples, with Vesuvius rising to the height of 3880 feet, the city along the shore, the clear Italian sky reflected in the expanse of water, the picturesque islands, and that brilliancy of general effect which is due to the increase of light caused by an approach of some degrees towards the equator, is one of those places which our tourists are fond of describing; but to the eye familiar with the gorgeous magnificence of the tropics, the spectacle is one of lesser dignity. The island of Sicily is one of the most fertile in the world, but under the joint effects of demoralization, bad laws, and the indolence of the government, its resources are not developed. Among the chief sources of commerce is the tunny fishery. These fish enter the Mediterranean in the spring, keeping by the European shore, and leave it again at the close of the year by the coast of Africa. They are caught in nets so contrived that the fish are driven into small compartments, where they are struck and killed. The sword-fish is pursued and struck with a spear having a line fast to the head, with which the fish is played till it is wearied out, in the manner described by Strabo (i. 24, Casaub.). Anchovies are taken along the shores of Sicily, and the murex purpura is found. Messina is the great commercial city and port, on the site of the antient Zancle. Scylla is considered in these days as an ordinary rock, but Charybdis is a vortex which might; on occasions, prove dangerous to a small vessel. The chief danger of the Faro is now considered to be merely the baffling winds in a current running from two to five miles an hour, in water too deep for anchoring, and subject to sudden squalls. Messina is famous for the optical illusion called *fata morgana;* and on the coasts a sudden rising and subsidence of the water is experienced, which is called *marobia*. There are no harbours on the south coast, which is low. The spacious harbour of Syracuse on the east coast is often used as a refuge in gales of wind. In the river, the Anapus, the papyrus grows abundantly. The seamen of Sicily are hardy and courageous. Mount Ætna, 10,880 feet high, is a conspicuous object in these seas. Among the Lipari or Æolian Islands is the constantly burning mountain of Stromboli, which rises like a steep cone from the sea, and is a very interesting object at night. Ustica produces the best vegetable soda.

The principal port on the west coast, and the chief commercial city of Italy, is Leghorn, which is a free port, and one of the principal depôts for wheat from the Black Sea. The principal exports are silk, oil, Carrara marble, alabaster, straw for hats, and wine. The coasting trade is carried on in small Italian vessels. Genoa, once the capital of a republic, but now a Sardinian province, is celebrated for the number and beauty of its marble edifices. The harbour is artificial. The port is free, and the commerce increasing. The chief productions are olive-oil, rice, velvet, &c. The sailors are said to be among the hardiest of the Mediterranean.

The sea to the south-west of Italy was antiently named from the Tyrrhenians, who are among those nations who once possessed the maritime power of the Mediterranean.

The chief port on the south coast of France is Marseille, at the mouth of the Rhône, said to have been founded by a colony of Phocæans, who, from the great trading facilities of the place, extended their possessions along the shores on both sides. Amongst these are Frejus, where Bonaparte embarked for Elba in 1814; and Cannes, where he landed from Elba in 1815. The Marseillois have been renowned as navigators. The principal exports are silk and wines; there is a great and increasing trade; and from 5000 to 6000 ships arrived in 1831. In the freshes of the Rhône the fresh water may be skimmed far out at sea. Lord Exmouth's fleet watered in this manner in the late war.

Toulon is the great naval arsenal of France. The Gulf of Lions, like all the gulfs on the north shores of the Mediterranean, is subject to violent gales from the northward, which sometimes last three days.

The islands of Sardinia and Corsica, lying north and south, extend over 80 leagues of the sea between Genoa and Tunis. The climate of Sardinia is mild, and the soil fertile. It exports corn, salted provisions, and fruit. The natives of the interior are savage. The Sardinians have few vessels of their own, the trade, even to the fisheries, being carried on by foreigners, principally Genoese. The shipping is chiefly French from Marseille. Corsica is mountainous, rising in some parts upwards of 8000 feet: it produces nearly the same articles as Sardinia, together with marbles and precious stones. Ajaccio, situated on the bay of the same name, is remarkable as the birthplace of Bonaparte. The small island of Malta, composed chiefly of calcareous sandstone, is, from its situation in the narrow sea between Sicily and Africa, and its excellent harbour, the great naval station of the Mediterranean, and second in importance to Gibraltar. The island is productive, and the population dense. Malta was ceded to the English in 1814. The Maltese are active sailors and expert divers; their vessels are small and open.

The east coast of Spain presents numerous harbours, and a highly fertile but not well wooded coast. The chief products are wine and olives and wool. The coast is particularly adapted to navigation by steam-vessels; but the disturbed state of the country, and the commercial restrictions, which do not allow foreign steam-vessels to ply, keep the trade in a very low state. The chief ports are Valencia, which is a very handsome city; Cartagena, which is one of the finest harbours in the world; Barcelona, not adapted to large ships; Alicant, and Malaga.

The Balearic Islands, Majorca, Minorca, with Iviza, one of the Pityusæ, now under the Spanish government, produce wine, corn, fruit, and some manufactures. The chief harbours are Palma and Port Mahon.

Gibraltar, standing at the foot of a rocky mountain, 1430 feet high, is a place of extraordinary strength. From its situation, and the narrowness of the straits dividing Spain from Africa, which are only eleven miles across, Gibraltar is the key of the Mediterranean, and has been the object of violent contests, the last of which terminated in 1783, leaving it in the possession of the British. It is a free port, but not a place of very great trade, and smuggling is extensively carried on. A constant current sets through the Straits of Gibraltar from the Atlantic at the rate of two or three miles an hour, and is felt as far as Cabo de Gata in Spain, 150 miles distant. Dr. Halley supposed this current required to supply the loss by evaporation, considering that the rivers which flow into this sea were not sufficient for the purpose. The writers of the 'Encyclopédie Methodique,' on the other hand, maintained that the waters carried off by evaporation, and returned again in the form of rain, would be precisely the same for the sea outside and inside the straits; and that the numerous rivers of the Mediterranean, by bringing down the waters of distant mountainous regions, would cause a supply in excess, which would require an outward current to carry it off. It had been taken for granted that the water of the Mediterranean must be salter than that of the ocean, in consequence of the continual supply of this current, and it had been stated to be so in the proportion of 41 to 38. Dr. Marcet however found no difference. The saltness furnishes the solution of the difficulty, and Mr. Tennant suggested that a comparison of the density at great depths would decide the fact of a contrary or outward current below, since, if the density or increase of saltness increased with the depth, it would naturally follow that a much slower current below would be sufficient to carry off the excess of salt left by evaporation. Capt. Smyth, at the suggestion of Dr. Wollaston, obtained water from the depth of 400 or 500 fathoms, and at 450 and 680 miles from the straits, in which Dr. Marcet detected no increase of salt; but in the water drawn from 670 fathoms depth, at only 50 miles from the strait, he found four times the usual quantity of saline matter; from which it would appear that a current below of only three-quarters of a mile an hour would prevent any increase in the saltness of the sea. It may be worth while to mention also that a story is told of a ship which sunk at Ceuta, opposite Gibraltar, having reappeared two miles farther to the westward. (*Phil. Trans.*, 1819, 1822, 1829.)

Tangier is a seaport of Marocco. Ceuta, opposite Gibraltar, is a fortress of great strength. The African shore from this place to Tripoli is hilly, and in some places sandy and sterile; but the country in the interior is highly fertile, though without woods. Algiers, the capital of a kingdom or state, is a place of great strength.

Tunis, the most populous city of Africa after Cairo, stands at the bottom of an extensive bay, from which it is separated by a shallow lake of intense saltness, from the continued evaporation under a hot sun, and on which are seen great numbers of flamingoes of a brilliant red plumage. The chief trade is with Marseille, to which the inhabitants export corn, the product of these fertile countries now, as it was in the days of antient Carthage. The ruins of Carthage, east of Tunis, and distant 10 miles, with the cisterns, where the ground is strewed with small thin pieces of verd antique and red porphyry, are not the remains of the antient city, but of that which was built afterwards by the Romans.

It is remarkable that on the low shelving shores of parts of these coasts the strong northerly winds do not blow home, and that accordingly a ship may bear up on a lee shore and anchor in smooth water.

Tripoli is the capital of the state of the same name.

Proceeding towards Barca, the antient Ptolemais, we pass the Gulf of Sydra, or Greater Syrtis, an object of so much dread to the antient seamen on account of marshes and sea-monsters. Capt. Smyth, who examined this coast, found that these terrors were poetical exaggerations of the difficulties of navigating a low and dangerous bight. Passing the desert shores of Libya, we arrive at Alexandria, founded on a sandy neck of land by Alexander the Great, whose sagacity pointed out the situation as eminently adapted to commerce.

Alexandria, which was one of the greatest commercial cities that ever existed, began to decline with the invasion of Egypt by the Saracens. Under these warlike people the maritime trade of the East passed to the shores of Syria, and Alexandria further declined as Cairo flourished. The trade however is still considerable: the chief exports are cotton, flax, drugs, spices, &c. The ports of Cairo, on the low and fertile shores of the delta at the mouth of the Nile, are Rosetta and Damietta. Fresh water may be skimmed two or three miles outside the Damietta mouth.

The navigation of the Mediterranean must no doubt be of very early date. The story of Minos destroying pirates (Thucyd., i. 4) takes for granted the fact, that there must have been merchant vessels carrying something worth stealing from the earliest recorded period. If with Strabo we take for granted the accuracy of Homer's descriptions, it by no means follows that the Greeks knew everything that could have been known to every other nation at that time; and the stories told of the jealousy with which the Phœnicians and Carthaginians guarded their discoveries, prove at least that geographical knowledge was not common property; and with regard to these very nations, the knowledge which the Greeks could have had of them, among other barbarians, must have been inferior to that which we possess in the minute accuracy of the Scriptures alone. The story of Utica having been established 130 years before Carthage, proves a regular communication between this place and Syria at a distance of upwards of 1200 miles; and we may conclude that occasional voyages of these enterprising people had already extended the bounds of knowledge far beyond these limits.

If the precise time of the discovery of places lying, as it were, in the thoroughfare of this sea, is so uncertain, the histories of the places in the deep bays of the northern shores must be still more obscure: we shall therefore give at once a slight sketch of the geography of this sea from Strabo, who wrote in the first century.

The stadium adopted by Strabo was that of Eratosthenes, 700 stadia making 1° of latitude or of longitude on the equator, or 60 nautical miles; hence a stadium is 0·0857 of a nautical mile, this last being about 6082 feet.

The Mediterranean was divided into three basins: the first comprised the sea between the Columns of Hercules and Sicily; the second, between Sicily and Rhodes; and the third, between Rhodes and the shores of Syria.

Strabo supposed that the parallel of latitude of 36¼° passed through the Sacred Promontory (Cape St. Vincent), between the Pillars of Hercules (or Gibraltar and Ceuta), dividing this part of the Mediterranean in the middle of its breadth, which was believed by navigators to be 5000 stadia, or 429 nautical miles, from the gulf of Lions to the shore of Africa, but which measures only 330. The sea here however lies altogether to the north of this parallel; and hence, as the configuration of the European shores seems to have been tolerably good, the coast of Africa must have been proportionally distorted. This parallel was carried through the straits of Sicily, Rhodes, and the gulf of Issus, now the gulf of Scanderoon.

In consequence of the above supposition, he placed Marseille to the southward instead of the northward of Byzantium. He supposed Sardinia and Corsica to lie north-west and south-east instead of north and south, and made the distance of Sardinia from the coast of Africa 2400 stadia, or 205 miles, instead of 100, which is the true distance. From the Columns of Hercules to the straits of Sicily he considers to be 12,000 stadia, or 1028 miles: it is only about 800.

From Cape Passaro (Pachynum) to the west extreme of Crete he considered 4500 stadia, or 386 miles; it measures 400: and he supposed the length of Crete 2000 stadia, or 171 miles, the true length being 140 miles. He supposed that a line drawn through Byzantium, the middle of the Propontis, the Hellespont, and along the capes of the coast of Asia Minor, would coincide with the meridian: this error placed Byzantium too far to the north, and not far enough to the east. From Alexandria to the east end of Crete he considered 3000 stadia, or 257 miles: it measures about 290. From Alexandria to Rhodes he made 3600 stadia, or 308 miles: it measures 320. He supposed the head of the Greater Syrtis to be 1000 stadia, or 86 miles, to the south of Alexandria: it is about 60. From Cape Acamas (the west point of Cyprus) to Cape Khelidonia, he made 1900 stadia, or 163 miles; it measures 120 and from Cape Pedalium (Cape Greco) to Berytus (Beyroot), he made 1500 stadia, or 129 miles; it measures 90. From Rhodes to Issus he considered 5000 stadia, or 429 miles· it measures 400.

Many of the latitudes given by Strabo are very near, that is, within 10′; those of Marseille and Byzantium excepted, the former being 3° 43′ too little, and the latter 2° 16′ too much. The longitudes, which were all at that time referred to Cape Sacrum as the first meridian, and the extreme west point, as was believed, of the known world, are without exception too small; that of Carthage, the nearest to the truth, being 1° 9′, and Alexandria, the most erroneous, 6° 40′, too small.

Fruit is an important article in our Mediterranean trade: fast-sailing vessels are therefore employed to carry it, and a premium is paid to the first vessel arriving in the port of London after a certain period from the commencement of the season. Formerly all the British trade to the Levant was carried on by the Turkey Company. This was an open Company, and was abolished in the reign of Geo. IV.

This sea is navigated by vessels of no great size. There is a form of rig peculiar to the larger vessels, called *polacca*, which has originated in the suddenness and frequency of squalls, which often require the sail to be instantly taken in: for this purpose the masts are made in one piece, and the topsails, on being lowered, can slide down without interruption. The Mediterranean, being studded with places of refuge, and in which gales, though frequent and violent, never last so long as to wear the ship or the spirits of the men, and in which, besides, vessels have from the earliest times to the present ceased to navigate in the winter months, may indeed be favourable to training men to a certain degree of expertness in managing boats, but could never originate that seamanship on the grand scale which the long and boisterous sea-voyages, the rugged and dangerous coasts, and long winter nights, force upon the hardier sailors of the northern regions.

The winds have been remarked as peculiarly variable in the Mediterranean, and three or four vessels have often been seen carrying different winds at the same time. The scirocco, or south-east wind, has always been noted throughout the Mediterranean for its depressing effects upon the animal system, and for a prejudicial influence still more surprising in other ways, as upon paint newly laid on, which does not dry afterwards. It is usually accompanied with a gloomy sky and haze. In winter its effects are but slightly perceived. Water-spouts are very common, and in the month of September the writer of this article saw sixteen together at one time.

The depth of the Mediterranean is without doubt very great, the sea being in most places unfathomable; and, unlike many other great expanses of water (as the Yellow Sea, the Baltic, and the English Channel), soundings are comparatively of limited utility.

The Mediterranean, though poetically termed a 'tideless sea,' is not strictly so; since in its latitudinal extent between Venice and the Lesser Syrtis it experiences a rise and fall of from five to seven feet. Tides are also felt, but somewhat irregularly, on the sides of the Gibraltar current, in the gulf of Corinth, and in the Faro of Messina; and there is a curious reciprocal motion in the waters in the channel of the Euripus, between Greece and Negropont. Strong currents occur, especially near Venice and the Faro of Messina. The Archipelago currents are noticed in the articles ARCHIPELAGO and EUBŒA. A westerly current sets along the coast of Karamania. It has been stated that an easterly current prevails constantly along the coasts of Africa and Egypt, but this, we believe, has not been substantiated.

The Mediterranean has been the scene of some very important naval actions. The first sea-fight on record was that between the Ionians and their own colony Corcyra, 644 B.C. The first engagement by sea which has been described was that between the Persians, in the reign of Darius, and the confederate Asiatic Greeks, before Miletus, 493 B.C. Thirteen years after this was the famous battle of Salamis, in which the fleet of Xerxes was destroyed. Numerous sea-fights took place between the Greeks and Persians, and amongst the Greeks themselves, and also between the Romans and Carthaginians. Among the latter was the action in which the Carthaginians were beat by the Romans under Duillius, 260 B.C., and which was the first action of the Romans at sea. The most curious circumstance recorded, namely, that the Romans were entirely unpractised in sea affairs, may have been a very good addition to their story; but it is a matter which we receive with some reservation, since, as every one knows, a mere landsman cannot even stand up in a boat on the sea without holding on. To this list may be added the battle of Actium, 30 B.C., in which Augustus triumphed over Antony and Cleopatra; that of 1203, in which the Latins, coming by sea, took Constantinople; the battle of Lepanto, in 1571, in which Cervantes fought; the battle of Sir George Byng, in the Faro of Messina, in 1718; the drawn battle of Admiral Byng, off Mahon, in 1756; the battle of the Nile, in 1798, in which Nelson cut off the communication between France and the expedition under Bonaparte, and destroyed the French naval power in the Mediterranean; the passage up the Dardanelles, by Sir T. Duckworth, in 1808, to force the Turks to agree to a peace with Russia, which object he failed to effect, though he destroyed part of their fleet. In 1816 Lord Exmouth, with the combined Dutch and English fleets, bombarded Algiers, and forced the dey to liberate the Christian prisoners. The last action of importance was that in the bay of Navarino, in which the combined English, French, and Russian squadrons destroyed the Turkish and Egyptian fleets, which was followed by the emancipation of Greece and the invasion of Turkey by the Russians.

Though the several parts of the Mediterranean must long have been intimately known to those frequenting particular places, yet a general and accurate knowledge of its shores is the result of the improved navigation of our own times. In 1783 Tofiño, the Spanish hydrographer, made a survey of the coasts of Spain and the Balearic Islands, in which he employed chronometers. In 1802 Galiano, captain of a Spanish frigate, obtained several chronometric differences between important stations, as Naples, the Levant, Alexandria, the Bosporus, and the coast of Africa. In 1811 Captain Beaufort surveyed with great accuracy the coast of Karamania in Asia Minor; his further proceedings were stopped by his being dangerously wounded. About three years afterwards Captain Smyth commenced, on his own responsibility, in a Sicilian gunboat, his extensive and valuable surveys of great part of the shores both of Europe and Africa, which he completed in the Adventure in 1824, and which have appeared in his chart of the Mediterranean. In 1816 M. Hell, with French officers of engineers, made a detailed survey of Corsica; and M. Gauttier extended a series of triangles over the Archipelago. He also determined by chronometers many positions on the Black Sea. A trigonometrical survey of the Morea was made in 1829-31 by the French under General Pelet, and the west coast of Asia Minor has been completed by Lieutenants Graves and Brock, of the royal navy, who are employed in completing the hydrography of the Archipelago and the remaining coasts. Some points of the coast of Syria were determined by M. Gauttier, and plans of particular ports have been furnished by our own officers, but a regular survey of this coast does not exist.

(Strabo; Gosselin, *Géogr. des Grecs;* Beaufort, *Karamania;* Smyth, *Sicily, Sardinia;* M'Culloch, *Commer. Dict.; Connaissance des Tems*, &c.)

MEDLEPAD. [ANGERMANLAND.]

MEDOC. [GIRONDE.]

MEDULLA OBLONGA'TA. [BRAIN.]

MEDULLA SPINA'LIS. [NERVOUS SYSTEM.]

MEDULLIN, a name which has been given by Dr. John to the pith of the sunflower, &c.; but it does not appear that its properties have been sufficiently examined to entitle it to be considered as a peculiar principle.

MEDU'SA (Zoology), the Linnean name for a genus of simple or free *Acalephans* [ACALEPHÆ, vol. i.], vulgarly known to the British by the name of *Sea-blubbers* or *Sea-nettles*, extremely transparent, difficult to observe in their native element, and still more difficult to preserve, from their gelatinous and easily-decomposed texture. These beautiful but evanescent animals are extremely numerous, swarming on many of our coasts and in our æstuaries, and occurring in almost all latitudes. Péron and Lésueur, Lamarck, Cuvier, Escholtz, and others, have attempted their arrangement with more or less success, and the last-named author divides them into six families, *Rhizostomidæ*, *Medusidæ*, *Geryonidæ*, *Oceanidæ*, *Æquoridæ*, and *Berenicidæ*. M. de Blainville makes them the second class, *Arachnodermata*, of his *Actinozoaria*, and subdivides them into two orders, depending on the absence or presence of a solid piece as a support for the umbrella-like body of the animal. The genera of his order *Cirrhigrada* (the 2nd) are provided with this solid piece [CIRRHIGRADA, vol. vii.]; but those of his first order, *Pulmograda*, have no such support. Under the *Pulmograda* he arranges the numerous sections of the *Medusæ*, and under that title the reader will find a sketch of the most approved systems, and a description and illustration of some of the most remarkable forms, as far as our limits will permit. [PULMOGRADA.]

MEDWAY. [KENT.]

MEERMAN, GERARD, was born at Leyden in 1722, and in 1748 became pensionary of Rotterdam. He spent the greater part of his life in learned research, chiefly relating to law. He died at Aix-la-Chapelle, December 15, 1771. His two great works were, his 'Novus Thesaurus Juris Civilis,' &c., 7 vols. fol., 1751-53 (to which his son added an eighth volume in 1780), and his 'Origines Typographicæ,' 2 vols. 4to., Hagæ, 1765. An analysis of this last work was published in 'The Origin of Printing, in two Essays,' 8vo., Lond., 1774, by Messrs. Bowyer and Nichols; the main object of which was to establish the claim of the town of Haarlem to the invention of printing. (*Biogr. Universelle*, tom. xxviii.)

MEERMAN, JOHN, son of the preceding, was born in 1753. His earliest literary effort was made at the age of ten years, in a translation into Dutch of the 'Mariage Forcé' of Molière. He commenced his regular studies at Leyden, and afterwards prosecuted them at Leipzig under Ernesti, and at Göttingen under Heyne. At different times in his life he visited nearly every country of Europe. His supplement (in an eighth volume) to his father's 'Thesaurus Juris Civilis' has been already mentioned. The more important of his other works were: 'Specimen Juris Publici de Solutione Vinculi quod olim fuit inter sacrum Romanum Imperium et Fœderati Belgii res publicas,' 4to., Leyden, 1774; 'A History of William, Count of Holland, King of the Romans,' in Dutch, 5 vols. 8vo., 1783-97; 'Remarks during a Tour in Great Britain and Ireland,' 8vo., Hague, 1787; 'An Historical Account of the Prussian, Austrian, and Sicilian Monarchies,' 4 vols. 8vo., Hague, 1793-4;

'Historical Account of the North and North-East of Europe,' 6 vols. 8vo., Hague, 1804-6; 'A Narrative of the Siege and Conquest of Leyden by John duke of Bavaria, in 1420,' 8vo., Leyden, 1806; all in Dutch. He also published 'Hugonis Grotii Parallelon rerum publicarum, liber tertius de moribus ingenioque populorum, Atheniensium, Romanorum, Batavorum,' with a translation into Dutch, 3 vols. 8vo., 1801-2, and 'Grotii Epistolæ ineditæ,' 8vo., 1806. In 1812 he published, in Dutch and French, a poem entitled 'Montmartre,' and in the same year a 'Discourse on the First Travels of Peter the Great, principally in Holland,' 8vo. His last publication was a translation into Dutch of Klopstock's 'Messiah.'

Under Louis Bonaparte, as king of Holland, he was made Director of the Fine Arts and Minister of Public Instruction, and was entitled to the gratitude of his country for the zeal and success with which he prosecuted his functions. Afterwards, when Holland became united to France, he was made a count of the empire and senator by Napoleon. He died August 15, 1815. The Meerman Library was sold by auction in 1824, and produced no less a sum than 131,000 florins.

(*Biogr. Univ.* tom. xxviii.; *Gent. Mag.* vol. lxxxvi., p. i., p. 639.)

MEERSCHAUM, a magnesian mineral found in the island of Samos and Negropont (Eubœa), in the Archipelago, &c. It is said to be employed as fullers' earth in the Turkish dominions, and in the manufacture of tobacco-pipes.

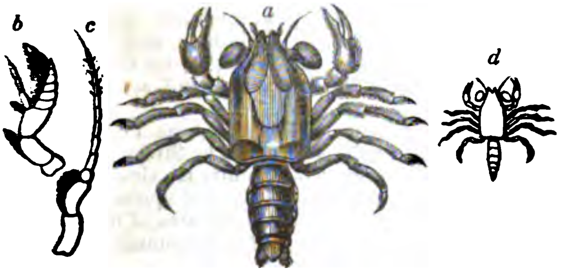
MEGADERMA. [CHEIROPTERA, vol. vii., p. 24.]

MEGADESMA, a name given by Bowdich to a genus of fresh-water *Conchifera* (*Potamophila* of Sowerby, *Galathea*, Lam.).

MÊGADHÛTA. [CALIDASA.]

ME'GALONYX. [MEGATHERIIDÆ.]

MEGALO'PA, Dr. Leach's name for a genus of Macrurous crustaceans (*Macropa* of Latreille).



Megalopa mutica.
a, Magnified; *b*, internal antenna; *c*, external antenna; *d*, natural size.

The external antennæ are setaceous, hardly one-fourth so long as the carapace, and formed of elongated joints; the intermediate ones terminated by two bristle-like appendages, the upper of which is the longest. External *jaw-feet*, with the two first joints compressed, the second the shortest, and notched at the end for the insertion of the others. Anterior feet equal, in form of didactylous pincers, rather short and stout; four last pair rather shorter, less stout, and terminated by a single nail, which is a little curved. *Carapace* short, wide, and a little depressed, terminated in front by a pointed rostrum, which is wide at the base, and sometimes inflected. *Eyes* very large, supported on a very short peduncle. *Abdomen* narrow, extended, linear, composed of seven joints, of which the five intermediate ones are provided with appendages, viz. the four first with false feet, having their external division very large and ciliated, and the fifth, on each side, with a horizontal blade or lamina, which is oval and ciliated, composing, with the last joint, a sort of fin, differing a little from that of the other *Macrura*.

Example, *Megalopa mutica*. This species differs from the others in having the rostrum a little inflected perpendicularly on the carapace and canaliculated in the middle; also in the absence of a recurved spine on the haunches of all the feet. The shell is truncated posteriorly, and has no point like that of *Megalopa armata*. Colour brownish.

Locality.—Found by MM. Audouin and Adolphe Brongniart at the mouth of the Loire.

ME'GALOPHUS. [MUSCICAPIDÆ.]

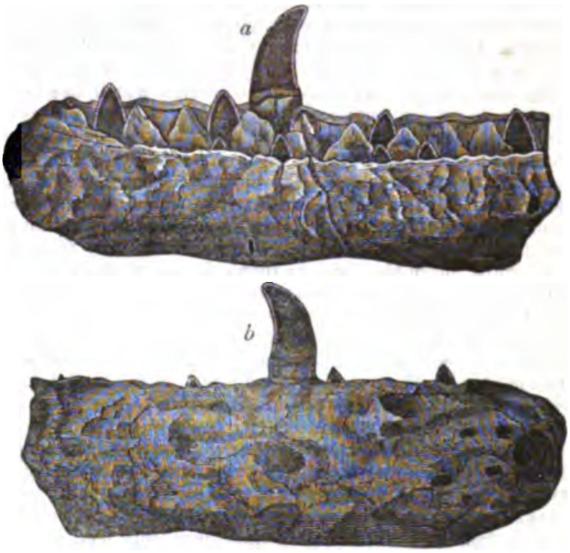
MEGALO'POLIS. [ARCADIA.]

MEGALOSA'URUS, the name assigned by Dr. Buckland and the Rev. W. Conybeare to an extinct genus of Saurians found in the oolitic slate at Stonesfield near Woodstock and other localities.

Though no entire skeleton has yet been discovered, the number of bones and teeth collected give sufficient data to enable the observer to pronounce upon the general osseous structure, with almost as great a certainty as would be the result of the examination of the bones of the animal in a perfect and connected state.

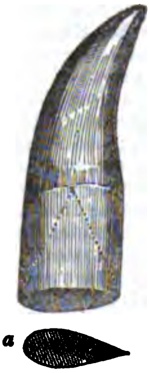
The femur, or thigh-bone, and tibia, or leg-bone, are nearly three feet in length severally, so that the entire hind-leg must have been nearly two yards long, and the discovery of a metatarsal bone measuring thirteen inches indicates that the foot was of a corresponding length. From these and other remains, including the vertebræ, teeth, &c., the size of this gigantic saurian has been calculated and its habits ascertained.

'The most important part of the Mega'osaurus yet found,' observes Dr. Buckland, in his 'Bridgewater Treatise, 'consists of a fragment of the lower jaw, containing many teeth.'



Anterior extremity of right lower jaw of Megalosaurus, from Stonesfield, one fourth natural size. *a*, View of the inside; *b*, view of the outside. (Buckland.)

'The form of this jaw shows that the head was terminated by a straight and narrow snout, compressed laterally like that of the *Delphinus Gangeticus*.'



Tooth of Megalosaurus, two-thirds natural size. The dotted lines indicate the compressed conical cavity, containing pulp, within the root of the growing tooth. *a*, Transverse section of the same, showing the manner in which the back and sides are enlarged, and rounded in order to give strength, and the front is brought to a strong and thin cutting edge.

The structure of these teeth, another of which is figured in the article MACHAIRODUS, leaves no doubt as to the carnivorous habits of this immense extinct lizard; and the internal structure of the cylindrical and other bones shows that it was a terrestrial animal, though it may have occasionally taken to the water in pursuit of prey, such as Plesiosauri and fishes. Its ordinary food is supposed to have been the smaller reptiles, crocodiles, and tortoises, whose remains occur abundantly in the strata where those of Megalosaurus abound.

The admirable adaptation of the teeth for carnivorous purpose is beautifully pointed out by Dr. Buckland in the treatise above quoted.

The same author so long ago as the year 1824 figured the fragment of jaw above alluded to and other bones of this saurian, and thus speaks of it in the 1st vol. of the 'Geological Transactions' (2nd series). 'Although the known parts of the skeleton are at present very limited, they are yet sufficient to determine the place of the animal in the zoological system. Whilst the vertebral column and extremities much resemble those of quadrupeds, the teeth show the creature to have been oviparous, and to have belonged to the order of saurians, or lizards. The largest thigh-bone of this animal in the Museum at Oxford is two feet nine inches long, and nearly ten inches in circumference at its central or smallest part. From these dimensions, as compared with the ordinary standard of the lizard family, a length exceeding forty feet and a bulk equal to that of an elephant seven feet high have been assigned by Cuvier to the individual to which this bone belonged; and although we cannot safely attribute exactly the same proportions to recent and extinct species, yet we may with certainty ascribe to it a magnitude very far exceeding that of any living lacerta. Large as are the proportions of this individual, they fall very short of those which we cannot but deduce from a thigh-bone of another of the same species, which has been discovered in the ferruginous sandstone of Tilgate Forest, near Cuckfield in Sussex, and is preserved in the valuable collection of Gideon Mantell, Esq., of Lewes,[*] together with many other bones belonging to the same species, and of the same size with those from Stonesfield. The femur in question, which has lost its head and lower extremity, measures in its smallest part, at the distance of two feet from its extremity, more than twenty inches in circumference, and therefore, when entire, must have equalled in magnitude the femur of the largest living elephant. To judge from the dimensions of this thigh-bone, its former possessor must have been twice as great as that to which the similar bone in the Oxford Museum belonged; and, if the total length and height of animals were in proportion to the linear dimensions of their extremities, the beast in question would have equalled in height our largest elephants, and in length fallen but little short of the largest whales; but as the longitudinal growth of animals is not in so high a ratio, after making some deduction, we may calculate the length of this reptile from Cuckfield at from sixty to seventy feet.'

In Cuvier's opinion *Megalosaurus* partook of the structure of the crocodile and the monitor. See also Mantell's *Geology of Sussex;* Cuvier, *Ossemens Fossiles;* and *Geol. Trans.*, vol. iii. (2nd series).

Besides the localities above mentioned we may notice the occurrence of this animal in the oolite of Normandy; Forest marble, Caen; Jura, near Solothurn? (H. Von Meyer.)

MEGAPODIIDÆ,[†] Mr. Swainson's name for a family of *Rasores*, consisting of the genus *Menura*, the subgenus *Megapodius*, and the genera *Dicholophus*, *Psophia*, and *Crax*, with the subgenera *Crax*, *Ourax*, *Ortalida*, *Penelope*, and *Lophocerus*. An account of *Dicholophus* will be found under the title Cariama; and *Psophia* is described under that of Agami, with the synonym of *Trophia crepitans*, an error for the Linnean name *Psophia crepitans*. For a description of Mænura see the article. *Megapodius* and the other genera are treated of under the title Cracidæ, *Lophocerus* being the *Galeated Curassow*, but thus distinguished subgenerically by Mr. Swainson:—'Front of the head with an elevated, pear-shaped, horn-like protuberance. Bill intermediate in shape, between *Crax* and *Ourax* Cere small. Nostrils basal, oval or round.'

Example, *Crax galeata.*

The genus *Ourax*, as restricted by Mr. Swainson, who gives *Ourax erythrorhynchus* as the type, appears to be the *Ourax Mitu* of Cuvier and others.

MEGARIAN SCHOOL. After the death of Socrates the majority of his disciples retired to Megara (Diog. Laert. ii. 106, iii. 6), where Euclid, one of the oldest of them, resided. [Euclid.] A few of these disciples remained at Megara with Euclid, who was looked upon as the founder of a school of philosophy which is usually known by the name of Megarian. In this school the Eleatic philosophy was taught, modified to some extent by the doctrines of Socrates. The Megarian philosophers maintained that the Supreme Good was always the same and unchangeable. They were distinguished in later times by their dialectic subtlety, and by the invention and solution of sophisms; on which account they were called Eristici (*ἐριστικοί*) and Dialectici (*διαλεκτικοί*). (Diog. Laert., ii. 106.)

The most celebrated of the successors of Euclid were, Eubulides of Miletus, who opposed certain opinions of Aristotle; Diodorus, surnamed Cronos, who was originally of Iassus in Caria, a pupil of Eubulides, and who lived in Egypt in the time of Ptolemy Soter; and Stilpo, who was originally of Megara, but afterwards resided at the court of Ptolemy Soter.

(Ritter's *History of Antient Philosophy*, b. vii., part i., c. 5; F. Deycks, *De Megaricorum Doctrina*, &c., Bonn, 1827.)

MEGARI'MA, the name proposed by Rafinesque for those species of *Terebratula* which are nearly equivalve and smooth, as *T. lævis*, *T. crassa*, &c.

ME'GARIS, one of the political divisions of antient Greece, was separated from Bœotia on the north by the range of Mount Cithæron, and from Attica on the east and north-east by the high land which descends from the north-west boundary of Attica, and terminates on the west side of the bay of Eleusis in two summits, formerly called Kerata, or the Horns, and now Kandili. [Attica.] Megaris was divided from the Corinthian territory on the west by the Oneian range of mountains, through which there were only two roads from Corinth into Megaris: one of these, called the Scironian Pass, which is the steep escarpment of the mountains which terminate on the coast of the Saronic gulf, passed by Crommyon (Strabo, p. 391), and along the side of the escarpment was the direct road from Corinth to Athens. This road was made wide enough by the emperor Hadrian for two vehicles abreast (Pausan., i. 40, § 10), but at present it only admits a single vehicle, except in a few places (Thiersch, *De l'Etat Actuel de la Grèce*, ii. 32); yet the road on the whole is in good condition. The other road, following the coast of the Corinthian gulf, crossed the Geranean mountains, which belong to the Oneian range, and led to Pegæ, on the Corinthian gulf, and thence into Bœotia.

The extreme breadth of Megaris, from Pegæ to Nisæa on the Corinthian gulf, is reckoned by Strabo at 120 stadia (p. 334); and the area of the country is calculated by Mr. Clinton, from Arrowsmith's map, at 720 square miles (*Fasti Hell.*, ii., p. 385), which is about the area of the county of Worcester. Megaris is a rugged and mountainous country and contains only one plain of small extent, in which the capital, Megara, was situated. The rocks are chiefly, if not entirely, calcareous. The country is very deficient in springs.

Megara was built on two hills, on the summit of each of which was a citadel, named respectively Caria and Alcathous. (Paus., i. 40, § 5; i. 42, § 1.) It was connected with the port of Nisæa by two walls, which were built by the Athenians when they had possession of Megara, B.C. 461-445. (Thucyd., i. 103.) The length of these walls is said by Thucydides (iv. 66) to have been eight stadia, and by Strabo (p. 391) to have been eighteen stadia. Pausanias has described at considerable length the public buildings which existed in Megara in his time; but scarcely any remains of them can now be traced. According to Procopius (*Bell. Vandal.*, i. 1) Megara was 210 stadia from Athens. Dion Chrysostom calls it a day's journey. Dodwell reckons it an eight hours' journey from Athens. (*Class. Tour*, ii. 177.) In front of the harbour of Nisæa was a little island called Minoa, which was occupied by the Athenians during the Peloponnesian war. (Thucyd., iii. 51.) Strabo, in speaking of Minoa, observes, that 'after passing the Scironian rocks we come to the promontory Minoa, which forms the port of Nisæa.' This apparent though not real discrepancy between Thucydides and Strabo has been made to appear greater than it is by translating the Greek word (*ἄκρα*)[*] 'peninsula' instead of 'promontory;' which latter term is quite consistent with Minoa being an island, or at least is by no means contradictory to the statement of Thucydides and Pausanias that it was an island. The positions of Minoa and Nisæa seem to be satisfactorily identified by Lieutenant Sprat (*London Geographical Journal*, vol. viii., p. 205).

The port of Pagæ or Pegæ on the Corinthian gulf was the only other place in Megaris of any importance. Tripodiscus, situated on the road from Pegæ to Megara, is mentioned by Thucydides (iv. 70) and Strabo (p. 394), and is said by Plutarch (*Qu. Gr.*, xvii., p. 387) to have been one of the five hamlets (κῶμαι) into which Megaris was originally divided; the names of which were, Heræa, Piræa, Megara, Cynosuria, Tripodiscus.

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[*] This collection has been purchased by the nation; and is now in the British Museum.

[†] In Mr. Swainson's work, 'Classification of Birds,' the words are 'Family Megapodinæ. Greatfoots;' but 'Megapodinæ' must be an error of the press, the termination of that word being used to indicate a subfamily.

[*] The reading should be, apparently, *δέκα ἢ ὀκτώ*, instead of *δέκα καὶ ὀκτώ*.

According to the traditions preserved by Pausanias (i. 39, § 4, 5), Car, the son of Phoroneus, originally reigned at Megara, and was succeeded, after the lapse of twelve generations, by Lelex, who gave to the people the name of Leleges. Lelex was succeeded by Cleson, and Cleson by Pylas. By the marriage of Pylas with the daughter of Pandion, Megara became annexed to Attica; and there can be no doubt that Megaris in early times belonged to Attica, since it is represented on the best authority that Megaris formed one of the four antient divisions of Attica. On the death of Pandion, Megaris fell to the lot of his son Nisus; but it was wrested from the Athenians during the reign of Codrus, when the Dorians invaded Attica. A Corinthian colony was settled at Megara, and the country was from this time regarded as a Dorian state. It remained for some time subject to Corinth; but it afterwards asserted its independence, but at what time is uncertain. Its wealth and power rapidly increased, as is evident from the numerous colonies which it planted, of which the most important were Selymbria, Chalcedon, and Byzantium, on the Bosporus and the Propontis, and Hyblæan Megara in Sicily. The navy of Megara was once powerful enough to cope with that of Athens; and it was only after a long and obstinate struggle that the Athenians were enabled to recover the island of Salamis, which had been seized by the Megarians.

The government was originally in the hands of the great Dorian landholders; but they were deprived of their power by Theagenes, who put himself at the head of the popular party, and obtained the sovereignty, about B.C. 620. He adorned the city with several public buildings. (Paus., i. 40, 41.) He married his daughter to Cylon, who was assisted by him in his attempt to usurp the government of Athens. (Thucyd., i. 126.) Theagenes was at length expelled from Megara; and shortly afterwards a most violent struggle arose between the aristocratic and democratic parties, of which a vivid picture is drawn in the poems of Theognis, a native of Megara, who appears to have been born shortly before the death of Solon, and to have lived down to the beginning of the Persian wars.

For some time after the Persian wars Megara appears to have been constantly engaged in war with Corinth; and her enmity to Corinth was the occasion of her forming an alliance with Athens, about B.C. 461. (Thuc., i. 103.) Athenian garrisons were placed in Megara and Pegæ; but six years afterwards the Megarians renounced their alliance with Athens, and put to death the Athenian garrison at Megara (Thuc., i. 114.) In the seventh year of the Peloponnesian war the democratic party formed a plan for surrendering the city to Athens, which was defeated by the arrival of Brasidas with a Lacedæmonian force. We read little more of Megara in Grecian history. In B.C. 357, democracy was again the established constitution. (Diod., xv. 40.) Megara was taken and almost destroyed by Demetrius; it was also taken by the Romans under Metellus (Paus., vii. 15, § 4); it suffered greatly in the invasion of Alaric (Procop., *Bell. Vand.*, i. 1); and its ruin was completed by the Venetians in 1687.

Coin of Megaris.
British Museum. Actual size.

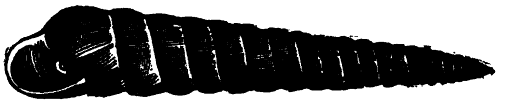
MEGASPI'RA, Mr. Lea's name for a pupiform, terrestrial, testaceous mollusk, remarkable for the length of the spire of its shell, which consists of twenty-three close-set, narrow, gradually increasing whorls, which he thus characterises generically:—

Shell clavate; aperture nearly oval, below rounded; margins reflected, above disjoined; columella many-folded, below entire, not effuse.

Animal unknown.

This genus, which is closely analogous to the genera *Bulinus*, *Pupa*, and *Auricula*, according to Mr. Lea, is founded on a single species, *Megaspira Ruschenbergiana*.

Description. Shell subcylindrical, turrited, thickly striate, brownish, with longitudinal reddish-brown spots, having a solid apex; whorls twenty-three, rather flattened; spire obtuse at the apex; columella with four folds; outer lip reflected.



Megaspira Ruschenbergiana. (Lea.)

MEGA'STHENES lived in the time of Seleucus Nicator, king of Syria, who sent him on an embassy to Palibothra, the capital of Sandracottus, king of the Prasii. The territories of Sandracottus were on the Ganges and the Jumna. Megasthenes stayed in India several years, and on his return recorded his observations in a work entitled 'Indica.' Of this work, which is unfortunately lost, there are extracts in Strabo, Arrian, and Ælian. Though Strabo has on several occasions expressed an unfavourable opinion of the trustworthiness of the author, it is quite certain that the work contained much valuable information which was then entirely new to the Greeks. Megasthenes gave the first account of Trapobane, or Ceylon.

MEGA'STOMA. [SHRIKES.]

MEGATHE'RIIDÆ, Megatheroids of Owen, who includes under the family the following genera of extinct *Edentata*, viz. *Megatherium*, *Megalonyx*, *Glossotherium*, *Mylodon*, and *Scelidotherium*, all of which have as yet been found in America only.

Megatherium. (Cuvier.)

A gigantic extinct mammiferous quadruped, more nearly allied to the Ant-eaters and Sloths than to the Armadillos. The dental formula cannot be definitely stated, because the number of teeth in the lower jaw is not known. The upper jaw, as Mr. Owen has shown, contains five on each side, and from the analogy of *Scelidotherium* it may be conjectured that *Megatherium* had only four teeth on each side in the lower jaw. In that case the formula would be

$$\text{Incisors } \frac{0}{0};\ \text{canines } \frac{0}{0};\ \text{molars } \frac{5-5}{4-4} = 18$$

Cuvier pointed out the skull of this animal as very much resembling that of the Sloths, but observed that the rest of the skeleton bore a relationship partly to the Sloths and partly to the Ant-eaters. The Madrid specimen was for a long time the principal, if not the only source of information with regard to the genus, and as Mr. Clift remarks in his paper, to which we shall presently allude more largely,* that magnificent though imperfect skeleton had remained for the last century altogether unique. 'Very few additional specimens,' says that able osteologist, 'appear to have been sent to Europe, and no other cabinet save the solitary one at Madrid possessed (as far as I am able to learn) a single intelligible fragment which could with certainty be assigned to this great unknown.' The zeal and energy of Sir Woodbine Parish have added greatly to the materials for arriving at a just conclusion as to the proper place of this animal in the series; and the history of the Megatherium may now be considered to be complete.

According to the description of Don Joseph Garriga,† Spain possessed considerable parts of at least three different skeletons. The first and most complete is that which is preserved in the royal cabinet at Madrid. This was sent over in 1789, by the Marquis of Loreto, viceroy of Buenos Ayres, with a notice stating that it was found on the banks of the river Luxan, west-south-west of Buenos Ayres. In 1795 a second arrived from Lima, and other portions, probably not very considerable, were possessed by Father Fernando Scio, who had received them as a present from a lady who had come from Paraguay. According to MM. Pander and D'Alton, they were unable in 1818 to find any traces of the Lima specimen, or that which had belonged to Fernando Scio.

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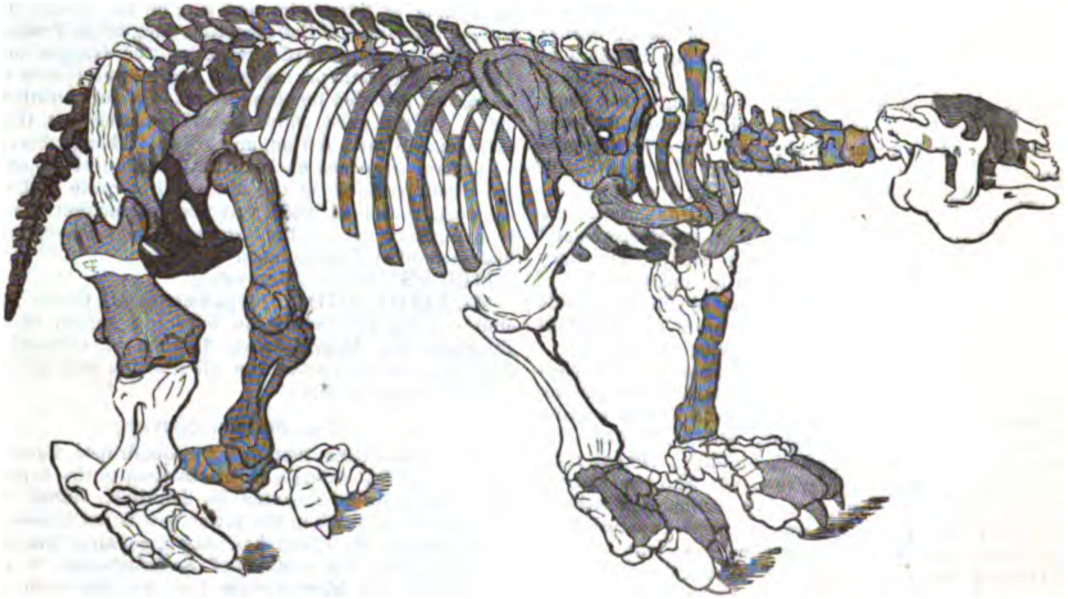
* 'Some account of the Remains of the Megatherium sent to England from Buenos Ayres, by Woodbine Parish, Jun., Esq., F.G.S., F.R.S.,' by William Clift, Esq., F.G.S., F.R.S.

† 'Descripcion del esqueletto de un quadrupedo muy corpulento y raro que se conserva en el real gabinete de l'historia natural de Madrid.' (Madrid, 1796.)

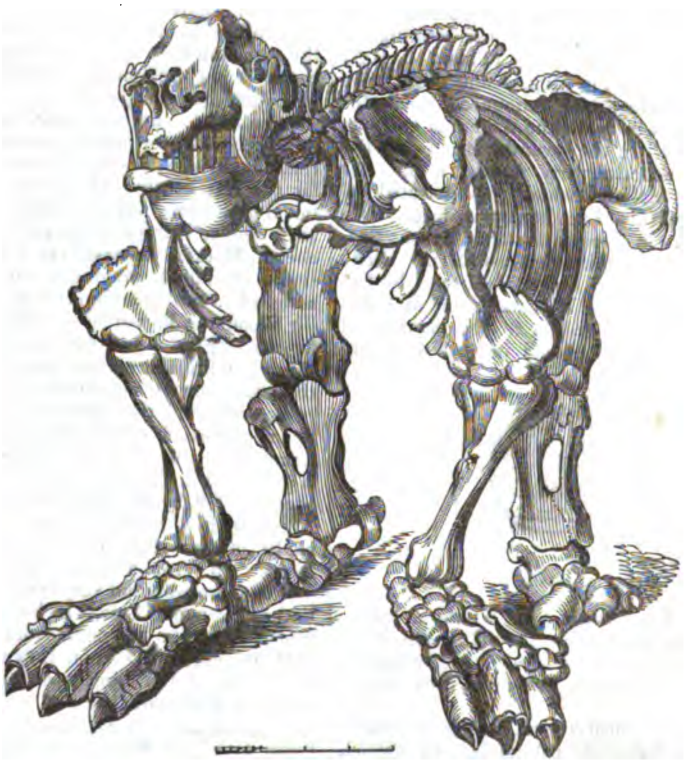
The remains collected by Sir Woodbine Parish were found in the river Salado, which runs through the flat alluvial plains (the Pampas) to the south of the city of Buenos Ayres, after a succession of three unusually dry seasons, 'which lowered the waters in an extraordinary degree, and exposed part of the pelvis to view, as it stood upright in the bottom of the river.' This and other parts, having been carried to Buenos Ayres by the country people, were placed at the disposal of Sir Woodbine Parish by Don Hilario Sosa, the owner of the property on which the bones were found. A further inquiry was instituted by Sir Woodbine Parish, and, on his application, the governor, Don Manuel Rosas, granted assistance, the result of which was the discovery of the remains of two other skeletons on his excellency's properties of Las Averias and Villanueva; the one to the north, the other to the south of the Salado, but at no great distance from the place where the first had been found. 'An immense shell or case was found with the remains discovered on the properties of Don Manuel, portions of which were brought to this country, but most of the bones associated with the shell crumbled to pieces after exposure to the air,' and the broken portions preserved had not been sufficiently made out, when Mr. Clift published his memoir, to enable that zoologist to describe them satisfactorily; but he gives very accurate figures of a portion of the shell.

The cuts here given will convey to the reader more accurately than words the osseous structure of this enormous animal, which, when full grown, must have been more than fourteen feet long including the tail, and upwards of eight feet in height.



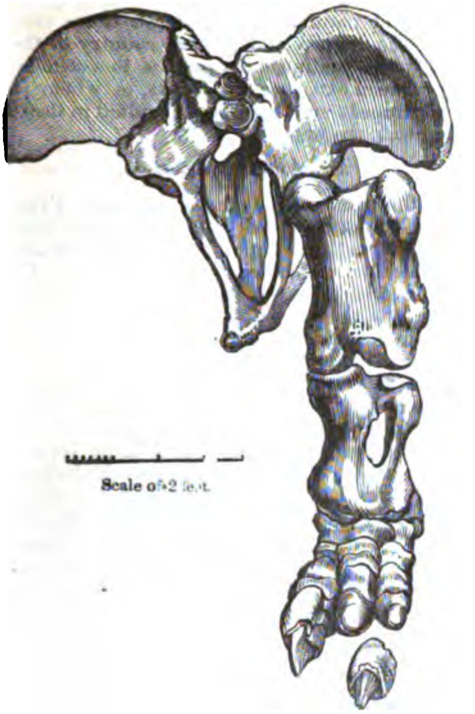
Skeleton of Megatherium. (Clift.)

The simple outline (from Pander and D'Alton) shows the extent of the skeleton at Madrid. The pale tint expresses the extent of corresponding parts sent to England by Sir Woodbine Parish. The dark tint shows the additional parts, which are deficient in the Madrid skeleton. (*Geo. Trans.*)

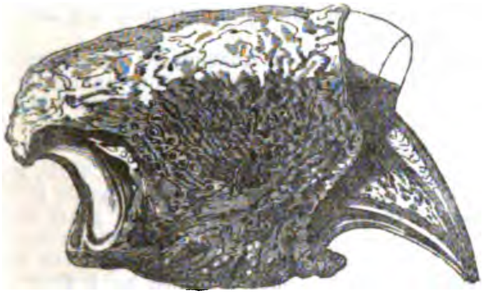


Scale of 2 feet.

Skeleton of Megatherium foreshortened, showing a nearly front view of the head and anterior and posterior extremities. (Pander and D'Alton.)


Scale of 2 feet.

Bones of the pelvis of Megatherium, discovered by Sir Woodbine Parish, now in the Museum of the Royal College of Surgeons, London. The bones of the left hind-leg and several of those of the foot are restored nearly to their natural place. (Dr. Buckland, 'Bridgewater Treatise.')



Unguml phalanx of Megatherium, one-fourth natural size. (Clift.)

Tooth of Megatherium, one-third natural size. (Clift.)

The thigh-bone was twice the thickness of that of the largest elephant; the fore-foot must have measured more than a yard in length, and more than twelve inches in width, and was terminated by an enormous claw, and the width of the upper part of the tail could not have been less than two feet. The following comparative measurements, furnished by Mr. Clift, will be found in Sir Woodbine Parish's interesting forthcoming work,* where a highly characteristic figure of the skeleton, drawn from the original bones, under Mr. Clift's superintendence, shows the parts which are wanting.

	Elephant.		Megatherium.	
	ft.	in.	ft.	in.
The expansion of the ossa ilia . .	3	8	5	1
Breadth of the largest caudal vertebra	0	7	1	9
Circumference of middle of femur .	1	0	2	2
Length of the os calcis . . .	0	7¼	1	5

The whole of the structure of this extinct animal is admirably adapted for digging the earth so as to enable it to obtain the succulent roots, which, in all probability, constituted the principal part of its food. The snout of the animal appears to have terminated in a short proboscis, which must have borne a good deal of resemblance in its proportions to that of the modern Tapirs.

We have seen that an immense shell or case accompanied the remains discovered to the north and the south of the river Salado; and Dr. Buckland was led to suppose, not without considerable apparent ground for the opinion, that this shell was the armour that protected the *Megatherium.*

'The size of the Megatherium,' says Dr. Buckland, in his 'Bridgewater Treatise,' 'exceeds that of the existing Edentata, to which it is most nearly allied, in a greater degree than any other fossil animal exceeds its nearest living congeners. With the head and shoulders of a Sloth, it combined in its legs and feet an admixture of the characters of the Ant-Eater, the Armadillo, and the Chlamyphorus; it probably also still further resembled the Armadillo and Chlamyphorus, in being cased with a bony coat of armour. Its haunches were more than five feet wide, and its body twelve feet long and eight feet high;* its feet were a yard in length, and terminated by most gigantic claws: its tail was probably clad in armour, and much larger than the tail of any other beast among extinct or living terrestrial Mammalia. Thus heavily constructed, and ponderously accoutred, it could neither run, nor leap, nor climb, nor burrow under the ground, and in all its movements must have been necessarily slow; but what need of rapid locomotion to an animal whose occupation of digging roots for food was almost stationary? And what need of speed for flight from foes, to a creature whose giant carcass was encased in an impenetrable cuirass, and who, by a single pat of his paw, or lash of his tail, could in an instant have demolished the Couguar or the Crocodile? Secure within the panoply of his bony armour, where was the enemy that would dare encounter this Leviathan of the Pampas? or in what more powerful creature can we find the cause that has effected the extirpation of his race? His entire frame was an apparatus of colossal mechanism, adapted exactly to the work it had to do; strong and ponderous, in proportion as this work was heavy, and calculated to be the vehicle of life and enjoyment to a gigantic race of quadrupeds, which, though they have ceased to be counted among the living inhabitants of our planet, have, in their fossil bones, left behind them imperishable monuments of the consummate skill with which they were constructed. Each limb and fragment of a limb forming co-ordinate parts of a well adjusted and perfect whole; and through all their deviations from the form and proportion of the limbs of other quadrupeds, affording fresh proofs of the infinitely varied and inexhaustible contrivances of creative wisdom.' Much of this eloquent passage is unassailable: but Professor Owen has demonstrated most clearly, and, we have reason to believe, to the entire satisfaction of Dr. Buckland himself, that the tessellated shell or case found with the Salado remains did not belong to the Megatherium, whose tegumentary covering seems to have been not unlike that of the Ant-eaters and Sloths, but to a Dasypodoid or Armadillo-like gigantic extinct animal, to which Mr. Owen has assigned the name of *Glyptodon*, whose hind-foot, like the fore, appears to be expressly modified to form a base to a column destined to support an enormous incumbent weight; whilst in the *Megatherium* the toes were free to be developed into long and compressed claws, such as form the compensating weapons of defence of the hair-clad Sloths and Ant-eaters. Mr. Owen, in his paper read to the Geological Society of London, entitled 'A description of a tooth and part of the skeleton of the Glyptodon, a large quadruped of the Edentate order, to which belongs the tessellated bony armour figured by Mr. Clift in his "Memoir on the remains of the Megatherium brought to England by Sir Woodbine Parish," showed that the portions of tessellated armour described and figured by Weiss (*Berlin Trans.*, 1827) are identical in structure with those brought to England by Sir Woodbine Parish, and that the bones which were found with the armour in both cases are the same in their characters, and therefore that they belonged to animals specifically identical. He next entered upon the inquiry, Had the Megatherium a bony armour? and he concluded, from a comparison of its skeleton with that of the Armadillos, that it had not. In the pelvis of the Armadillo there are twelve sacral vertebræ anchylosed together, and the spines of the vertebræ are greatly developed anterio-posteriorly, forming a continuous vertical ridge of bone, bearing immediately the superincumbent weight. In the Megathere the sacral vertebræ are only four in number, and are not anchylosed, and the spinous processes are comparatively small, not locked together, as in the Armadillos, but separated by intervals as in the Sloths. In the Armadillos, the weight of the cuirass is transferred from the sacrum to the thigh-bones by two points on each side. One of them, the ischium, is anchylosed to the posterior part of the sacrum, the other point is formed by the conversion of the iliac bone into a stout three-sided beam passing straight from the thigh-joint to abut against the anterior part of the sacrum, where the weight of the shell is greatest, a structure which is wanting in the Megathere. In no species of Armadillo is the ilium expanded, while in the Megathere it is greatly developed, resembling that of the Elephant in size, form, and position; and among the Edentata the nearest approach in this portion of the skeleton is to be found among the Sloths and Ant-eaters. The most striking point however in the structure of the Armadillos, with reference to the support of a bony covering, is the remarkable production of a part of the vertebra from above the anterior articular process on each side, in a straight direction upwards, outwards, and forwards, to nearly the level of the true spinous processes. Now these oblique processes, which are developed only in the loricated Edentata, beautifully correspond in form and use with the tie-bearers in the architecture of a roof, and are entirely wanting in the Megathere, the structure of this part of the vertebral column of that animal corresponding with the character of the vertebræ of the hair-clad Sloths and Ant-eaters. Mr. Owen noticed other supposed adaptations in the skeleton of the Megathere to sustain a bony covering, as the breadth of the ribs, but the ribs of the Sloths and Ant-eaters are broader than those of the Armadillos.

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* 'Buenos Ayres and the Provinces of the Rio de la Plata,' 8vo., London.

* See above, p. 66.

The paper contained a tabular account of the discovery of twelve skeletons of the Megathere, and in no instance did any portion of bony armour occur with or near the bone.[*] A notice was also given of the remains of a Glyptodon, found in the left bank of the Pedernal before its junction with the Sala, an affluent of the Rio Santo, near Monte Video, and preserved in the museum of that town. From the accounts which have been given of these remains, they appear to have belonged to the same species as that described in the paper. An allusion was also made to some portions of bony armour obtained in the Rio Seco, in the Banda Oriental, and similar in structure to the specimen of the Pedernal. One of the portions was the covering for the tail. It was hollow to its extremity, and presented in its concavity vestiges of caudal vertebræ very distant from each other.

In conclusion, Mr. Owen observes, that having brought together evidence of the remains of five specimens (found in the Rio Seco, Rio Janeiro, Villanueva, Pedernal, and the Banda Oriental) of a large Edentate species undoubtedly covered with armour, and more or less corresponding with the characters of the Glyptodon, and having established the characters of that genus on both dentary and locomotive organs; he trusts at the same time that he has vindicated the opinion of Cuvier with reference to the Megathere, by proving it to be, by its tegumentary covering as well as its osseous system, more nearly allied to the Ant-eaters and Sloths than to the Armadillos. (*Geol. Proc.*, 1839.)

May we venture a suggestion as to the immediate probable cause of the extinction of these and other gigantic quadrupeds whose remains are found in America? The southern parts of that great continent are even now subject to long continued droughts, sometimes lasting for three years in succession, and bringing destruction on the cattle; and, indeed, the discovery of the remains collected by Sir Woodbine Parish was owing to a succession of unusually dry seasons, as we have seen. The upright position of most of these skeletons found in situ, with the ponderous vertebræ and bones of the pelvis in their natural situation, indicates that the animal must have been bogged in adhesive mud sufficiently firm to uphold the ponderous bones after the decomposition of the soft parts. A long continued drought would naturally have brought these extinct animals from the drained and parched country to the rivers, dwindled, by the continued dry seasons, to a slender stream running between extensive mud banks, in which these gigantic quadrupeds may have been engulfed in their anxious efforts to reach the water.[*]

Megalonyx. (Jefferson.)

Under this name Mr. Jefferson, formerly President of the United States, described, from some bones found in caverns in the west of Virginia, an extinct mammiferous animal, which he considered to be carnivorous. The bones on which his description was founded were, a small fragment of a femur or a humerus, a complete radius, an ulna complete but broken in two, three claws,[†] and half a dozen other bones of the foot.

From the materials above mentioned, and on comparison with the analogous bones in the Lion, Mr. Jefferson came to the conclusion that the *Megalonyx* must have been upwards of five feet in height, that it must have weighed nearly nine hundred pounds, that it was the largest of Unguiculated animals, and that it was probably the enemy of the Mastodon of the Ohio, as the Lion is of the Elephant. When once a theory takes possession of the human mind, there is generally no want of materials to confirm it in the imagination of the theorist. Thus Mr. Jefferson appeals to certain figures resembling a Lion mentioned by the most antient historians of the Anglo-Americans as visible on a rock at the mouth of the Kanhawa, a branch of the Ohio, which must have been traced by the hands of the Indians from their rudeness; and to the accounts of travellers, some of them then living, who had heard during the night frightful roarings which terrified the dogs and the horses; and he asks if they do not prove the existence of some great unknown carnivorous species in the interior of America, and whether this redoubtable animal may not have been the *Megalonyx*?

Dr. Wistar, Professor of Anatomy in the University of Philadelphia, subsequently perceived some analogy between the bones of the fossil foot of Jefferson's animal and similar bones in the foot of the Sloth, without other aid than Daubenton's description.

Cuvier, who saw at once the true analogies of the animal, and was ridiculed for his opinion by Faujas de St. Fond, who mistook the clear-sightedness of that great zoologist for the blindness of one who would constrain nature to bend to the factitious classification of an artificial system, obtained casts of the bones indicated by Jefferson from Mr. Peale of Philadelphia, and was afterwards furnished by M. Palisot de Beauvois with two *morceaux* found in the same cavern where Jefferson's specimens were discovered fortunately one of these was a tooth. With these additional materials Cuvier completed his labours, and satisfactorily showed that the *Megalonyx* belonged to the *Edentata*.

Mr. Owen, in his description of his genus *Mylodon*, says, 'The greater part of Cuvier's chapter on *Megalonyx* is devoted to the beautiful and justly celebrated reasoning on the ungueal phalanx, whereby it is proved to belong not to a gigantic Carnivore of the Lion kind, as Jefferson supposed, but to the less formidable order of Edentate quadrupeds; and Cuvier, in reference to the tooth,—the part on which alone a generic character could have been founded,—merely observes that it resembles at least as much the teeth of one of the great Armadillos as it does those of the Sloths. In the last edition of the "Règne Animal" Cuvier introduces the *Megatherium* and *Megalonyx* between the Sloths and Armadillos, but alludes to no other difference between the two genera than that of size,—"l'autre, le *Megalonyx*, est un peu moindre." Some systematic naturalists, as Desmarest and Fischer, have therefore suppressed the genus, and made the *Megalonyx* a species of *Megatherium*, under the name of *Megatherium Jeffersonii*. The dental characters of the genus *Megatherium* are laid down by Fischer, as follows:—"*Dent. prim.* et lan. $\frac{0}{0}$; molares $\frac{4-4}{4-4}$, obducti, tritores, coronide nunc planâ transversim sulcatâ, nunc medio excavatâ marginulis prominulis." That *Megalonyx* had the same number of molares as *Megatherium* (supposing that number in the Megathere to be correctly stated, which it is not) is here assumed from analogy, for neither Jefferson, Wistar, nor Cuvier,—the authorities for *Megalonyx* quoted by Fischer,—possessed other means of knowing the dentition of that animal than were afforded by the fragment of a single tooth.' (Owen, in *Zoology of H. M. S. Beagle.*)

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[*] Sir Woodbine Parish has just now (May 29, 1839) kindly communicated to us a letter received by him, giving information of the discovery of an almost entire skeleton of an adult *Megatherium* on the banks of the Rio de la Matanza, with all the vertebræ of the body, all the ribs, all the teeth, the head, and the legs, in short, with the whole of the bones except the tail and one foot. Close to it was the skeleton of a '*Tatou gigantesque*' (Glyptodon probably), with its bony armour complete. There was also found a very small and perfect *Megatherium*, which must have been only just born at the epoch of destruction. No mention is made of any traces of bony armour or shell about the *Megatheria*. In the old animal only one foot is wanting. It has been suggested that the so-called young *Megatherium* may possibly be a skeleton of *Scelidotherium*.

[*] Mr. Darwin states that he was informed by an eye-witness, that during the 'gran seco' the cattle in herds of thousands rushed into the Parana, and being exhausted by hunger, they were unable to crawl up the muddy banks, and were drowned. (*Voyages of the Adventure and Beagle between the years* 1826 *and* 1836,' vol. iii., 1839.) Sir Woodbine Parish says, 'In the last great drought, which continued during the summers of 1830, 31, and 32, it was calculated that from a million and a half to two millions of animals died:—the borders of all the lakes and streamlets in the province were long afterwards white with their bones.' (*Buenos Ayres and the Provinces of the Rio de la Plata*, 8vo., 1839.)

[†] The ungueal phalanx of Megalonyx is much more compressed than that of Megatherium.

The same author (*loc. cit.*) adds, 'With respect to existing Mammalia, most naturalists of the present day seem to be unanimous as to the convenience at least of founding a generic or subgeneric distinction on well-marked modifications in the form and structure of the teeth, although they may correspond in number and kind, in proof of which it needs only to peruse the pages of a *Systema Mammalium* which relate to the distribution of the Rodent order. According to this mode of viewing the logical abstractions under which species are grouped together, the extinct Edentate Mammal discovered by Jefferson must be referred to a genus distinct from *Megatherium*, and for which the term *Megalonyx* should be retained. This will be sufficiently evident by comparing the descriptions given by Cuvier of one of the teeth of *Megalonyx Jeffersonii*, and by Dr. Harlan of a tooth of his *Megalonyx laqueatus*, with those of the *Megatherium* which have been published by Mr. Clift. The fragment of the molar tooth of the *Megalonyx Jeffersonii*, described and figured in the 'Ossemens Fossiles,' seems to have been implanted in the jaw like the teeth of the Megatherium by a simple hollow base, similar in form and size to the protruded crown: its structure Cuvier describes as consisting of a central cylinder of bone enveloped in a sheath of enamel. The transverse section of this tooth presents an irregular elliptical form, the external contour being gently and uniformly convex; the internal one undulating, convex in the middle, and slightly concave on each side, arising from the tooth being traversed longitudinally on its inner side by two wide and shallow depressions. The imperfect tooth of the species called by Dr. Harlan *Megalonyx laqueatus*, and of which a cast was presented by that able and industrious naturalist to the Museum of the Royal College of Surgeons, resembles in general form, and especially in the characteristic double longitudinal groove on the inner side, the tooth of the *Megalonyx Jeffersonii.*'

Two claws of the fore-foot, a radius, humerus, scapula, one rib, an os calcis, a metacarpal bone, some vertebræ, a femur, and a tibia of *Megalonyx laqueatus*, which were discovered in Big-bone Cave, Tenessee, United States, are also described by Dr. Harlan,* who, though he does not enter into the question of the generic characters of *Megalonyx*, seems, as Mr. Owen observes, to feel that they do not rest entirely on dental modifications; for Dr. Harlan remarks that 'a minute examination of the tooth and knee-joint renders it not improbable, supposing the last-named character to be peculiar to it, that if the whole frame should hereafter be discovered, it may even claim a generic distinction, in which case either Aulaxodon or Pleurodon would not be an inappropriate name.' Upon this Professor Owen makes the following pertinent observation:—'There can be no doubt, as it appears to me, with respect to a fossil jaw presenting teeth in the same number and of the same general structure as in the *Megatherium*, and with individual modifications of form as well marked as those which distinguish *Megatherium* from *Megalonyx*, that the palæontologist has no other choice than to refer it, either as Fischer has done with *Megalonyx*, to a distinct species of the genus *Megatherium*, or to regard it as a type of a subgenus distinct from both. With reference however to the Pleurodon of Dr. Harlan, after a detailed comparison of the cast of the tooth on which that genus is mainly founded with the descriptions and figures of the tooth of the *Megalonyx Jeffersonii* in the "Ossemens Fossiles," they seem to differ in so slight a degree as to warrant only a specific distinction, and this difference even, viewing the various proportions of the teeth in the same jaw of the *Megatherium*, is more satisfactorily established by the characters pointed out by Dr. Harlan, in the form and proportions of the radius, than by those of the tooth itself.'

Among the bones collected by Spix and Martius in the cave of Lassa Grande, near the Arrayal de Torracigos in Brazil, and described by Professor Doellinger,† there were no teeth, and only a few bones of the extremities. The Professor concludes from their shape, the presence of an osseous sheath for the claw, and the form of their articulation, that they doubtless belong to a Megatheroid animal of the size of an Ox. The bones, according to the Professor, are not those of an immature individual, and agree sufficiently with Cuvier's descriptions and figures of the *Megalonyx* to warrant their being referred to that kind of animal.

Glossotherium (Owen.)

This genus is founded on a fragment of a cranium in Mr. Darwin's collection, discovered in the bed of the same river in Banda Oriental with the skull of the *Toxodon*. The fragment includes the parietes of the left side of the cerebral cavity, the corresponding nervous and vascular foramina, the left occipital condyle, a portion of the left zygomatic process, and, though last, not least, the left articular surface of the lower jaw. No tooth, no locomotive extremity, was present to lend its aid; and yet, upon the slender materials above stated, Professor Owen has been enabled to give generic distinction to the animal to which they belonged, and to fix its place in the animal series satisfactorily.

Professor Owen remarks, that the importance of the articular surface of the lower jaw in the determination of the affinities of a fossil animal has been duly appreciated since the relations of the motions of the lower jaw to the kind of life appointed for each animal were pointed out by Cuvier; but he observes that we should be deceived if we were to establish, in conformity with the generalization laid down by Cuvier, our conclusion, from this surface, of the nature of the food of the extinct species under consideration; for the shape of the glenoid cavity is such as to allow the lower jaw free motion in a horizontal plane from right to left, and forwards or backwards, like the movements of a millstone: 'Nevertheless,' continues Mr. Owen, 'I venture to affirm it to be most probable that the food of *Glossotherium* was derived from the animal and not from the vegetable kingdom, and to predict, that when the bones of the extremities shall be discovered, they will prove the Glossothere to be not an ungulate but an unguiculate quadruped, with a fore foot endowed with the movements of pronation and supination, and armed with claws, adapted to make a breach in the strong walls of the habitations of those insect societies upon which there is good evidence, in other parts of the present cranial fragment, that the animal, though as large as an ox, was adapted to prey.'

The data on which Professor Owen rests this affirmation are, in the first place, a remarkable cavity situated immediately behind the tympanic bone, of nearly a regular hemispherical form and an inch in diameter. The surface of this cavity does not appear to have been covered with articular cartilage, because it is irregularly pitted with many deep impressions, and Mr. Owen concludes therefore that it served to afford a ligamentous attachment to the styloid element of a large *os hyoides*. In addition to this evidence of the size of the bones of the tongue, there is a more certain indication of the extent of its soft and especially its muscular parts in the magnitude of the foramen for the passage of the lingual or motor nerve, which anterior condyloid foramen is larger than any of those which perforate the cranium, with the exception of the great foramen: it is eight lines in the long diameter, and readily admits the passage of the little finger.

The professor remarks that it is only in the Ant-eaters and Pangolins that we find an approximation to these proportions; and that in the Giraffe, the largest of ruminants, and having the longest and most muscular tongue in that order, the foramen for the corresponding nerve is scarcely more than one fourth the size of that of *Glossotherium*. In the other parts of the cranium Mr. Owen finds more decisive evidence of the relationship of this extinct edentate to the genera *Myrmecophaga* and *Manis*.

The question, Had the Glossotherium teeth? is answered by the Professor in the affirmative, from the rugged surface of the temporal fossa indicating an extensive temporal muscle; from the well-defined boundary, formed by a slightly-elevated bony ridge, extending to near the sagittal suture; the size of the zygomatic portion of the temporal bone, and the remains of the oblique suture by which it was articulated to the malar bone; and he is of opinion that they will probably be found to be molar teeth of a simple structure, as in the *Orycteropus*.

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* 'Medical and Physical Researches,' p. 323, &c.

† Spix and Martius, 'Reise in Brazil,' band ii., p. 5.

Here is evidence of the existence of an *os malæ*. This bone is wanting in the Pangolins; in the true Ant-eaters it does not reach the zygomatic process of the temporal bone. From this evidence of the completion of the zygomatic arch, the Professor concludes that *Glossotherium* was more nearly allied to the Armadillos and *Orycteropus;* and from the form and loose condition of the tympanic bone, which, through the care and attention of Mr. Darwin, was preserved *in situ*, that the affinity of the animal was closer to *Orycteropus* than to the Armadillos: but the tympanic bone of *Orycteropus* differs from that of *Glossotherium* in forming part of the circumference of an ellipse whose long axis is vertical, and in sending outwards from its anterior part a convex eminence, which terminates in a point directed downwards and forwards: in the distance from the origin of the zygoma to the occipital plane, which is relatively greater in *Glossotherium* than in *Orycteropus*, the former is more similar to *Myrmecophaga* and *Manis*.

The internal surface of the cranial fragment shows that in *Glossotherium*, as in other *Bruta*, the cerebellum must have been almost entirely exposed behind the cerebrum, that the latter was of small relative size, not exceeding that of the Ass; and that it was chiefly remarkable, as in *Orycteropus*, the Ant-eater, and Armadillo, for the great development of the olfactory ganglia.

Such are the leading points on which the establishment of this extinct genus is placed. Our limits do not admit of our following out the interesting details which confirm the view taken by Mr. Owen, and which the reader will find in his 'Fossil Mammalia,' as part of the 'Zoology of the Voyage of Her Majesty's Ship Beagle, under the command of Captain Fitzroy, R.N., edited and superintended by Mr. Darwin, and published with the approval of Her Majesty's Treasury;' but we think it advisable, with reference to the succeeding fossil species described by the Professor, and here noticed, to give the concluding paragraph in his paper on *Glossotherium*.

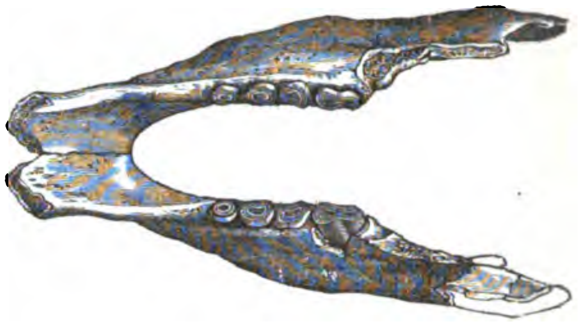
'A question,' says Professor Owen, 'may arise after perusing the preceding evidence, upon which the present fossil is referred to a great Edendate species nearly allied to the *Orycteropus*, whether one or other of the lower jaws, subsequently to be described, and, in like manner, referrible, from their dentition, either to the *Orycteropodoid* or *Dasypodoid* families of *Edentata*, may not have belonged to the same species as does the present mutilated cranium. I can only answer, that those jaws were discovered by Mr. Darwin in a different and very remote locality; that no fragments or teeth referrible to them were found associated with the present fossil; and that, as it would be therefore impossible to determine from the evidence we have now before us which of the two lower jaws should be associated with *Glossotherium;* and as both may, with equal, if not greater probability, belong to a totally distinct genus, it appears to me to be preferable, both in regard to the advancement of our knowledge of these most interesting *Edentata* of an antient world, as well as for the convenience of their description, to assign to them, for the present, distinct generic appellations.'

Mylodon. (Owen.)

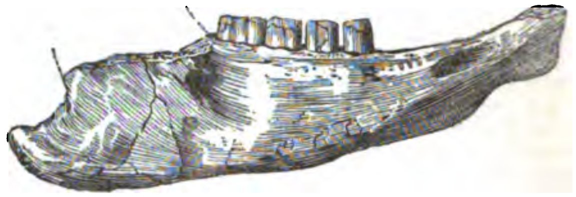
A genus of Edentate Megatherioids, founded on some fossil remains described by Dr. Harlan in his 'Medical and Physical Researches,' and referred by him to *Megalonyx*, and on a mutilated lower jaw and teeth discovered by Mr. Darwin among the many interesting novelties which have been the result of that zealous naturalist's researches in the southern division of America.

The fossil last alluded to was found in a bed of partly consolidated gravel at the base of the cliff called Punta Alta, at Bahia Blanca, in Northern Patagonia, and consists of the lower jaw, with the series of teeth entire on both sides: the extremity of the symphysis, the coronoid and condyloid processes, and the angular process of the left ramus, are wanting.

The teeth are implanted in very deep sockets, and about one sixth only of the last molar projects above the alveolus; but the proportion of the exposed part increases gradually in the anterior teeth. This and the relative distance of the teeth will be seen in the following figure.

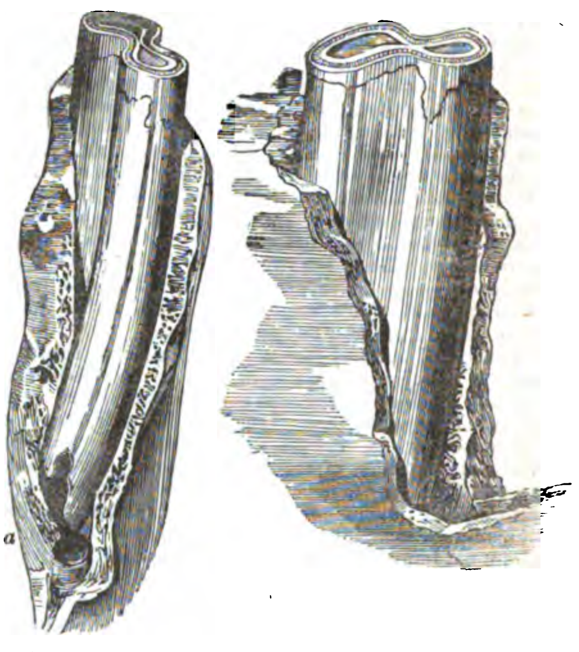


Lower jaw of Mylodon, one-sixth nat. size. (Owen.)



External view of right ramus of lower jaw of Mylodon (profile), one-sixth nat. size.

The implanted part of each tooth is simple, of the same size and form as the projecting crown, and with a large conical cavity at the base, for the persistent pulp, and indicating that their growth, during life, was perpetual



Teeth of Mylodon, showing the depth of their implantation. The cavity at the base of the tooth is seen in figure *a*. Two-thirds nat. size. (Owen.)

Professor Owen remarks that these teeth are composed, as in *Bradypus*, *Megatherium*, and *Megalonyx*, of a central pillar of coarse ivory, immediately invested with a thin layer of fine and dense ivory, and the whole surrounded by a thick coating of cement.

The exterior surface of the symphysis of the jaw (which is completely anchylosed) is characterised by two oval mammilloid processes, situated on each side of the middle line, and about half-way between the anterior and posterior extremes of the symphysis. Nearly four inches behind the anterior extremity of the above process is the large anterior opening of the dental canal, which is five lines in diameter, and situated about one-third of the depth of the ramus of the jaw from the upper margin. The Professor observes that the magnitude of this foramen, which gives passage to the nerve and artery of the lower lip, indicates that this part was of large size; and that the two symphyseal processes, which probably were subservient to the attachment of large retractor muscles, denote that the motions of such a lip were free and extensive. The angle of the jaw is produced backwards, and ends in an obtuse point, slightly bent upwards; a foramen, one-third less than the anterior one, leads from near the commencement of the dental canal to the outer surface of the jaw, a little below and behind the last molar tooth; and this foramen presents the same size and relative position on both sides of the jaw. Mr. Owen finds no indication of a corresponding foramen, or of symphyseal processes in the figures or descriptions of the lower jaw of the Megatherium, nor in that of the Sloths, Anteaters, Armadillos, or Manises, which he had examined with a view to this comparison.

Mr. Owen further observes that in the *Megatherium* the inferior contour of the lower jaw is peculiarly remarkable, as Cuvier has observed, for the convex prominence or enlargement which is developed downwards from its middle part; but in the *Mylodon* the corresponding convexity is slight, not exceeding that which may be observed at the corresponding part of the lower jaw of the Ai or the Orycteropus; and after entering into further interesting details, the Professor comes to the conclusion that the lower jaw of the *Mylodon* is very different from that of the *Megatherium:* with that of *Megalonyx* he had of course no means of comparing it.

'Among existing *Edentata*,' continues the Professor, 'the *Mylodon*, in the form of the posterior part and angle of the jaw, holds an intermediate place between the Ai and the great Armadillo: in the form of the anchylosed symphysis of the lower jaw it resembles most closely the Unau, or two-toed Sloth; but in the peculiar external configuration of the symphysis, resulting from the mamilloid processes above described, the *Mylodon* presents a character which has not hitherto been observed in any other species of *Bruta*, either recent or fossil.'

Two species, *Mylodon Harlani*, founded on the fossil described by Dr. Harlan, and *Mylodon Darwinii*, on that discovered by Mr. Darwin, are recorded by Professor Owen; and he gives the following admeasurements of the lower jaw of the latter species:—

	Inches.	Lines.
Length (as far as complete) . .	17	6
Extreme width, from the outside of one ramus to that of the other . .	9	0
Depth of each ramus . . .	4	9
Length of alveolar series . .	4	8
From first molar to broken end of symphysis	6	0
Breadth of symphysis . . .	3	7
Longitudinal extent of symphysis .	4	6
Circumference of narrowest part of each ramus	5	9

He further observes that the teeth and bones of *Mylodon Darwinii*, above described, exhibit all the appearances and conditions of those of a full-grown animal, and that they present a marked difference of size as compared with those of *Mylodon Harlani*, which must have been a much larger animal, for if the lower jaw of the latter species bears the same proportion to its teeth as that of *Mylodon Darwinii* does, it must be about two feet in length. (*Zoology of H. M. S. Beagle.*)

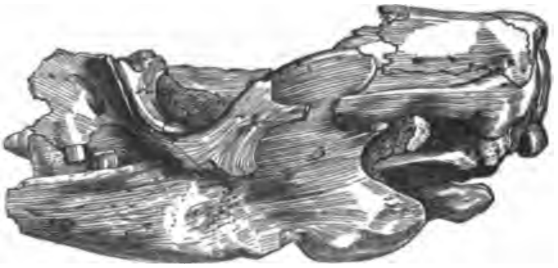
Scelidotherium. (Owen.)

A large extinct edentate mammal, allied to *Megatherium* and *Orycteropus*.

The remains on which this genus is founded include the cranium, which is nearly entire, with the teeth, and part of the *os hyoides;* the seven cervical vertebræ, eight dorsal and five sacral vertebræ, both scapulæ, the left humerus, radius and ulna, two carpal bones, and an ungueal phalanx; the two femora, the proximal extremities of the left tibia and fibula, and the left astragalus.

These bones were discovered by Mr. Darwin at Punta Alta in Northern Patagonia, and in the same bed of partly consolidated gravel as that wherein the lower jaws of *Toxodon* and *Mylodon* were imbedded. All the parts were discovered in their natural relative position, indicating, as Mr. Darwin observes, that the sublittoral formation in which they had been originally deposited had been but little disturbed. This beach is covered at spring-tides, and many portions of the skeleton were encrusted with *Flustræ:* small marine shells were lodged within the crevices of the bones.

Sufficient of the cranium remains to indicate that its general form resembled an elongated, slender, subcompressed cone, beginning behind by a flattened vertical base which expanded slightly to the zygomatic region, and thence contracted gradually in all its dimensions to the anterior extremity.



Remains of skull of Scelidotherium. (Owen.) Reduced.

'The Cape Ant-eater (*Orycteropus*)' [AARD-VARK], says Professor Owen, 'of all *Edentata*, most nearly resembles the present fossil in the form of its cranium, and next in this comparison the great Armadillo (*Dasypus Gigas*, Cuv.) may be cited: on the supposition therefore that the correspondence with the above existing Edentals observable in the parts of the fossil cranium which do exist, was carried out through those which are defective, the length of skull of the Scelidothere must have been not less than two feet. The cranium is singularly small and slender in proportion to the rest of the skeleton, especially the bulky pelvis and femur, of which bones the latter has a length of seventeen inches, and a breadth of not less than nine inches; the astragalus again exceeds in bulk that of the largest Hippopotamus or Rhinoceros; yet the condition of the epiphyseal extremities of the long bones proves the present fossils to have belonged to an immature animal. Hence, although the Scelidothere, like most other Edentals, was of low stature, and, like the Megatherium, presented a disproportionate development of the hinder parts, it is probable that, bulk for bulk, it equalled, when alive, the largest existing pachyderms not proboscidean. There is no evidence that it possessed a tessellated osseous coat of mail.'

Professor Owen gives a most minute and interesting description of the various parts of the cranium, for which we refer to his memoir, remarking only that the most interesting features in the region of the temporal bone consist in the fine condition of the tympanic bones, and the presence of a semicircular pit, immediately behind the tympanic bone, for the articulation of the styloid element of the hyoid or tongue bone.

'In these points,' observes the Professor, 'we trace a most remarkable correspondence with the Glossothere, and in the separate tympanic bone the same affinity to the Orycteropus as has been already noticed in the more bulky extinct Edental. This correspondence naturally leads to a speculation as to the probable generic relationship between the Glossothere and Scelidothere: now it may first be remarked that the styloid articular depression is relatively much larger and much deeper in the Glossothere than in the Scelidothere: in the former its diameter equals, as we have seen, one inch; in the Scelidothere it measures only a third of an inch, the whole cranium being about two-fifths smaller. If we turn next to the anterior condyloid foramina, which in the Scelidothere are double on each side, we obtain from them evidence that the muscular nerve of the tongue could only have been one-third the size of that of the Glossothere. These proofs of the superior relative development of the tongue in the Glossothere indicate a difference of habits, and a modification probably of the structure of the locomotive extremities; and when we associate these deviations from the Scelidothere with the known difference in the position of the occipital plane, which in the Glossothere corresponds with that in the *Myrmecophaga* and *Bradypus*, we shall be justified in continuing to regard them, until evidence to the contrary be obtained, as belonging to distinct genera.'

The bones of the cranium connected with the organ of hearing and an accidental fracture of the right os petrosum, demonstrating its usual dense and brittle texture, and at the same time exposing the cochlea with part of its delicate and beautiful lamina spiralis, give Professor Owen occasion to observe that the conservation of parts of the organs of vision in certain fossils has given rise to arguments which prove that the laws of light were the same at remote epochs of the earth's history as now; whilst the structures just alluded to demonstrate, in like manner, that the laws of acoustics have not changed, and that the extinct giants of a former race of quadrupeds were endowed with the same exquisite mechanism for appreciating the vibrations of sound as their existing congeners enjoy at the present day.

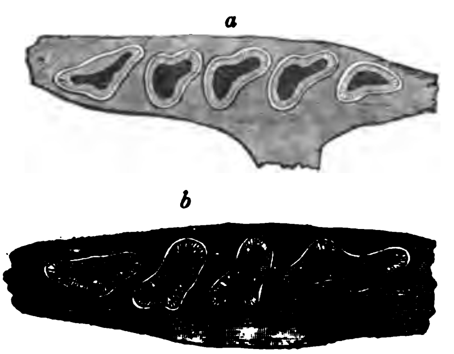
'The brain,' says Mr. Owen, 'being regulated in its development by laws analogous to those which govern the early perfection of the organ of hearing, appears to have been relatively larger in the Scelidothere than in the Glossothere: it was certainly relatively longer; the fractured cranium gives us six inches of the antero-posterior diameter of the brain, but the analogy of the Orycterope would lead to the inference that it extended further into the part which is broken away. The greatest transverse diameter of the cranial cavity is four inches eight lines; their dimensions however are sufficient to show that the brain was of very small relative size in the Scelidothere; and, both in this respect and in the relative position of its principal masses, the brain of the extinct Edental closely accords with the general character of this organ in the existing species of the same order. We perceive by the obtuse ridge continued obliquely upwards from above the upper edge of the petrous bone, that the cerebellum has been situated wholly behind the cerebrum; we learn also, from the same structure of the enduring parts, that these perishable masses were not divided, as in the Manis, by a bony septum, but by a membranous tentorium, as in the Glossothere and Armadillos: in the Orycteropus, as has been before remarked, there is a strong, sharp, bony ridge extending into each side of the tentorium. The vertical diameter of the cerebellum and medulla oblongata equals that of the cerebrum, and is two inches three lines: the transverse diameter of the cerebellum was about three inches nine lines; its antero-posterior extent about one inch and a half. The sculpturing of the internal surface of the cranial cavity bespeaks the high vascularity of the soft parts which it contained, and there are evident indications that the upper and lateral surfaces of the brain had been disposed in a few simple parallel longitudinal convolutions. The two anterior condyloid foramina have the same relative position as the single corresponding foramen in the Glossothere, Orycterope, and Armadillos; and the inner surface of the skull slopes outwards from these foramina to the inner margin of the occipital condyle.'

The size of the orbit is relatively smaller than in the Orycterope, and still less than in the Ant-eaters. 'Here however,' observes Mr. Owen, 'we have merely an exemplification of the general law which regulates the relative size of the eye to the body in the Mammalia. The malar bone does not extend so far forwards in front of the orbit as in either the Orycterope or Armadillo; in the inclination however with which the sides of the face converge forwards from the orbits, the Scelidothere holds an intermediate place between the Armadillos and Orycterope.'

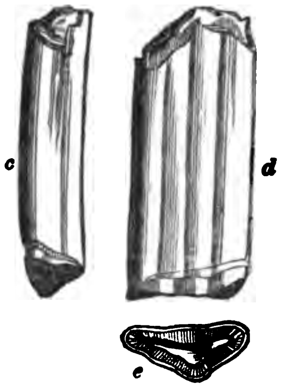
The dental formula of Scelidotherium appears to have been:—

$$\text{Incisors } \frac{0}{0};\ \text{Canines } \frac{0}{0};\ \text{Molars } \frac{5-5}{4-4} = 18.$$

Though the teeth of *Mylodon* and *Scelidotherium* have a close analogy to those of existing small Insectivorous Edentals, there is nothing in their structure to militate against the presumption that these extinct genera were fed on succulent plants, such as cabbage-palms, or on farinaceous vegetables, such as large ferns. Their teeth are well adapted to chew vegetable tissues of moderate firmness. (*Zoology of H. M. S. Beagle.*)



One-half nat. size.



Dentition of Scelidotherium.

a, Teeth of upper jaw in situ, seen from above; *b*, teeth of lower jaw in situ, same view; *c*, *d*, teeth, showing the depth of their implantation in the jaw and their structure; *e*, crown of tooth, seen from above. (Owen.) Reduced.

After the above was written, and indeed while the article was in the press, we received the *Comptes Rendus* (April, 1839), in which appears an extract of a letter from M. Lund to M. Victor Audouin, dated the 5th of November, 1838, giving an account of the discovery by M. Lund of numerous fossil mammals in Brazil. The portion of the country examined by this zealous zoologist is comprised between the rivers Rio das Velhas, one of the confluents of the Rio de S. Francisco, and the Rio Paraopeba. This tract forms an elevated plateau of 2000 feet above the level of the sea, and is traversed in the midst by a mountain-chain only from 300 to 700 feet high. The chain is formed by a secondary limestone (calcaire secondaire) stratified horizontally and having all the characters of the *zechstein* and the *hohlen-kalkstein* of the Germans (*calcaire à cavernes*). It is entirely riddled with caverns and traversed in all directions by fissures, the interior of which is more or less filled with a red earth identical with the red earth which forms the superficial bed of the country. In this basin of the Rio das Velhas, M. Lund has discovered in company with the remains of *Feræ*, *Glires*, *Pachydermata*, *Ruminantia*, *Marsupialia*, *Cheiroptera*, and *Simiæ*, the following mammiferous fossils, which seem to claim attention here.

'Family of Edentata.

'A *Myrmecophaga* of the size of an ox (*Myrmecophaga gigantea*).

'Family of Effodientia.

'1. Two species of *Dasypus*; one allied to *D. octocinctus*, and the other twice as large as the living species.

'2. *Xenurus*. 3. *Euryodon*, a lost genus of *Tatou*, or Armadillo. 4. *Heterodon**, distinguished from all the living armadillos by the proportion of its teeth. 5. *Chlamydotherium*, a new genus of armadillo, representing on a great scale the genus *Euphractus* of Wagler (the *Encoubert* of Buffon); two species, one of the size of a tapir, the other larger than a rhinoceros.

'6. *Hoplophorus*. A very extraordinary genus, whether we consider the massive proportions of the species, their gigantic stature, or the singular combination of different types of organization manifested in them. Their characters nevertheless approach more and more to the family of sloths.

'These singular animals were armed with a cuirass which covered all the upper parts of their body, and was composed of small hexagonal scutcheons, except on the middle of the body, where the scutcheons put on a square form and were arranged in immoveable transverse bands. The bones of the trunk as well as the large bones of the extremities are very similar to those of the Armadillos (Tatous) and especially to those of the *Cachicames* [Armadillo, vol. ii., p. 352]; but the bones of the feet are so abridged and the articular surfaces present such a considerable flattening, that nothing similar is to be seen in any animal skeleton, and one cannot conceive how such feet could serve for digging in the earth (creuser la terre): the form of the teeth, too, indicates that these singular animals could only have been nourished with vegetable substances, and we must suppose that they fed after the manner of the great *Pachydermata*. However this may be, the *Hoplophori*, of which

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* This name is preoccupied. See the title.

M. Lund distinguishes two species, present this particularity, that their zygomatic arch is furnished with a descending branch, a character regarded till now as exclusively proper to the Sloths. These two species were each of the size of an ox. Fragments of these skeletons have already been described by MM. Weiss and D'Alton of Berlin.

'M. Lund has found fragments belonging to a genus approaching *Hoplophorus*, and to which he assigns the name of *Pachytherium*. Its proportions were still more massive and its stature taller.

'Family of Bradypoda.

'M. Lund is thus conducted to the family of the Sloths, which, "at the Antediluvian epoch," played in these countries a very important part, whether the number and variety of their forms, or the great size which the species attained, are considered.

'The first genus which he notices is *Megalonyx*. It is connected with the Armadillos (Tatous) by the osseous plates which protected a part of its body; but these plates, although of excessive size, far from forming a continuous cuirass as in the Tatous, were separated from each other by great intervals. The *Megalonyx* exhibits the greatest affinity to *Megatherium*, principally in the structure and composition of the feet, but those of the posterior limbs present the same torsion as the feet of *Bradypus tridactylus*, although proceeding from a different cause. In the Ai this torsion is produced by the particular mode of the articulation of the leg with the astragalus; in the *Megalonyx*, according to M. Lund, the articulation is effected in the ordinary manner, and it is the carpal surface of this last bone which, by its anomalous conformation, caused the contorsion of all the rest of the foot.

'The molars, to the number of five above and four below, are deprived of roots as in the animals of the order *Edentata;* in that they differ from those of *Megatherium*, which are described as having two roots.*

'The Megalonyxes were provided with a tail, which was excessively strong and probably prehensile, and this, joined to the contorsion of the hind feet and the enormous size of their claws, leads to the belief, says M. Lund, that these animals, notwithstanding the enormous weight of their body, were destined to climb, like their analogues in the present creation.

'This genus appears to have been very rich in species. M. Lund already distinguishes five; one of which, *M. Cuvieri*, was of the stature of a very stout ox; and this was not the largest species.

'By the Megalonyxes, a new genus (*Sphenodon*), which was of the size of a hog, finds its place.

'Still nearer to the Sloths must be arranged a new genus which M. Lund designates under the name of *Colodon*, and which consists of one species.

'Returning to the consideration of the animals which he enumerates, and which are comprised in the order *Bruta* or *Edentata* of Cuvier, M. Lund observes,—

'1. That the family of Ant-eaters properly so called, that of the Tatous, and that of the Sloths, which, at the present epoch, are peculiar to America, were also found at the preceding epoch.

'2. That then, these same families were exclusively proper to this part of the world, as they are at the present epoch; and that this gives cause for thinking that no species of these three families has hitherto been found in the diluvial beds of the other parts of the world.

'3. That this great order of the *Edentata* was then more numerous both in genus and species than it now is.

'4. That the greater part of these mammiferous genera which once peopled the country have disappeared.

'5. That every species has been destroyed, two species only exhibiting affinity, but not perfect identity, with the living species.

'6. Finally, that the animals of this order attained at that epoch dimensions much greater than those which they now present.

'The family of the Sloths has now entirely disappeared in the basin of the Rio das Velhas, which is explained by the want of virgin forests, all this country being occupied by the form of vegetation called by the Brazilians *Campos*. It is probable that at the epoch when these great animals lived it was otherwise, and that the country was then covered by immense forests. Everything leads to the belief that they led the same kind of life as their analogues of the present creation, that is to say, that notwithstanding the colossal proportions of their bodies, they sought their nourishment on trees.'

Such is the extract from the letter of M. Lund relating to the subject of the present article. The zoologist will look with anxiety for more detailed descriptions, which will enable him to ascertain which of the animals mentioned by M. Lund are identical with those noticed above, and give him a further insight into the species detected by this magnificent discovery. *Hoplophorus*, we presume, is the *Glyptodon* of Owen. The gigantic *Myrmecophaga* is probably the *Glossotherium* of the same author.

MEGATRE'MA, Dr. Leach's name for those species of *Pyrgoma* which have a large aperture. [Cirripeda, vol. vii., p. 209.]

MEIBOM, MARC, a member of a numerous German family, who were distinguished in the seventeenth century for their classical knowledge and scientific attainments. He was born at Tonningen, in the duchy of Schleswig, about the year 1630, and died at Utrecht about the year 1711. Dr. Hutton gives 1590 as the year of his birth, and 1668 as that of his death, which are no doubt incorrect. Marc Meibom was patronised by Christina, queen of Sweden, to whom he dedicated a collection of seven Greek authors upon music, Amster., 1652, 4to. He was subsequently appointed to a professorship in the university of Upsal, by Frederick III., to whom he acted in the capacity of librarian. He quitted Upsal for the professorship of belles-lettres in the academy of Amsterdam, where he remained but a short time. In 1674 he came to England, where he prepared the publication of a new edition of the Hebrew Bible, asserting that the edition then in use was full of errors; his pretensions appear however to have been ridiculed by the learned. Among his published works, a list of which will be found in the 'Biographie Universelle,' there is a curious 'Dialogue on Proportion,' wherein he introduces the whole of the antient geometricians, Euclid, Theon, Apollonius, &c. Many of the views advanced by Meibom in this work respecting the doctrine of proportion were shown to be erroneous by Langius, and by Dr. Wallis in a tract printed in the first volume of his works. (Hutton's *Dict.*; and *Biograph. Univer.*)

MEIGLYPTES. [Woodpeckers.]

MEINAN, River. [Siam.]

MEININGEN, or **MEINUNGEN**, the capital of the duchy of Saxe-Meiningen-Hildburghausen, is situated in 50° 35′ N. lat. and 10° 24′ E. long., in a pleasant valley on the banks of the river Werra, which here divides into several arms. It is a well-built town, with broad, straight, and paved streets; the ducal palace, called the Elisabethenburg, is a handsome building; the centre part is 500 feet in length, and it has two wings. It contains a library of 25,000 volumes, a gallery of paintings, a collection of engravings, and the archives of Henneberg. In a separate building in the garden there is a cabinet of medals and a collection of natural history. The other principal buildings are the house of the assembly of the Estates, the townhall, with a good library, the four churches, an infirmary, and a theatre. There are a lyceum, a gymnasium, a seminary for country schoolmasters, and several schools. The environs are very agreeable. The inhabitants, now 6000 in number, have manufactures of black crape, yarn, calico, and woollens of various descriptions, in which they carry on a considerable trade.

MEISSEN, one of the circles of the kingdom of Saxony, is a part of the antient Margraviate of the same name. It lies on both sides of the Elbe, between 50° 42′ and 51° 26′ N. lat., and 12° 45′ and 14° 17′ E. long. Its area is 2355 square miles, and its population 379,378 souls. This circle is one of the most fertile and best cultivated parts of the kingdom: it produces corn, fruit, flax, hemp, tobacco, hops, and in some parts wine. It likewise contains the principal manufactories in Saxony of woollen, linen, and cotton. Dresden, the capital of the kingdom, is in this circle, which is peculiarly distinguished by its natural beauties, such as the mountainous country known by the name of the Saxon Switzerland, the basaltic groups of Stolpen, and the romantic environs of Dresden, Pillnitz, and Meissen. [Dresden.]

MEISSEN, the second town in the circle of the same name in the kingdom of Saxony, is situated in 51° 10′ N. lat. and 13° 25′ E. long., on the little river Meise or Misi, on and between hills on the left bank of the Elbe, over which there is a covered bridge, supposed to have been originally built in the eleventh century; this bridge was destroyed in 1547, 1757, and in 1813, but has since been rebuilt. Meissen is one of the oldest towns in the country, having been founded in 922 (as some say, 928), by king Henry I., as a bulwark of his German settlements against the conquered Slavonians. His son, Otho I., founded the cathedral, and established a bishopric, of which the town continued to be the seat till the Reformation. There are now but few remains of the fortifications which were begun by Henry I. The cathedral, a masterpiece of antient German architecture, has a tower surmounted with a spire 60 feet high, composed of beautiful open work. It is rich in antient monuments. Adjoining it is the princes' chapel, founded in 1425, by Frederick the First, elector of Saxony, of the house of Meissen, for the hereditary vault of his family, in which there is a bronze monument of the founder. The palace of Albrechtsburg, near the cathedral, was formerly the common residence of the margraves, burgraves, and bishops of Meissen; but the margraves transferred their residence to Dresden in the thirteenth century. The palace was almost entirely rebuilt in 1471. Ever since 1710 it has contained the celebrated porcelain manufactory, the productions of which rival or surpass those of China and Japan in hardness, durability, the beauty of the forms, and the taste of the painting. The former convent of St. Afra, on a lofty rock, which is joined by a stone bridge to the eminence on which the palace stands, contains the prince's school, in which there are 120 scholars, most of whom live free of all expense. There are various flourishing manufactures, but the chief source of profit is the making of wine. (Reinhard, *Die Stadt Meissen*, &c; Ursinus, *Die Domkirche zu Meissen*.)

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* But see above, pp. 67, 69.

MEISSNER, AUGUSTUS GOTTLIEB, a popular and voluminous German writer of the last century, was born at Bauzen in Upper Silesia, November 4, 1753. In 1785 he was appointed professor of æsthetics and classical literature at the university of Prague, and in 1805 director of the high school at Fulda, where he died, February 20, 1807. He wrote several dramatic pieces, including some translations from Molière and Destouches; also an abridgement in German of Hume's 'England:' but it is his 'Skizzen' that rendered him a favourite with the public. These sketches, extending to fourteen *sammlungen*, or series (the first of which appeared in 1778, the last in 1793), consist of essays, tales, narratives, anecdotes, dialogues, &c.; and recommend themselves by their agreeable liveliness, shrewdness, and pleasantry. Although not entirely free from blemishes of style, they have the merit of being the most successful attempts in the lighter walks of literature which Germany could then produce. Many of these pieces were translated or imitated in French, Danish, and Dutch, and one or two were translated by Thompson in his 'German Miscellany.'

His 'Tales and Dialogues' (1781-9) may be considered as a continuation of his sketches, being similar in plan. His 'Alcibiades,' 'Massaniello,' 'Bianca Capello,' and 'Spartacus,' are productions of greater length (the first mentioned being in four volumes), and are specimens of the historical and biographical romance. With the exception of the last, they have all been translated into French. Besides the above and a variety of other works, Meissner contributed a great number of literary and historical articles to different periodicals.

MEISTERSINGERS. [GERMANY—*Language and Literature*.]

MEKINEZ. [MAROCCO.]

MEJERDA, or **BA'GRADAS**, is a river in Northern Africa, and probably the largest river of that continent which falls into the Mediterranean, except the Nile. Its upper course lies within the territories of Algiers; in its middle course it forms the boundary-line between that country and Tunis, and in its lower course it traverses the northern district of the last-mentioned state. A great number of rivers rise in the mountains which between 35° and 36° N. lat. and 7° and 8° E. long. constitute the most eastern of the elevated ranges of Mount Atlas: after watering a rich and populous country, which extends east of those ranges, they unite about 35° 30′ N. lat., and form the Wady Serat, the principal branch of the Mejerda river. In its course, which is nearly due north, it separates Algiers from Tunis, until it reaches 36° 10′ N. lat., where it is joined by the Wady Hamis from the west, and takes the name of Mejerda. Up to this junction its course exceeds 100 miles, and from this point it runs about 60 miles eastward through a hilly country. It then turns north-north-east, and continues this course until it falls into an inlet of the bay of Tunis near Cape Farina, after a course of more than 260 miles. The Mejerda does not appear to be navigated, but it is used to irrigate the fields in the lower part of its course, where it flows through a wide and level valley. It overflows and fertilises the adjacent country; but these inundations do not, as in the Nile, take place in the middle of summer, but in the spring. They are the effect of the winter and spring rains, and of the melting of snow on the high mountains which surround its upper branches.

MEKRAN. [PERSIA.]

MELA, POMPO'NIUS, a Roman writer on geography. He is thought by some critics to have been the same person as the Annæus Mella, or Mela, who was implicated in a conspiracy against Nero, and who put an end to his own life (Tac., *Ann.*, xvi. 17; Plin., *H. N.*, xix. 6); but this opinion is only founded on the similarity of the names. It is probable, from a passage in which Mela speaks of the recent conquest of Britain (iii. 6), that he was contemporary with the emperor Claudius; and it is evident from many passages in his work that he could not have lived before the time of Augustus (iii. 1, 'turris Augusti titulo memorabilis;' compare iii. 2, &c.). It appears from a passage in his own work (ii. 6) that he was born at Tingitera in Spain; but the MSS. differ so widely in this passage, that it is difficult to determine the right reading: many critics think that we ought to read Mellaria.

Mela's work is entitled in most MSS. 'De Situ Orbis.' It is divided into three books, and contains a very brief description of the various parts of the world. In the first book, after giving a short account of the great divisions of the earth, Mela commences with Mauritania (part of Marocco), and following generally the coast, he describes successively Numidia, the province of Africa, Cyrenaica, Egypt, Arabia, Syria, Phœnicia, Cilicia, Pamphylia, Lycia, Caria, Ionia, Æolis, Paphlagonia, and the countries on the Euxine and the Mæotis as far as the Rhiphæan mountains. In the second book he commences at the river Tanais (Don), and gives an account of the countries in Europe on the western side of the Mæotis and the Euxine as far as Thrace. He then proceeds to describe Greece, Italy, Gallia Narbonensis, and the coast of Spain as far as the Straits of Gibraltar, from which he commenced his description in the first book. The remainder of the second book is occupied with an account of the islands in the Mediterranean, Adriatic, Ægean Sea, &c. In the third book he commences again at the Straits of Gibraltar, and follows the western coast of Spain till he reaches Gaul; he then gives an account of the western coast of Gaul, and afterwards describes Germany and the central parts of Europe and Asia as far as the Caspian. After mentioning some of the islands in the ocean, he next describes India and the maritime coast of Carmania, Persia, and Arabia, and concludes with a description of the central parts of Africa.

Mela appears to have been a mere compiler, and to have had no scientific knowledge of his subject. If we consider him later than Strabo, it does not appear from Mela's work that geography had made any progress in the meantime. Like Strabo, he considers the earth as penetrated by four great inlets of the ocean, of which the Mediterranean, the Red Sea, and the Persian Gulf were three: the fourth was the Caspian Sea. The singular error as to the Caspian is the more remarkable when contrasted with the fact that Herodotus knew the Caspian to be a lake. (Herod., i. 203; Strabo, p. 121; Mela, i. 1; iii. 6.)

The best editions of Mela are by Gronovius, Leyden, 1685, frequently reprinted; by Tzschucke, 7 vols. 8vo., Leip., 1807; and the Bipont, 1809. Mela has been translated into English, by Arthur Golding, Lond., 1585 and 1590; into Italian, by Porcacchi, Ven., 1557; and into French, by Fradin, 3 vols. 8vo., Paris, 1804.

MELAIN, a name which has been given to the colouring matter of the ink of the cuttle-fish. It is obtained pure by evaporating the ink to dryness and boiling the residue successively in water, alcohol, hydrochloric acid, more water, and a little carbonate of ammonia. Dr. Prout found 100 parts of the dry residue of the ink of the cuttle-fish to be composed of—Melain, 78·; carbonate of lime, 10·40; carbonate of magnesia, 7·; substance analogous to mucus, 0·84; various salts, 2·16.

MELALEUCA CAJEPUTI (Roxb.), the *Melaleuca*

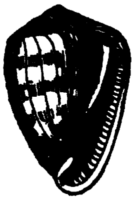
Minor (Smith), a native of the Molucca islands, yields the oil termed cajeput. It is obtained by distillation of the leaves and branches, which are collected the night before they are subjected to this process. It is very limpid, pellucid, and of a light or yellowish green colour. Specific gravity, 0·927; it boils at 140° (Réaumur). It is possessed of a penetrating odour; the taste is acridly aromatic, leaving a sense of coldness in the mouth. Its chemical composition is, carbon 78·12, hydrogen 11·49, oxygen 10·38. It seems to consist of two distinct oils: one transparent as water, of specific gravity 0·897; the second dark green, of specific gravity 0·920. Unrectified oil reddens litmus paper, but rectified does not. It does not detonate with iodine, nor does it form an artificial camphor with hydrochloric acid gas, but has its colour much changed by that gas. It never deposits a stearopten. Some samples of cajeput oil contain copper, which may be detected by different tests; an artificial oil is also sometimes vended, but it is not difficult to detect the fraud.

In its action on the human frame cajeput participates in the properties of other volatile oils, and is rubefacient externally, stimulant and antispasmodic when taken internally. Mixed with other ingredients it has proved a useful application to the joints in rheumatism and similar affections, while a few drops of it have often relieved or warded off slight attacks of hysteria or epilepsy. It by no means realised the expectations entertained of it as a remedy in spasmodic cholera.

MELA'MPUS (Zoology), De Montfort's name for a genus of turbinated *testacea* (*Conovula* or *Conovulus* of Lamarck) placed by Cuvier next to the great genus *Auricula*, and by M. de Blainville and M. Rang under the family *Auriculacea*. De Blainville arranges both *Melampus* (Conovula) and *Tornatella* under *Pedipes* (Adanson).

This genus has, like the *Auriculæ*, plaits on the columella or pillar of the shell, but the external lip has no roll or *bourrelet*, and is finely striated internally. The general contour of the shell is that of a cone, of which the spire forms the base.

Example, *Melampus coniformis*.



Melampus coniformis, a little enlarged.

MELANCHTHON, PHILIP, (or MELANTHON, as he himself was most accustomed to write the name, according to Christ. Saxius, 'Onomast.' iii. 589), was born in the small town of Bretten or Bretheim, in the Palatinate of the Rhine, or Lower Palatinate, as it used to be called, the dominion of the elector palatine. They still show at Bretten, or did a few years ago, the house in which his parents lived. His father was George Schwarzerde, or Schwarzerdt, and is called by Melchior Adam, the earliest authority, Magister Armorum, a description which has given rise to some controversy. It appears that whatever was the original condition of Melanchthon's father, he was a man of remarkable ingenuity in his profession, and had worked his way up to a situation of some distinction, that of principal engineer to the elector, before the birth of his son. (See Bayle, *Dict. Crit.*, 2nd edit., ii. 2089, and the authorities there quoted.) According to Joachim Camerarius (in *Vit. Ph. Melan.*) he was a native of Heidelberg, and came to take up his residence at Bretten upon marrying the daughter of John Reuterus, a person who had been mayor of that town. Reuterus, who lived till his grandson was eleven years old, has the credit of having been the chief superintendent of his earliest training. On the death of his grandfather, which was followed within a fortnight by that of his father, he was sent to the college of Pfortsheim, where the remarkable progress he had already made in his studies was continued at an answerable or an accelerated rate. (See a short notice of the early life of Melanchthon in Baillet's *Enfans Célèbres*, pp. 42, 43.)

At Pfortsheim he lodged in the house of a sister of the celebrated Greek scholar John Reuchlin, who was his relation, and it was from Reuchlin, who had translated his own Teutonic surname into the Greek formation Capnio, on the supposition of its connection with Rauch (smoke), that the young Schwarzerde, a compound, meaning, in English, 'black earth,' received the more melodious Grecised appellation of Melanchthon (quasi μέλαινα χθὼν), intended to signify the same thing; by which alone he is now known.

After spending about two years at Pfortsheim, Melanchthon was removed in 1509 to the university of Heidelberg, which however he quitted in 1512 for that of Tübingen, where he remained till, on the recommendation of his friend Reuchlin, he was in 1518 appointed, by the elector Frederic of Saxony, professor of Greek in the newly established university of Wittemberg. This situation he held so long as he lived.

It was at Wittemberg that Melanchthon became acquainted with Luther, then occupying the chair of theology in that university. In his young colleague the great reformer found, along with a ready disposition to imbibe his opinions in religion, a piety as sincere as his own, and an erudition greatly superior; while, if Melanchthon wanted the fiery energy and boldness, and the large heart of Luther, he was free also from some of the defects apt to attend upon such endowments of strength and passion, and, by the calmness, moderation, and gentleness of his whole nature, was formed both to temper the impetuosity of his friend, and to win admittance for their common views into minds of a certain class, and that by no means the lowest, which all the powers of the other might have assailed in vain.

Thus attached by the characteristics in which they were contrasted, as well as by those in which they resembled each other, they soon became the most intimate of associates and fellow-workers. After that of Luther, Melanchthon is the most distinguished name in the history of the Reformation in Germany; and the remainder of his biography is chiefly the detail of his various labours in the promotion of that great cause. In 1519 he accompanied Luther to Leipzig, to hold a disputation on the divine original of the papal authority with Eccius, or Eckius, one of the ablest of the Catholic champions of that age. For some years after this he was actively employed, not only in writing books in defence of the reformed doctrines, but in founding schools and colleges, in visiting churches, and in other services of the same kind, undertaken at the command of the elector.

In 1530 he was appointed by the general body of the reformers to draw up what was intended to be the conciliatory Confession, or exposition of their opinions, which was presented to the emperor at the diet held at Augsburg in March that year. Both Francis I. of France, and Henry VIII. of England, were desirous of obtaining the assistance of Melanchthon in their religious reforms, but circumstances interfered to prevent him from visiting either country. In 1540 and 1541 he maintained another great disputation with Eccius, which was begun at Worms, and afterwards transferred to Ratisbon, where it was carried on before the diet, the emperor presiding in person. After the death of Luther, Melanchthon became involved in a bitter controversy with the more ardent spirits of his party, in consequence of his aversion to extreme courses, and especially the timidity he was accused of showing in his approval of the system of compromise between the two religions issued by the emperor in 1548, and afterwards known by the name of the Interim, an approval in which, whether the circumstance is to be held honourable to him or the reverse, it must be admitted that he stood nearly alone among the distinguished men of both sides. He died at Wittemberg, 19th April, 1560, leaving two sons and two daughters by his wife, the daughter of a burgomaster of that town, whom he had married in 1520, and who died in 1557. His numerous works, consisting of theological treatises, commentaries on several of the Greek and Latin classics, Latin poems, and some historical and philosophical writings, were published in a collected form in five vols. fol., at Basle, in 1544, and in four vols. fol., at Wittemberg, in 1564, again in 1580, and again in 1601.

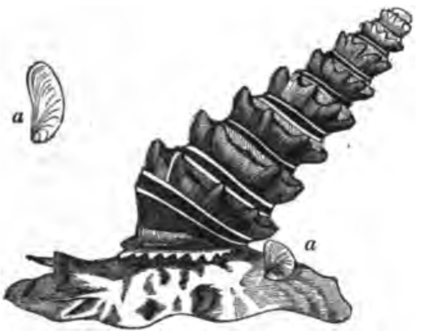
Melanchthon principally contributed to the diffusion of the Aristotelian philosophy in Germany, both by his teaching and his writings, among which were his 'Elements of Logic and Ethics.' [ARISTOTLE, p. 336.]

MELANERPES. [WOODPECKERS.]

MELA'NIA, a genus of fluviatile, testaceous, operculated Gastropods, placed by Lamarck in his family *Melanians* [MELANIANS]; by M. de Blainville in his family *Ellipsostomata* [ELLIPSOSTOMATA]; by Cuvier in his order *Pectinibranchiata*, between the genera *Helicina* and *Rissoa;* and by M. Rang under the order last mentioned, and in the first family of it (*Turbinés* of De Férussac), between the subgenera *Paludina* and *Rissoa*.

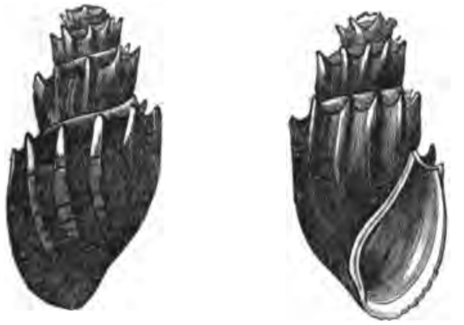
Generic Character.—Animal elongated, with a foot which is ordinarily short and not thick; head proboscidiform, subconical, truncated, and terminated by a buccal slit which is small and longitudinal; one pair of tentacles elongated, filiform, carrying the eyes on the external side, sometimes near the base, sometimes towards one-fourth of their length; mantle open, with festooned edges; *operculum* horny, elongated, and narrow, with an apicial and paucispiral summit. (Deshayes.)

Shell with an epidermis, of an oval oblong, a pointed spire, which is often elongated or turriculated, and an oval aperture which is widened anteriorly, and has a very sharp edge.

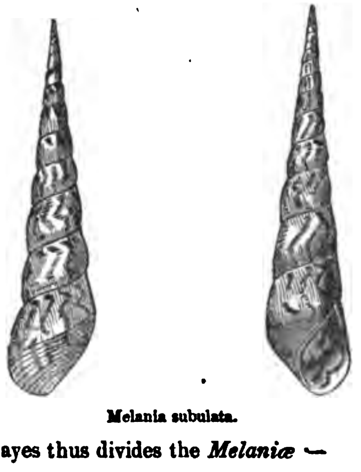


Animal and Shell of Melania (Pirena) aurita. *a*, Operculum.

Geographical Distribution of the Genus.—The rivers of warm climates generally, and of Asia especially. Species are also recorded from Africa and North and South America. Mr. Conrad has described several new species from the rivers of Alabama.



Melania amarula.



Melania subulata.

M. Deshayes thus divides the *Melaniæ* —

α.

Shell oval or subturriculated.

Example, *Melania amarula*

β.

Shell elongated, turriculated.

Example, *Melania truncata.*

γ.

Shell with the inferior angle detached.

Example, *Melania costellata.*

δ.

Shell with a bordered aperture.

Examples, *Melania marginata* and *Melania subulata*

Lamarck gives the rivers of the East Indies, Madagascar, the Isle of France, &c., as the locality of *Melania amarula*, the animal of which, he says, is very bitter, and passes for an excellent remedy for the dropsy.

The apex of all the species is generally eroded as the animal advances in age.

FOSSIL MELANIÆ.

M. Deshayes, in his Tables (Lyell, 1833), makes the number of living species thirty-four, and the number of fossil (tertiary) twenty-five. The species recorded as both living and fossil (tertiary) are, *Melaniæ inquinata, inflexa, Cambessedesii*, and a new species. The habitations allotted to the living species of *inquinata, inflexa, Cambessedesii*, and the new species, are, the Philippine Isles, the Mediterranean, and the lakes of Como and Geneva. *Melaniæ lactea, nitida*, and *costellata*, are noticed as fossil species found in more than one tertiary formation. In the last edition of Lamarck (1838) the number of recent species is thirty-six, and of these *M. inquinata* only is noted as occurring in a fossil state. The number of fossil species recorded in this edition is eight, and of these M. Deshayes notes the species *costellata, marginata*, and *nitida*, as not being *Melaniæ, M. nitida* having all the characters of the genus *Eulima*. The other two M. Deshayes keeps provisionally among the *Melaniæ*. *Melania semiplicata*, another of the eight, he conceives to be a variety of *M. lactea*, and is of opinion that it should be expunged from the catalogue.

Dr. Mantell records two species (*sulcata* and *costellata ?*) in the blue clay of Bracklesham. Professor Phillips notes a *Melania ?* in the Speeton clay, and two species (*M. Heddingtonensis* and *M. striata*) in the coralline oolite, *M. Heddingtonensis* and *M. vittata* in the cornbrash, and *M. Heddingtonensis* and *M. striata* in the Bath oolite. In the table at the end of his work (*Geology of Yorkshire*) he records *Melaniæ striata* in the coralline and Bath oolite, *Heddingtonensis* in the coralline oolite, cornbrash, and inferior oolite, *lineata* in the inferior oolite, and *vittata* in the coralline oolite and cornbrash. Dr. Fitton records *Melania Heddingtonensis* in the Oxford oolite (Dorset and Oxford).

MELANIANS, Lamarck's name for a family of fluviatile, testaceous, operculated Mollusks, breathing water only, and belonging to the order *Trachelipoda*. The family consists of the genera *Melania, Melanopsis*, and *Pirena*, according to Lamarck, and Mr. G. B. Sowerby, Jun. (*Conchological Manual*) suggests that to these may be added *Anculosa* and *Pasithæa*. M. Deshayes, in the last edition of Lamarck, adds the genera *Eulima* and *Rissoa* to *Melania, Melanopsis*, and *Pirena*, the latter of which, it seems, should be expunged.

MELANOPSIS, a genus of fresh-water, testaceous, turbinated mollusks, to which Lamarck assigns a position among his family of *Melanians*. M. de Blainville places it in his family *Entomostomata*, between *Cerithium* and *Planaxis;* and M. Rang, who includes in it the genus *Pirena*, between *Scalaria* and *Planaxis*.

The genus *Melanopsis* was established by M. de Férussac, and much difference of opinion appears to have existed among zoologists as to its proper place in the series. M. Deshayes, in the last edition of Lamarck, gives it as his opinion that it should be arranged in the family of *Melanians*; and he observes that if one considers the zoological and conchological characters of the two genera *Melania* and *Melanopsis*, the conviction that they should be united soon arises. He remarks that M. de Férussac gave, in the first volume of the 'Memoirs of the Society of Natural History of Paris,' an interesting account of the animal of the *Melanopsides*, which he had observed in Spain in the neighbourhood of Seville and Valencia, and that M. Quoy has since made known the animal of *Pirena terebralis* of Lamarck; so that the means are now at hand for comparing with exactness the three principal types of the family of

Melanians, and of observing the analogy of their zoological characters.

If,' continues M. Deshayes, 'we have before us a great number of species of *Melaniæ* and *Melanopsides*, living and fossil, we remark a phenomenon entirely similar to that which we have pointed out with relation to the genera *Bulimus* and *Achatina;* that is to say, that we have seen the columellar truncation established by nearly insensible degrees from the most uncertain commencement to a notch as deep as that which marks the *Buccina*. If, in relying on the identity of the organization of the *Bulimi* and *Achatinæ*, we have been able to reduce almost to nothing the value of the character of the columellar truncation, we are authorised to employ here the same means for demonstrating the little importance which the truncation of the columella in the *Melanopsides* ought to have in the eyes of zoologists as a ground for separating them from the *Melaniæ*. Already we have explained ourselves as to the value of the genus *Pirena*, and have shown that it was composed by Lamarck from heterogeneous materials: on one side we find true *Melaniæ*, and on the other singular shells, approximating in their characters to certain *Cerithia* which Linnæus comprised among his *Strombi*. On approximating these species we soon find that they have all the principal characters of *Melanopsis*, and that they do not in reality differ from them, except by a notch in the right lip, which notch occupies in these species the place of the posterior gutter in the bucciniform *Melanopsides*. M. de Férussac clearly perceived the relation of these shells to the *Melanopsides*, and joined them to that group, leaving in the genus *Pirena* only those which we actually comprise among the *Melaniæ*. Thus dismembered, the genus *Pirena* should be expunged from the system.'

Geographical Distribution of the Genus.—M. Deshayes observes that the *Melanopsides* inhabit the fresh waters of the south of Europe, and particularly those in the neighbourhood of the Mediterranean; and that they show themselves abundantly in a fossil state in the greater part of the tertiary beds of Europe. He remarks that M. de Férussac has noticed that among the fossil species in our temperate countries there are some analogous to those which live in much warmer regions,—an interesting fact, from which he has been led to conclude that the lowering of the temperature had been a sufficient cause for the destruction of the races which once lived in the centre of France. M. Deshayes states that he had objected to M. de Férussac's drawing a conclusion so general from so confined a number of observations; and he thinks that, in order to establish a fact so important as that of change of temperature by the aid of observations on the mollusks, it would be necessary to find a great collection of facts, not only regarding the fresh-water mollusks, but also respecting those which inhabit the sea. He has, he says, collected these facts, and is thus able to estimate approximatively the temperature proper to each of the principal tertiary epochs.

Generic Character. — (*Melanopsis*, Fér., and *Pirena*, Lam.)—*Animal* with a proboscidiform muzzle and two contractile tentacula, which are conical, annulated, and each with an oculated peduncle at their external base; foot attached to the neck, very short, oval, angular on each side anteriorly; respiratory orifice in the gutter formed by the union of the mantle with the body. *Operculum* horny, subspiral.

Shell with an epidermis, elongated, fusiform or conicocylindrical, with a pointed summit; spire consisting of from six to fifteen whorls, the last often forming two-thirds of the shell; aperture oval, oblong; columella twisted, solid, callous, truncated at its base, separated from the external border by a sinus, the callosity prolonging itself on the convexity of the penultimate whorl, forming a gutter backwards; sometimes a sinus at the posterior part of the right lip.

a.

A single sinus at the external border of the aperture, separating it from the columella. (Genus *Melanopsis*, Lam.)

Example, *Melanopsis prærosa* (*Melanopsis lævigata*, Lam., *Melania buccinoidea*, Oliv., *Melanopsis buccinoidea*, Fér.).

β.

Two distinct sinuses at the external border of the aperture, one which separates it from the columella, the other situated near the union of this border with the penultimate whorl.

Melanopsis prærosa.

Example, *Melanopsis atra* (*Pirena terebralis*, Lam., *Strombus ater*, Linn.).

Locality.—Madagascar.

Melanopsis atra.

FOSSIL MELANOPSIDES.

Mr. G. B. Sowerby, who also includes the genera *Melanopsis* and *Pirena* under the first generic appellation, says, 'We are not aware that any of the *Melanopsides* are marine, for all the recent species occur either in rivers or lakes, and yet most of the fossil species are found in beds that are considered by geologists (in this country) to be of marine formation. We know not what degree of credit is to be given to the assertion of a celebrated author, "that the greater number of the genera of the Pectinibranchia might formerly have contained species peculiar to rivers and lakes as well as to the sea," but this we do know, that wherever the fossil *Melanopsides* are found, they are accompanied by many other species of genera that at present only live in fresh water; and therefore we think they ought to be considered as characteristic of the formation in which they occur.'

M. Deshayes, in his Tables, makes the number of living species of *Melanopsis* ten, of fossil species (tertiary) eleven, and notes *Melanopsides buccinoidea* (prærosa), *Dufourei*, *costata*, *nodosa*, *acicularis*, *incerta*, as species occurring both living and fossil (tertiary). He assigns as habitations to the latter, Asia, Spain, Greece, and Laybach. Of *Pirena* he makes the number of living species three, and of fossil (tertiary) two. In the last edition of Lamarck, M. Deshayes gives nine recent species, and of these he notices *Melanopsides costata*, *prærosa*, *nodosa*, *Dufourei*, and *acicularis ?* (*M. subulatus*, Sow., 'Min. Con.'), as occurring in a fossil state, observing that it is to be presumed that the species found fossil at Dax is to be distinguished from *M. Dufourei*, which occurs in a fossil state in the Isle of Rhodes. The number of species which are fossil only he makes seven. The number of recent species of *Pirenæ* he gives as four, but records none as fossil only. Under *Pirena terebralis* (*Melanopsis atra*) is a reference to Férussac's fossil *Melanopsides*, pl. 2, f. 7, &c.

Dr. Fitton records three species with a query, two under the names of *Melanopsis ? attenuata* and *M. ? tricarinata*, in the Weald-clay (Dorset), and Hastings sand (Sussex), and the third, without a name, in the Purbeck beds (Bucks).

MELANORRHŒA, a genus of the natural family of Terebinthaceæ, tribe Anacardiaceæ, so called from the brown fluid turning black upon exposure to the air, with which every part of the principal species abounds. This tree (*M. usitata*) is familiarly known as the Burmese varnish-tree, or theetsee, but was not described by botanists until discovered by Dr. Wallich, and figured in his splendid work 'Plantæ Asiaticæ Rariores,' t. 11 and 12. The tribe to which it belongs, abounds in plants yielding a blackish, acrid, and resinous juice used for varnishing and other such purposes, as the Marking Nut and the Japan Varnish-tree. This tree was first seen near Prome, and is found in different parts of Burma and along the coast from Tenasserim to Tavoy, extending from the latter in 14° to 25° N. lat., as Dr. Wallich has identified it with the *Kheu* or Varnish-tree of Munipur, a principality in Hindustan, bordering on the north-east frontier districts of Silhet and Tippera. It grows especially at Kubbu, an extensive valley elevated about 500 feet above the plains of Bengal, and 200 miles from the nearest sea-shore. There it attains its greatest size, some, and those not the largest, having clear stems of 42 feet to the first branch, with a circumference near the ground of 13 feet. It forms extensive forests, and is associated with the two staple timber-trees of continental India, Teak and Saul (*Tectona grandis* and *Shorea robusta*), especially the latter, and also with the gigantic Wood-oil tree, a species of *Dipterocarpus*. A second species of the genus, *M. glabra*, has been obtained by Dr. Wallich from Tavoy.

The Theetsee forms a large tree, with the habit of Semecarpus, and abounds in every part with a viscid ferruginous juice, which quickly becomes black by the contact of the atmosphere. Its leaves are large, coriaceous, simple, very entire, and deciduous. The panicles of flowers are axillary, oblong; those of the fruit simple and lax, with very large rufous and finally ferruginous involucres. It sheds its leaves in November, and continues naked until the month of May, during which period it produces its flowers and fruit. During the rainy season, which lasts for five months, from the middle of May until the end of October, it is in full foliage.

A branch with leaves.

At Prome a considerable quantity of varnish is extracted from this tree, but very little at Martaban. It is collected by inserting a pointed joint of a bamboo, which is closed at the other end, into wounds made in the trunk and principal boughs, which are removed after twenty-four or forty-eight hours, and their contents, which rarely exceed a quarter of an ounce, emptied into a basket made of bamboo and rattan previously varnished over. The collecting season lasts from January to April. In its pure state it is sold at Prome at about 2*s.* 6*d.* for about 3½ lbs. avoirdupois. (Wallich.) Mr. Smith, who was long resident at Silhet, and was acquainted with this substance in 1812, states that it is procurable in great quantities from Munipur, where it is used for paying river-craft and for varnishing vessels designed to contain liquids. The drug, he says, is conveyed to Silhet for sale by the merchants, who come down annually with horses and other objects of trade. In Burma, Dr. Wallich states that almost every article of household furniture intended to contain either solid or liquid food is lacquered by means of it The process consists in first coating the article with a layer of pounded calcined bones, after which the varnish is laid on thinly, either in its pure state or variously coloured. The most difficult part consists in the drying. It is also much employed in the process of gilding: the surface, being first besmeared with this varnish, has then the gold leaf immediately applied to it. Finally, the beautiful Pali writing of the Burmese on ivory, palm-leaves, or metal, is entirely done with this varnish in its native and pure state. Some difference of opinion exists as to the effects of this juice on the human frame. Dr. Wallich states that it possesses very little pungency, and is entirely without smell, and that both Mr. Swinton and himself have frequently exposed their hands to it without any serious injury, and that the natives never experience any injurious consequences from handling its juice; but he has known instances where it has produced extensive erysipelatous swellings attended with pain and fever. Sir D. Brewster, on the contrary, considers it a very dangerous drug to handle, one of his servants having been twice nearly killed by it. (Wallich, *Pl. As. Rar.*, i., p. 9, t. 11 and 12; and *Edinb. Journ. of Science*, viii., p. 96 and 100.)

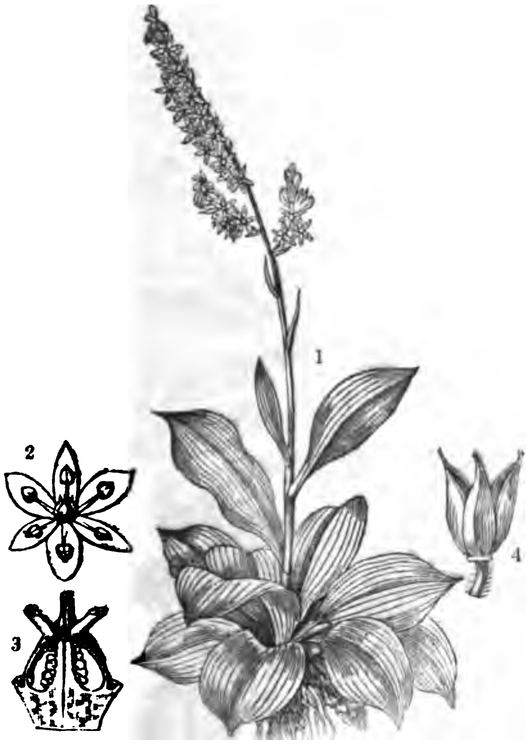
A naked fruit-bearing branch, with the large involucres.

MELANO'SIS is a malignant disease distinguished by the deposition of a peculiar soft morbid substance, of which the most prominent character is a deep brown or black colour. This substance may be deposited in separate masses, or infiltrated into the tissue of different parts of the body, or it may be effused from the blood in a fluid form into natural or morbidly formed cavities, or separated from it with the secretions. The deposition of melanotic matter generally takes place successively in numerous parts of the body, producing in all the injurious effects of compression and irritation, till it proves fatal either by its direct influence on some important organ or by the exhaustion which it gradually induces.

MELANTERITE, one of the mineralogical names for native sulphate of iron, or green vitriol. [IRON.]

MELANTHA'CEÆ are a natural order of poisonous Endogens, very nearly related to Liliaceæ, from which indeed they are only to be distinguished with certainty by their anthers being turned towards the sepals and petals, and by their styles or carpels being distinct or at least separable. The species vary exceedingly in their appearance, some being subterranean-stemmed herbaceous plants, producing a few flowers without their leaves just above the surface of the ground, as is the case with Colchicum; others forming a stem of considerable size with large leaves and numerous flowers. The consequence of this difference in their manner of growth is a considerable difference in the appearance of the species, but they are all found to conform to the characters of Liliaceæ, with the difference above explained. Iridaceæ, to which they bear a striking resemblance, because of the similarity between Colchicum and Crocus, are readily distinguished by their inferior fruit and triandrous flowers.

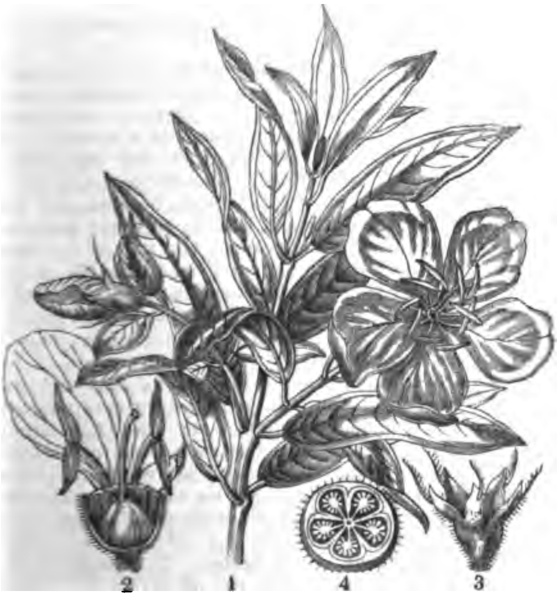
The most important species of this order are medical plants, viz.: Colchicum, or Meadow Saffron, which is employed as a remedy for gout and rheumatism; Veratrum album, whose acrid poisonous rhizoma is White Hellebore; Asagræa officinalis and Veratrum Sabadilla, both of which furnish the seeds called Cebadilla, now largely consumed in the preparation of Veratria; and a few North American plants of less moment.



1, A diminished figure of Veratrum Sabadilla; 2, an expanded flower; 3, a vertical section through part of the ovary; 4. a ripe seed-vessel.

MELASO'MA. [Shrikes.]

MELASTOMA'CEÆ, an extensive natural order of polypetalous Exogens, nearly related to Myrtaceæ. They have opposite ribbed leaves without any trace of dots; anthers prolonged into a beak, and having in the bud their points curved downwards, and inserted into sockets between the side of the ovary and that of the calyx. The ovary itself is many-celled and many-seeded, and connected with the calyx by vertical plates, which form the partitions between the sockets in which the anthers are confined. The species are extremely numerous in tropical countries, where they usually form bushes or small trees, and are scarcely known beyond the tropics, with the exception of some Rhexias, which straggle into North America. In Europe the order is unknown, unless in gardens, where many species are cultivated for the sake of their gay purple or white flowers. Some of the species bear berries, which are eatable, and stain the mouth a deep purple, whence their name Melastoma, or black-mouth; otherwise they are of no known use to man; not a trace of aromatic secretions being found in them, notwithstanding their near relationship to the aromatic Myrtaceæ.



1, A branch of Rhexia speciosa; 2, a vertical section of the flower; 3, a calyx; 4, a transverse section of the ovary.

MELAZZO. [Messina.]

MELCOMBE REGIS. [Weymouth.]

MELEA'GER. [Anthology.]

MELEAGRI'NA. [Avicula; Malleacea.]

MELEA'GRIS, the generic name for the Turkeys. [Turkey; Pavonidæ.]

MELES. [Badger.] N.B. Remains of a Fossil Badger, *Meles vulgaris fossilis* (*Ursus Meles*, Linn.), occur in the Bone-caves at Lunel and in Brabant.

MELI, GIOVANNI, born at Palermo, in Sicily, about 1740, studied medicine, in which science he took the degree of doctor, and afterwards became professor of chemistry in the university of his native city. But he is best known for his poetical compositions in the vernacular dialect of Sicily, which have earned him the name of the modern Theocritus. His pastoral poems are equal, if not superior, to any compositions of the same kind which Italy has ever produced. The luxuriant beauty and variety of Sicilian scenery inspired the author, who has faithfully portrayed in his eclogues the various appearances of the seasons in that fine climate, as well as the rich tints of the sky, the bold features of the mountains and coasts, the occupations of the shepherd and the husbandman; and he has enlivened his description with love-songs, which have become popular in Sicily, and have been set to music for the favourite native instrument, the guitar. One of his finest songs, beginning

> 'Sti silenzii, sta virdura,
> Sti muntagni, sti vallati,'

is given with an English translation, and other specimens of Meli's poetry, in an article 'On the Dialects and Literature of Southern Italy,' in No. IX. of the 'Foreign Quarterly Review,' November, 1829.

Meli has excelled particularly in his 'Ecloghe Pescatorie,' or fishermen's dialogues, in which he has borrowed the peculiar language and humour of that class of people. Unlike Guarini, Tasso, and other courtly writers of pastoral poetry, Meli makes his shepherds, husbandmen, and fishermen speak their own homely and unpretending language, which is nevertheless susceptible of poetical imagery. The seventh idyll is in a loftier key: it is the lamentation of Polemuni, a man persecuted by fate, forsaken by his fellow-creatures, a despairing outcast, who is represented as seated on a lonely cliff which overhangs the deep waves that have wasted the base of the rock, and have hollowed out caves in it, within which the surge roars in dark eddies. The halcyon has built its nest on the bare sides of the cliff, and its melancholy cry is heard far over the foaming billows. Polemuni was the son of a substantial fisherman, who himself followed for a time his father's trade, had a tight gallant boat, and store of nets and tackle: when on shore he was the gayest of the gay, and the favourite of the girls of his district. Misfortune came: a storm swamped his boat, his love proved faithless, and he found himself slighted and forsaken by all. Houseless and almost naked, he is sitting on the lone cliff with his poor reed in his hand, attempting to follow his wonted occupation, while he vents his grief in song. He remembers his former happy days, and contrasts them with his present bereavement; he rails at the faithlessness of pretended friends, he sees the gloom of despair closing all around him, until at last a fearful tempest breaks forth, the waves swell beyond all bounds, and, rising in one mountain billow, overflow the cliff, and hurl the devoted victim down into the abyss of the sea.

Meli's odes, which fill the second volume of his works, are mostly amorous, though not indecent. Some of them are exquisitely finished, such as 'Lu Labbru' (the lip), and 'Lu Pettu' (the breast). An Italian version of them has been published by Professor Rosini of Pisa, which however is inferior in gracefulness to the original.

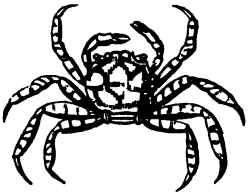
Meli has written a mock heroic poem, under the title of 'Don Chisciotti' (Don Quixote), in twelve cantos, which is a sort of imitation of Cervantes's celebrated novel. It abounds with beauties of detail, but the ludicrous prevails throughout, and often becomes mere farce. He also wrote a volume of fables, besides satires, some of which reflect on peculiar features of Sicilian life and manners, and other minor poems. His works were collected and published at Palermo, under his own revision, in 1814, in seven volumes. King Ferdinand granted the author a copyright for ten years, and gave him also a small pension, for which the author expresses his gratitude in one of his compositions. Meli died, not long after, at an advanced age.

The Sicilian dialect has assumed, under his pen, a delicacy of refinement which places it foremost among the written languages of Italy. Some remarks on the Sicilian and other Italian dialects, with specimens of their poetical capabilities, are given in an article 'On the Study of the Italian Language and Literature,' in No. X. of the 'Quarterly Journal of Education.'

ME'LIA (Zoology), M. Latreille's name for a genus of *Cancerians* (*Lybia* of M. Milne Edwards, who has since withdrawn the name in favour of M. Latreille's prior appellation). This form approximates to *Pilumnus*, but has also some analogy with *Grapsus*.

Example, *Melia tessellata*. Colour whitish with red lines; some hairs on the feet. Length about five lines.

Locality, Isle of France.



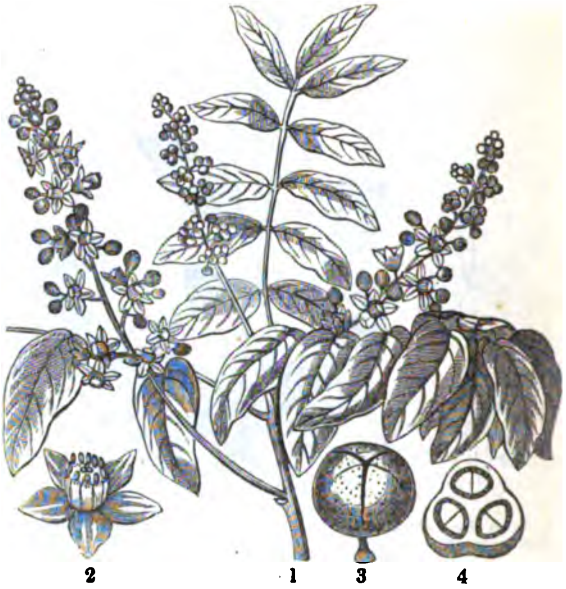
Melia tessellata.

ME'LIA, so called from Μελία, the Greek name of the common ash, which one species of the genus is thought to resemble in foliage. It belongs to the natural family *Meliaceæ*, to which it has given its name, and which is, like Melia, characterised by having the filaments of the anthers combined into a tube, with the anthers sessile within it, and opening inwards; the seeds without wings. The species are few in number, and chiefly Indian; one is naturalised in the South of Europe, and one is found in North America; of these, *Melia Azadirachta*, the *Neem tree* or *Margosa tree* of the Peninsula of India, has been separated into a distinct genus on account chiefly of its ternary, not quinary, structure of the parts of the pistil, and its single-seeded fruit. This has been named Azadirachta from the Persian (*Azad-i-durukht*, the excellent tree). Its bark is bitter, and considered a valuable tonic. The fleshy part of the fruit (like that of the olive) yields a fixed oil, which is bitter, and considered anthelmintic and stimulant. The leaves are universally used in India for poultices, and both the flowers and seeds are irritating and stimulant. According to Dr. Ainslie a kind of toddy is procured by fermenting the sap of healthy young margosa-trees.

Melia Azedarak, sometimes called Persian lilac, Pride of India, and Common Bead-tree (*Hill Margosa*, by Dr. Ainslie), is said by Dr. Roxburgh to be a native of China: it is also a native of the North of India. It is much cultivated in the southern parts of the United States of America. It is called *dek* in the north provinces of India, and may be confounded with another species under the name Azedarach by Avicenna. When in flower it has some resemblance to the lilac, and its flowers are very fragrant. The berries are sweetish, and, though said to be poisonous, are eaten by children in the United States without inconvenience, but are reputed to be a powerful vermifuge. The bark of the root in its recent state has a bitter nauseous taste, yielding its virtues to boiling water, and is cathartic and emetic, and considered in the United States an efficient anthelmintic, and also useful in infantile remittents.

Melia Bukayun is distinguished by Dr. Royle from the West Indian *M. sempervirens* of Schwarz, with which it was united by Dr. Roxburgh. This tree appears to be a native of Persia, though common throughout India; it is called by the Arabs *ban*, and by the Persians *azad-i-durukht*. It is probable therefore that this may be one of the trees included under the *Azedarach* of Avicenna. The seeds are bitter, and considered laxative and anthelmintic, as is also the bark. *M. tomentosa* is a species found in the island of Penang, and *M. composita*, in which are included both *M. superba* and *M. robusta*, is a species found in Malabar and Mysore.

MELIA'CEÆ, a natural order of polypetalous Exogens, distinguished from all others by their stamens being united into a complete cup, within, and often below, the rim of which the anthers are inserted. It consists of trees or shrubs with alternate, often compound, leaves, inhabiting all countries within the tropics, but very rare in colder climates; the Melia Azedarach, or Bead-tree, a Syrian plant, now naturalised in the south of Europe, forming the principal exception. In general the species are bitter and astringent, but they are sometimes dangerously poisonous, acting violently as emetics and purgatives. Notwithstanding this, the pulpy fruit of the Lanseh is esteemed in the Indian Archipelago, and that of Milnea edulis is eaten in Silhet, where it seems to resemble the Litchi and Longan of China.



1. Trichilia spondioides; 2, an expanded flower; 3, a ripe fruit; 4, a transverse section of the same.

MELICERTA. (Zoology.) [PULMOGRADA.] *Melicerta* and *Melicertus* are also used to designate genera of Crustaceans. [SALICOQUES.]

MELILOT, the Melilotus or Honey-lotus of botanists, so called from its smell, is a tall yellow-flowered annual. It has loose racemes of small flowers formed like those of Clover, of which it was once regarded as a species. The Melilotus officinalis, or *Trifolium Melilotus officinalis* of Linnæus, has long roots and a branching stem two or three feet high. It grows wild in woods, hedges, and neglected fields. When cultivated in a dry soil and made into hay, it has a powerful aromatic smell, and mixed in a small proportion with meadow-hay, gives it an agreeable flavour. This plant is used in making the Swiss cheese called Schabzieger. It is ground in a mill, and mixed with the curd into a kind of paste, which is put into conical moulds and there dried. [CHEESE.]

The white or Siberian melilot rises several feet high, with a strong branching stem. It was strongly recommended by Thouin in a memoir addressed to the Agricultural Society of Paris in 1788, and has been tried occasionally with some success by various agriculturists, without however having been so generally adopted for cultivation as might have been expected from the high encomiums passed upon it. It will bear four cuttings in the year, and produces a very great quantity of green fodder. It should be cut before the stems become woody, and thus it will continue several years in the ground, although it is naturally only biennial. A light and moist soil suits this plant best.

MELI'NA, Schumacher's name for the genus *Perna* of authors. [MALLEACEA, vol. xiv., p. 335.]

MELINDA, or, as it is written in Captain Owen's 'Voyages,' Maleenda, is a port situated on the eastern shores of Africa, in about 3° S. lat. and 40° E. long. It derives its chief title to notice from the first voyage of Vasco de Gama, who sailed along the eastern coast of Africa as far north as this place, where he got a pilot from the king to conduct his vessel to India. Gama describes the town as situated on a plain near the sea-shore, surrounded with gardens, and consisting of houses neatly built of hewn stone, with handsome rooms and painted ceilings. It was at that time evidently a place of some importance. In 1605 the Portuguese, under Don Francisco d'Almeyda, took possession of this place, and, about twenty-three years later, they occupied Mombas also; and as the harbour of the latter is much superior, Melinda began to decline. It is not known when and in what manner it was taken from the Portuguese; but it seems that in the beginning of the last century it was in possession of the Arabs. Nor is it known in what manner it was lost by the Arabs; but when Captain Vidal visited the place in 1824, he found that the territories of the antient kingdom of Melinda were totally occupied by the Galla, a savage nation, which has carried its conquests from the southern declivity of the Abyssinian Alps as far south as Melinda. On the site of the town Captain Vidal found nothing but ruins, and he thinks that it has been entirely destroyed by the Galla in their wars against the Arabs, who possessed and still possess most of the ports along this coast. (Owen's *Narrative of Voyages to explore the Shores of Africa, &c.*)

MELI'PHAGA. [MELIPHAGIDÆ.]

MELIPHA'GIDÆ (Honey-suckers), a family of Tenuirostral birds. [TENUIROSTRES.]

Mr. Vigors, in his paper 'On the Natural Affinities that connect the Orders and Families of Birds' (*Linn. Trans.*, vol. xv.), thus generally refers to the *Meliphagidæ*. 'That extraordinary group, the existence of the much more considerable portion of which was unknown to the Swedish naturalist, for which there was consequently no place in his system, occupies a prominent and important situation in the ornithological department of nature. Chiefly confined to Australasia, where they abound in every variety of form, and in an apparently inexhaustible multitude of species, they find a sufficient and never-failing support in the luxuriant vegetation of that country. There the fields are never without blossom, and some different species of plants, particularly the species of *Eucalyptus*, afford a constant succession of that food which is suited to the tubular and brush-like structure of the tongue in these birds. Their numbers and variety seem in consequence to be almost unlimited. Like the *Marsupial Animals* of the same country, a group to all appearance equally anomalous, which contains within its own circle representatives of all the other groups of the *Mammalia*, this division of birds comprises every form which is observable among the families of the *Insessores*. From the powerfully constructed and strong-billed *Corvidæ* and *Orioli*, down to the slender *Merops* and the delicately shaped *Cinnyris*, every *Insessorial* group has its analogous type in this family. Their approach to the *Scansorial* tribe is strongly conspicuous. The hind toe of the greater portion of the group is long, powerful, and apparently formed for climbing, as Mr. Lewin has pointed out in his generic description of *Meliphaga* (*Birds of New Holland*). In this point of view they seem in Australasia to supply the place of the genuine *Pici*; no species of *Woodpecker*, as far as I have been able to ascertain, having hitherto been found in that country. This strong affinity to the *Scansores* is preserved by their forming one of the extremes of the present circle, which comes in contact with that tribe. I have indeed some doubts whether, in consequence of this affinity, they may not be even still more intimately united to that group, and form the immediate point of junction of the present tribe with the *Certhiadæ*. I have consequently entered them and their conterminous families into the tabular series with a mark of uncertainty. Time, with more accurate examination of their manners and internal economy, will clear away, it is to be hoped, these and similar points of doubt respecting groups so interesting. The following facts however are, I think, sufficiently decided, namely, that the three groups, the *Promeropidæ*, *Meliphagidæ*, and *Nectariniadæ*, constitute distinct and prominent divisions in the tribe, of which, by that generally stronger and more perfect conformation which distinguishes them from the more typical families, they form the aberrant groups; that they are united among themselves by general affinities; and that they connect the tribe on each side with the conterminous tribes that approach it, that is, with the *Scansores* at the one extreme, and with the *Fissirostres*, where we first entered on the order, at the other.'

Mr. Swainson (*Classification of Birds*, vol. i.), after observing that he never had the opportunity of examining the tongue of the African Sun-birds (*Cinnyridæ*), states that by a fortunate chance he had discovered that the type among the Australian Honey-suckers (*Meliphagidæ*) which represents the *Trochilidæ*, has the tongue constructed precisely the same as in those birds. 'This brings us,' continues Mr. Swainson, 'to the second description of extensible, or rather of suctorial tongues, and which is of a form almost peculiar to the honey-suckers of Australia and its islands. In these birds the tongue is not nearly so extensible as in the *Trochilidæ*, being seldom more than half as long again as the bill; nor are the bones of the *os hyoides* carried back upon the skull, as in the woodpeckers and humming-birds. Nevertheless the structure appears especially adapted for suction; the form of the lower part is the same as in ordinary birds, but the end is composed of a great number of delicate fibres or filaments exactly resembling a painter's brush. Lewin, who drew and described these birds in their native region, has figured the tongue of the warty-faced honeysucker (*Meliphaga Phrygia*) (*Birds of New Holland*, pl. 4), and describes the bird as sometimes to be seen 'in great numbers, constantly flying from tree to tree (particularly the blue gum), feeding among the blossoms by extracting the honey with their long tongues from every flower as they passed.' What will appear still more extraordinary to the scientific naturalist is the fact that some birds of this meliphagous group are actually woodpeckers, and yet retain the typical structure of the tongue of their own natural family. The same observer, speaking of the blue-faced honey-sucker, describes it as being 'fond of picking transverse holes in the bark, between which and the wood it inserts its long tongue in search of small insects, which it draws out with great dexterity.' Now, as Lewin describes this bird as a honey-sucker, we must conclude, until facts prove otherwise, that it has the filamentous tongue of the honey-suckers, but that it is used for the purpose, not of spearing insects, but of catching them by means of the glutinous matter on the filaments, a mode of capturing its prey by no means improbable, provided the insects are of small size. It must not be supposed however that the food of the *Meliphagidæ*, several of which are as large as a thrush, and three or four much larger, is restricted, any more than that of the humming-birds, simply to the nectar of flowers. They indeed feed upon the honey, but, as Lewin declares, combined with the numerous small insects lodged in most of the flowers, which they extract in a dexterous manner with their tongues, peculiarly formed for that purpose. It is clear however, when we come to reflect upon the matter, that birds which are attached to the secretions of particular trees, as are many of the *Meliphagidæ*, can only enjoy their favourite food for a comparatively short season, that is, while the tree or plant is in blossom. They must therefore either feed at other times upon small insects or upon fruit. The two first habits we have shown them to possess; and the last, that of devouring fruits also, is exemplified in the yellow-eared honey-sucker of Lewin, who remarks that 'in the winter season these birds have been seen feeding on the sweet berry of the white cedar in great numbers.'

Mr. Swainson makes the *Meliphagidæ* the first family of the tribe *Tenuirostres*; and he thus characterizes these *Honey-suckers*:—

Bill the strongest in this tribe (*Tenuirostres*), having the mandible distinctly notched. *Feet* large, strong; the hinder toe much developed. *Tongue* extensible, generally ending in a bunch of filaments.

The following genera and subgenera are placed by this author under the Meliphagidæ.

Genera. Meliphaga. (Lewin.)

Bill moderate or short, weak; the under mandible not thickened. Lateral *toes* unequal; the inner the shortest. *Tail* rounded or graduated. Tongue bifid; each division ending in numerous filaments. (Sw.)

Subgenera:—*Meliphaga.* (Example, *Meliphaga barbata.*[*] 'Ois. Dor.,' pl. 57, and *M. Australasiana.*) *Ptilotis* (Sw.), leading to *Glyciphila.* (Example, 'Lew. Bds.,' pl. 5.) *Zanthomiza* (Sw.). (Example, *Zanthomiza Phrygia,* Shaw. 'Zool. of N. H.,' pl. 4, the tenuirostral type.) *Anthochæra*[†] (Horsfield and Vigors), the rasorial type. (Example, *Anthochæra carunculata.* White's 'Voyage,' pl. 6.)

Glyciphila. (Sw.)

Habit of *Meliphaga.* *Bill* either shorter or slightly longer than the head; the notch in the upper mandible far removed from the tip. *Tongue* rather short, terminated by numerous filaments. The third and three following *quills* longest and nearly equal. Lateral *toes* equal. *Tail* even. (Sw.)

(Example, *G. fulvifrons.* Lewin, *N. H. Birds,* pl. 22.)

Anthomiza.

Habit of *Meliphaga.* *Bill* rather short. *Tongue ?* *Wings* much rounded; all the quills more or less terminating in points. *Tail* forked. Lateral *toes* equal. The fissirostral type. (Sw.)

Example, *A. cæruloc ephala.* ('Mus. Carl.,' i., pl. 5.)

Leptoglossus. (Sw.)

Habit of *Cinnyris.* *Bill* remarkably long, slender, and curved. *Tongue* retractile, long, bifurcated, as in *Trochilus.* Lateral *toes* unequal. *Tail* nearly even. The tenuirostral type. (Sw.)

Example, *L. cucullatus.* ('Ois. Dor.,' pl. 60.)

Ptiloturus. (Sw.)

Bill much lengthened, slightly curved; the upper mandible dilated, and folding over the base of the under; the margins of both inflected towards their tips. *Nostrils* lengthened; the aperture linear. *Wings* moderate, rounded; the first quill spurious; the four next very broad at their base, and emarginate at the inner web. Lateral *claws* unequal. *Tail* very long, graduated; the middle feathers lax and narrow. The rasorial type. (Sw.)

Example, *P. Capensis.* (Le Vaill., 'Af.,' vi., pl. 287, 288.)

Manorhina. (Vieill.)

Bill short, robust; the under mandible thickened: culmen arched, and much elevated from the base, considerably compressed its whole length; commissure curved; upper mandible notched near the tip.

Example, *M. viridis.* ('Ill. of Orn.,' pl. 78.)

Subgenera:—*Gymophrys* (Gymnophrys?) (Sw.). Example, *G. torquatus.* (Lewin, 'N. H. Birds,' pl. 24.) *Eidopsarus* (Sw.). (Example, *E. bicinctus.*)

Entomiza. (Sw.)

Bill strong, moderate; culmen much elevated. *Nostrils* large, naked; the aperture large, oval, and placed in the middle of the bill, at the termination of the naked membrane; culmen obtuse, convex. Frontal feathers small, compact. Hind *toe* and *claw* very large, and as long as the middle toe.

Example, *E. cyanotis.* (Lewin, 'N. H. Birds,' pl. 4.)

Philedon. (Cuv.)

Culmen sharp, carinated. Head and face naked. *Front* with an elevated protuberance. Hind *toe* and *claw* shorter than the middle.

Example, *P. corniculatus.* (White's 'Voy.,' pl. 16.)

Myzomela. (Horsf. and Vigors.)

Bill with both mandibles very considerably curved; the sides broad and much compressed. *Tongue* and *nostrils* as in *Meliphaga.* *Wings* lengthened; the third, fourth, and fifth quills equal. *Tail* short, even. Middle *toe* much longer than the hinder; lateral toes equal.

Example, *M. cardinalis.* (Lewin, 'N. H. Birds,' pl. 19.) Mr. Swainson inquires whether this can be the fifth subgenus of *Meliphaga?* or an aberrant *Melithreptes?*

Mr. Vigors and Dr. Horsfield, in their 'Description of the Australian Birds in the Collection of the Linnean Society,' after remarking on the then (1826) imperfect state of knowledge with regard to this group, and the constant influx of new species from New Holland and the Australian Islands, observe that the then known species exhibited five prominent modifications of form, according to the variation chiefly of the characters of the bill and tail, and that they wished to consider these types of form as sections only of the group which they name provisionally the genus *Meliphaga.* When the species should become more known, they express their opinions that the sections there marked out might justly be considered genera, and the higher group be denominated *Meliphagina.* 'When this subdivision takes place,' say our authors in conclusion, 'the section which stands first in our text may be considered the true *Meliphiga.*' The *Meliphaga Novæ Hollandiæ* will form the type. It may be thus characterised:—*Bill* rather slender, subelongate; the *culmen* arched, subcultrated at the base; *nostrils* longitudinal, linear, very narrow, covered above by a membrane, and exceeding the middle of the bill in length. *Tongue* furnished at the apex with many bristles. *Wings* moderate, somewhat rounded; first *quill* short; second, third, and fourth (which last is longest) gradually longer; the third and fifth, the second and sixth, equal: external beards (pogoniæ) of the third to the seventh inclusive widest in the middle. *Tail* subelongate, rounded. *Feet* rather strong; *hallux* subelongate, strong; acrotarses scutellated.

Example, *Meliphaga Novæ Hollandiæ.*

Mr. Caley says, 'This bird is most frequently met with in the trees growing in scrubs, where the different species of *Banksia* are found, the flowers of which, I have reason to think, afford it a sustenance during winter. In the summer I have shot it when sucking the flowers of *Leptospermum flavescens.* In the scrubs about Paramatta it is very common.'

Meliphaga Novæ Hollandiæ.

The following are the sections given by Mr. Vigors and Dr. Horsfield.

*

Tail rounded, bill rather long and slender.
Mel. Novæ Hollandiæ, Australasiana, and *melanops.*

* *

Tail rounded; bill rather shorter, and rather strong.
Mel. auricomis, chrysotis, and *leucotis.*

* * *

Tail equal, bill rather short, strong. (*Melithreptus* of Vieillot?)
Mel. chrysops, lunulata, indistincta, and *brevirostris.*

* * * *

Tail equal, bill rather short and slendor.
Mel. cardinalis.

* * * * *

Tail equal, bill rather slender and longer.
Mel. tenuirostris, fulvifrons.

The other genera recorded by Mr. Vigors and Dr. Horsfield are *Myzantha* (V. and H.), *Anthochæra, Tropidorhynchus* (V. and H.), *Sericulus* (Sw.), *Mimeta* (King), *Psophodes* (V. and H.), and *Pomatorhinus* (Horsf.).

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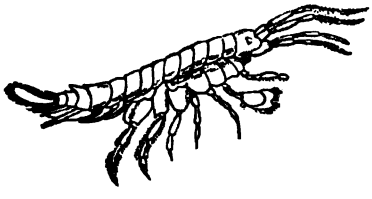
[*] Certhia Novæ Hollandiæ of old authors; and of which Mr. Swainson is led to believe M. Sericea is only a sexual difference.

[†] Mr. Swainson has the following note to *Anthochæra:*—'I hardly think it advisable to discriminate these subordinate types by subgeneric names; but as that of *Anthochæra* has been already done, I have designated what appears to me to be three of the others; the fifth I am unacquainted with.'

ME'LITA, Dr. Leach's name for a genus of Amphipodous crustaceans generally found beneath stones on the seashores.

Example, *Melita palmata, Cancer palmatus,* Montagu. Colour blackish; antennæ and feet annulated with pale greyish.



Melita palmata, enlarged.

MELITÆA. This term is employed by Peron and Blainville for a group of Medusidæ, by Lamarck and Lamouroux for Polypiaria, analogous to Isis and Gorgonia. [Polypiaria Corticifera.]

MELITHREPTUS. [Meliphagidæ; Soui-Manga.]

ME'LITO, SAINT, was bishop of the church at Sardis in Lydia, in the second century. He is supposed by some to have been the angel of the church at Sardis, to whom St. John addressed the epistle in *Rev.*, iii. 1-6; but this conjecture is not supported by any antient writer, and it is also improbable on account of the length it assigns to the episcopate of Melito.

By Polycrates, bishop of Ephesus, in the second century, he is called 'Melito the Eunuch,' probably because he lived in celibacy, in order the better to discharge the duties of his office: the same writer adds, that he was guided in all his conduct by the influence of the Holy Spirit. (Euseb., *Hist. Ecc.*, v. 24.) Tertullian, as quoted by Jerome, praises his eloquent and oratorical genius, and says that he was thought by many to be a prophet. Yet he has been charged with heterodoxy; but upon no better ground than the titles, or perhaps a misunderstanding of the titles, of one or two of his works.

During the persecution of the Christians in the reign of Marcus Antoninus, Melito wrote an apology for them. It is addressed to the emperor, but we are not told whether it ever reached his hands. Eusebius, who has preserved an extract from this apology, places it in A.D. 170; Tillemont assigns to it the date of 175; Basnage and Lardner, that of 177.

Melito died and was buried at Sardis before the end of the second century.

Eusebius and Jerome have given lists of Melito's works, of which the most important is a 'Catalogue of all the Books of the Old Testament which are universally acknowledged.' This is the earliest catalogue of the O. T. Scriptures found in any Christian writer. It was obtained, as Melito himself informs us, in Palestine, whither he had travelled on purpose to procure it. It contains all the books at present received as canonical, except *Nehemiah* and *Esther*, of which the former is probably included under 'Esdras' (Ezra). The 'Proverbs of Solomon' are also called 'Wisdom.'

Melito wrote a book on Easter, a fragment of which is preserved by Eusebius, on the occasion of a controversy which arose in Laodicea concerning the time of keeping that feast.

All his other works are lost; but from the title of one of them, 'Concerning the Devil and the Revelation of John,' Lardner thinks it probable that he received the Apocalypse as canonical, and ascribed it to the Apostle John.

(Eusebius, *Hist. Ecc.*, iv. 26; Hieronymus, *De Vir. Illust.;* Du Pin's *Ecc. Hist.*, cent. 2; Cave's *Lives of the Fathers*, vol. i., p. 179; Lardner's *Credibility*, part ii., c. 15.)

MELIZO'PHILUS, Dr. Leach's name for a genus of Insessorial birds. [Merulidæ; Sylviadæ.]

MELLILITE, a mineral which occurs crystallized. Primary form a square prism. Scratches apatite. Colour reddish or greyish yellow. Lustre vitreous. Translucent. Specific gravity 3·24 to 3·28.

Fuses by the blow-pipe into a greenish glass; the powder gelatinizes in nitric acid. Found at Tivoli and Capo di Bove near Rome.

Analysis by Carpi:—Silica, 38·; Lime, 19·6; Magnesia, 19·4; Alumina, 2·9; oxide of Iron, 12·1; oxide of Manganese, 2·; oxide of Titanium, 4·

MELLITE. *Honey-Stone.* Occurs nodular, granular, and crystallized. Primary form a square prism. Fracture conchoidal. Hardness 2·0 to 2·5. Colour honey-yellow, orange-yellow. Streak white. Lustre resinous, vitreous. Translucent; transparent. Specific gravity 1·597. In the flame of a candle it becomes white and opaque. When more strongly heated it becomes black and falls to powder.

Found at Artern in Thuringia, in bituminous wood.

Analysis by Klaproth:—Mellitic acid, 46; Alumina, 16; Water, 38.

Mellitic Acid was discovered by Klaproth in mellite, which is a mellitate of alumina; this, when digested in carbonate of ammonia or potash, is decomposed, and the alkaline mellitate formed is to be decomposed by acetate of lead, by which mellitate of lead is precipitated, and this treated with hydrosulphuric acid is decomposed, and sulphuret of lead is precipitated, while mellitic acid remains in solution.

This acid has a sour bitter taste, is very soluble in water, and also in alcohol, and it crystallizes in colourless needle-form crystals. Neither nitric nor hydrochloric acid produces any effect upon it, but it undergoes some change when heated with alcohol.

According to Liebig and Pelouze this acid consists of—

One equivalent of hydrogen	1·
Four equivalents of carbon	24·
Four equivalents of oxygen	32·
Equivalent	57·

MELLI'VORA. [Ratel.]

MELLON, a compound of azote and carbon, discovered by Liebig, and which, like cyanogen, consisting of the same elements in different proportions, is considered as a compound radical. When dry sulphocyanogen is heated to redness in a retort, it is decomposed; there are obtained a considerable quantity of sulphur and sulphuret of carbon, and there remains a substance of a lemon-yellow colour, which is mellon.

The properties of this substance are, that it has a yellow colour; is insoluble in water, alcohol, dilute hydrochloric or sulphuric acids; but it is dissolved and decomposed by nitric acid and the solutions of potash and soda; and with the last mentioned, ammonia is evolved. Mellon decomposes the iodide, bromide, and sulphocyanide of potassium, when fused with them, iodine, bromine, and sulphocyanogen being evolved. When heated with potassium it forms mellonuret of potassium, which, being dissolved in boiling water, and nitric, hydrochloric, or sulphuricacid being added to the solution, hydromellonic cid is formed, which is precipitated, in the state of hydrate, as a dirty white gelatinous substance, which becomes yellow on drying: it is slightly soluble in water, has a weak acid reaction, and is not decomposed by hydrochloric or nitric acid.

Mellon is composed of—

Six equivalents of carbon	36
Four equivalents of azote	56
Equivalent	92

and this, with one equivalent of hydrogen = 1, forms 1 equivalent of hydromellonic acid = 93.

MELMOTH, WILLIAM, bencher of Lincoln's Inn, born in 1666, died in 1743. The work by which his name is known is 'The great Importance of a Religious Life,' a book of which the author was not known till after his death, and which was ascribed by Walpole to the first earl of Egmont. Nichols mentions, in his 'Literary Anecdotes,' that since the death of Melmoth to his time above 100,000 copies of this work had been sold.

MELMOTH, WILLIAM, son of the above, born in 1710, died in 1799, was appointed commissioner of bankrupts by Sir Eardley Wilmot. He was twice married, first to the daughter of the well-known Dr. King, secondly to Mrs. Ogle. He was an accomplished scholar, though not educated at either University, and his translations of the Epistles of Pliny, those of Cicero to his friends, and the treatises on Old Age and Friendship, are generally allowed to be the best in the English language. These translations are made in an easy and pleasing but rather diffuse style. He was the writer of 'FitzOsborne's Letters, containing dissertations both moral and literary.' He wrote a treatise on the Christian Religion, and Memoirs of his father. Both Birch and Warton, the former in his life of Tillotson, the latter in a note on Pope's works, mention Melmoth's translations with the highest praise. He also wrote a poem on Active and Retired Life, in Dodsley's 'Collection,' which is characterised by smooth versification and sound morality. Chalmers's *Biographical Dictionary;* Nichols's *Literary Anecdotes.*)

MELO (Malacology), Broderip's name for a subgenus of *Voluta*. [VOLUTA.]

MELOBE'SIA, a genus of Polypiaria, proposed by Lamouroux. The small porous plates of this stony substance are attached to the leaves of marine plants.

MELOCRI'NUS, a genus of Crinoidea, employed by Goldfuss in his 'Petrifacta Europæ' for some fossils of the transition limestone. It has not yet been mentioned as British. [ENCRINITE.]

MELODRAMA. [ENGLISH DRAMA, p. 409.]

MELODY (μελῳδία), in music, is Air or Song—a succession of single diatonic sounds, in measured time.

Melody and Air are synonymous terms in modern music, whatever their difference may have been in that of antient Greece; we therefore shall add but little to what we have already said on the subject under the word AIR, to which the reader is particularly referred.

The question—which exercises most influence over the mind, melody or harmony? has often been agitated, Rousseau taking the lead, who certainly has treated it eloquently, but inconsistently, acting the part of advocate on both sides, and on each refutes himself. He seems to admit, and thus to agree with Metastasio, that music is a kind of language, but overlooks the fact, that, like every other language, it can only affect those who understand it by either studying its principles, as in the case of the few, or by frequently hearing, and thus becoming empirically acquainted with it, as in the case of the many. He does not seem to have considered that simple music, that is, melody, like simple language, makes most impression on the unlearned majority, because easily understood; while complex music, namely, harmony, like high-wrought rhetoric, excites more pleasure in the minds of the instructed minority, who enter into its combinations and perceive all its relations. Melody and harmony may be said to generate each other, the one being a selection of single sounds from a harmonic source, the other a union of two or more melodies simultaneously heard. Thus both are closely connected; and Dr. Burney has remarked, that after melody and harmony have been heard together, nothing can compensate for their separation.

ME'LOE VESICATO'RIUS. [CANTHARIS.]

MELOGALLIC ACID. The reference to this article under GALLIC ACID is a typographical error. It should have been Metagallic Acid. [METAGALLIC ACID.]

MELOLO'NTHIDÆ, a family of Coleopterous insects of the section *Lamellicornes*, and subsection *Phyllophagi*. This family, of which the common cockchafer (*Melolontha vulgaris*) is an example, may be thus characterised: labrum transverse, and in most instances deeply cleft in the middle; mentum as long as broad, or with the length exceeding the breadth; sometimes nearly heart-shaped, and sometimes square; the anterior margin either straight or notched in the middle, but without any projecting process or tooth; mandibles strong and horny, and having at most but a single membranous appendage, which is situated in a concavity on the inner margin; the apex truncated, and having two or three denticulations; maxillæ generally horny, and armed in most cases with five or six denticulations; antennæ usually with more than three lamellated joints; all the tarsi terminated by two claws, which are usually furnished with a spine on the under side near the base, and sometimes divided at the apex.

The family Melolonthidæ consists of three genera: *Melolontha, Rhizotrogus*, and *Serica*. and some subgenera of minor importance. Species of this family are found in all parts of the world. In the genus Melolontha the antennæ are ten-jointed; the terminal five, six, or seven joints are lamellated, and form a large fan-like appendage; in the females the lamellated joints form a smaller club than in the males, owing to their smaller size, and also to a decrease in their number, there being six, five, or four; the labrum is deeply cleft on its lower margin; the claws of the tarsi are furnished with a spine on the under side near the base; the abdomen in the male sex often terminates in a horny pointed process.

Two species of this genus are found in England, the common cockchafer (*Melolontha vulgaris*, Fab.), of which there is a figure in the article COLEOPTERA, and the *Melolontha fullo*, a large species nearly an inch and a half in length, and which is of a blackish-brown colour, with irregular white markings. This beautiful insect is common in some parts of the Continent, but rare in this country, and has been found chiefly in the neighbourhood of Deal.

The genus *Rhizotrogus* differs from Melolontha chiefly in having but three lamellated joints to the antennæ, which are nine-jointed.

Rhizotrogus solstitialis, an insect which makes its appearance in the month of June, and often occurs in great abundance in some parts of this country: it very closely resembles the common cockchafer, but is of a smaller size, narrower form, and paler colour.

In the species of Rhizotrogus, as in Melolontha, the claws of the tarsi are furnished with a spine on the under side at their base; but in the next genus, *Serica*, the claws of all the tarsi are divided at the apex; the body is of a convex, ovate form, generally has a silk-like appearance, and changes in hue according with a change in the direction of the light.

Serica brunnea, a common insect in England, as well as in various parts of the Continent, is about three-eighths of an inch in length, and of a uniform pale-brown colour: the elytra are rather deeply striated, and, as well as the thorax, thickly punctured.

Serica Ruricola, another British species of the present genus, is of a black colour; the elytra are reddish-brown, and have the suture and outer margin black. This is a smaller insect than the last (being about three-twelfths of an inch in length), and of a shorter and more rounded form: it also differs in having the palpi obtusely terminated, and not acute, as in *S. brunnea*. This difference in the form of the palpi is considered by many authors of sufficient importance to separate the two insects generically, and by these authors the *S. Ruricola* is placed in the genus *Omaloplia*.

The genus *Serica* is found in all the quarters of the globe; and in M. Dejean's 'Catalogue des Coléoptères' there are sixty species enumerated.

In addition to the foregoing three groups, which appear to constitute the more typical *Melolonthidæ*, Latreille places in this family the following six genera:—

1. *Dasyus* (Lepel. et Serv.). This genus contains but few species, and appears to be confined to Brazil: they have the claws of the two anterior tarsi bifid, and those of the other tarsi entire.

2. *Macrodactylus* (Latreille). In this genus all the joints of the tarsi are alike in both sexes, and all the claws are bifid. The legs are very long, and the body is of an elongated and slender form: the thorax is narrower than the elytra, and is contracted both anteriorly and posteriorly.

Macrodactylus subspinosus, a common insect in some parts of North America, is about three-eighths of an inch in length; the head and thorax are black, but covered with minute yellow scales; the elytra are of a yellowish-brown colour, also covered with yellow scales: the under parts of the body are nearly white, owing to the dense clothing of scales with which they are furnished; the legs are deep-yellow, and the tarsi are black. About seven other species of the present genus are known, nearly all of which inhabit South America.

3. *Diphucephala* (Dejean). The species of this genus are confined to Australia. [DIPHUCEPHALA.]

4. *Plectris* (Lepel. et Serv.). The claws of the intermediate tarsi unequal in size; the larger of these two pairs of claws are bifid, and all the claws of the remaining tarsi are also bifid. Twelve species are known: they inhabit Brazil.

5. *Ceraspis* (Lepel. et Serv.). The species of this genus, all of which inhabit Brazil, may be distinguished by having two small notches near the middle of the hinder margin of the thorax; the space between the notches is received into a notch in the scutellum. The antennæ are 10-jointed: the claws of all the tarsi, with the exception of the anterior pair, are unequal; the larger claw of the intermediate tarsi is entire in the male sex, the other claws are bifid. In the females all the claws are bifid. The body is covered with minute scales, and is of an elongated form.

6. *Areoda* (Leach). Antennæ 10-jointed; sternum produced anteriorly; the claws of the tarsi unequal in the male sex, and equal in the females. The larger claws of the males

are bifid. The basal joints of the tarsi are short, and the terminal joint is very large, and grooved beneath. These insects are of large size, and adorned with brilliant colours. In the form of the sternum, and structure of the tarsi and claws, they depart from the true Melolonthidæ, and evince an affinity to the *Rutelidæ* and *Anoplognathi*, where, as in the present genus, the species have the power of folding the claws backwards against the under side of the terminal joint of the tarsus (like the closing of the blade of a penknife); and when thus closed, the point of the larger claws is lodged between the penultimate and antepenultimate joints of the tarsi.

Areoda lanigera, a common species in some parts of North America, is rather more than three-fourths of an inch in length, of an oval form and pale yellow colour, with green reflections: the under parts of the body are of a dark green colour, and thickly furnished with white hairs.

There are six other known species of this genus: one is found in Guadaloupe, and the remainder inhabit South America.

MELON (*Cúcumis Melo*) is an herbaceous, succulent, climbing or trailing annual, cultivated for its fruit in hot Eastern countries from time immemorial. In regions where most cooling vegetables disappear on the approach of great summer heat and drought, the melon, together with the water-melon, become essential substitutes. The antiquity of the cultivation of melons being so remote, and their dispersion over large portions of Asia and Africa so extensive, their indigenous locality cannot be traced at the present day. The originals of the varieties called Cantaloup, from a place of that name about 15 miles from Rome, where melons have been cultivated since the time of the Mithridatic war, are said to have been brought from Armenia by Lucullus. In that country and Persia, melons are well known to be extremely plentiful; and their cultivation, in the open air, is supposed nowhere to equal that which is practised in the plains of Ispahan and in Bokhara. The soil is there manured with pigeons' dung. But the varieties cultivated at and near Ispahan differ very much from the Cantaloups, which have hitherto been preferred for European culture. The Persian varieties are adapted to circumstances of soil and climate which it seems impossible to imitate artificially; for the skill of the horticulturist has been exerted in vain in attempting to produce fruit of these varieties in full perfection with regard to flavour and size.

If the roots be favourably situated, so far as moisture is concerned, the melon will bear a tropical heat; and, generally speaking, it will not succeed perfectly in the open air beyond the 43rd parallel of latitude. Its range of atmospheric temperature may be estimated at between 70° and 80°. The medium in which the roots are placed should of course be more uniform, and about 75° of bottom heat will be found both safe and efficacious.

The soil should be a fresh strong loam, not too adhesive. The topsoil of rich alluvial pasture-ground is found to answer the purpose exceedingly well, particularly where it has been overflowed in winter. If dung be used, it should be well rotted and intimately mixed with the soil; and it must not be used in such quantity as to occasion a too luxuriant growth of foliage, which in this climate would cause the fruit to be deficient in flavour.

Light is so essential, that unless the plants are kept near the glass, no tolerable degree of flavour will be acquired. As much of the direct rays of the sun should be admitted as the plants will endure, more especially when the fruit is approaching maturity. A screen may be occasionally necessary, but it should be of very thin texture.

If melon plants were not adapted for a dry atmosphere, during a considerable portion of the day at least, they could not exist in the parching climates in which they naturally grow; and therefore a free admission of air is to be recommended, so far as is consistent with the maintenance of a high temperature. The health of the plant soon suffers if evaporation by the foliage is not freely carried on; for it is found that when it is obstructed by continued moist foggy weather, disease commences, and mildew ensues. The regulation of moisture in the artificial atmosphere in which melons are grown, under an English sky, is, of all others, the most insurmountable difficulty. Covering the soil with slates or tiles or with clean gravel has been successfully resorted to as a mode of preventing the air in the frame from being at all times saturated with moisture exhaled from the soil.

Melons will thrive if their roots are actually allowed to extend themselves in water; and in the case of the floating-beds on which they are grown in some parts of Persia, they find their way through the mould and its support into the water. But a drier medium for the roots becomes essential for good flavour in the comparatively close mode which in forcing them it is necessary to adopt in this country, in order to prevent the dissipation of heat, which would otherwise take place from a limited atmosphere the temperature and elasticity of which are so much above that by which it is surrounded.

About four months may be allowed, on an average, for the period between the sowing of melons and the ripening of the fruit. The middle of January is found to be early enough to sow; and the young plants are so exceedingly tender, that accidents are then very likely to occur to them. It is on this account necessary to make successive sowings, in order to be prepared for replacement, if requisite, and also for continuing the supply throughout the summer. A sowing for the latest crops will require to be made in April. Melons may be grown by means of frames on hot-beds [HOT-BED], or in pits heated according to some of the various modes of hot-water application now so generally adopted. The seeds are sown in pans, or in small pots, and transplanted into other small pots when their seed-leaves are about half an inch broad. It is best to put only a single transplanted melon into each pot. While this is done in a separate frame, that which is intended for their future growth and fruiting is prepared for their reception, by placing small hills, rather more than a foot high, of light rich mould below each sash, and nearer to the back of the frame than the front. Care must be taken that this mould be of the proper temperature before the young plants are introduced, which is to take place when they have made a few rough leaves. As the roots extend, more soil should be added of a gradually stronger nature; and ultimately the roots should have a depth of about 15 inches of such soil. The soil should never be introduced in a cold state; and if there be no means for previously bringing it to the temperature of at least 70°, it should be put into the frame in small quantities. When water is required, it should never be much below the above-mentioned temperature, nor should it exceed 78°. It should not be applied when the air of the frame is at a high temperature from sun-heat. Shading is necessary immediately after watering, when the sun's rays have any great degree of power; unless this precaution is attended to, scorching will be induced, and the red spider will be likely to attack the foliage.

With regard to pruning and training the *runners* or *vines* of melon plants, it is necessary that a sufficient number of these for filling the frame should be made to ramify as close to the base of the main stem as can be conveniently effected by pinching off the top of the latter when it has made a few joints, or four leaves above the cotyledons; and the laterals, which in consequence become developed, may be again subdivided by a similar process. Blossoms of a monœcious character will soon after make their appearance. The male blossoms, or at least a portion of them, must be retained for the purpose of fertilisation till the requisite quantity of fruit is fairly set, after which those shoots which have only male blossoms may be dispensed with, in order to afford more space for the foliage connected with the fruit. The extremities of the fruit-bearing vines are stopped by pinching at the second or third joint above the fruit. The vines must afterwards be kept regulated so as not to overcrowd the frame with more foliage than can be duly exposed to the light. The regulation should be early and frequently attended to, so as not to have occasion to remove many vines from the plant, or divest it of much foliage at any one time. A piece of slate or tile is placed under each fruit for the purpose of keeping it from the damp soil. The heat must be fully maintained, or even considerably increased, as the fruit approaches maturity, in order to allow the admission of a more free circulation of air; but if at the same time the bottom heat be allowed to decline, the plants will become diseased and fall a prey to the mildew or to the red spider.

It has been observed that the Persian melons differ from those generally cultivated in Europe; the best account of them is in the sixth volume of the 'Transactions of the Horticultural Society.' It is there stated that 'they are found to require a very high temperature, a dry atmosphere, and an extremely humid soil. In that country we are told that the melon is grown in open fields, intersected in every direction by small streams, between which lie elevated beds richly manured with pigeons' dung. Upon these beds the melons are planted.' It is further observed that 'the Persian gardener has therefore to guard against nothing but scarcity of water; the rest is provided for by his own favourable climate. With us the atmosphere, the ventilation, the water, and the heat are all artificial agents operating in opposition to each other.' From what has been experienced it seems in vain to attempt to bring those fruits to that delicious perfection here which they are known to acquire in their native country, except at the most favourable period of our season; for if this be chosen the two greatest essentials for producing flavour, a copious ventilation and high temperature, may be frequently combined without the latter being at the same time much counteracted by the former.

The varieties of melons can scarcely be kept permanent, particularly where many are cultivated, as they hybridise so readily. One of the finest, and perhaps the best of all, is the Beechwood melon. The Early Cantaloup, Windsor Scarlet Fleshed, Cephalonian, Green Fleshed Egyptian, Green Fleshed Italian, Early Polignac, and Golden Rock, are esteemed excellent. Of the Persian varieties the Green Hoosainee, Striped Hoosainee, and the large Germek are considered the hardiest; and the Melon of Keiseng, Melon of Nukshevan, Sweet Melon of Ispahan, and the Geree Melon are the highest flavoured. The Dampsha is a winter melon, or one of those varieties which are cultivated in the East, and have the property of keeping for a long time after being cut.

(*Guide to the Orchard and Kitchen Garden*; *Transactions of Hort. Soc.*; Loudon, *Encyclopædia of Gardening*.)

MELO'NIA. [FORAMINIFERA, vol. x., p. 348, where the name of the genus is erroneously printed *Melonis*.]

MELO'PHUS, Mr. Swainson's name for a subgenus of *Leptonyx* (Sw.). The subgenus is thus characterised:—

General structure of *Fringillaria*, but the upper mandible is notched near its tip. Hinder claw lengthened, but rather shorter than its toe. Lateral *toes* equal. *Tail* even. *Head* crested. Tertials not lengthened. (Sw.)

Example. *M. erythropterus*. ('Ill. of Orn.,' pl. 132.) [FRINGILLIDÆ, vol. x., p. 483.]

MELOS [MILO.]

MELPO'MENE. [MUSES.]

MELROSE. [ROXBURGHSHIRE.]

MELTON MOWBRAY. [LEICESTERSHIRE.]

MELUN, a town in France, capital of the department of Seine et Marne, situated on the Seine, 24 miles in a direct line south-east of Paris, or 28 miles by the road.

Cæsar, who mentions the place in his 'Commentaries' by the name Melodunum, and perhaps Metiosedum, describes it as being 'a town of the Senones, situated in an island of the Sequana (Seine), in the same manner as Lutetia (Paris).' (*B. G.*, lib. vii., c. 58.) It was taken by Labienus, Cæsar's legatus, in his campaign against the Parisii. (*Ibid.*) It was a place of note in the earlier times of the French monarchy, and was repeatedly taken by the Northmen or the English. It was taken, after an obstinate resistance by the governor Barbazan, by the English under Henry V. (A.D. 1419 or 1420); but in 1435 the inhabitants drove them out and admitted the troops of Charles VII.

The town is for the most part built on a slope on the right bank of the Seine, and, from the advantage of its situation, presents a good appearance, though neither well laid out nor well built. It has a large circular place, and two insignificant promenades. Of its two churches, that of St. Aspaïs is distinguished by some handsome stained-glass windows. The prefect's residence was formerly a Benedictine abbey, and there are the ruins of an old castle on the island, in which the Celtic town stood. The population in 1831 was 6604 for the town, or 6622 for the whole commune; in 1836 it was 6846. The chief manufactures are cotton yarn, printed cottons and other cotton goods, woollen cloths, druggets and serges, leather, window-glass, and earthenware. There are flour and tan mills, and lime and plaster kilns. Trade is carried on in corn, flour, wine, cheese, wool, and cattle: there is a well-frequented market for corn intended for the supply of Paris. There is much meadow-land round the town. There are a prison or house of correction, a barrack for cavalry, and a theatre; a high school, a free drawing-school, &c.

The arrondissement of Melun has an area of 390 square miles: the population in 1831 was 57,697; in 1836, 57,821 it is divided into six cantons or districts, each under a justice of the peace, and comprehends 105 communes.

MELVILL, or MALEVILL, GEOFFREY DE, of Melville Castle, in the shire of Edinburgh, first appears in the records about the middle of the twelfth century, when he is designated by King Malcolm IV., 'Vicecomes meus de castello puellarum,' that is to say, sheriff of Edinburgh. There was then no sheriff of the shire of Edinburgh; none had yet been constituted, nor for some time afterwards; and the public business was in all likelihood principally transacted in the castle, of which he was said to be sheriff.

In the same reign and forwards to the year 1171, Melville was lord-justiciar of 'Scotland,' then strictly so called, or the territory of the king of Scots north of the Frith of Forth; the district south of the Forth (once a part of Northumberland) long continuing a distinct territory under the name of 'Lothian,' and having its own separate justiciar. Melville is the earliest justiciar of Scotland yet discovered in our records. The time of his death is uncertain. He had a younger son Philip, who by his marriage obtained the barony of Monethyn in the Mearns. Philip de Malevill, the son of the said Philip, was sheriff of the Mearns about the year 1200. In 1222 he was made sheriff of Aberdeen; and in 1240 a joint-justiciar of Scotland with Richard de Montalt.

MELVILLE, SIR JAMES, is supposed to have been born in the year 1535. He was the third son of Sir John Melville of Raith, one who early joined the party of the Reformation in Scotland, and after suffering from the animosity of Cardinal Beaton, at length fell a victim to his successor, Archbishop Hamilton, in 1549. Young Melville, then about 14 years old, was upon this, it seems, sent by the queen dowager's influence and direction, and under the protection of the French ambassador returning to France, to be a page of honour to the youthful Mary, queen of Scotland. He appears however to have rather continued in the ambassador's employ till 1553, when he got into the service of the constable of France. He afterwards made a visit to the court of the Elector Palatine, and being well received, remained there for some time, but ultimately came to Scotland. It would be a profitless task to follow the knight in all his missions and movements. He was a courtier in the strict sense of that term, one to whom a court was the whole world, and its principles of action the great code of duty. He appears to have had a high idea of his own importance, and sometimes blames himself for the unfortunate temper, which he says he possessed, of finding fault with the proceedings of the great. All this and much more we learn from the elaborate memoirs of his own life and times, which he was careful to write for the benefit of posterity. Two mutilated editions of this curious work were published in English, besides a French translation, but an accurate edition has been recently published from the original manuscript. Sir James died on the 1st November, 1607.

MELVILLE, ANDREW, was born on the 1st August, 1545. He was the youngest of nine sons, children of Richard Melville of Baldovy, a small estate on the banks of the South Esk, near Montrose; and he had the misfortune to lose both his parents when only about two years old, his father falling at the battle of Pinkie in 1547, and his mother dying in the course of the same year. The care of young Melville devolved upon his eldest brother, who was minister of the neighbouring parish of Maritoun after the establishment of the Reformation in 1560. The year preceding this, Melville, then at the age of fourteen, was removed from the grammar-school of Montrose, where he had been for some time, to St. Mary's College, in the university of St. Andrew's. This place he left in 1564, with considerable reputation for his proficiency in philosophy and the languages, and repairing to the Continent, entered himself a student in the university of Paris, where he remained two years, when, in order to acquire a more perfect knowledge of the civil law, he proceeded to Poictiers. He had scarcely arrived there when, such was the opinion entertained of him, that though a stranger and only twenty-one years of age, he was made a regent in the college of St. Marceon. He continued in this situation for three years, prosecuting at the same time the study of the law, when, on account of the political disturbances of the place, he retired to Geneva, and was there, by the influence of Beza, appointed to the chair of humanity in the Academy, which happened to be then vacant. When he received this appointment he was, as to pecuniary means, in a state of almost total destitution. Leaving his books and other effects behind him, he had set out on his journey to Geneva on foot along with a young Frenchman, who wished to accompany him, and on reaching their destination the joint fund of the two travellers did not exceed a crown. The quarter's salary, which was advanced to Melville at his admission to the chair, proved accordingly a most seasonable relief. Geneva was a scene to which the mind of Melville often recurred in after-life. It was there he made that progress in Oriental learning for which he became so distinguished. There also he enjoyed the society of some of the best and most learned men of the age; but above all it was there the hallowed flame of civil and religious liberty began to glow in his breast, with a fervour which continued unabated ever after. He left Geneva in the spring of 1574, at the urgent request of his friends at home, and returned to his native country after an absence altogether of about ten years. On this occasion Beza addressed a letter to the General Assembly, in which, among other expressions of a like kind, he declared that Melville was 'equally distinguished for his piety and his erudition, and that the Church of Geneva could not give a stronger proof of affection to her sister church of Scotland than by suffering herself to be bereaved of him that his native country might be enriched with his gifts.'

It was about this time Melville seems to have made his first appearance as an author. His earliest publication consisted of a poetical paraphrase of the 'Song of Moses,' and a chapter of the Book of Job, with several smaller poems, all in Latin, and worthy of the disciple of Buchanan,[*] especially his 'Carmen Mosis.'

On Melville's arrival in Edinburgh, in July, 1574, he was invited by the regent Morton to enter his family as a domestic tutor; but this invitation was declined by Melville, who was averse to a residence at court, and preferred an academic life. He was early gratified in this wish; for shortly afterwards he was appointed by the General Assembly Principal of Glasgow College. Here his learning, energy, and talents were eminently serviceable, not only to the university over which he presided, but to the whole kingdom and to literature in general. He introduced improvements in teaching and discipline, of great importance, and infused an uncommon ardour into his pupils. His very table-talk and conversation were so interesting and instructive that the master of the grammar-school, who was afterwards principal of the college, used to say 'he learned more of Mr. Andrew Melville, cracking and playing, for understanding of the authors which he taught in the school, than by all his commentators.' It was not however as a mere scholar or academician that Melville was distinguished. He took a prominent part in the ecclesiastical disputes of the time, and was active in the church courts and in the conferences held with the parliament and privy-council on the then much agitated subject of church government. To him is generally ascribed the overthrow of episcopacy at that time and the establishment of presbytery, and he commonly went afterwards by the name of Episcopomastix, or the Scourge of bishops. His intrepidity was often very remarkable. On one occasion, when threatened by the regent Morton in a menacing way, which few who were acquainted with his temper could bear without apprehension, Melville replied, 'Tush, man! threaten your courtiers so. It is the same to me whether I rot in the air or in the ground; and I have lived out of your country as well as in it. Let God be praised; you can neither hang nor exile his truth!'

Another matter to which the attention of the General Assembly was at this time directed was the reformation and improvement of the universities. Here Melville also took a leading part. At the end of the year 1580 he was translated from Glasgow to be principal of St. Mary's College in the university of St. Andrew's, where he distinguished himself by his usual zeal and ability. Besides giving lectures on theology, he taught the Hebrew, Chaldee, Syriac, and Rabbinical languages, and his prelections were attended not only by young students in unusual numbers, but also by several masters of the other colleges. In these scholastic labours however he did not lose sight of the condition of the Church, and being called on to open an extraordinary meeting of the General Assembly in 1582, he inveighed in his sermon in strong terms against the arbitrary and oppressive measures of the court. His boldness gave offence to the regent, and shortly afterwards he was cited before the privy-council on a charge of high-treason founded on some expressions which it was alleged he had made use of in the pulpit. The charge was not proved; but being determined to silence him, the privy-council found him guilty of behaving irreverently before them, and sentenced him to imprisonment, and to be further punished in his person and goods as his majesty should see fit. Fearing his death was ultimately intended, he was urged by his friends to make his escape, and accordingly leaving Edinburgh he went first to Berwick and then to London, where he remained till about the end of the year 1585, when the indignation of the kingdom having driven Arran from the court, Melville returned to Scotland after an absence of about twenty months, and resumed his former station in the university. His sincerity and zeal however were by no means agreeable to the king, who wished to assume an absolute control over the affairs of the Church; and in order to accomplish his wish to get rid of him, the king had recourse to one of those stratagems which James thought the essence of 'king-craft.'

In May, 1606, after the king had ascended the English throne, Melville received a letter from his majesty desiring him to repair to London that his majesty might consult him and others of his learned brethren on ecclesiastical matters. Melville and others went accordingly, and had various interviews with the king, who at times condescended even to be jocular with them; but they soon learned that they were interdicted from leaving the place without special permission from his majesty. Melville having written a short Latin epigram, in which he expressed his feelings of contempt and indignation at some rites of the English church on the festival of St. Michael, was immediately summoned before the privy-council, found guilty of *scandalum magnatum*, and, after a confinement of nearly twelve months, first in the house of the dean of St. Paul's, and afterwards in that of the bishop of Winchester, was committed to the Tower. Here he was kept a prisoner till the month of February, 1611, a period of about four years, when, at the solicitation of the duke of Bouillon, who wished his services as a professor in the university of Sedan, he was permitted to depart the kingdom.

In 1620 his health, which had previously been slightly impaired, grew worse, and in the course of the year 1622 he died at Sedan, in the seventy-seventh year of his age, but under what circumstances is not accurately known.

Melville appears to have been low in stature and slender in his person, but possessed of a sound constitution and great physical energy. His voice was strong, his gesture vehement, and he had much force and fluency of language, with great ardour of mind and constancy of purpose. His natural talents were of a superior order; and, in the concluding words of his biographer, 'next to the Reformer I know no individual from whom Scotland has received such important services, or to whom she continues to owe so deep a debt of national respect and gratitude as Andrew Melville.' (M'Crie's *Life of Melville*.)

MEMBRANE (in Anatomy) is an expansion of any tissue in a thin and wide layer. Since the time of Bichat [BICHAT], the membranes have been generally enumerated as of three kinds, the serous, the mucous, and the fibrous, which are distinguished as well by their physical characters and their functions, as by the diseases to which each is peculiarly subject.

The serous membranes are so named from the character of their secretion, which consists of a very small quantity of thin serous fluid. In the adult condition of man and the higher vertebrata, they form what are called shut sacs. In each of the cavities of the chest, for example, which are exactly filled by the lungs, there is a serous membrane, the pleura, which lines the walls of the chest, and is then reflected on and covers the surface of the lung; and thus there is enclosed between the surface of that part which lines the chest, and of that which envelopes the lung, an extremely narrow space, a sac, into which a very small quantity of fluid is secreted. During respiration there is a constant friction between the lung and the walls of the chest, which the fluid, by its lubrication of their surfaces, renders easy. It is the general condition of serous membranes, that they exist, with the single exception of the conjunctiva of the eye [EYE], wherever there is friction between the surface of an organ and the cavity in which it is contained. They are adapted for this condition by possessing a remarkably smooth polished surface, covered by a very fine layer of epithelium, through which their moistening secretion can easily pass. The basis of their structure is a fine and rather loose cellular tissue, which by boiling is at once converted into gelatine. The serous membranes in man are, the arachnoid, which is found in the cerebro-spinal cavity [Brain], lining the dura mater, and covering the brain and spinal chord, and lining the ventricles; the pleuræ, lining the chest and covering the lungs [Respiration]; the pericardial serous membrane, similarly related to the heart and its investing sac [Heart]; the peritoneum, lining the abdominal walls and covering the abdominal part of the digestive canal, the liver, spleen, part of the pancreas, &c.; and the tunica vaginalis, forming the sac of the testis.

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[*] In a copy of verses addressed to Buchanan, Melville calls him his master: 'Andreas Melvinus Geo. Buchanano praeceptori suo et Musarum parenti.' To what period this alludes however, we have no precise information.

The synovial membranes, by which joints are lined, and the heads of bones which move on each other covered, may be regarded as a modification of serous membranes, differing from them chiefly in the character of their secretion and in some of their diseases. [Articulation.]

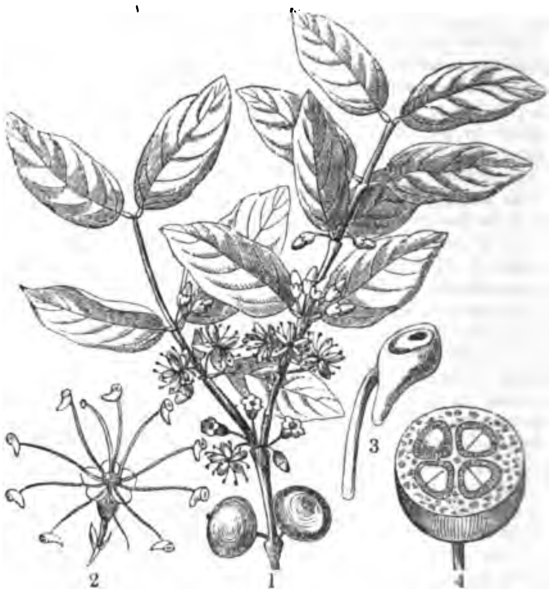
A membrane very similar to the serous lines the whole vascular system, and forms the internal membrane of the arteries, veins, lymphatics, and lacteals, forming a closed cavity with innumerable ramifications, and affording, with its polished surface and fine epithelium, the least possible obstacle to the movement of the circulating fluids.

The mucous membranes, like the serous, are named from their peculiar secretion. [Mucus.] While the serous membranes line all those cavities whose surfaces are in contact with living parts, the mucous membranes line those canals and cavities which, in the adult condition of man and the higher vertebrata, are exposed to the contact of the air and other inorganic substances. The basis of these membranes is a compact cellular tissue, which does not yield gelatine in boiling, and whose areolæ do not contain fat. Their epithelium is thicker than that which covers serous membranes, but thinner then the epidermis covering the skin, to which they are in many respects similar. In the parts where they line the organs of sense, the mucous membranes are generally beset with fine nervous papillæ; in other parts, numerous glands for peculiar secretions open on their surface by orifices through which the membrane is continued up the branches of the ducts into the very substance of the gland. [Gland.] Nearly all the tracts of mucous membrane in man communicate with each other: they are, the nasal, which lines the cavities of the nose; the conjunctival, which covers the front of the eye-ball and lines the eye-lids, and opens by the lacrymal duct into the nose [Eye; Lachrymal Gland]; the auditory, which lines the cavities of the ear [Ear] and opens into the pharynx; the digestive, including that which lines the mouth, œsophagus, stomach, intestines, and the several glands whose ducts open into this canal; the respiratory, which lines the larynx, trachea, and bronchial tubes [Respiration]; the urogenital; and the mammary.

The fibrous membranes are those which are chiefly formed of tendinous tissue. They serve either to form strong cavities for the protection of important parts, as the pericardium, the dura mater, the fibrous capsules of joints, the sheaths of tendons, &c., or to envelop and strengthen certain parts, as the periosteum, fasciæ, &c.; or they are merely expanded tendons, as aponeuroses. They are tough and inelastic membranes, composed of the shining dense wavy fibres which constitute the usual structure of tendons, mixed with more or less of a dense cellular gelatinous tissue.

MEMBRANI'PORA. [Polypiaria Membranacea.]

MEMECYLA'CEÆ are a very small natural order of Polypetalous Exogens, consisting of a few tropical plants of little interest. Most of them inhabit the East Indies, the Isle of France, and Madagascar. They are in habit and foliage like Myrtaceæ, with which order they agree in most respects; but they have anthers which in form resemble those of many Melastomaceæ, and the leaves have no transparent dots. From the latter order they are distinguished by their leaves not being ribbed, and by their cotyledons being convolute. In the opinion of Brown and Chamisso, it is rather as a section of Melastomaceæ than as a peculiar order that Memecylaceæ are to be accounted. No useful properties have been assigned to any of the species, except to Memecylon edule, an East Indian plant, whose leaves are an ingredient in the dyes of Coromandel, according to Roxburgh, and whose ripe astringent pulpy black berries are eaten by the natives.



1, Mouriria guayanensis; 2, a full-blown flower, 3, a stamen, with the anther opening by pores at the upper end; 4, a transverse section of a ripe fruit, copied from a figure by Turpin.

MEMEL, River. [Niemen.]

MEMEL (called Klaipeda by the Lithuanians), the capital of the circle of the same name, in the government of Königsberg, in East Prussia, is situated in 55° 42′ N. lat. and 21° 5′ E. long. It is the most northern town in the Prussian dominions; and being only 13 miles from the frontiers of Russia, has long been the centre of a very extensive contraband trade with that empire, which has however been extremely restricted by the very rigorous measures employed by the Russian government. It is situated at the mouth of the little river Dange (pronounced Danie), near the Kurisches Haff, which is connected by a narrow channel with the Baltic. The harbour, which is good and safe, is defended by the citadel. Before it there is a lighthouse, 73 feet high, on a sand-hill. Memel is extremely well situated for commerce; and the number of ships that annually visit it may be taken at 700 on an average, of which at least two-thirds are British. The principal articles of exportation are:—timber, which is brought down in floats; hemp, flax, corn, hides, tallow, bristles, wax, feathers, and yarn. The imports are chiefly colonial produce and calicoes. There are breweries, distilleries, soap-manufactories, and saw-mills. The town was formerly well fortified; but only a part of the works now remain, and no use is made of them. There are several public offices and public schools; the churches are four in number, viz. one German Lutheran, one Lithuanian Lutheran, one Roman Catholic, and one Calvinist. None of the public buildings are remarkable. The town is however on the whole regularly built. The population, by the census of 1837, was 9034. Memel is likewise the German name of the river Niemen.

(A. G. Preuss, *Beschreibung von Preussen*, 8vo., 1835; Stein; Horschelmann.)

MEMINNA, a genus of the subfamily *Moschina* (Gray). [Moschidæ.]

MEMNON, a personage frequently mentioned by Greek writers. He is first spoken of in the 'Odyssey,' as the son of Eos, or the morning, as a hero remarkable for his beauty, and as the vanquisher of Antilochus. (iv. 188; xi. 521.) Hesiod calls him the king of the Ethiopians, and represents him as the son of Tithonus. (*Th.*, 985.) He is supposed to have fought against the Greeks in the Trojan war, and to have been killed by Achilles. In the *Ψυχοστασία*, a lost drama of Æschylus, the dead body of Memnon is carried away by his mother Eos. (*Fragm.*, No. 261, Dindorf.) He is represented by most Greek writers as king of the Ethiopians, but he is also said to have been connected with Persia. According to Diodorus (ii. 22), Tithonus, the father of Memnon, governed Persia at the time of the Trojan war, as the viceroy of Teutamus, the Assyrian king; and Memnon erected, at Susa, the palace which was afterwards known by the name of Memnonium. Diodorus also adds that the Ethiopians claimed Memnon as a native of their country. Pausanias combines the two accounts: he represents Memnon as king of the Ethiopians, but also says that he came to Troy from Susa, and not from Ethiopia, subduing all the nations in his way. (Paus., x, 31, § 6; i. 42, § 2.) Æschylus also, according to Strabo, spoke of the Cissian, that is, Susian, parentage of Memnon (xv., p. 720): and Herodotus mentions the palace at Susa, called Memnonia, and also says that the city itself was sometimes described under the same name. (Herod., v. 53, 54; vii. 151.)

The great majority of Greek writers agree in tracing the origin of Memnon to Egypt or Ethiopia in Africa; and it is not improbable that the name of Memnon was not known in Susa till after the Persian conquest of Egypt, and that the buildings there called Memnonian by the Greeks were, in name at least, the representative of those in Egypt. (British Museum, *Egyptian Antiquities*, i., p. 267.) The partial deciphering of the Egyptian proper names affords us sufficient reason for believing, with Pausanias (i. 42, § 2), that the Memnon of the Greeks may be identified with the Egyptian Phamenoph, Phamenoth, Amenophis, or Amenothph; of which name the Greek is probably only a corruption. Phamenoph is said to mean 'the guardian of the city of Ammon,' or 'devoted to Ammon,' 'belonging to Ammon.'

Memnon then must be regarded as one of the early heroes or kings of Egypt, whose fame reached Greece in very early times. In the eighteenth dynasty of Manethon the name of Amenophis occurs, with this remark:—'This is he who is supposed to be the Memnon and the vocal stone.' He is Amenophis II., and the son of Thutmosis, who is said to have driven the shepherds out of Egypt.

There are many colossal statues in Egypt, which have been called Memnonian, of which the most celebrated is the vocal statue described by Strabo and Pausanias. At sunrise a sound was said to proceed from this statue, which Pausanias compares to the snapping of a harp or lute string (i. 42, § 3). Strabo states that he heard the sound himself, in company with Ælius Gallus (p. 816); and Tacitus relates that Germanicus also heard the sound. (*Ann.*, ii. 61.) This statue is identified, by the descriptions of Strabo and Pausanias, with the northernmost of the two colossal statues in the Theban plain, on the west bank of the Nile. Its height, according to modern travellers, is about 50 feet; and its legs contain numerous inscriptions in Latin and Greek, commemorating the names of those who had heard the sound. Most of these inscriptions belong to the period of the early Roman emperors. There is some difficulty however, notwithstanding these inscriptions, in identifying this statue with the one described by Strabo and Pausanias. These writers say that the upper part had in their time fallen down; but at present the upper part exists in its proper position, though not in a single piece. Heeren conjectures that the broken statue might have been repaired after the time of Strabo. With respect to the sounds supposed to come from this statue, it is conjectured that they were caused by some trickery of the priests. 'Alexander Humboldt speaks of certain sounds that are heard to proceed from the rocks on the banks of the Oronoko at sunrise, which he attributed to *confined air* making its escape from crevices or caverns, where the difference of the internal and external temperature is considerable. The French *savans* attest to having heard such sounds at Carnak, on the east bank of the Nile; and hence it is conjectured that the priests, who had observed this phenomenon, took advantage of their knowledge, and contrived, by what means we know not, to make people believe that a similar sound proceeded from the colossal statues.' (British Museum, *Egyptian Antiquities*, vol. i., p. 266.)

The head of the colossal Memnon in the British Museum has no claim to be considered as the vocal Memnon described by Strabo, Tacitus, and Pausanias. The height of the figure to which the head belongs was about 24 feet, when entire. There is also an entire colossal Memnon in the British Museum, 9 feet 6¼ inches high, which is a copy of the great Memnon at Thebes.

(Hamilton's *Ægyptiaca*; *British Museum*, 'Egyptian Antiquities;' *Philological Museum*, No. 4, art. 'Memnon.')

MEMNON of Rhodes was the brother of the wife of Artabazus, the satrap of Lower Phrygia, and was advanced, together with his brother Mentor, to offices of great trust and power by Darius Ochus, king of Persia. We are ignorant of the time of Memnon's birth, but he is mentioned by Demosthenes as a young man in B.C. 352. (*Aristocrat.*, p. 672.)

Memnon possessed great military talents, and was entrusted by Darius, the last king of Persia, on the invasion of Asia by Alexander of Macedon, with an extensive command in western Asia; but his plans were thwarted and opposed by the satraps, and it was contrary to his advice that the Persians offered battle to the Macedonians at the Granicus. After the defeat of the Persians at the Granicus, Memnon was appointed to the chief command in western Asia, as the only general who was able to oppose the Macedonians. He first retired to Miletus, and afterwards withdrew to Halicarnassus in Caria, which he defended against Alexander, and only abandoned at last when it was no longer possible to hold out.

After the fall of Halicarnassus, Memnon entered into negotiations with the Lacedæmonians, with the view of attacking Macedonia. He was now completely master of the sea, and proceeded to subdue the islands in the Ægean. He took Chios, and obtained possession of the whole of Lesbos, with the exception of Mitylene, before which place he died, B.C. 333. The loss of Memnon was fatal to the Persian cause: if he had lived he would probably have invaded Macedonia, and thus have compelled Alexander to give up his prospects of Asiatic conquest, in order to defend his own dominions.

(Arrian; Diodorus Siculus; Quintus Curtius.)

MEMNON, a Greek historian of Heraclea in Bithynia, lived in the first or second century of the Christian æra. He wrote a history of the tyrants of his native town, of which considerable extracts have been preserved by Photius; these extracts have also been published separately The best edition is by Orellius, Leip., 1816. They have also been translated into French by the Abbé Gédoyn, in the 'Mém. de l'Acad. des Inscriptions,' vol. xiv., p. 279-333. Photius was not acquainted with the first eight books of Memnon's History, nor with those which follow the sixteenth book. (Phot., c. 224.) The 'Excerpts' of Photius embrace a period from the assassination of Clearchus to the death of Brithagoras, which was at least later than 46 B.C.

MEMOIRS, a term, in its application to a particular species of writing, of French origin, and in appearance properly signifying, as its obvious etymology would denote, a narrative or account mainly or primarily intended for no higher purpose than that of simply recording the facts it embraces, or addressing the one faculty of the memory. Perhaps the modern memoirs may be held to answer pretty nearly to what the Romans understood by *Commentarii* or *Commentaria* (see the meanings of this word in Facciolati, *Lexic.*), unless when that title was given, in genuine or affected modesty, to writings of a more artificial character than that to which it rightly belonged. The philosophical ends, and the gratification of the imagination and the taste, aimed at in what is properly called a history, are not therefore to be looked for in memoirs, which, when they relate to historical subjects, are in truth not so much history as materials for history. A common description of French works of this kind is *Mémoires pour servir* (i.e. *à l'histoire*). Most frequently too, but not universally, memoirs detail events in which the writer himself has been personally concerned. Very often the work is purely biographical, and not historical at all; and sometimes materials for biography only, and not a biographical work in the proper sense of the term. Sometimes it is neither historical nor biographical, but merely a discourse or statement on some point in science or literature; of this kind are the published memoirs of many academies ('Mémoires de l'Académie des Inscriptions,' for instance), and other literary or scientific societies. It may be noted, that when Horace Walpole wrote his amusing account of the last ten years of the reign of George II., probably soon after the middle of the last century, the word 'Memoires,' which is the title he has given his work, was still so far from being completely naturalised among us, that he has retained the French spelling. At the same time, we have several English memoirs—such for instance as 'Memoires of the Reigne of King Charles I.,' by Sir Philip Warwick, 1701; 'Memoirs concerning the Affairs of Scotland,' by George Lockhart, Esq., 1714; 'Memoirs of John Ker, of Kersland,' by himself, 1726, &c. The French language is particularly rich in those kinds of historical and biographical materials which are expressed by the term Mémoires.

MEMORIAL. [ANNUITY.]

MEMORY is a name given to one of what are called the faculties of the mind,—the faculty (as it is otherwise expressed) of remembering or recollecting. The word is used to denote at the same time the operation or act of remembering, the state of the mind when it exercises the faculty, as distinguished from the faculty itself; but this last is a derived and by far the rarer use of the word.

What ideas are, how they are first generated, and how afterwards reproduced, are matters the explanation of which belongs to other articles. [IDEA; SENSATION; ASSOCIATION.] But when an idea is reproduced in the mind by any of the ordinary modes of association, and there co-exists with this idea the idea of its having been before present in the mind, this complex state of mind is a case of memory. We are then said to remember the thing (whatever it may be), the idea of which is thus present to the mind. This is an exercise of the faculty of memory.

Mr. Stewart seeks to make a distinction between the memory of events and the memory of things, on the ground that in the former case alone does the idea of past time form part of the complex state of mind. This does not seem to be correct. In all cases of memory, in the memory of things as well as of events, there is (as has been said) the idea of the idea which is now present to the mind having been present before. And this idea is obviously a complex idea, of which the idea of the previous time and the idea of the interval between that and the present time are parts. The particular idea of past time, by means of which Mr. Stewart seeks to make his distinction, belongs to the event that is remembered, and has evidently nothing to do with the mental phenomenon of memory. It is the idea of the event having taken place at a past time, and not (which alone is concerned with the mental phenomenon of memory) the idea of the idea of this event having been before present to the mind.

There is a distinction between *remembering* and *recollecting*, which, though not always observed in conversation, it is yet worth while to notice. The ideas that are remembered either come into the mind without any effort on the part of the person remembering, or with such effort. In the first case the person is more properly said to remember; in the second to recollect. The effort of recollection may be generally described as consisting in seeking out for different ideas which are likely to recall, by any of the ordinary modes of association, the desired idea. What these modes of association are has already been fully explained in two previous articles, ASSOCIATION and DREAMS.

It will be seen that the thing which is essential to the faculty of memory, and which distinguishes it from other faculties of the mind, that indeed which the faculty of memory may be said to be, is the faculty of recognising an idea which has before been present to the mind, as having been before present. But this faculty of recognition can never be exercised until the idea that is to be recognised has been introduced by one of the ordinary modes of association. Thus the principle or (as it may also be called) the faculty of association is necessary to the exercise of the faculty of memory. This principle of association, which, though necessary to the exercise of the faculty of memory, is yet only accidentally connected with that faculty, becomes consequently the basis of mnemonics, or the art of recollection.

The principle of all systems of mnemonics, however much these may differ in complexity, is the same, and simple. It is to select a number of objects which, whether of themselves or by reason of the order of selection, are more easily remembered than those which it is our object to remember, and to associate in our minds each one of the latter set with some one of the former. One of the simplest systems of mnemonics is the plan which used to be resorted to by the antient orators, of connecting in their minds the different parts of a speech with different parts of the building in which it was delivered. The different systems of *Memoria Technica* which have been put forth in later times are more complex specimens of the art. Of these, or of any one of these, it is unnecessary to give a detailed account here. One of the best known is that of Dr. Grey (Lond., 1730).

MEMPHIS. [EGYPT.]

MENA, JUAN, the best Castilian poet of the fifteenth century, was born about 1412 at Cordova, the 'alma ingeniorum parens,' as Nicolas Antonio calls it, on account of its numerous authors, especially Latin, Arabic, Hebrew, and Castilian poets. Although Mena did not show an ardent love of letters till he attained his twenty-third year, yet he so quickly and fully stored his mind, both in his native city and at Salamanca and Rome, that he was much courted by the elegant poet the Marquis of Santillana, Don Enrique de Villena, the constable Alvara de Luna, and the rhymesters who attended Juan II. This king appointed Mena his Latin secretary, and, what is more, his historiographer, a most honourable office, which was instituted by Alphonso X., 'el Sabio,' i.e. 'the Learned.' A fatal pleurisy stopped Mena's career in 1456 at Torrelazuna, where his friend the Marquis of Santillana erected a sumptuous monument to his memory.

Mena's chief performance, 'El Laberinto,' or 'Las Trescientas (coplas),' is a didactic moral poem of the allegorical kind, but the scene is different from that of Dante, and it is unlike the work of the Italian poet also both in metrical form and style. It was published for the first time in 1496.

Quintana, a high authority (*Poesi. Selec. Introduc.*), dwells on it with little of his wonted severity. Southey, on the contrary, appears to forget the age in which the poem was written. The scenery, says he, and machinery, are despicable. He has however overlooked its most glowing passages, such as the patriotic end of the naval hero Conde de Niebla: he observes, 'There is no glimpse of imagination, and scarcely a trace of feeling' in it. Even the erudition of the commentator Fernan Nuñez, which must have been prodigious in his time, is mere schoolboys' learning, according to this critic. If Mena, coming 200 years after Berceo, is to be denied the title of the Spanish Ennius, it is much to be regretted that his more fortunate and immediate successors did not estimate his merit, and themselves imitate him in making new words and poetical forms or inflections, which are so congenial to inspiration and originality of thought, and so productive of deep impressions.

Mena also wrote some fugitive pieces; 'La Coronacion,' in honour of his patron and friend Santillana, and part of another moral allegory, 'Tratado de Vicios y Virtudes.' This latter was unsuccessfully continued by Gomez Maurique, Pero Guilen (styled 'el gran trobador,' probably of Segovia), and Jeronimo de Olivares, Knight of Alcántara. He also wrote 'La Cronica de Juan II.,' from 1420 to 1435. Some inedited memoirs on noble families of Castile ('Libro de Linages'), and a portion of the Iliad in Spanish, still in MS., are properly attributed to him. This is not the case however either with the first act or the whole of 'La Celestina, o Tragi-Comedia de Calisto y Melibea,' which was begun by Rodrigo Cota, and continued in a different style by Fernan de Rojas; nor with the anonymous 'Coplas de Mingo Rebulgo' (a satirical eclogue against Enrique IV., not Juan II., as Bouterwek has hastily fancied); nor the commentary, which, as well as the text, belongs to Fernando del Pulgar, according to Mariana (year 1472 of his history) and the learned Sarmiento ('Obras Postumas'). The primitive sources for Mena's biography are, Bachiller Fernan Gomez de Cibda Real ('Centon Epistolario'), Valero Francisco Romero ('Epicedio à Hernan Nuñez'), and Sanctius Brocensius, the editor of the corrected edition of all his works, which Lucas Junta published at Salamanca in small 12mo. in 1582, and which was the foundation of a 25th, published in 1804 at Madrid, in small Spanish 8vo., by Repulles. This has not however the glosa, or comment, of Fernan Nuñez above mentioned, who is not to be confounded with the chronista Fernan Perez de Guzman.

ME'NAGE, GILLES, was born at Angers (where his father, a man of considerable learning and eloquence, held the office of *Avocat du Roi*), on the 23rd of August, 1613, as he has himself informed us in his 'Anti-Baillet,' chap. 71, where he inveighs with no small bitterness against the malignity of Baillet, who, in his 'Jugemens des Savans,' had made him more than three years older than he was, forgetting, observes Ménage, that the older I am, the more respect he owes me, and that Callistratus, the jurisconsult, on the fifth law of the Digest, 'De Jure Humanitatis,' has said, 'In our state, old age hath been at all times venerable; for our ancestors were wont to give to old men almost the same honour as to magistrates.' Ménage began life by practising as an advocate at Paris; but finding this profession not to suit his taste or his temper, he got himself made an abbé, which enabled him to hold some livings in the church without cure of souls. He then resided for a time in the family of Cardinal de Retz; but he finally established himself in a house of his own in the cloister of Nôtre Dame, which soon became celebrated for the assemblies of men of letters, whom he continued to gather around him on the Wednesday evening of every week to the end of his long life,—his *Mercuriales*, as he called them, from the Latin name for that day. A very considerable range of learning, an admirable memory, and some wit enabled Ménage, notwithstanding a pedantry which was often ridiculous, to maintain his position with sufficient *éclat* as the central figure of these réunions; and he also made some small profession of gallantry, both Madame La Fayette and Madame Sevigné having the honour of ranking him among their avowed admirers. These social enjoyments however did not prevent him from writing a great many books, which brought him a wide reputation, and were highly applauded in his own day by the general voice of the literary world, although the satiric and contemptuous style in which he was apt to indulge had not failed to make him a good many enemies; and one unfortunate performance in particular, his 'Requête des Dictionnaires,' published in ridicule of the Dictionary of the Academy, for ever shut against him the doors of that institution, or at least excluded him from a seat till he thought himself too old and infirm to accept one when he might have had it. (See the account he himself has given of this affair in his *Anti-Baillet*, chap. 82.) Of his numerous works, the following are the most important:—'Origines de la Langue Française,' 4to., Paris, 1650, afterwards enlarged and republished under the title of 'Dictionnaire Etymologique de la Langue Française,' folio, 1694, and 2 vols. folio, 1750; 'Poemata Latina, Gallica, Græca, et Italica,' 8vo., Par., 1658, and 12mo., Amstel., 1687; 'Observations sur la Langue Française,' 12mo., Par., 1672; 'Origini della Lingua Italiana,' folio, Genev., 1685; 'Anti-Baillet,' 8vo., Par., 1685, and, along with Baillet's 'Jugemens,' 4to., Amst., 1725; a valuable edition of Diogenes Laertius, with annotations; and some other editions of classical and other works. After his death, which took place in 1692, his friends published, under the title of 'Menagiana,' a collection of his bon-mots and other remarks made in conversation, upon the value of which Bayle, in his Dictionary, has pronounced a very high eulogium, and which is still generally considered to be one of the best, if not the very best, of this class of works. It was originally published in two volumes, the first of which appeared in 1693, the second in 1694; but the best edition is the third, published in 1715, and enlarged by the additions of the learned editor, M. de la Monnoye, to four volumes.

MENAI BRIDGE, across the Menai Strait, where it connects Caernarvonshire with the Isle of Anglesey, at the rocky point called Ynys-y-Moch (or Pigs' Island), situated in the latter, is the finest Suspension Bridge hitherto erected, and a noble monument of the scientific skill of the late Thomas Telford. Formerly the passage between Anglesey and the opposite mainland was kept up by six ferries, the chief of which was called Bangor Ferry, from its proximity to that town; but a permanent connection, by means of a bridge, had been in contemplation, and various projects for one had been considered long before the present structure was undertaken. In 1785 a petition for such a bridge was presented to parliament, but the scheme advanced no further until after the union with Ireland, when it was deemed expedient to facilitate the intercourse between the two countries by forming a commodious route to Holyhead. Mr. Rennie, the engineer, was accordingly directed to make plans for the purpose in 1801, and four different designs were made by him, one of which was for a cast-iron arch of 450 feet span, and rising 150 feet above high-water mark. The measure was however postponed until 1810, when it was again resumed, and a committee of the House of Commons for the purpose appointed. Mr. Telford was then instructed to make a survey of the roads from Shrewsbury and Chester to Holyhead, and also to prepare designs for a bridge across the Menai Strait. He made two, adapted to two several points: one at the Swellies, where he proposed a bridge of three cast-iron arches, each 260 feet in span, with a stone arch between each two of them, 100 feet in span; the other at Ynys-y-Moch, with a single cast-iron arch 500 feet in span, to which latter he himself gave the preference. The subject excited much public attention, but great doubts were entertained of the practicability of the plan. In the meanwhile Telford published his design for Runcorn Bridge, with a centre opening 1000 feet wide, and two others of 500 feet each. Upon this he was directed by government to design one on a similar principle, that is, a suspension bridge, for the passage across the Menai.

The site fixed upon by him at Ynys-y-Moch was highly favourable, the opposite shores being bold and rocky, and allowing the roadway of the bridge to be 100 feet above high-water mark. The distance between the supporting pyramids or points of suspension was proposed to be 560 feet, the height of the pyramids 50 above the level of the roadway, the main chains to be 16 in number, with a deflection of 37 feet, their ends being secured in a mass of masonry built over stone arches between each of the supporting piers or pyramids and the adjoining shore, and these arches, four on the Anglesey and three on the Caernarvonshire side, being each 50 feet in span. The roadway is divided into two carriage ways, each 12 feet wide, with a footpath 4 feet wide between them.

The plan having been approved of by parliament, the sum of 20,000*l.* was voted to enable the commissioners to commence operations. Accordingly, in July, 1818, all the requisite preparatory steps were taken, labourers were engaged, workshops built, and the levelling for the foundations commenced, when such opposition was made to the scheme, that the commissioners were obliged to apply to parliament for an act to confirm and amend their powers. Although this occasioned considerable delay, all the preparatory works continued to be proceeded with. The new bill received the royal assent, July 2, 1819, and the first stone was laid on the 10th August following. The three arches on the Caernarvonshire side were keyed in on January 18, February 27, and March 25, 1822; those on the Anglesey side, August 31, September 14, and October 3 and 24 of the same year. In March of the following year the iron-work for the attachment of the main chains to the rock was begun to be fixed; and in July a new act of parliament was passed, conferring greater authority on the commissioners; besides which the Treasury issued 108,498*l.* 18*s.* for completing the bridge and paying the sum awarded by the jury for the purchase of Bangor Ferry. In 1824 the works were so far advanced, that the only remaining difficulty was, 'How are the main chains to be put up?' a question that gave rise to much speculation and doubt, for no precise details had been determined upon up to that time, which was so far an advantage, that the engineer had the benefit of full consideration and experience, and many mistakes were obviated that must have happened had the details been all settled beforehand.

In the beginning of May the cast-iron segments and saddles were carried up to the pyramids; but it was not till the April of the year 1825 that the first chain was fixed, which operation was then most satisfactorily accomplished. After the second chain had been put up, it was found necessary to replace some of the bars which had been damaged; and owing to this it was practically ascertained that if one or more links of a chain should at any time be injured, they could be taken out and replaced. On the 9th of July the last chain was fixed, and by the end of August the whole of the suspended parts of the chains had been connected with each other; and on the 2nd September the suspending of the roadway-bearers was commenced. In January, 1826, preparations were made for opening the bridge, and on Monday the 30th the mails drove over it for the first time. Shortly after however (February 6) a tremendous gale did considerable damage to the iron-work, and repeated gales during the spring tended greatly to retard the necessary operations in repairs. But no inconvenience has been since felt; and there is reason to believe that, with ordinary care and attention, this noble structure will last for ages.

With respect to the constructive details and operations of the work, those who wish for such information will find all the particulars in a large folio by W. Alexander Provis, the superintending engineer, entitled, 'An Historical and Descriptive Account of the Suspension Bridge over the Menai Strait in North Wales,' &c., London, 1828.

All that we add is the following (as given by Drewry in his work on suspension bridges):

The weight of the 16 main chains between the points of support, including connecting plates, screw-pins, wedges, &c., is

	Tons.	cwts.	qrs.	lbs.
	394	5	0	16
The transverse ties . .	3	16	2	20
The suspending-rods and platform, &c. . . .	245	13	2	27
Making the total suspended weight	643	15	2	7

According to Mr. Rhodes's experiment the tension on the iron at each point of suspension is 1·7 times the whole suspended weight, or 1094·42 tons. The entire section of the bars of the chains is 260 square inches, which would bear 7020 tons without breaking; or taking the standard of 9 tons per square inch, the chains will bear without any risk (9 × 260 =) 2340 tons, or 2340 — 1094·42 = 1245·5 tons more than the strain produced by the weight of the bridge itself; consequently it may safely be loaded with $\frac{1245{\cdot}5}{1{\cdot}7}$ or 732½ tons, besides its own weight.

MENANDER (Μένανδρος), a Greek comic poet, one of that class who are called the writers of the new comedy, was born B.C. 341, and died, as some suppose, by drowning, B.C. 289 or 290. According to Suidas he was the son of Diopeithes and Hegistraté, was cross-eyed, and yet clear-headed enough.* The same authority says that he was inordinately addicted to women. He wrote more than one hundred comedies, of which only fragments remain, but in spite of this fertility, and although the most admired writer of his time, he was only eight times victor. His master was Theophrastus, according to the testimony of Pamphila.

All antiquity agrees in praise of Menander. We learn from Ovid that his plots all turned on love, and that in his time the plays of Menander were common children's books—

> 'Fabula jucundi nulla est sine amore Menandri,
> Et solet hic pueris virginibusque legi.'
> Ovid, *Trist.*, ii. 370.

Julius Cæsar called Terence a 'dimidiatus Menander,' having reference to his professed imitation of the Athenian dramatist. Plutarch preferred him to Aristophanes, and Dion Chrysostomus to all the writers of the old comedy. Quintilian (*Inst. Orat.*, x., 1. 69) gives him unqualified praise as a delineator of manners. From these notices, from the plays of Terence, and from an awkward compliment passed upon him by Aristophanes the grammarian, we may infer Menander to have been an admirable painter of real life. His effeminate and immoral habits, and that carelessness in his verses, which subjected him to the charge of plagiarism, or at least of copying, all point to the man of fashion rather than the imaginative poet. And indeed the writer of what is termed the new comedy (that, namely, which satirised characters, not persons) had more occasion for knowledge of the world than for higher qualities, just as the fashionable novel-writer of the present age had much better be a nobleman or a member of parliament than a philosopher or a speculative thinker. It has been observed that there is very little of the humourous in the fragments of Menander which remain; but we cannot judge of a play by fragments. Sheridan's plays, if reduced to the same state, would be open to a similar charge, although he is perhaps the most witty writer of any age or country. The essential aim of the comedy of manners is to excite interest and smiles, not laughter.

The plays of Menander were probably very simple in the dramatic action. Terence did not keep to this simplicity, but, as he tells us himself, he added to the main plot some subordinate one taken from a different piece of Menander; thus, as he says, making one piece out of two.

Between the time of Aristophanes and that of Menander a great change must have taken place in the Athenian character, which was probably mainly brought about by the change in the political condition of the Athenian state. The spirit of the people had declined from the noble patriotism which characterised the plays of Aristophanes at a time when Athens was struggling for supremacy in Greece; and in the time of Menander, Macedonian influence had nearly extinguished the spirit that once animated the conquerors of Marathon and Platæa. Manners probably had not changed for the better in Athens, though the obscenity and ribaldry of Aristophanes would no longer have been tolerated. The transition from coarseness of expression to a decent propriety of language marks the history of literature in every country. Thus the personal satire and the coarseness which characterised the old comedy were no longer adapted to the age and circumstances in which Menander lived, and there remained nothing for him to attempt as a dramatist, but the new species of comedy in which, by the unanimous judgment of all antiquity, he attained the highest excellence.

The fragments of Menander are principally preserved in Athenæus, Stobæus, and the Greek lexicographers and grammarians. A good critical edition of the fragments of Menander and Philemon, by Meineke, was published at Berlin 1823, 8vo. It seems possible that some of the plays of Menander may yet exist; at least there is evidence to the fact of some of the plays having been in existence in the seventeenth century. (*Journal of Education*, i. 188.)

Many of the fragments of Menander have been well translated by Cumberland in the 'Observer.' (Suidas, ed. Gaisford, p. 2455; Fabr., *Bibl. Gr.*, vol. ii., p. 455, ed. Harles; *Encycl. Metropolitana.*)

MENANDER PROTECTOR, a Greek writer, who lived at Constantinople during the latter half of the sixth century. He was one of the emperor's body-guards, whence he derived the surname of Protector. (*Cod. Theodos.*, vi. 24) He wrote a history of the Eastern empire from A.D. 559 to A.D. 582, in eight books, of which considerable extracts have been preserved in the 'Eclogæ Legationum,' attributed to Constantine Porphyrogennetus. The best edition of Menander is by Bekker and Niebuhr, Bonn, 1830, together with the fragments of Dexippus, Eunapius, Patricius, &c.

MENASSEH BEN ISRAEL, a celebrated Jewish Rabbi, was born in Spain about A.D. 1604. He was educated in Holland, whither his father, Joseph Ben Israel, had fled to escape the persecution of the Inquisition. At the age of eighteen he succeeded his tutor, Rabbi Isaac Usiel, as preacher and expounder of the Talmud in the synagogue at Amsterdam; and he soon after commenced his work entitled 'Conciliador,' on which his reputation as one of the most learned and accurate of Jewish theologians chiefly rests.

At the age of thirty-five he lost his fortune through the confiscation of his father's property by the Spanish Inquisition; and in consequence of this loss he betook himself to commerce, a necessity of which he grievously complains on account of the interruptions which it caused to his studies. He came over to England during the Protectorate, and was graciously received by Cromwell, from whom he obtained some favours for his nation. He died at Amsterdam, about 1659.

Menasseh lived on terms of intimacy with several of the most learned men of his age, by whom he was highly esteemed for his erudition and moral worth. Grotius testified his respect for the Rabbi's learning by consulting him on the most difficult points of theology, and by recommending his works, especially the 'Conciliador,' to the attention of biblical students. Menasseh was strongly attached to Judaism, and some of his works are disfigured by the introduction of invectives against Jesus Christ.

The following are his chief works:—

1, 'Conciliador nel Pentateucho,' published in Spanish at Amsterdam in 1632. A Latin translation of this work, by Dionysius Voss, was published at Frankfort in 1633, with the title, 'Conciliator, sive de Convenientia Locorum S. Scripturæ quæ pugnare inter se videntur.' 2, 'De Resurrectione Mortuorum,' Amst., 1636. 3, 'De Creatione Problemata xxx.,' Amst., 1635. 4, 'De Termino Vitæ Libri iii.,' Amst., 1639. 5, 'Spes Israelis,' and in Spanish, 'Esperanza de Israel,' Lond., 1650. 6, 'A Defence of the Jews in England,' Lond., 1656. 7, An edition of the Hebrew Bible, in 2 vols. 4to., Amst., 1635.

MENDELSSOHN, MOSES, was born at Dessau, in 1729, where his father Mendel was a schoolmaster. Being a Jew, he instructed his son in the Hebrew language and the elements of Jewish learning, though he caused him to be instructed in the Talmud by others. The celebrated work of Maimonides, 'Moreh Nevochim' (the guide to the wanderers), he studied with such zeal that an impaired constitution and a distorted spine were lasting marks of his application. This work however seems to have strengthened his mental powers. In 1742 he went to Berlin, where he subsisted on the small bounties of the members of his own persuasion; but his mind was greatly improved by his intercourse with men of superior intellect. Israel Moses, a Jewish mathematician, urged him to read Euclid's 'Elements;' a physician named Kitsch instructed him in Latin; and by the aid of Dr. Aaron Salomon Gumpertz, he became acquainted with modern literature. He lived for some time in a very humble condition, until a rich silk-manufacturer, named Bernard, took him into his house as instructor to his children. He subsequently became a superintendent in the factory, and was ultimately taken into partnership. His intimacy with Lessing began in 1754, and is said to have been of the greatest advantage to him. Philosophy now became his favourite study, and his first work was his 'Briefe über die Empfindungen' (letters on the sensations). He published other philosophical works from time to time, and gained a high reputation for acuteness rather than for originality of thought: his excellent moral character also greatly contributed to the respect in which his religious authority was held. His 'Jerusalem, oder über Religiöse Macht und Judenthum' (Jerusalem, or an essay on the interference of the state in matters of religion and Judaism) appeared in 1783. He had begun a philosophical work entitled 'Morgenstunden' (morning hours), of which the first volume was published, when he received Jacobi's 'Essay on the Doctrine of Spinoza.' He thought that this essay charged his friend Lessing (the deceased) with Spinozism; a charge then much more heavy than at present, when many German philosophers are avowed admirers of Spinoza. The zeal with which he defended his friend by a written answer excited him to such a degree, that a cold, which he subsequently took, was sufficient to terminate his existence in 1786.

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* Στραβὸς τὰς ὄψεις ὀξὺς δὲ τὸν νοῦν.

As an instance of the successful pursuit of knowledge under difficulties, Mendelssohn is immortalised; and to do him full justice, the circumstances of his life must be remembered by the reader of his works, one of which has been translated into almost every European language: this is his 'Phædon,' a dialogue on the immortality of the soul, held between Socrates and his disciples. The characters are taken from Plato's dialogue of the same name, and the descriptive parts are mere translations of the original. The Jewish philosopher however has made Socrates produce new arguments in place of those attributed to him by his disciple Plato; thinking these new arguments better adapted to the conviction of modern readers. The following is his principal and indeed his only peculiar argument, the rest of the dialogue being employed in its defence, and in expressions of reliance on the goodness of the Deity. For every change three things are required: first, a state of the changeable thing prior to its change; secondly, the state that follows the change; and thirdly, a middle state, as change does not take place at once, but by degrees. Between being and not-being there is no middle state. Now the soul being simple, and not, as a compound body, capable of resolution into parts, must, if it perish, be absolutely annihilated; and in its change from death to life, it must pass at once from being to not-being, without of course going through any middle state; a change which, according to the three requisitions of change, is impossible. Thus by *reductio ad absurdum* the immortality of the soul was proved. Kant, in his 'Critik der reinen Vernunft' (second edition[*]), has shown the futility of Mendelssohn's argument, while he admits his acuteness in perceiving that mere incapability of resolution into parts was of itself not sufficient to preserve the immortality of the soul, as had been supposed by many philosophers of the time. Mendelssohn, by assuming that change must be gradual and not sudden, thought that he had established his point, as the soul, being simple, could not admit of gradual resolution. Kant however shows that we may conceive a gradual annihilation even without resolution into parts; or, to use his own expression, a diminution of the *intensive magnitude*. Thus a deep red colour may grow fainter and fainter till at last all the redness is gone, and this without any diminution of the surface coloured. Another fallacy in Mendelssohn's argument is that his definition of change applies only to a transition from one state of being to another, and therefore does not include a transition from being to not-being. For if not-being be considered a state of being, there is no occasion for an argument at all, as the continuance of being is assumed in the definition of change, nor would anything be gained by supposing the soul in such a paradoxical state as nonentity with still a sort of being attached to it.

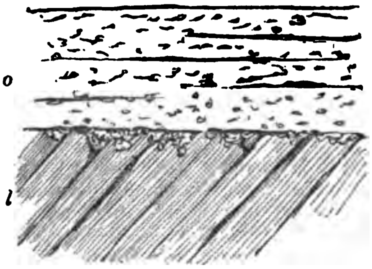
A magnificent edition of Mendelssohn's works was published lately at Berlin: an English version of the 'Phædon' appeared in 1789 and also in 1838.

MENDE. [LOZERE.]

MENDICITY. [PAUPERISM.]

MENDIP HILLS, a long ridge of limestone extending from Wells in Somersetshire to the Bristol Channel at Bleydon Hill and Brean Down. Through its whole length it is what geologists term an anticlinal axis, the strata dipping to the north, under the drainage of the Avon and the Yeo, and to the south under the low plains watered by the Axe and the Brue. This axis passes from Frome by the Beacon Hill above Shepton Mallet, Masbury Castle, Nine-Barrow Hill, and Black Down, to Bleydon Hill, Uphill, and Brean Down, from whence, according to Buckland and Conybeare, it may be supposed to be continued into the Steep Holm in the Bristol Channel.

Along the line of the axis of Mendip old red-sandstone strata show themselves for considerable lengths, and form the nucleus of this miniature mountain range. They are exposed on the roads from Wells to Chewton Mendip, and to Harptree, in each case evidently lying below the carboniferous limestone. Upon the slopes of this limestone, both north and south, rest considerable stratified masses of what is often justly termed magnesian conglomerate, and this is covered by the general mass of red marls which fill so large a tract in the low parts of Somersetshire. The limestone series is estimated by Buckland and Conybeare at from 500 to 700 yards thick. The axis of the Mendip Hills runs irregularly east and west: the geological æra of its principal upward movement appears to be anterior to the red marls, and probably to the red conglomerate; though near Wells and in other parts the slope of the conglomerate beds proves a subsequent movement. There is no better example known of the unconformity of strata than that presented in Vallus Bottom, near Wells, by the junction of the lower oolite formation and the mountain or carboniferous limestone. Here the upturned and almost vertical strata of mountain-limestone are found covered by horizontal strata of oolite, each of these contrasted rocks containing the characteristic fossils which belong to them elsewhere. What renders the case more curious is the fact that the level surface of the subjacent inclined beds of limestone is not only worn smooth by littoral action below the oolite, but also covered by attached oysters, and perforated by the lithophagous shells of the oolitic sea into large and small holes now full of the oolite, and partly retaining the boring shells not uncommon in that rock.



o, the oolite in level beds; l, the mountain limestone in steeply inclined beds.

The most elevated point of the Mendip Hills is Masbury Castle, about 999 feet above the sea level.

The features of these hills remind the observer of some parts of northern Derbyshire, both in the wide bare surface of limestone and the rugged glens which suddenly break the dullness of the open country. These narrow valleys appear like cracks and fissures in the mass of calcareous rocks, which, in Cheddar Cliffs, rise 285 feet perpendicularly from the feet of the spectator, and undoubtedly exceed in grandeur the noblest rocks of Derbyshire or Yorkshire. Several of these glens are called 'combes,' and Brockley Combe may be taken as a beautiful example of the mixture of gray rock and antient wood.

From the chasms just alluded to the transition is easy to the caves and internal fissures, which are numerous in Mendip. Many of these have become familiar to geologists by the uncommon abundance of bones found in them by a host of explorers since the days of Catcott, the celebrated and unfortunate explorer of Hutton Hole.

Dr. Buckland, in his 'Reliquiæ Diluvianæ,' describes, from the notes of Mr. Catcott and Mr. Conybeare, the circumstances under which the teeth and bones of elephants, horses, oxen, stag, bear, fox, and other animals of the 'Mastozootic' æra occurred at Hutton. The bones were found in the ochre-pits, which were antiently worked; they were mostly white, well preserved, and appear to have been drifted in by water, or collected from the falling in of quadrupeds roaming on the surface.

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[*] Not in the first edition. The complete edition of Kant's works, now publishing by M. Rosenkranz, at Leipzig, is highly valuable, as distinguishing the additions made in subsequent editions to the original form.

At Buringdon, in the Mendip Hills, and also in Wokey Hole, a celebrated cavern near Wells, human bones have been found of high antiquity, but being accompanied by urns or other marks of sepulture, it is not supposed they belong to races contemporary with the mammoth and large cavern bear. The specimens of this latter animal in the cave at Hutton are of enormous bulk.

Not far from Hutton Hole is the no less renowned cavern of Banwell, explored under the direction of the bishop of Bath and Wells. The best collection of the contents of this rich repository is to be seen near the mouth of the cave, at the house of Mr. Beard. The complicated parts of this cavern are accessible by steps made in the rock, and are much visited. The bones belong chiefly to oxen and deer. Bones of elephants, bears, and other carnivora occur less commonly. The specimens are usually in admirable preservation, and contrast remarkably with the fragmentary bones of the same animals at Kent's Hole and Kirkdale.

Very recently Mr. Long communicated to the British Association at Newcastle a notice of human bones found in a cave at Cheddar.

The Mendip Hills, in their metalliferous products, resemble the similarly constituted mountains of Derbyshire and Flintshire. They yield galena, calamine (carbonate of zinc), and ochre. Manganese is dug about East Harptree. The galena occurs principally in limestone; the calamine belongs to the overlying magnesian conglomerate. In that rock agates occur, and the large geodic crystallizations of quartz called 'potatoe-stones.' The fossil corals, shells, trilobites, &c. of the Mendip Hills have been long known to collectors; but a complete account of them has, we believe, never been prepared.

(Conybeare and Phillips, *Geology of England and Wales;* Buckland and Conybeare, 'On the South-west Coal District of England,' in *Geol. Trans.*, vol. i., new series.)

MENDOCI'NO, CAPE. [CALIFORNIA.]

MENDOZA, INIGO LOPEZ, better known as the Marques de Santillana (Sancta Juliana), was born in 1398, at Carrion de los Condes, and died in 1458. He was grandson of the poet Pero Gonzalez Mendoza, and a descendant of that Mendoza, who, in the battle of Aljubarrota, saved the life of Juan I. at the expense of his own. (Romane de Hurtado de Velarte: 'El Caballo vos han muerto'.) He was also the father of the first duke of Infantado, who secured the preservation of his valuable library and directed it to be kept at his palace of Guadalajara.

Santillana was the most elegant scholar at the court of Juan II., then the most brilliant in Europe. Much of his poetry is still in MS., and is partly lost or lying in dust. Several of his pieces however, chiefly devotional and amatory, are contained in the older Cancionoros. Like the compositions of D. Juan Manuel, the marquis Enrique de Villena, and many others, they exhibit a singular contrast with the fierceness of that period. They throw a false shade, perhaps a decent veil, over realities too disgraceful and disgusting, from which the gifted few sought mental relief in subtility and imaginary affection; but such poetry can never touch the heart nor even be forcibly expressed when it is not genuine, that is to say, when it is not deeply felt. By introducing the sonnet, Santillana (Quintana's *Poes. Escog.*), became a forerunner of the bold innovator Boscan. But he did more, by endeavouring to impart a moral tendency to the national poetry, by extending it by allegorical invention, and embellishing it with learning. His efforts in that respect are apparent in his 'Elegy to his tutor and friend Villena,' and his 'Doctrinal de Provados,' which show that he was no adherent of Alvaro de Luna. All parties were eager to obtain the powerful assistance of Santillana's military, political, and moral character. His 'Refranes' (traditional proverbs) were reprinted by the learned Mayans (*Origenes de la Lengua Castellana*, vol. i., p. 179.)

Fernando del Pulgar, Sarmiento (*Obras Postumas*), Nico. Antonio, and Sanchez (*Colec. de Poes.*), give much curious information on this Mendoza.

MENDO'ZA, DIE'GO HURTA'DO, a scholar, statesman, and general under Charles V., was grandson of the above Mendoza, and younger son of the first marquis of Mondejar, who was also second count of Tendilla. He was born in 1503, at Granada, and not at Toledo, as was supposed by Tamayo Vargas. He received his early education at home from Peter Martyr d'Angleria, who had been brought to Spain by the first count of Tendilla to teach the youth of the nobility. After learning Arabic at Granada, he studied Latin, Greek, Hebrew, divinity, and civil and canon law at Salamanca, where, by way of relaxation, he produced the first specimen of the comic romance, in his 'Lazarillo de Tormes,' a work which has been improperly ascribed by Siguenza to the Jeronymite Juan Ortega. It is written in that *gusto picaresco*, which was much in fashion in the seventeenth century. Being sent from the university to the Imperial army in Italy, to show his talents in a new capacity, he still found time occasionally to visit the universities of that country, and to hear the eminent lecturers, such as Niphus of Naples and Montesdoca of Seville. In his capacity of ambassador at Venice and at Trent, where political interests were at stake; at Rome, the centre of intrigue; and as general in Tuscany, which was threatened by the Turks and their ally Francis I., he always defeated the treachery of the French king, and baffled the designs of all parties. He faced every danger, and commanded the respect and admiration even of those whom he could not please. (Paul. Mann., *Cic. de Philoso.*, Lazaro Bonamico.) Nor could he conceal that spirit of freedom which Charles had destroyed in Spain. He strongly reprobated his sale of the Tuscan fortresses to Cosmo de' Medici, and by his opposition prevented his transfer of Milan and Siena to Paul III., who wanted to buy them for Octavio Farnesio. In a letter to Zuñiga, alluding to ambassadors, he boldly says, 'When kings wish to cheat, they begin by us.' The republicans or burgesses indeed looked on Mendoza as the greatest enemy of Italy. That country however was indebted to him for having introduced into it the writings of Basil the Great, Gregory of Nazianzus, Cyril of Alexandria, Archimedes, Appian, and others. Not satisfied with employing Arnoldus Ardenius in transcribing the Greek MSS. of different libraries, especially those which Cardinal Bessarion had bequeathed to Venice, Mendoza sent Nico. Sophianus of Corcyra to Thessaly and Mount Athos in search of manuscripts. He also paid a heavy ransom for a Turkish prisoner, who was a favourite of Solyman the Magnificent. As a return for this service he only asked for antient works from the sultan, to whom they were useless, and begged him to permit the Venetians, then in great want of corn, to import it from Turkey. His request was granted, with a present of several chests of literary treasures. In 1555 Mendoza was superseded at Rome, in order to propitiate Julius III. Subsequently he fell under the displeasure of that heartless bigot Philip II., who banished from his court this old servant, then sixty-four years of age. This act of royal severity proved however beneficial both to the illustrious veteran and to posterity. In his retirement at Granada Mendoza prosecuted those studies which were congenial to his taste: he investigated antiquities, collected above 400 Arabic MSS., and crowned his literary fame by his 'Guerra contra los Moriscos,' the publication of which, even with omissions, the government did not permit till the year 1610. The true text was restored in 1776, at Valencia, by Portalegre, who prefixed to it the author's life, which, although ill written, is highly interesting. In this work, the finest specimen of the historical style in the Spanish language, Mendoza has left the best example of an imitation of the Latin historians that modern European literature possesses. The rich and florid diction of this history forms a contrast with the conciseness and rigidity of Sallust, with whom however Mendoza has generally been compared. The modern historian is a model of impartiality: he does not even spare his own brother. Having been an eye-witness of most of the events which he has so admirably recorded, he has happily combined in the same work the strictest accuracy with integrity and the ability of a great writer.

In 1575 Mendoza obtained permission to return to Madrid on business, but he died shortly after his arrival there. He bequeathed his valuable library to the king. Ambrosio Morales, Nico. Antonio, Bouterwek, and many others, are profuse in their eulogiums of Mendoza. Juan Diaz published his poems in 1610 at Madrid, but without the numerous comic and satiric pieces. Other more important works of his have never yet been published· among them are his political commentaries.

MENDO'ZA. [PLATA, LA.]

ME'NE'HOULD, SAINTE. [MARNE.]

MENELA'US (called also **MILLEUS** by Apian and Mersenne, but on what authority is not known; in a copy of Weidler which belonged to Montucla we find the latter, in a manuscript note, describing Milleus as 'Menelaus défiguré par les Arabes') was an Alexandrian, who observed the stars for a long while at Rome, and was living there in the time of Trajan. He is mentioned by Proclus and Pappus, and probably is the person intended by Plutarch, who mentions a mathematician of that name. Pappus gives the titles, or other mention, of at least two works of Menelaus which have not come down to us. Ptolemy, in the Syntaxis, compares some of his own observations with those of Menelaus.

The only writing of Menelaus which has come down to us is the Latin treatise on spherical geometry, translated from the Arabic; the Greek is probably lost. This work, in three books, was published (Lalande) in a collection of Greek geometers made at Paris, in 1626; and afterwards Lalande, Heilbronner) by Mersenne, in his 'Universæ Geometriæ Synopsis,' Paris, 1644; also (Heilbronner and Weidler) by Regiomontanus. Another work on chords is said by Heilbronner to be contained in Mersenne's Synopsis: this is a mistake, since the work is entirely lost.

The books of Menelaus on spherical geometry have been much used by Ptolemy in the Syntaxis, and the latter had for a long time the credit of two very remarkable propositions which appear in Menelaus, and which have been much used by Carnot and others in the modern extensions of geometry. These are the well known propositions relating to a transversal which cuts the three sides of a triangle, plane or spherical. [TRIANGLE.] There are other propositions of great ingenuity; so that Menelaus, who must be looked on as the successor of Hipparchus and Theodosius in the school of Greek geometers who treated of the doctrine of the sphere, must also be considered as having gone considerably beyond his predecessors.

MENES. [EGYPT.]

MENGS, ANTON RAFAEL, one of the most distinguished artists of the eighteenth century, was born at Aussig in Bohemia, in 1728. He was scarcely six years old when his father, who was himself a painter, though one of very moderate ability, being determined to bring him up to the same profession, whether he had talent or not, adopted a course of education for him more calculated to inspire him with a disgust than with a true relish for it. Being of a most harsh and tyrannical disposition, he compelled the boy to employ himself in drawing the whole day long, allowing him neither recreation nor relaxation from his tasks. In course of time Rafael was instructed by his father in oil painting, and miniature and enamel painting, but was still tasked in the same rigorous manner, and frequently received severe chastisement, if he had completed not within the time allotted him—which was generally short enough—what he had been set to do. In 1741 his father quitted Dresden, whither he had been called by Augustus III. (for he was a native of Denmark), and went to Rome, taking young Mengs with him. On his arrival in that city, his father used to take him every morning to the Vatican, in order that he might there study the productions of Raffaelle, and would make him remain there the whole day, without other refreshment than a bottle of water and piece of bread, until he came to fetch him back in the evening; nor was he even then allowed to recruit himself from his fatigue, but compelled to revise and finish up the studies he had brought home. This excessive drudgery did not however disgust him with the profession to which he was thus in a manner yoked: still the mode of life it occasioned was prejudicial, inasmuch as it prevented his acquiring other knowledge, and tended to render him shy of all society. In 1744 he returned with his father to Dresden, where his talents obtained for him the notice of Augustus, who appointed him court-painter; but according to a stipulation he had previously made, he was permitted to return to Rome, and his father accompanied him. After continuing his studies some time longer, he began to distinguish himself by his original compositions, among the rest by a Holy Family, in which the Virgin was painted from a beautiful peasant girl, of whom he became so enamoured, that he turned Catholic for her sake and married her. After that event he again returned to Dresden, where his pension was raised to a thousand dollars, and he was commissioned by the king to paint a large altar for a new chapel; which he wished to execute at Rome. But on his arrival there, other commissions (among which was a copy of Raffaelle's 'School of Athens' for Lord Percy, afterwards duke of Northumberland), and the Seven Years War, which caused the stoppage of his pension, interfered with the prosecution of the work. In 1757 he made his first attempt in fresco, a ceiling-piece in St. Eusebio, which was in too simple a style to satisfy the taste of that day. His 'Apollo and the Muses,' another work of the same class, in the Villa Albani, obtained for him much greater renown, and is one that will bear comparison with those by the greatest Italian masters. About this time he became acquainted with Webb, to whom he communicated his ideas on art, which the other passed off as his own in his 'Remarks on Poetry and Painting.' Mengs's reputation was greatly increased by the numerous works he executed for Charles III. of Spain, by whom he was invited to Madrid in 1761, and remained in that country till 1775, with the exception of an interim of three years, in the course of which he painted the ceiling of the Camera de' Papiri at Rome. His pencil was employed in decorating the royal palaces of Spain; and the Apotheosis of Trajan, in that of Madrid, is considered his chef d'œuvre.

After a marriage of the utmost domestic harmony, Mengs lost his wife in 1778. From that time his health began to decline, nor was it long before he followed her to the tomb: he died on the 29th of June in the following year, and was buried by her side in the church of San Michele Grande at Rome. Notwithstanding the great sums be had received during his life, about 250,000 livres, instead of amassing money he left scarcely sufficient to defray the expenses of his funeral; but the king of Spain bestowed pensions on his two sons, and provided also for his five daughters. Although Mengs's reputation as an artist does not now stand so high as in the last century, he undoubtedly possessed many excellences, and, compared with his immediate contemporaries, deserved the applause showered upon him. Refined taste, nobleness of ideas, correctness of drawing, vigour of colouring, finished execution, and studied grace are merits of a high rank, which he possessed in an eminent degree; but though most carefully studied, and in conformity with the principles he laid down for the art, his works do not always display those loftier qualities of mind which the higher branch of historical painting demands. His writings, which were published after his death by the Cavalier d'Azara, contain many excellent precepts, and both practical and critical observations, and have accordingly been translated into the principal modern languages.

MENIN, or MEENEN, a fortified town in West Flanders, situated on the left bank of the river Lys, by which it is separated from France. It is 11 miles north from Lille, and 30 miles south from Bruges; in 50° 48′ N. lat. and 3° 12′ E. long.

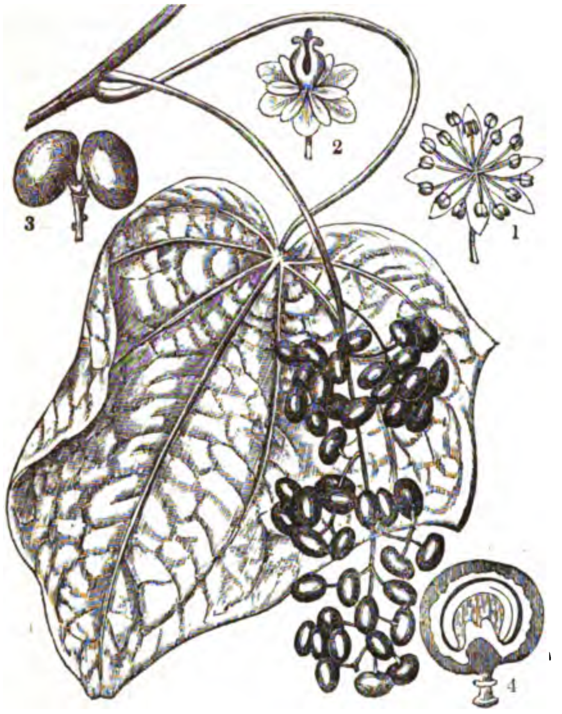
Menin contains manufactures of linen, lace, and soap, besides many breweries, salt-refineries, and oil-mills. It also carries on a considerable trade in horses, cattle, sheep, corn, and tobacco. It has a population of 7909 inhabitants.

MENISCUS. [LENS.]

MENISPERMA'CEÆ are an important and extensive natural order of Exogenous plants, considered by some to be Polypetalous, and referred to De Candolle's Thalamifloral subclass; by others placed among the Monochlamydeæ of that author. The order consists of twining or scrambling shrubby plants, with alternate leaves without stipules, and small greenish or white unisexual flowers, often collected in large loose panicles or racemes. The floral envelopes are arranged in a power of three or four, and usually in more rows than one; whence arises the opinion that these plants belong to Polypetalous Exogens, the inner series being regarded as a corolla. The stamens are either distinct or monadelphous, either equal in number to the inner series of the calyx, and of the same number, or much more numerous. The carpels are in most cases three, or some multiple of that number, either distinct from each other or consolidated. The fruit consists of succulent one-celled drupes, with a solitary seed, and a horseshoe-shaped embryo, with thin flat cotyledons.

The wood of the stem is arranged essentially upon the Exogenous plan, but has some striking peculiarities. According to M. Decaisne, it has no annual concentrical layers The woody plates are always simple, and do not divide longitudinally, as in other Dicotyledons, but increase each year by the formation of a new woody layer outside the former and inside the liber. The latter ceases to grow after the first year. In Cissampelos Pareira and some others new woody plates, like the first in appearance, but having no spiral vessels or liber, show themselves, at the end of several years, on the outside of the first, and produce around them a concen tric circle, a formation which may be repeated a great many times. (*Comptes Rendus*, v. 393.)

Menispermaceæ are usually bitter and tonic plants; the species of Cocculus called Bakis, Fibraurea, cinerascens, and others, are used in their native countries as a remedy for intermittent fevers. Cocculus palmatus furnishes the Calumba root of the shops, a valuable bitter. Pereiria medica is used for the same reason in Ceylon, as is Clypea Burmanni in Malabar, and various sorts of Cissampelos in Brazil. But the bitter principle, which in its diluted state is thus valuable, becomes a dangerous poison if concentrated, as in the seeds of Anamirta Cocculus, the Cocculus Indious of the shops.



Menispermum canadense.

1, a male flower; 2, a female; 3, the ripe fruit; 4, a vertical section of the same, showing the embryo and horse-shoe seed.

MENISPERMI'NA, a vegetable alkali extracted by Pelletier and Couerbe from the *menispermum cocculus*, or *cocculus Indicus*, in the shells of the fruit of which it occurs.

MENISPERMUM (so called from *μήνη*, the moon, and *σπέρμα*, seed, from the crescent-like form of its fruit), a genus of the natural family of *Menispermaceæ*, which formerly contained numerous species, many of them valuable for their medicinal and other qualities, such as the Calumba root, and the berries called Cocculus Indicus, which are now referred to the genus COCCULUS. Menispermum, as at present constituted, contains but few species; and these are climbing shrubs which have their sepals and petals in quaternary order, arranged in two or three whorls. *Male*, stamens 16 to 20; *Female*, ovaries 2 to 4; Drupes baccate, round, kidney-shaped, single-seeded. *M. canadensis* and *smilacinum* are found in the United States of America, and *M. Dauricum* in the wooded hills of Da-uria.

MENNONITES, a religious sect which sprung up in Holland and Germany about the time of the Reformation, and which is identified by many writers with the sect of the Anabaptists, with whom the Mennonites held several leading doctrines in common. [ANABAPTISTS.] They received their appellation from Simon Menno, who was born at Witmarsum, a village in Friesland, in the year 1505. In 1536 he left the Roman Catholic church, in which he was a priest, and joined the Anabaptists, among whom he became a teacher in the next year. During the remainder of his life, Menno travelled with his family and preached his doctrines throughout a great part of Germany and Holland, where he gained many proselytes, chiefly from among the Anabaptists. He died in the year 1561, in the duchy of Holstein. His works were published in one volume folio, at Amsterdam, in 1651. Though he is said to have been a notorious profligate when young, his character after he came forward as a religious teacher was unimpeachable; and he was possessed of considerable genius, some learning, and a persuasive eloquence. His doctrines were free from the anti-social and licentious tenets and the pretensions to inspiration which are ascribed to the Anabaptists; but he agreed with them in condemning the baptism of infants, in expecting a personal reign of Christ on earth for a thousand years at the Millennium, in excluding magistrates from the Christian church, and in maintaining that all war was unlawful, that the taking of oaths was prohibited by Christ, and that human science is useless and pernicious to a Christian. But these tenets were so explained and modified by Menno, as to differ very little from the doctrines generally held by the reformed churches. He insisted upon the strictest attention to moral duties, and exercised a most severe discipline upon offenders.

The followers of Menno very soon split into two sects, the Flemings and the Waterlandians, so called from the countries in which they arose. The latter somewhat relaxed the severe discipline of Menno towards offending members, which the former maintained in all its rigour. The Flemings divided again, on the subject of the treatment of excommunicated persons, into Flandrians and Frieslanders, and there also arose a third division called Germans. In process of time the greater part of these sects joined the Waterlandians.

The Mennonites put forth several confessions in the seventeenth century, the earliest of which is one drawn up by the Waterlandians. By these confessions it appears that their doctrines were nearly the same with those mentioned above as held by Menno. According to Mosheim, their fundamental principle was that 'the kingdom which Christ established upon earth is a visible church or community, into which the holy and the just are alone to be admitted, and which is consequently exempt from all those institutions and rules of discipline that have been invented by human wisdom for the correction and reformation of the wicked.'

In the seventeenth century the Mennonites obtained toleration in Holland, Germany, and England. In the year 1630, a considerable part of them arranged their differences in a conference at Amsterdam, and formed a union, which was renewed in 1649.

Further information respecting this sect may be found in Herman Schyn's *Historiæ Mennonitarum plenior Deductio*, which is a defence of the Mennonites, and in which the author protests against their being confounded with the Anabaptists; and also in Mosheim's *Eccles. Hist.*, cent. xvi., sect. iii., part ii., c. 3; and cent. xvii., sect. ii., part ii., c. 5. It is to be wished that Mosheim had written the history of this sect in a spirit of greater candour.

MENOBRANCHUS. [NECTURUS.]

MENOPO'MA. [SALAMANDROPS.]

MENORCA, or **MINORCA**, is the second in size ('the minor') of the Balearic Islands. It is situated in the Mediterranean, off the eastern coast of Spain, between 39° 47′ and 40° 5′ N. lat., and between 3° 50′ and 4° 23′ E. long. It lies 24 miles to the east-north-east of Mallorca, about 125 miles south-east of the coast of Cataluña, 162 miles east by south from the mouth of the Ebro, the nearest part of Valencia, and about 190 miles north from the territory of Algiers in Africa. It has a circumference of 62 miles, and an area of about 300 square miles. In form it is irregular; being in length 33 miles, and in the broadest part 13 miles. The coast is indented on every side with small bays or deep creeks, and is surrounded with islets, rocks, and shoals.

Menorca was successively possessed by the Phœnicians, Carthaginians, Romans, Vandals, and Arabs. On the conquest of Mallorca, in A.D. 1229, by Don Jayme of Aragon, surnamed the Conqueror, Menorca, which was still held by the Moors, became tributary to that prince. In A.D. 1287 the island was conquered by Alfonso, grandson of Don Jayme the Conqueror, who banished or enslaved the Moorish inhabitants. In the reign of Charles V. it was seized, but soon evacuated, by Barbarossa. It remained subject to the crown of Spain till the year 1708, when the earl of Stanhope, with 3000 British troops, attacked Mahon, and by shooting into the town arrows to which were attached papers threatening the garrison with labour in the mines unless they immediately surrendered, he induced them to capitulate. The conquest of the island followed that of its capital, and was confirmed by the treaty of Utrecht: the English retained possession of Menorca till the year 1756, when

Mahon was attacked by the French under Marshal de Richelieu, and Admiral Byng having failed in relieving it, the island fell into the hands of France. At the peace of 1763 it was restored to the English, from whom it was wrested by the Spaniards in 1782; it was retaken in 1798, and finally ceded to Spain at the peace of Amiens in 1802.

In Menorca, the spring of the year is generally clear, mild, and temperate; the summer is intensely hot; the autumn is the season of the annual rains, which are exceedingly heavy; the winter is often cold, though snow and ice are rare. On the whole the climate is less agreeable than that of Mallorca; the air is more humid; and the summer heats more oppressive, which arises from the comparatively level character of Menorca. The only eminence deserving the name of mountain is Monte Toro in the centre of the island, the greater part of which is unsheltered from the violent north winds which in the winter rage in the Gulf of Lions, while the heats of summer are untempered by mountain breezes. The surface of the country is a gently undulating plain, rocky and barren, or partially clothed with wild olives and corn. The southern shore is the most level. The soil is for the most part poor and sandy; that on the slopes is much richer than that of the low grounds.

The mineral productions of Menorca are limestone, freestone, marble of various colours (little used however by the natives), slate, of which a quarry is worked at Cape Mola on the east side of the island, gypsum, used for cement, and potters' clay. There are a few lead-mines, very unproductive, and iron-ore is found in small quantities.

The vegetation of Menorca is very similar to that of Mallorca, though it is much less abundant, and the trees seldom attain to so large a size. Aromatic plants and herbs, many with medicinal qualities, grow in profusion. Wheat, barley, and a little maize are cultivated, though not enough for the consumption of the island; they return on an average six or seven for one. Olive-trees grow almost without culture; little oil is made from their fruit, which is generally preserved for eating. Vines are plentiful, and produce both white and red wine. Fruit is abundant: there are oranges, lemons, pomegranates, figs, apples, pears, and almonds; the melons are of superior flavour. Date-palms will grow in sheltered spots, but yield no fruit. Capers grow spontaneously in all parts of the island. Flax, hemp, saffron, and the cotton-tree thrive well, but are little attended to. Vegetables are no less abundant than fruit, and consist chiefly of peas, beans, onions, cauliflowers, broccoli, tomatos, endive, cucumbers, and gourds, all excellent in quality.

Menorca is rich in cattle, sheep, goats, and pigs; and also in game, as partridges, quails, and rabbits; woodcocks, snipes, and teal are plentiful in winter. Fish, especially anchovies, with oysters, lobsters, and other crustacea, abound on the coasts. Lizards swarm, and there are a few venomous reptiles, but no beasts of prey.

The natives are engaged either in agriculture, fishing, or commerce. The imports consist of corn, oil, brandy, tobacco, coffee, sugar, spices, hardware and cutlery, linen and woollen goods, timber, cordage, tar, and gunpowder. The exports are wines, wool, cheese, salt, honey, and wax. The possession of Menorca by the English during the last century did much to promote its trade and commerce; a spirit of activity and enterprise was awakened, and the natives, besides engaging in mercantile pursuits, fitted out vessels as privateers, and enriched themselves at the expense of France and Spain. But since the island has reverted to the Spaniards, trade and commerce have greatly declined.

The island is divided into four *terminos*, or districts, Ciudadela, Mahon, Alhayor, and the united *terminos* of Ferarias and Mercadal. In each is a town of the same name, the capital of the district. The population of the whole island is about 35,000, of which the *termino* of Ciudadela contains 8000, of Mahon 19,000, of Alhayor 4000, and of Ferarias and Mercadal 4000. Ciudadela, the present metropolis of Menorca, is situated on the north-west coast, on a small port, shallow and difficult of entrance. The city is fortified, and its walls are partly of Moorish, partly of more recent construction. Its population is above 4000. The streets are narrow, crooked, and wretchedly paved; many of the houses are neat, and some handsome. A cathedral, two parish churches, several convents, an hospital, a barrack, with a government-house, are the public buildings.

Ciudadela, though the residence of the captain-general, the bishop, and the nobility of Menorca, is inferior in importance to Mahon, or Port Mahon, on the opposite or south-eastern shore of the island, and 24 miles from the capital, with which it communicates by a carriage-road. Mahon is said to have been founded by and called after Mago, a distinguished Carthaginian commander. It is picturesquely situated at the bottom of a deep and narrow bay, on rocks much elevated above the sea, and in many places undermined by the waves. Mahon was formerly surrounded with walls, the only relic of which is a gateway of Arabian architecture. The streets are steep, narrow, crooked, and badly paved: the governor's house, town-hall, hospital, barracks, and other public buildings are scarcely worthy of notice; the private houses are neat and clean, built with taste, but often without regard to comfort, for many being on the English model, they are ill adapted to the sultry climate. Some of their roofs are tiled, and some flat-terraced in the Oriental style. The port of Mahon is one of the best in the Mediterranean, or (it has been said) in the world, as a large fleet of line-of-battle ships may ride within it, in seven or eight fathoms water, perfectly sheltered from every wind. The Spaniards have a saying, 'The ports of the Mediterranean are June, July, August, and Port Mahon:'

> 'Los puertos del Mediterraneo son
> Junio, Julio, Agosto, y Puerto Mahon.'

Port Mahon alone made the possession of Menorca an object of contention among the maritime nations of Europe during the past century In the harbour are four rocky islets; on one stands an hospital, on another a quarantine establishment, on a third a lazaretto, and on the fourth an arsenal with naval storehouses—all erected by the English. At a short distance from Mahon stood Fort St. Philip, famed in the military annals of the last century, and once a league in circumference. It is now a heap of ruins, having been blown up by the Spaniards in 1803, to prevent its being used by the English, in case they should again seize the island.

The other ports of Menorca are, Fornels, a well sheltered bay, capable of holding a large fleet, and Adaya, a small harbour, full of rocks and shoals, and only entered by fishing-craft.

Alhayor, Mercadal, and Ferarias, the other district-capitals of Menorca, are little more than villages, and contain nothing worthy of notice.

Monte Toro is in the form of a cone, with a flat summit which is occupied by an Augustin convent, to which pilgrimages are often made by the natives with bare feet. Mount St. Agatha, the eminence next in importance, is supposed to have been a military post in the time of the Romans, and traces of a Moorish fortification are still visible on its summit. Two miles south of Ciudadela is a curious grotto, called 'La Cava Perella,' full of stalactites and stalagmites; and in the same vicinity is another cavern containing a pool or lake of salt-water.

Menorca is not rich in antiquities. About two miles from Alhayor is a rude pyramidical ruin of Druidical character ascribed to the Phœnicians, the earliest colonists of the island; but whether it be temple, tomb, or watch-tower is yet disputed. Punic, Greek, Roman, Gothic, and Arab coins have been discovered; together with small statues of bronze, vases, lamps, urns, &c., chiefly of Roman origin.

In character and manners, the Menorquines resemble the natives of Mallorca. They are equally attached to their native soil, and to their customs and religion, but they are less indolent and more enterprising. Like the Mallorquines they are proud, boastful, and irascible, yet ordinarily mild and peaceable. The same dress and language are common to both.

(Dameto and Mut, *History of the Balearic Kingdom*, Armstrong's *History of the Island of Minorca*; Laborde, *Itinéraire Descriptif de l'Espagne*; St. Sauveur, *Travels through the Balearic and Pithyusian Islands*.)

ME'NSTRUUM. [Solvent.]

MENSURATION is the name given to a branch of the application of arithmetic to geometry, which shows how to find any dimension of a figure, or its area, or surface, or solidity, &c., by means of the most simple measurements which the case will admit of. We need hardly say that a complete treatise on this science would involve every branch of mathematical science. We shall in this article collect together the most important rules, the method of using which will be obvious to all who can employ the trigonometrical tables. By the length of a line we mean the number of linear units contained in it, and by its square and cube the number of units multiplied by itself once and twice.

The measurement of lengths and directions resolves itself for the most part into the determination of a side or angle of a triangle, when other sides or angles are given. The triangle may be either on a plane or on a sphere; but we refer the latter to SPHERE, since the use of spherical trigonometry can only be well explained in connection with astronomy. Let a, b, c be the sides of a triangle, and A, B, and C the opposite angles. If the triangle be right angled at C, we have the following formulæ:—

$$a = c \sin A = c \cos B = b \tan A = b \cot B$$
$$b = c \sin B = c \cos A = a \tan B = a \cot A$$
$$c = \frac{a}{\sin A} = \frac{a}{\cos B} = \frac{b}{\sin B} = \frac{b}{\cos A}$$
$$c = \sqrt{(a^2+b^2)} \quad a = \sqrt{(\overline{c+b}\,.\,\overline{c-b})} \quad b = \sqrt{(\overline{c+a}\,.\,\overline{c-a})}$$

The preceding formulæ contain the solution of every case of right angled triangles.

We now pass to oblique angled triangles, of which there are four cases.

1. Given the three sides, a, b, and c, to find the angles. Let the perpendicular let fall from C upon the longest side c divide it into two segments α and β adjacent to a and b, and let b be $> a$. Then the equations

$$\beta+\alpha = c, \quad \beta-\alpha = \frac{(b-a)(b+a)}{c}$$

(in which $\beta - \alpha$ is easily found by logarithms), will give β and α. Then

$$\cos B = \frac{\alpha}{a} \quad \cos A = \frac{\beta}{b} \quad C = 180^\circ - (A+B)$$

Another method is as follows. Compute M from the following*

$$s = \frac{a+b+c}{2} \quad M = \sqrt{\left(\frac{s-a\,.\,s-b\,.\,s-c}{s}\right)}; \text{ then}$$

$$\tan \tfrac{1}{2}A = \frac{M}{s-a} \quad \tan \tfrac{1}{2}B = \frac{M}{s-b} \quad \tan \tfrac{1}{2}C = \frac{M}{s-c}$$

2. Given two sides a and b, and the remaining angle C, required c, A, and B. Firstly, to find the angles, determine

$$\tfrac{1}{2}(B+A) \text{ from } \tfrac{1}{2}(B+A) = \tfrac{1}{2}(180^\circ - C)$$
$$(B-A) \text{ from } \tan \tfrac{1}{2}(B-A) = \frac{b-a}{b+a}.\cot \tfrac{1}{2}C$$
$$A = \tfrac{1}{2}(B+A) - \tfrac{1}{2}(B-A); \; B = \tfrac{1}{2}(B+A) + \tfrac{1}{2}(B-A)$$
$$c = b\frac{\sin C}{\sin B} = a\frac{\sin C}{\sin A}$$

To find the third side without the aid of the angles, assume

$$\sin \theta = \frac{\sqrt{(ab)}.2\cos\tfrac{1}{2}C}{a+b}, \text{ then } c = (a+b)\cos\theta;$$

or

$$\tan \theta' = \frac{\sqrt{(ab)}.2\sin\tfrac{1}{2}C}{a-b}, \text{ then } c = \frac{a-b}{\cos\theta'}$$

3. Given a, b, and the angle A, to find the rest:

$$\sin B = \frac{b}{a}\sin A, \; C = 180^\circ - (A+B), \; c = \frac{a \sin C}{\sin A}$$

4. Given a, and two of the angles, to find the rest. It is unnecessary to distinguish the angles given, as two immediately determine the third.

$$b = a\frac{\sin B}{\sin A}, \; c = a\frac{\sin C}{\sin A}$$

The area of the triangle is

$$\frac{ab\sin C}{2} \text{ or } \frac{bc\sin A}{2} \text{ or } \frac{ca\sin B}{2} \text{ or } \sqrt{(s.\overline{s-a}.\overline{s-b}.\overline{s-c})}$$

The perpendiculars let fall from the vertices A, B, and C, upon the opposite sides, are severally $2\sqrt{(s.s-a.s-b.s-c)}$ divided by a, b, and c.

$$\text{Diam. of inscribed circle } 2\sqrt{(\overline{s-a}.\overline{s-b}.\overline{s-c} \div s)}$$

$$\text{Do. of circumscribed circle } \frac{a}{\sin A} \text{ or } \frac{b}{\sin B} \text{ or } \frac{c}{\sin C}$$

$$\text{or } abc \div 2\sqrt{(s.\overline{s-a}.\overline{s-b}.\overline{s-c})}$$

Segments of c made by perpendicular from C,

$$\text{Adjacent to } a, \frac{c^2+a^2-b^2}{2c}; \text{ to } b, \frac{c^2+b^2-a^2}{2c}.$$

Segments of c, by line bisecting C,

$$\text{Adjacent to } a, \frac{ac}{a+b}; \text{ to } b, \frac{bc}{a+b}.$$

$$\text{Line bisecting C} = \frac{2\sqrt{(abs.\overline{s-c})}}{a+b} = \frac{2ab}{a+b}\cos\tfrac{1}{2}C$$

$$\text{Line bisecting } c = \tfrac{1}{2}\sqrt{(2a^2+2b^2-c^2)}.$$

The area of a rectangle (in square units), and that of a parallelogram, is the product of the units in the base and perpendicular distance of the opposite sides. But if two sides only be parallel, half the sum of the parallel sides must be multiplied by the perpendicular distance between them. In other cases, the figure must be measured by dividing it into triangles, except when it is either a four-sided figure capable of inscription in a circle, or a regular polygon. Every triangle is half of the rectangle contained by any one of its sides, and the perpendicular let fall from the opposite vertex.

If a, b, c, and d be the sides of a four-sided figure inscribed in a circle, and s their half-sum, the area is

$$\sqrt{(s-a.s-b.s-c.s-d)}.$$

If a be one of the sides of a regular polygon of n sides, the area of the figure and the diameters of the circumscribed and inscribed circles are

$$\frac{na^2}{4}\cot\left(\frac{180^\circ}{n}\right), \; a \div \sin\left(\frac{180^\circ}{n}\right), \text{ and } a \div \tan\left(\frac{180^\circ}{n}\right)$$

Tables connected with this subject are given in the article POLYGONS, REGULAR, and corresponding tables for the solids in SOLIDS, REGULAR. For the method of measuring irregular areas, see QUADRATURES, METHOD OF.

The whole of the measurement of the circle depends upon the ratio of the circumference to the diameter, which is called π, and is 3·1415927 very nearly, or $\frac{22}{7}$ roughly, or $\frac{355}{113}$ very nearly. [ANGLE.] So many simple derivations from this number are practically useful, that we shall give a table of them, accompanied by their logarithms, first giving a method of multiplying and dividing by π, which is a correction of the use of $\frac{22}{7}$. To multiply by π, multiply by 22 and divide by 7; from the result take one-eighth of the hundredth part of the multiplicand as a correction; the result is too great only by about its 200,000th part. To divide by π, multiply by 7, divide by 11 and 2, and to the result add the eighth part of the thousandth part of the dividend; the result is too small by very nearly its 100,000th part.

The table just referred to is as follows:—

	Number.	Logarithm.
π	3·1415927	0·4971499
$\pi:2$	1·5707964	0·1961199
$\pi:4$	·7853982	9·8950899
$\pi:6$	·5235988	9·7189986
$\pi:8$	·3926991	9·5940599
$\pi:12$	·2617994	9·4179686
$4\pi:3$	4·1887902	0·6220886
2π	6·2831853	0·7981799
4π	12·5663706	1·0992099
$1:6\pi^2$	·01688686	8·2275490
$1:\pi$	·3183099	9·5028501
$4:\pi$	1·2732395	0·1049101
$1:4\pi$	·0795775	8·9007901
π^2	9·8696044	0·9942997
$\sqrt{\pi}$	1·7724539	0·2485750
$\sqrt[3]{\pi}$	1·4645919	0·1657166
$\sqrt{(1:\pi)}$	·5641896	9·7514251
$\sqrt{(4:\pi)}$	1·1283792	0·0524551
$\sqrt{(1:4\pi)}$	·2820946	9·4503951
$\sqrt[3]{(6:\pi)}$	1·2407010	0·0936671
$\sqrt[3]{(3:4\pi)}$	·6203505	9·7926371
Hyp. log. π	1·1447299	0·0587030

To find the circumference from the diameter, multiply by π; to find the diameter from the circumference, multiply by $1:\pi$; to find the area from the diameter, multiply the square of the diameter by $\pi:4$; to find the area from the radius, multiply the square of the radius by π; to find the diameter from the area, multiply the square root of the area by $\sqrt{(4\cdot\pi)}$; to find the area from the circumference,

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* This convenient adaptation of a well-known formula is found, we believe, for the first time in Professor Wallace's lately published work on Mathematical Theorems and Formulæ (Longman, 1839).

multiply the square of the circumference by $1:4\pi$; to find the circumference from the area, multiply twice the square root of the area by $\sqrt{\pi}$; to find the ordinate perpendicular to a diameter, take the square root of the product of the segments into which it divides the diameter.

To find the area contained between two concentric circles, multiply the product of the sum and difference of the radii by π.

The arc of a circle and its subtended central angle are connected as follows: the arc which is equal to the radius subtends an angle of 57°·3 very nearly; or it may be easily remembered as 57 degrees and *three*-tenths of a degree, diminished by one-*fourth* of a minute and one-*fifth* of a second; being 57° 17′ 44″·8, or 206264″·8. To find an angle from its arc (the radius being known), multiply the arc by 57·3, and divide by the radius; the result is too great by about three-quarters of its 10,000th part, and is in degrees and decimals of a degree. To find the arc from its angle, turn the angle into degrees and decimals, multiply by the radius, and divide by 57·3; the result is now too small by about three-quarters of its 10,000th part.

To find the area of a sector, find the arc (if only the angle be given), and multiply it by half the radius. To find the area of a segment contained between an arc and a chord, find the sector, and from it subtract the triangle formed by the terminal radii and the chord. [Segment.]

To find the length of an arc, when the radius is not known, measure the chord of the arc, and the chord of its half; from eight times the chord of the half subtract the chord of the whole, and take one-third of the remainder. For an arc not exceeding 60 degrees, the error is less than the 7000th part of the whole.

The preceding are the principal rules of mensuration, of which the necessity occurs in the elementary parts of the subject: those which remain are connected with solid geometry, and the most essential are as follows:—

The number of cubic units in the content of a rectangular solid (or parallelopiped; there is no shorter term for this most elementary form of solid figures) is the product of the number of linear units in its three adjacent sides. The content of a prism or cylinder is the product of the number of square units in its base and the number of linear units in its altitude. The content of a pyramid or cone is one-third of the base multiplied by the altitude. The surfaces of a prism or pyramid must be found by computing those of their several faces. The surface of a common cylinder (not including the bases) or of a right prism is the circumference of the base multiplied by the altitude; that of a common cone is half the product of the circumference of the base and the slant side.

The following formulæ relate to the sphere. To find the surface from the radius, multiply the square of the radius by 4π, or the square of the diameter by π; to find the content from the radius, multiply the cube of the radius by $4\pi:3$, or the cube of the diameter by $\pi:6$; to find the radius from the surface, multiply the square root of the surface by $\sqrt{(1:4\pi)}$, to find the diameter, multiply the square root of the surface by $\sqrt{(1:\pi)}$; to find the radius from the content, multiply the cube root of the content by $\sqrt[3]{(3:4\pi)}$; to find the diametet, multiply the cube root of the content by $\sqrt[3]{(6:\pi)}$; to find the surface from the content, multiply the cube root of the square of six times the content by $\sqrt[3]{\pi}$, to fine the content from the surface, multiply the square root of the cube of the surface by $1:6\sqrt{\pi}$. [Sphere.]

For other formulæ and methods, the detached articles on the different subjects may be consulted; or Hutton's or Bonnycastle's elementary works on mensuration.

MENTHA PIPERI′TA (Peppermint), a plant common in many parts of Britain, but cultivated for medical purposes. The dried plant, which is more powerful than the fresh, is of a lively green, with a peculiar aromatic odour, and a pleasant camphor-like taste, at first burning, but at last causing an enduring sensation of cold in the mouth. The dried herb is used for the preparation of a distilled water, and of a volatile oil, from which oil spirits or essence of peppermint is prepared. Of the oil three varieties occur in commerce, the German, English, and American. Twenty pounds of the herb yield from four to six drachms; but if the flowers be also distilled, the same weight will yield four ounces. It is often adulterated with oil of turpentine, oil of marjoram, and absolute alcohol. When pure it is of a whitish yellow, yellow, or even green colour; odour very strong, taste burning, camphor-like, causing a sense of coldness in the mouth. The oil is at first limpid, but becomes thicker, like a fixed oil. European oil does not deposit a stearopten, but the American easily forms long colourless four-sided prisms, which possess the odour of the oil. The American oil is more soluble in alcohol than the German; specific gravity 0·92, but when rectified 0·90. The action on the human system of any of the preparations of mint is stimulant and antispasmodic. The oil is used to be added to drastic or griping purgatives, and in other cases. It proved of considerable utility in bringing about reaction in the collapsed stage of Asiatic cholera.

MENTHA PULE′GIUM (Pennyroyal), an indigenous species of mint, smaller than most of the others, and of which the entire herb, except the root, is officinal. The odour is strong and peculiarly aromatic; taste herbaceous and bitterish. It has a stimulant and antispasmodic property, similar to most mints, but is supposed to possess also a specific power over the uterus, which has been much over-estimated. A distilled water, a spirit, and volatile oil are prepared from it, as from the preceding species.

MENTHA VI′RIDIS (Spearmint), a plant of Britain, very much resembling M. piperita; the colour however is of a deep green. It is also frequently confounded with M. crispa, than which it has a stronger and more agreeable odour, but weaker than peppermint. It has not the aromatic odour of that plant, nor does it leave the sense of coolness in the mouth. From it are prepared a distilled water, a spirit, and a volatile oil, which are used as the former.

MENTZ. [Mainz.]

MENU. [Manu.]

MENU′RA. [Mænura.]

MENYANTHES TRIFOLIA′TA (officinal part, the leaves), a plant common in our bogs, and hence called bog-bean, as its leaves resemble the common bean. The leaves are ternate, petiolate, and even when dried have a fine green colour, but are without odour; they possess an enduring bitter taste. One hundred parts of the fresh herb dry into thirty-nine; ten pounds of the dried plant yield two pounds and three-quarters of extract. It contains an extractive (Menyanthin), which Brandes says forms a white, transparent, and, when highly dried, pulverisable mass of an intense degree of bitterness. Troommsdorff says he obtained a yellowish brown, clear, very viscid, not pulverisable, bitter extract.

It is a tonic and febrifuge medicine of undoubted efficacy, but greatly neglected in the treatment of disease. The chief use said to be made of the large quantity annually collected is to substitute it for hops in brewing, a proceeding which is both illegal and detrimental to the beer, since, though bitter, it does not possess the aromatic quality of the hop.

MENZA′LEH, LAKE. [Egypt.]

MENZIKOFF, PRINCE. [Peter the Great.]

MEPHI′TES. [Badger, vol. iii., p. 262; Skunk.]

MEPHITIC AIR. [Carbonic Acid.]

MEQUINEZ. [Marocco.]

MER. [Loir et Cher.]

MERCAPTAN, a compound of hydrogen, carbon, and sulphur, discovered by Zeise, and so called from its energetic action on binoxide of mercury (corpus *mercurium captans*). It is prepared by distilling a mixture of sulphovinate of barytes and a strong solution of protosulphuret of barium. A volatile liquid and water pass over into the receiver, while sulphate of barytes remains in the retort; the ethereal product floats on the water, and when removed and carefully distilled, it separates into thionic æther and mercaptan, the properties of which are, that it is a colourless liquid, has a penetrating alliaceous smell, and a peculiar sweetish taste; its specific gravity is 0·842, it boils at 144°, and remains fluid at 8°. Water dissolves it sparingly, but æther and alcohol unite with it in all proportions; it has no action on litmus paper. Acetate of lead, but not nitrate of lead, gives a plentiful yellow colour in the solutions of mercaptan. When added to binoxide of mercury, energetic action ensues, water is generated, and a colourless crystalline compound is formed; with bichloride of mercury a similar product is obtained, attended with the formation of hydrochloric acid.

According to Zeise, the ultimate composition of mercaptan is—

Six equivalents of hydrogen . .	6
Four equivalents of carbon . .	24
Two equivalents of sulphur . .	32
Equivalent . . .	62

He however considers it as a *hydruret* of a compound base which he calls *mercaptum*, presumed to consist of five equivalents of hydrogen 5, four equivalents of carbon 24, and two equivalents of sulphur 32 = 61.

When mercaptan is made to act upon potassium, *mercaptide* of potassium is formed, and one equivalent of hydrogen is evolved; the constitution therefore of mercaptum and mercaptan is analogous to that of cyanogen and hydrocyanic acid.

MERCATOR, GERARD (whose real name was Kauffman, of which *Mercator* is the Latin equivalent), was born at Rupelmonde in East Flanders, in the year 1512. He applied himself with great industry to the sciences of geography and mathematics, and was patronised by the emperor Charles V., and appointed, in 1559, cosmographer to the duke of Juliers. He gave his name to the method of geographical projection now usually employed in the construction of nautical maps, in consequence of his having first represented the meridians by equidistant parallel lines, and the parallels of latitude by straight lines at right angles to the meridian, but he did not know the distance which ought to separate these parallels. Nicholas Mercator is said to have discovered the law which regulates these distances; but the English mathematicians having refused to pay for the promulgation of his discovery by accepting a pecuniary challenge which he is said to have proposed to them, he died without communicating it even to his friends. The credit of first investigating the principles of that projection, and applying them to the purposes of navigation, appears to be due to Edward Wright. Gerard Mercator died at Doesburg, Dec. 2, 1594. His published works are entitled 'De Usu Annuli Astronomici,' Louvain, 1552; 'Chronologia,' Cologne, 1568, fol.; 'Tabulæ Geographicæ,' Cologne, 1578, fol.; 'Harmonia Evangelistarum,' Doesburg, 1592, 4to. His maps were collected in one volume, 4to., in 1594; and another edition was published in 1623, containing 156 maps.

(Hutton's *Mathematical Dictionary;* Montucla, *Histoire des Mathématiques;* Robertson's *Dissertation on the Rise and Progress of Navigation.*)

MERCATOR, NICHOLAS (whose real name was Nicholas Kauffman), was born at Holstein, in Denmark, in 1640. At an early age he was engaged in a correspondence with some of the principal geometricians of Denmark, Italy, and England. In 1660 he came to England; and shortly after the formation of the Royal Society, he was elected a member of that body. The date of his death is uncertain. According to Dr. Hutton, it took place in England in the year 1690 (*Mathematical Tracts*), or in 1694 (*Mathematical Dictionary*); but, according to Weiss (*Biog. Univers.*), he died at Paris, February, 1687. The reputation of Mercator rests principally upon a method, of which he was the author, whereby the area of the spaces comprised between the hyperbola and its asymptote may be determined arithmetically to any degree of approximation required; and upon the application of this method to the construction of logarithmic tables. It had been shown, as early as the year 1647, by Gregory St. Vincent, and subsequently by Mersenne, that these areas, if they could be computed, would give the logarithms of the corresponding abscissæ measured along the asymptote. [LOGARITHMS.] It was also known that in the equilateral hyperbola whose semi-axis = $\sqrt{2}$, the relation between the ordinate and abscissa was expressed by the equation $y = \frac{1}{1+x}$; and Wallis had shown in his 'Arithmetica Infinitorum,' published in 1655, that if the equation of a curve be represented by $y = 1 + x + x^2 + x^3 +$, &c., its area would be correctly expressed by the infinite series $x + \frac{x^2}{2} + \frac{x^3}{3} +$, &c. Wallis however, although his attention had been particularly directed to the subject, did not observe the almost obvious analogy between the equations $y = 1 + x + x^2 +$, &c., and $y = \frac{1}{1+x}$, as he could not have failed to do, had he chanced to perform the simple division indicated by the fraction $\frac{1}{1+x}$, for he would then have seen that the latter equation was identical with $y = 1 - x + x^2 - x^3 +$, &c. Mercator performed this division, and moreover describes the several steps of the operation with such minuteness, that one might almost suppose it to have been the first operation of the kind that had at that time been effected. He then proceeded to determine the required area, by considering it made up of a number of ordinates very near to each other, which method Kepler had previously employed in approximating to the area of a planet's orbit, and in this way he correctly inferred that the area corresponding to the abscissa $1 + x$, that is, the hyperbolic logarithm of $1 + x$, was $x - \frac{x^2}{2} + \frac{x^3}{3} -$, &c. These investigations were published by Mercator in 1668, in a work entitled 'Logarithmotechnia, sive methodus construendi logarithmos nova, accurata et facilis,' 4to., London. Wallis, who soon improved upon this method, says, when speaking of the work in a letter addressed to Lord Viscount Brounker, 'With this book, which has just appeared, I was so much pleased, that I could not quit it until I had completed its perusal. The doctrine by which the logarithms may be expeditiously constructed is perspicuously and ingeniously treated.' (*Phil. Trans.*, 1668.)

Mercator has been charged with dishonourably appropriating the discoveries of others, and with meanly withholding the publication of some which really belonged to him. [MERCATOR, GERARD.] In the 'Philosophical Transactions' for 1670, there is a paper by him, entitled 'Considerations concerning the Geometric and Direct Method of Signior Cassini for finding the Apogees, Excentricities, and Anomalies of the Planets,' besides which he has left the following works:—'Cosmographia,' Danzig, 1651, 12mo; 'Rationes Mathematicæ subductæ,' Copen., 1653, 4to.; 'De Emendatione Annuâ diatribæ duæ, quibus exponuntur et demonstrantur Cycli Solis et Lunæ,' 4to.; 'Hypothesis Astronomica nova et consensus ejus cum observationibus,' Lond., 1664, fol.; 'Institutionum Astronomicarum libri duo,' Lond., 1676, 8vo.; 'Euclidis Elementa Geometrica,' Lond., 1678, 12mo.

(Hutton's *Mathematical Tracts;* Montucla, *Hist. des Mathem.; Biog. Univ.*)

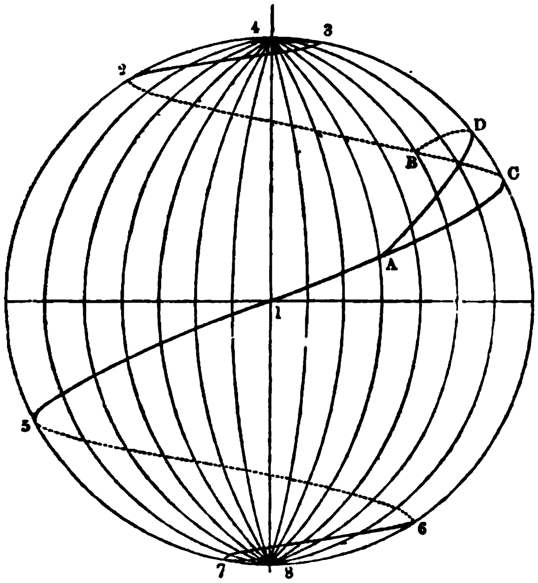
MERCATOR'S PROJECTION. It is our object in this article to endeavour to describe the projection, the use of which constitutes the principal difference between the methods of travelling by land and by sea, in such a manner as rather to give information to the landsman than the rules by which the mariner is guided. Perhaps there is no point of navigation on which a person who is neither a seaman nor a mathematician has so little chance of gaining any information from popular works.

We shall suppose the ship a mathematical point in comparison with the earth, and imagine the whole of the latter to be covered by sea. Also let the ship be always sailing before the wind, and no allowance for leeway or currents to be necessary. Throw out also the variation of the compass, that is, suppose the needle always to point due north.

A ship thus circumstanced, if it should continue sailing due north, would in time reach the north pole on a meridian circle of the sphere, on which, if it still kept its course, it would proceed due south, and would at last reach the south pole: such a ship would never change its longitude, except at the moment of passing either pole, when the longitude would alter at once by 180 degrees. If however the vessel sailed continually due east or due west, it would sail upon a small circle of the sphere, being always at the same distance from the pole, and always in the same latitude. In the first case the differences of latitude would give the distances sailed over, at the rate of 60 nautical miles to a degree; in the second case, the differences of longitude, reduced in the same way, and the results multiplied by the cosine of the latitude, would serve the same purpose.

But suppose that the vessel took an intermediate course, say north-east. It would not sail on any circle of the sphere, great or small; for by hypothesis the line of the course is always making an angle of 45 degrees with the meridian; and there is no circle (unless it be the meridian itself, or a parallel of latitude, the equator included) which always makes the same angle with the meridian. Neither could the vessel, keeping such a course, reach the pole; for at the moment when it touches the pole, it is sailing north, whereas by hypothesis it is always sailing north-east. The fact is, that a curve which makes equal angles with all meridians must be a spiral which approaches the pole, encircling it with an infinite number of folds, but never actually reaching it, as in the following diagram, in which the curve 1, C, 2, 3, 4, &c., is that on which a ship would sail from 1 towards the north pole on a course east-north-east, and the curve 1, 5, 6, 7, 8, &c., is that of a course west-south-west towards the south pole. The dotted part of the figure is supposed to be on the other, or the invisible, side of the sphere. A ship sailing from A to B over A C B, keeps one course; but were it to sail over the great circle A D B, the course must be perpetually altering.

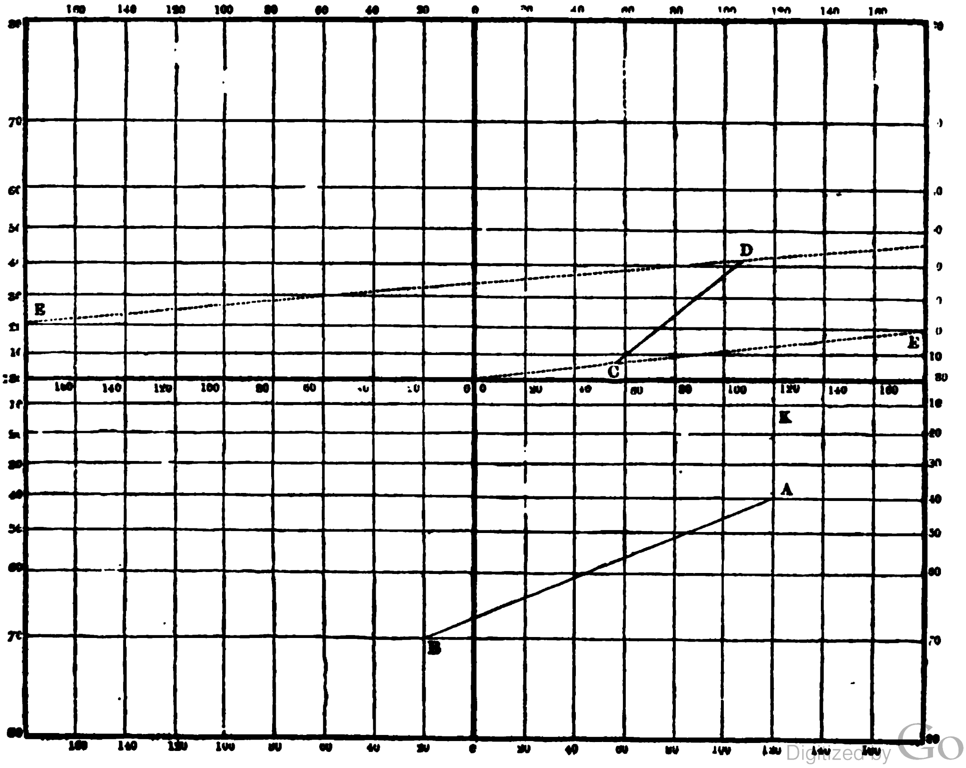
North Pole.



South Pole.

The spiral A C B is the only one on which a ship should sail directly from A to B, though there is an infinite number of such curves which pass through both A and B, the reason being, that in every other spiral except A B one or more complete circuits in longitude must be made, and the ship would come again to the meridian passing through A before it reaches B. In the same manner a spiral might be found, passing through A and B, which cuts the meridian of A five hundred times before it passes through B. Of course the shortest course is always preferred; and it is the object of Mercator's projection to lay down such a map of the world that the straight line joining two points shall be the map of the course which must be followed in order to sail from one to the other in the most direct manner, consistently with always keeping the same point of the compass.

The spirals above described are called loxodromic spirals, or rhumb lines, and under the latter term their mathematical properties are explained. Our present object is to turn the globe into one of Mercator's maps, in a manner which will give the unmathematical reader some idea of its construction. For this purpose suppose the map of the world to be painted on the globe, and let the globe be made of a thin and very elastic material. Let the elasticity of this material increase as we go towards either pole, and so rapidly that it becomes as great as we please at and near the poles. Let the equator E Q be immoveably connected with the internal centre (supposed fixed) of the globe. If then the north and south poles be pulled away from the equator, the thin membrane of the sphere will be extended; and if the pull be continued until the poles are sufficiently distant, a large portion of the sphere on each side of the equator will assume a cylindrical form, or one nearly cylindrical; and the greater elasticity of the upper parts will cause the small folds of the different spirals to be much more extended than the larger ones, so as to become equal to them. Let the mathematical hypothesis implied in the preceding be carried to its extreme limit, that is, let the poles be pulled to an infinite distance; and let the law of the elasticity be such, that the several loxodromic spirals shall have precisely similar successive folds on the resulting cylinder, that is, let them take a regular screw-like form. The meridians will then all become straight lines parallel to one another; and if the membrane be then fixed in its cylindrical shape, that is, if it lose its elasticity, and if one of the meridians be slit all the way down, and the cylinder unrolled into a plane, we shall have before us Mercator's projection, as shown in the following diagram. The degrees of longitude remain everywhere the same, those of latitude increase sensibly. The map goes up to 80° of latitude, and any part of the remaining 10° might be drawn; but no space would be sufficient for the whole of the remainder. Any two points, A and B, being given, the line A B joining them points out, on the supposition that all the meridians look towards the north, the most direct course on which a ship can sail from one to the other: if a compass were placed



at A, then A B would show, A K being the north direction, the point of the compass on which to steer. Again, from C to D the most direct course is on the dark line C D; but C E, E D, is another way of coming to the same point. It must be remembered that the extreme lines on the right and left represent the same meridian, as they coincided before the cylinder was divided for the purpose of being unrolled.

It thus appears that we have a map on which the sailing course between any two places is found by simply drawing a right line. Another advantage, depending upon the nature of the rhumb line however, and not on the projection, is the simplicity of the rule by which the distance sailed can be determined. This is pointed out in RHUMB-LINE.

The preceding is Mercator's projection of the whole 360 degrees of longitude up to 80 degrees of latitude. A chart, as in other cases, is a part of the projection, enlarged to a convenient size.

MERCENA'RIA, Schumacher's name for the *Venus mercenaria* of authors, which passes current as money, under the name of Wampum, among the Indians of North America. [VENERIDÆ.]

MERCIA. [ENGLAND.]

MERCURY, or QUICKSILVER. This metal, which possesses the remarkable property of being fluid at usual temperatures, has been known from the remotest ages. Although it is met with in very large quantity, yet the mines occur in comparatively few places; those of Almaden in Spain, and Idria in Carniola, are the most important. There are however mines of this metal in Hungary, Transylvania, and the district of Deux Ponts in Germany. Mercury has been obtained for a very long time in China and Japan, and although the amount of the produce is unknown, there is every reason to think it is considerable; it is also found at Huancavelica in Peru.

Mercury is always obtained from cinnabar, which is a bisulphuret of the metal; it is found in the red-sandstone associated with coal at Almaden; sometimes, as in the district of Deux Ponts, the cinnabar occurs in the subordinate porphyries; and at Idria it is found in the subordinate bituminous schist, but rarely in limestone itself.

The cinnabar which is found in coal-sandstone is often accompanied with argillaceous and bituminous schist, and imprinted with fishes and plants; often with combustible fossils, and sometimes even intimately mixed with coal.

Pliny states (xxxiii. 7) that Callias, an Athenian, discovered the preparation of vermilion, or cinnabar, B.C. 505. He also mentions the mines of Almaden [ALMADEN] as producing in his time 10,000 Roman pounds annually; but this was not the amount which the mines could have produced, for the supply was purposely limited. Le Play, a French geologist, who visited Almaden in 1833, describes the mines as being richer than at any former period, furnishing annually nearly 2,244,000 pounds of mercury. About 700 workmen are employed underground, and 200 in the operations connected with the extraction of the metal from the ore at the surface.

Formerly mercury was imported in packages of fifty or sixty pounds weight; the metal was poured into a fresh sheep-skin, from which the wool was taken off, the ends were tied tight, and the sort of bag thus made was enclosed in a second skin, and that in a third, and three or four bags were packed in close barrels. Of late years however mercury has been brought to this country in wrought-iron bottles.

Various processes are adopted for the purpose of separating the mercury from the ore, all of which depend upon the volatility of the metal, its conversion into vapour in distilling vessels or retorts, and its condensation by cold. In order to separate the sulphur from the metal, either iron or lime may be employed; the first forms sulphuret of iron, and the latter of calcium, with the sulphur, and the metal is thus set free, volatilized, and condensed. The retorts employed are made of cast or sheet iron, or earthenware.

According to Dumas the following mines yield annually the annexed number of quintals of mercury (a quintal is 108 lbs. avoirdupois nearly):—

Almaden . .	25,000	to	32,000
Idria . . .	6,000		10,000
Hungary } Transylvania } .	700		700
Deux Ponts .	400		500
Palatinate . .	180		200
Huancavelica .	3.000		3,000
	35.280		46.400

We may perhaps reckon the average at about 2000 tons.

The properties of mercury are, that it is fluid, of a silvery white colour, and possesses a high degree of lustre; it is inodorous, tasteless, unacted upon or very slightly by exposure to air at common temperatures, and not at all by water at any temperature. The specific gravity of mercury is about 13·568. It boils at 670°; the density of its vapour is 6·976; and yet, as shown by Priestley, it vaporises at common temperatures, and Faraday has confirmed the observation. At 40° below Zero, mercury becomes solid, crystallizes in octohedrons, and gives a dull sound like lead; at the moment of congelation it contracts considerably; for while its density at 47° is 13·545, that of frozen mercury is 15·612; when in this state it is malleable, and may be cut with a knife.

Mercury is a good conductor of electricity and of heat, but its capacity for heat is extremely small; it expands uniformly at all temperatures between its boiling and freezing points. When mercury is pure it assumes the spherical form in small portions, but when it contains other metals it forms into long striæ; a very minute admixture is sufficient to produce this effect; when thus impure it must be subjected to distillation, by which the mercury is volatilized, and the metals mixed with it remain; or it may be purified to a considerable extent from the more oxidizable metals by agitation with dilute nitric acid.

ORES OF MERCURY.—*Native Mercury.*—This occurs in but few places, and is met with in small cracks or crevices of the rocks in which the common ore occurs, and is frequently accompanied by red silver.

The principal localities are Almaden in Spain, and Idria in Carniola; some is also met with in the Palatinate.

Chloride of Mercury (*Horn Mercury; Baumerite; Muriate of Mercury*) occurs crystallized and in tubercular crusts. Primary form a square prism. Cleavage parallel to the lateral faces and the diagonal planes of the primary form; the latter are the more brilliant. Fracture conchoidal. Hardness 1·0 to 2·0. Readily scratched with the knife. Colour pearl grey, or yellowish grey. Lustre adamantine. Translucent. Specific gravity 6·482.

Heated by the blow-pipe, it is entirely volatilized, and it yields by analysis

Chlorine	14·89
Mercury	85·11
	100·

Occurs principally at Moschelandsberg in Deux Ponts, but is also met with in Spain, Bohemia, and the Palatinate.

Cinnabar; Vermilion; Bisulphuret of Mercury.—This is the common ore of the metal. Occurs crystallized and massive. Primary form of the crystal an acute rhomboid. Cleavage easy, parallel to the lateral faces of a regular hexhedral prism. Fracture conchoidal. Hardness 2·0 to 2·5. Colour carmine red. Lustre adamantine, approaching metallic. Opaque, translucent, transparent. Specific gravity 8·098.

Heated by the blow-pipe, whitens a piece of copper held over it. Unacted upon by nitric or hydrochloric acid, but readily by a mixture of them.

It occurs in the places which have been mentioned; as Almaden, Idria, &c.

Massive Varieties.—Amorphous. Structure granular, compact. Fibrous and pulverulent.

Analysis by Klaproth:—

Sulphur	14·25
Mercury	85·
	99·25

Native Amalgam.—Occurs crystallized and massive. Primary form a cube. Cleavage indicating the form of a rhombic dodecahedron. Fracture conchoidal. Hardness 3·0 to 3·5. Scratches gypsum; is scratched by fluor-spar. Colour silver white. Lustre bright metallic. Opaque. Specific gravity 14·119.

When heated by the blowpipe, the mercury is volatilized, and the silver remains in the metallic state.

Analysis by

	Klaproth.	Cordier.
Mercury	64	72·5
Silver	36	27·5
	100	100·

Massive Variety.—Amorphous. Structure compact. Sometimes semi-fluid by mixture with excess of mercury. Found in France, Spain, Sweden, Hungary, the Palatinate, &c.

Iodide of Mercury occurs in spots of a fine lemon-yellow colour in the variegated sandstone of Casas Viejas, Mexico. When exposed either to the air or ammonia it becomes black.

GASEOUS COMBINATIONS.—We now proceed to consider the action of the elementary gaseous bodies upon this metal.

Oxygen and Mercury combine to form two compounds, the protoxide and binoxide; they have however but little affinity for each other, and it is doubtful whether any combination takes place between them, even when the metal is exposed to and long agitated with moist air at common temperatures. The protoxide of mercury may be formed in several modes: when, for example, potash, soda, or lime-water is added to a solution of protonitrate of mercury, or to protochloride of mercury, protoxide of mercury is separated. Its properties are, that it is nearly black, insoluble in water and the alkalis, but dissolves readily in nitric acid; it decomposes and is decomposed by hydrochloric acid, water and protochloride of mercury being formed. With sulphuric acid it forms an insoluble salt. It is totally volatilised by heat; and even by being kept out of the action of light is apt to separate into mercury and peroxide. It is directed to be prepared in the London Pharmacopœia under the name of *hydrargyri oxydum*.

Protoxide of mercury is composed of—

One equivalent of oxygen	8
One equivalent of mercury	202
Equivalent	210

Binoxide or Peroxide of Mercury.—This may be prepared by several processes; the simplest is that of exposing the metal nearly at its boiling point to the action of atmospheric air; it then absorbs oxygen, and is converted into a dark red crystalline substance, formerly used in medicine under the name of *Mercurius præcipitatus per se*. It is inodorous, acrid to the taste, and is said to be slightly soluble in water. At a red heat it is decomposed, the mercury returns to the metallic state, and oxygen gas is evolved; the nitric, hydrochloric, and some other acids readily dissolve it, and the solutions formed are decomposed by potash, hydrated binoxide of mercury of an orange colour being precipitated.

This oxide may also be procured by dissolving mercury in nitric acid, and decomposing the nitrate formed, by the action of heat; and also by decomposing the bichloride of mercury by the addition of potash to the solution. As procured by the former of these modes it is called in the London Pharmacopœia *hydrargyri nitrico-oxydum;* it has a bright red colour and a crystalline appearance: when obtained by decomposing the bichloride of mercury it is less brilliant, and is more of an orange colour, and is the *hydrargyri binoxydum* of the Pharmacopœia.

Binoxide of mercury is composed of—

Two equivalents of oxygen	16
One equivalent of mercury	202
Equivalent	218

Azote and Mercury, and *Hydrogen and Mercury*, do not combine.

Chlorine and Mercury form two compounds of very great importance in a medicinal point of view, the chloride or protochloride being the substance usually called calomel, and the perchloride or bichloride that which is commonly termed corrosive sublimate.

Chloride or Protochloride of Mercury (*Calomel*) may be obtained in several ways 1st, by heating the metal in the gas; the residue, after washing, is the protochloride; 2nd, by adding a chloride, as common salt, to a solution of protonitrate of mercury, in which case the chloride of mercury is precipitated; 3rd, by adding the protoxide of mercury to hydrochloric acid, the results are chloride of mercury and water; lastly, there is the process of the Pharmacopœia, which is the best, and this consists in heating together common salt, mercury, and its bipersulphate; the results are, that when submitted to sublimation sulphate of soda remains, and the chloride of mercury formed is vaporized and condensed. It is the *hydrargyri chloridum* of the Pharmacopœia. The properties of chloride or protochloride of mercury are, that when procured by precipitation it is a white pulverulent substance, whereas that obtained by sublimation is crystalline, hard, and dense; its specific gravity is 7·175; it is colourless, inodorous, insipid, and sometimes regular crystals are observed, the primary form of which is a square prism; by long exposure to light it becomes of a rather dark colour, owing to incipient decomposition. It is quite insoluble in water, not readily acted upon by dilute acids, and is decomposed by lime-water, potash, and soda, protoxide of mercury being separated. It is totally volatilized by heat.

Protochloride of mercury is composed of—

One equivalent of chlorine	36
One equivalent of mercury	202
Equivalent	238

Bichloride or Perchloride of Mercury (*Corrosive Sublimate*) may also be formed by several processes. When, for example, the metal is heated in the gas, the soluble portion resulting from their action is bichloride of mercury; it may be formed by dissolving the binoxide in hydrochloric acid, the results being water, and the bichloride, which crystallizes when the solution is sufficiently evaporated; lastly, it is best formed by the process of the Pharmacopœia, which consists in heating a mixture of chloride of sodium and bipersulphate of mercury, by which sulphate of soda and bichloride of mercury are formed; the latter rises in vapour, and is condensed in the upper and cool part of the apparatus.

The properties of bichloride of mercury, the *hydrargyri bichloridum* of the Pharmacopœia, are, that it is a white semi-transparent crystalline mass, and perfect crystals are occasionally obtainable, the primary form of which appears to be a right rhombic prism. This substance is inodorous, its taste is nauseous and acrid, and it is a violent poison. Its specific gravity is 5·200; water at 60° dissolves rather more than one-twentieth, and boiling water one-third of its weight. Light has no action upon this salt, but it partially decomposes the aqueous solution, chloride of mercury being precipitated. It is more soluble in alcohol, æther, hydrochloric acid, and solution of hydrochlorate of ammonia, than in water. It is totally volatilized by heat. Lime-water, potash, and soda, added to a solution of this salt, precipitate yellow hydrated binoxide of mercury; but carbonate of lime decomposes it only partially, a deep red-coloured crystalline substance being thrown down, which is oxychloride of mercury. Ammonia throws down a white precipitate, which is called in the Pharmacopœia *hydrargyri ammonio-chloridum*.

Cyanogen and Mercury combine to form one compound, which is a bicyanide; it is prepared by boiling together in water, Prussian-blue and binoxide of mercury, which act upon each other though neither is soluble. By evaporating the solution the bicyanide is obtained in colourless crystals, the primary form of which is a right square prism; this salt has a metallic taste, is poisonous, much more soluble in hot than cold water, and but sparingly taken up by alcohol. By heat it is decomposed, and cyanogen gas is obtained. Nitric acid dissolves it without decomposition, but it is decomposed by sulphuric acid, and also by hydrochloric acid, which evolves hydrocyanic acid, with the formation of bichloride of mercury. The affinity between cyanogen and mercury is so strong, that its solution, unlike that of any other mercurial compound, is not decomposed by the alkalis; but hydrosulphuric acid and the hydrosulphates readily produce this effect. It is contained in the London Pharmacopœia.

Bicyanide of mercury is composed of

Two equivalents of cyanogen	52
One equivalent of mercury	202
Equivalent	254

Fluorine and Mercury.—When hydrofluoric acid is added to a solution of protonitrate of mercury, no precipitation takes place, and it does not appear that a protofluoride of the metal has been yet obtained. If however the acid be added to binoxide of mercury, an orange-coloured compound is formed, which is soluble in water, and the solution by evaporation yields yellowish prismatic crystals, which appear to be perfluoride of mercury.

Bromine, the only elementary fluid known except mercury, unites with it to form two compounds.

Google

Bromide or Protobromide of Mercury is procured by mixing solutions of bromide of potassium and protonitrate of mercury; a white curdy precipitate is obtained, which is insoluble in water.

Bibromide of Mercury is prepared by treating the metal with bromine and water. This salt is soluble in water, and the solution yields colourless crystals, which are dissolved by alcohol; this salt is decomposed by nitric and sulphuric acids. Neither of these salts is applied to any particular use.

SOLID COMBINATIONS.—*Non-metallic elementary solids and Mercury* mostly combine, but—

Carbon and Mercury do not form any compound.

Sulphur and Mercury unite in two proportions, forming the sulphuret or protosulphuret and the bi-sulphuret or persulphuret of mercury. When sulphur and mercury are triturated together they form a black mixture, which is used in medicine, and was formerly called *Æthiops mineral;* this however is not a definite compound of the elements.

Protosulphuret of Mercury is easily obtained by passing a current of hydrosulphuric acid gas into a solution of protonitrate of mercury; a black powder is precipitated, which is insoluble in water, totally volatilized at a high temperature, and is by nitric acid converted into a sulphate. It consists of—

One equivalent of sulphur	16
One equivalent of mercury	202
Equivalent	218

Bisulphuret of Mercury; Cinnabar; Vermilion.—It has been already stated that this is the principal ore of mercury. It is procured artificially by heating sulphur with eight times its weight of mercury in an iron vessel; the compound formed is then subjected to sublimation. The sublimate is a compact, deep red, crystalline mass, which, when reduced to powder, is of a beautiful scarlet colour. It is inodorous, insipid, insoluble in water, and unalterable by exposure to the air; it is totally vaporised by heat, and is decomposed when heated with some of the metals, and also by distillation with lime, potash, or soda.

When heated with sulphuric acid, sulphurous acid is evolved, and a sulphate of mercury is formed; it is insoluble either in nitric or hydrochloric acid, but when they are mixed the nascent chlorine which is evolved decomposes and dissolves the bisulphuret, even without the assistance of heat.

Bisulphuret of mercury is composed of

Two equivalents of sulphur	32
One equivalent of mercury	202
Equivalent	234

Phosphorus and Mercury may be made to combine by heating phosphorus with the oxide or protosulphuret of mercury, by passing it in vapour over the protochloride, or phosphuretted hydrogen, into a solution of protonitrate of mercury. It is an insoluble substance, and has a black or brown appearance, which is modified by the mode of its preparation.

Iodine and Mercury form two compounds, and they may be formed in two modes: first, by the mere trituration of the equivalents with a little spirit of wine in a mortar; and secondly, by adding a solution of iodide of potassium to one of protonitrate of mercury to obtain the protiodide, and of pernitrate of mercury to prepare the biniodide. The former method is adopted in the Pharmacopœia.

Protiodide of Mercury is a greenish-yellow powder, devoid of smell, and insoluble in water. By the agency of light or of heat it is apt to be resolved into mercury and biniodide, but when quickly heated it sublimes unchanged.

Iodide or protiodide of mercury is composed of

One equivalent of iodine	126
One equivalent of mercury	202
Equivalent	328

Biniodide of Mercury, especially when prepared by precipitation, is of a fine red colour, approaching to scarlet; it fuses readily, and sublimes in rhombic scaly crystals, which are at first yellow, but become red on cooling. Water does not act upon it, but it is soluble in alcohol when heated, and also in some acids.

It is composed of

Two equivalents of iodine	252
One equivalent of mercury	202
Equivalent	454

Selenium and Mercury. The protoseleniuret is a tin-coloured compound, which sublimes in shining scales: the biseleniuret is obtained by fusing the protoseleniuret with selenum; it is a grey crystalline mass.

Metals and Mercury, or the greater number of them, readily combine; other metallic compounds are termed alloys, but those which contain mercury are called amalgams. [AMALGAMS.]

ACIDS AND MERCURY.—The action of acids on this metal, like that which they exert on others, is various, and of course depends upon the nature of the acid and the power of the metal in attracting oxygen.

Nitric Acid and Mercury.—It is a well-known fact that concentrated nitric acid acts upon very few metals, and it is curious that although the affinity between mercury and oxygen is extremely weak, yet this metal decomposes nitric acid and attracts its oxygen, even at common temperatures the fluidity of the metal is probably the cause of this facility of action. A solution of pernitrate of mercury is thus obtained, which, if it crystallize at all, does so with great difficulty; for the solution may be evaporated to the sp. gr. 2·00 without yielding crystals.

Protonitrate of Mercury, that is, nitrate of the protoxide, is readily obtained by adding excess of the metal to the dilute acid. Action readily takes place, and crystals are formed with great readiness. There is no protoxide of any metal which forms so many nitrates as that of mercury; they are at present very imperfectly known, and require analysis.

The crystallized protonitrates of mercury are mostly decomposed by water, subprotonitrate being precipitated in an insoluble state.

It has already been observed that the pernitrate of mercury can scarcely be obtained in a crystalline form.

Hydrochloric Acid and Mercury do not act upon each other under any circumstances; when however the protoxide is added to the acid, protochloride of mercury and water are formed; while with the binoxide of mercury water and the bichloride are procured.

Sulphuric Acid and Mercury do not act on each other without the assistance of heat; with it, the acid is decomposed, and the metal converted into binoxide, and bipersulphate of mercury is formed.

Protosulphate of Mercury is procured by adding sulphuric acid or a sulphate to protonitrate of mercury; a white insoluble compound is precipitated, which is not applied to any use, and which consists of

One equivalent of sulphuric acid	40
One equivalent of protoxide of mercury	210
Equivalent	250

Bipersulphate of Mercury, obtained, as just described, by heating together the acid and metal, is a colourless salt, which, when mixed with water, is decomposed, and sulphuric acid remains in solution, while a yellow precipitate is obtained, formerly called *turpeth mineral.*

The bipersulphate of mercury is composed of

Two equivalents of sulphuric acid	80
One equivalent of binoxide of mercury	218
Equivalent	298

Turpeth mineral is a subsulphate of the binoxide of mercury, composed of

Three equivalents of sulphuric acid	120
Four equivalents of binoxide of mercury	872
Equivalent	992

Bipersulphate of mercury is not directly applied to any purpose, but the formation of it is one of the steps in the process of preparing calomel and corrosive sublimate in the Pharmacopœia.

Carbonic Acid and Mercury do not, under any circumstances, act on each other. When an alkaline carbonate is added to a solution of protonitrate of mercury, a precipitate is obtained, which, on drying, does not appear to contain any carbonic acid, so that a protocarbonate of mercury does not appear to be capable of being formed.

Percarbonate of Mercury may however be obtained by mixing solutions of carbonate of soda and pernitrate of mercury; the precipitate, when dry, is of an ochre-yellow colour, and appears to be a dicarbonate, composed of

Two equivalents of binoxide of mercury	436
One equivalent of carbonic acid .	22
Equivalent	458

Phosphoric Acid and Mercury.—The protophosphate is formed when phosphate of soda is added to a solution of protonitrate of mercury; a white crystalline precipitate falls, which is insoluble in water, or in excess of phosphoric acid; it is decomposed by heat, which expels the mercury and leaves the acid.

Perphosphate of Mercury is thrown down by phosphate of soda from the pernitrate; in appearance it does not differ much from the protophosphate, but, unlike it, is dissolved by excess of acid.

Fulminate of Mercury is a detonating compound, which was discovered by Mr. Howard; it is prepared in an indirect mode by dissolving mercury in nitric acid, and adding alcohol to the solution; when the effervescence is over, a greyish crystalline precipitate is obtained, which is to be washed with a small quantity of distilled water, and dried at a gentle heat.

The properties of fulminate of mercury are, that it explodes with considerable violence when heated to about 300°, and the explosion is accompanied with a bright flame; friction, the electric spark, sulphuric and nitric acids, also cause it to explode; the results of it are, azotic gas, carbonic acid gas, and a little ammonia. It appears to consist of

One equivalent of fulminic acid .	34
One equivalent of protoxide of mercury	210
Equivalent	244

Acetate of Mercury.—The protoacetate is the only one which has been employed, and it is now indeed nearly fallen into disuse. It is prepared either by dissolving protoxide of mercury in acetic acid, or by mixing solutions of acetate of soda and protonitrate of mercury. This salt has a pearly lustre, is formed in crystalline flakes, dissolves sparingly in water, and is insoluble in alcohol. Its taste is acrid.

It is composed of

One equivalent of acetic acid . .	51
One equivalent of protoxide of mercury	210
Equivalent	261

SALTS.—Having now stated the nature and composition of the more important compounds of mercury, we shall state the general properties of its salts, which, according to Professor Brande, are as follows:—

The soluble salts of the protoxide are mostly white, of a metallic taste, and not virulently active as poisons. Some of them, when neutral, are resolved by water into basic and acid salts. Phosphorous and sulphurous acids, and protochloride of tin, precipitate metallic mercury: the caustic alkalis throw down a black powder; the carbonated alkalis, yellow or brown; the phosphates, white, even in very dilute solutions; sulphuretted hydrogen and the hydrosulphurets, black; hydriodic acid and the iodides, yellow; hydrochloric acid and the chlorides, white and curdy; the alkaline chromates, scarlet; ferrocyanide of potassium, white; the oxalates, white, even when very dilute; tincture of galls, brownish yellow.

The soluble salts of the peroxide or binoxide of mercury are mostly white when neutral, yellow when basic; they are poisonous, and nauseously metallic to the taste, and are often resolved by water into acid and basic salts. Copper throws down from them metallic mercury, and ammonia and carbonate of ammonia produce white precipitates; iodide of potassium, a scarlet-red; and infusion of galls, an orange precipitate. Unless in concentrated solution, they are not affected by hydrochloric or oxalic acids. The presence of organic substances interferes considerably with the appearances produced by some of the above tests; hence in cases of poisoning by corrosive sublimate peculiar precautions are sometimes required, and in all cases the precipitate should be collected and heated in a tube, if necessary, with a little white flux, or some reducing agent, so as to separate metallic mercury, the microscopic globules of which are easily sublimed and discerned. The insoluble mercurial salts are mostly volatilized at a red heat, and they are all decomposed, with the production of metallic mercury, when mixed with a little carbonaceous matter, and heated in a glass tube.

USES OF MERCURY.—The uses of mercury in the arts are numerous and important. It is used in the extraction of gold and silver from their ores, in gilding [GILDING], the silvering of mirrors, and in filling thermometers and barometers. Bichloride of mercury has been lately extensively used for the prevention of dry-rot; and lastly this metal is extensively employed in various forms in medicine.

MEDICAL PROPERTIES OF MERCURY.—In a purely metallic state, mercury, when taken into the human stomach, produces no effects except such as are owing to its mechanical properties. Nevertheless it may become oxidized, and, by combining with some of the acids of the stomach, occasion violent disorder. Even its external application leads to similar results, from the metal first becoming oxidized, then absorbed, and producing the same effects as if taken by the mouth. The preparations of mercury differ very much in the degree of their action, both according to the nature of the combination, and also of the dose employed or the mode of administration. The milder preparations seem only to increase the natural and healthy actions of the organs of the body, particularly the secreting and exhaling organs; while the more active, if not given in very minute doses, destroy the texture and impair the function of many organs, both those with which they are brought into immediate contact, and others which they affect by sympathy or other means. No medicinal substance is capable of producing so much benefit, none is so frequently abused, or so fertile a source of injury, as mercury. Its mode of action is little understood, but its effects are often sufficiently obvious. A brief statement of the most important of these effects is all that can be given here.

When mercury, triturated with chalk or magnesia, or with confection of roses (which is the case when it is made into *blue* pill), is taken in moderate dose into the stomach, it does not seem to make any immediate sensible impression, unless that organ be in a state of morbid sensibility, when it is apt to cause heartburn, nausea, or disturbance of the bowels. It may be repeated at proper intervals, and the individual, especially if robust, appears only to have an increased appetite and more ready digestion. This is more particularly the case when corrosive sublimate (bichloride of mercury) is given in very minute doses. Even the introduction of mercury into the body by friction over parts where the skin is thin, would seem to increase, for a time, the activity of the whole system. To whatever surface applied, the absorbents would appear to lay hold of it, and carry it into the circulating mass. Owing to peculiarity of constitution (idiosyncrasy) a very minute quantity of mercury produces in some individuals very striking effects, either violent salivation, disturbance of the bowels, or other inconveniences, accompanied by great debility. This result is quite distinct from the effects of an overdose of some of the more active forms, which produces actual poisoning, or from the effects of the too long continued administration of some of the mild preparations. Children, owing to the irritability of their bowels, are not so apt to be salivated as adults, and more mercury can be borne in warm than in cold countries.

When a single dose of mercury is given, it is generally one of the preparations which act on the bowels, either alone, or in combination with or followed by some other purgative medicine; and little permanent effect is observed: but repeated small doses, especially if hindered from passing off by the bowels, by combination with opium, excite arterial commotion, and end by establishing a febrile movement. The pulse is full and more frequent, the animal heat augmented, the secretion from the skin abundant; at last followed by thirst, restlessness, and sleeplessness. This disturbance frequently lasts some time, even after the medicine has been discontinued, and is occasionally accompanied with determination or congestion of blood either towards the lungs, abdomen, or brain, followed sometimes by hæmorrhage from various organs. Blood drawn during a mercurial course is generally found covered with a buffy coat, the same as is the case in inflammatory diseases. On the salivary glands the effects are most conspicuous: they become irritated, more sensible, turgid, and pour out abundant saliva, which, on standing, deposits flakes of coagulated albumen. The breath at the same time acquires a peculiar fetor (called mercurial), the gums are swollen, but pale and tender, the teeth become loose, and the tongue and lining membrane of the mouth are covered with ulcers.

The general commotion of the system often proves a powerful agent in the cure of many diseases, but occasionally it becomes too great, and requires to be moderated. Not only must the exhibition of the mercury be suspended for a time, in such cases, but very plethoric persons must be bled, and put on the antiphlogistic plan even before beginning its use. The warm bath, diluent drinks, and a milk or farinaceous diet, with cool air, are proper means of lessening the violence of its action.

The effects just mentioned show the necessity of abstaining from its administration when there is a tendency to hæmorrhage (especially of the lungs), or a disposition to consumption, or if there exist a scrophulous constitution, or the person be affected with sea scurvy: also during certain states of the female system, and during pregnancy or suckling.

When the use of mercury is too long continued, or it is given in too strong doses, its stimulating action appears to fatigue the system, and to pervert the function of assimilation, both immediately in the blood, and also in the different organs and tissues. Hence the individual loses his muscular power, becomes pale, tumid, and puffy, or else greatly emaciated. The brain and spinal chord are irritated; the limbs exhibit involuntary tremblings, and all the tissues acquire a morbid susceptibility. The blood is found to be deteriorated, and to have lost its ordinary consistence, and the person appears to be affected with scurvy or consumption. The inconsiderate use of mercurial preparations, especially of corrosive sublimate, often occasions chronic inflammation of the stomach, causing indigestion, and alterations or thickenings of the coats of the stomach. Diseases of the brain not unfrequently result from an improper use of mercury. Lastly, a peculiar affection of the skin often occurs from the abuse of this substance.

In the treatment of diseases, four distinct effects may be obtained from the employment of mercurial preparations. 1st. By some of them the intestinal canal is irritated, and the expulsion of its contents occasioned. 2nd. Others are used to create a general commotion of the system, to rouse the lymphatics, and excite both the secreting and excretory glands. 3rd. To control or altogether change the action of the capillary vessels, when that is extreme and tending to the effusion of serum, and more especially of coagulable lymph. With this may perhaps be joined the action of the mercury as an alterative. 4th. What is regarded as its specific effect in bringing about the cure of some peculiar diseases.

Calomel, or the protochloride of mercury, is the preparation most employed as a purgative; it influences the intestinal canal along its whole length, and excites the liver and other glands to secretion. It is of very great utility, not only at the commencement of fevers, but even during their course, either when given alone or in conjunction with some other purgative. It is not admissible if the tongue be very red and sensible, and a similar state of stomach be presumed to exist. In many eruptive fevers, especially scarlet fever, its early and even free employment is productive of the best results. In the yellow and many other fevers of hot climates it is indispensable. In these diseases mercury is introduced into the system by every means; and whenever the patient is salivated, recovery may be expected. In many of the less rapid fevers of Europe, the like benefit follows its use.

During the inflammatory and turgescent stage of hydrocephalus acutus, or water on the brain, calomel, alone or with digitalis, is frequently efficacious in saving the patient; at the same time other forms of mercury, especially the liniment, may be used. In the wasting or atrophy of children, the steady daily use of calomel and rhubarb produces the best results, if proper dietetical means be adopted.

These measures should at no time be resorted to, except under the direction of responsible medical attendants. The unnecessary use of mercury, when some other purgative would have answered as well, is much to be reprobated, and not only injures the constitution of children, but if they are teething at the time, it leads to the early decay of their teeth. (Bell *On the Teeth.*)

Persons under the influence of mercury, even when a single dose has been taken as a purgative, are very liable to take cold, especially from wet. This must be carefully guarded against. The bichloride of mercury (or corrosive sublimate) seems not to dispose the system so much to be hurtfully impressed by cold, and is therefore well suited to camp and navy practice. Besides, if given in sufficiently small doses, it is perhaps the best of all the preparations to use as an alterative, especially in cases of chronic inflammation or thickening of the tissues, such as the heart.

Mercury has a great power of checking the deposition of coagulable lymph, and controlling changes in the organic particles of bodies, both vegetable and animal. One of the most valuable uses of mercury is connected with this power of changing the action of the capillaries when that action is extreme, or when there is a tendency to pour out serum in excess, or effuse coagulable lymph. In some inflammations the action of the vessels is so violent as to pour out their contents, and this leads to obstructions or changes of structure which derange the functions, or even speedily occasion death. Thus in croup coagulable lymph is effused in the windpipe, obstructing respiration; in peritonitis, or inflammation of the outer lining of the intestines, lymph is poured out, agglutinating the folds of the intestines; in iritis the same happens, closing the pupil of the eye and destroying vision. In all these cases, after free venesection, or even without it, calomel given very freely will hinder further effusion, and even cause the absorption of what has already escaped from the vessels; as may often be seen when the iris of the eye is inflamed.

Many serious chronic diseases are removed by a judicious and persevering use of mercury, but these can neither be enumerated here, nor can even the most general rules be attempted to be laid down. (Holland, *Medical Notes; On Mercurial Medicines;* and Teale *On Neuralgic Diseases.*)

The specific employment of mercury is still less suitable to be discussed here. It may be remarked however that the opinion for the necessity of giving mercury in any quantity is now altogether exploded.

It is not necessary to dwell on any of the other preparations of mercury, many of which are valuable, either alone or as additions to other substances. Calomel frequently greatly assists in promoting the action of other medicines, particularly diuretic medicaments. How far calomel, either in small frequently repeated doses or in very large ones, was really useful in Asiatic cholera cannot be ascertained. The employment of corrosive sublimate in the arts depends in some cases on principles explained above. Thus it checks fermentation, and opposes the formation of new compounds; hence, when applied in solution to timber, it prevents the dry-rot from occurring, by solidifying the albumen of the wood. [ANTISEPTICS.] In cases of poisoning by it, the antidotes most proper are those substances which contain albumen, such as white of egg, milk, flour, &c. [ALBUMEN.]

MERCURY, the planet nearest to the sun Its orbit being entirely within that of the earth, it never recedes to the point of the heavens opposite to the sun, but is always found within 29° of the sun. Hence it is only visible to the naked eye in the evening, when it is to the east of the sun, and near to its greatest distance (or elongation) from the sun; so that the sun can descend sufficiently below the horizon to allow the planet to be seen just before its setting: similarly, it is only visible in the morning (before sunrise), when it is near its greatest elongation westward of the sun. The phases of Mercury are not visible without a telescope. The apparent diameter of Mercury varies from 5 to 12 seconds; the real diameter is ·398 of that of the earth, or about 3140 miles. Its bulk is to that of the earth as 63 to 1000; its mass is reckoned at the two-millionth part of that of the sun. It revolves on an axis, the inclination of which to the ecliptic is not determined, in $24^{h}\ 5^{m}\ 28^{s}\cdot 3$. It has seven times the light and heat of the earth.

The transits of Mercury, or passages of the planet over the sun's disc, take place when the conjunction (the inferior conjunction, as it is called, Mercury being between the earth and the sun) happens at the time that the planet is near its node. These transits are not so useful in the determination of the sun's parallax or the longitude of the place of observation as those of Venus: we shall therefore refer the account of such transits in general to the latter planet. The following are, according to Delambre, the times of the transits which will yet take place in the present century (civil time at Paris):—

1845	8 May, 8 P.M.	1878	6 May, 7 P.M.
1848	9 Nov., 8 P.M.	1881	8 Nov., 1 A.M.
1861	12 Nov., 7½ A.M.	1891	10 May, 3 A.M.
1868	5 Nov., 7 A.M.	1894	10 Nov., 6½ P.M.

Elements of the Orbit of Mercury.

Epoch, 1799, December 31, 12^h mean astronomical time at Seeberg.

Semiaxis major ·3870938, that of the earth being assumed as the unit.

Excentricity ·2041704; its secular increase (or increase in 100 years) ·0000039.

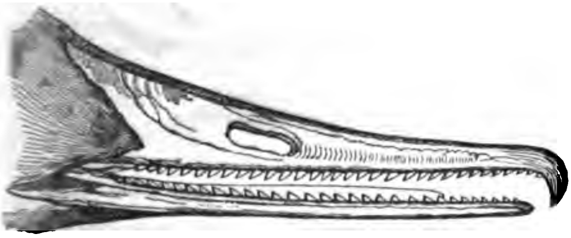
Inclination of the orbit to the ecliptic $7° \, 0' \, 5''·9$; its secular increase $18''·4$.

Longitudes from the mean equinox of the epoch: (1.) of the ascending node, $45° \, 57' \, 9''·0$; its secular increase (combined with the precession), $4215''·1$; (2.) of the perihelion, $74° \, 20' \, 6''·0$; its secular increase (combined with the precession), $5602''·9$; (3.) of the planet (mean), $108° \, 4' \, 48''·3$.

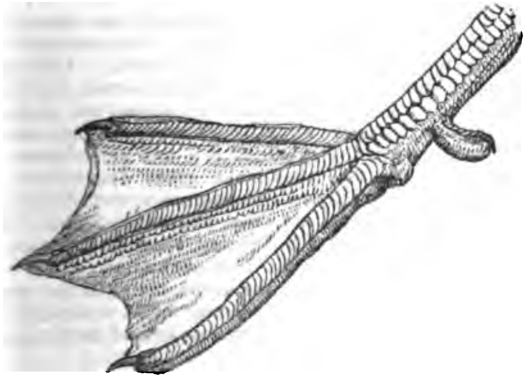
Mean sidereal motion in one mean solar day, $4° \, 5' \, 32''·558$; in 365¼ it is $53° \, 42' \, 47''·65$ more than 4 complete revolutions; sidereal revolution, 87·96926 mean solar days.

MERCURY, TRANSIT OF. [MERCURY; VENUS, TRANSIT OF.]

MERGANI'NÆ (*Merginæ*, Bonap.), a subfamily of *Anatidæ*, consisting of the genus *Mergus*, Linn., the *Goosanders* or *Mergansers* of the British. The Prince of Musignano makes it include two subgenera, Mergus (*Smew*) and Merganser, Leach (*The Goosanders*), and places the subfamily next to the *Fuligulinæ*, and immediately preceding the *Pelecanidæ*. The Linnean genus *Mergus* is placed between the last section (*Cristatæ*) of the great genus *Anas* and the genus *Alca* in the *Systema Naturæ*, and the position assigned to it by various authors will be found in the article DUCKS. In the second volume of Mr. Swainson's *Classification of Birds*, the subfamily is placed after the *Fuliguliniæ*, and immediately preceding the family *Colymbidæ*.



Bill of Merganser.



Foot of Merganser.

Generic Character.—Bill straight, narrow, and slender, subcylindrical anteriorly, wide at the base, and abruptly hooked at the tip; margins of both mandibles serrated, the serrations or teeth directed backwards. *Tongue* slender. Feet short, with the toes fully palmated, and placed behind the point of equilibrium.

The species are not numerous, and of these, *Mergi Merganser, Serrator, albellus*, and *cucullatus* are found in Europe. We select *M. Merganser* and *M. albellus* as examples.

Merganser. (Leach.)

Example, *Merganser Castor* (*Mergus Merganser* and *Castor* of Linnæus).

Description.—Very Old Male. Tufted head (the tuft large and thick), and part of the neck greenish black, the reflection varying in different lights; lower part of the neck, breast, belly, abdomen, coverts of the wings and scapulars farthest from the body, tinged of a yellowish rose colour* (which soon fades in stuffed specimens to white) on the under parts; upper part of the back and scapulars nearest to the body deep black; quills blackish; great coverts bordered with black; rest of the back and tail ash-coloured; beauty-spot on the wing white, without transverse bands; bill deep red, black above and on the terminal nail; iris reddish brown, sometimes red; feet vermilion red. Length 26 to 28 inches. (Temm.)

In this plumage the bird is the *Mergus Merganser* of Linnæus and others; *Le Harle* of Buffon and the French; the *Goosander* or *Merganser* of Latham and Pennant; *Gansen-säger* and *Taucher-gans* of Bechstein and the Germans; *Mergo, Oca marina e Mergo dominicano* of the 'Stor. degl. Ucc.,' and *Dubbelde Zaagbek* of Sepp. and the Netherlanders.

Female.—Tuft long and loose; head and part of the neck reddish brown; throat pure white; lower part of the neck, breast, sides, and thighs whitish ash; all the upper parts deep ash; beauty-spot of the wing white without any transverse band; bill faded red; iris brown; feet yellowish red, webs ashy-red. Length 24 or 25 inches.

Young Males of the Year: Similar to the females.

The Young at the age of one year are distinguished by blackish spots disposed on the white of the neck; the ruddy colour of the neck is then terminated by a deeper colour; blackish plumes begin to show themselves on the top of the head, and white feathers appear on the coverts of the wings.

In this state the bird is the *Mergus Castor* of Linnæus and others; *Mergus rubricapillus* of Gmelin; the *Harle femelle* of Buffon; the *Dun Diver* or *Sparling Fowl* of Latham and others; and the *Mergo oca* of the 'Stor. degl. Ucc.'

This species is the *Sugherone* of the Italians; the *Meer-rack* and *See-Rack* of the Germans; *Wrakfogel, Kjorkfogel, Ard*, and *Skraka* of the 'Fauna Suecica;' *Skallesluger* of the Danes; *Skior-and* of the Icelanders; *Peksok* of the Greenlanders; *Seek* of the Cree Indians; *Hwyad ddanhedog* of the antient British; and *Goosander* and (provincial) *Jack-saw* of the modern British. It is supposed to be the Κάστορος ὄρνις, of the Greeks, the *Fiber* and *Castor Ales* of the Latins, and is the *Bieure* of the old French.

Food; Reproduction; Utility to Man.—The food of the Goosander consists of small fish, amphibious animals, small crustaceans and mollusks. Temminck says that its nest is placed among rolled pebbles on the banks of waters, in bushes or in hollow trees, and that it lays twelve or fourteen whitish eggs, which are nearly equally pointed at each end. The flesh is very rank and bad. Graves, who tasted one, pronounces it to have been offensive in the highest degree. The old French quatrain, in the *Portraits des Oyseaux*, gives the following description of its habits and of its quality as food:—

Le Bieure scait aux estangs se plonger
Pour le poisson, auquel est dommageable.
Mais qui vouldroit festoyer un diable,
Faudroit un Bieure avoir pour son manger.

Geographical Distribution.—Mr. Gould (*Birds of Europe*) states that 'its native locality appears to be the northern regions of the continents of Europe and America, where, among large and unfrequented lakes, it finds an asylum and breeding-place; from these, its summer haunts, it emigrates southwards on the approach of the severities of winter, seldom appearing in our latitudes unless the season indicates an exceedingly low temperature in the Arctic circle at such times it frequents our shores and unfrozen lakes, either in pairs or in small flocks of seven or eight: but the extensive inland waters of Holland and Germany appear to be its favourite resort.' This species was shot at Fulham in the severe winter of 1837. It appears in Dr. Richardson's list of birds, that they merely winter in Pennsylvania and migrate in summer to rear their young in the fur countries; the specimen described by him was killed on the Saskatchewan. It also occurs in Major Sabine's list of Greenland Birds. The Prince of Musignano notes it as rather rare in winter at Rome, and as not common, at the same season, in Philadelphia (*Specchio Comparativo*), and as occurring in Europe generally, and in America generally, in his *Geographical and Comparative List of the Birds of Europe and North America*. It was seen in Japan by Dr. Von Siebold and M. Bürger.

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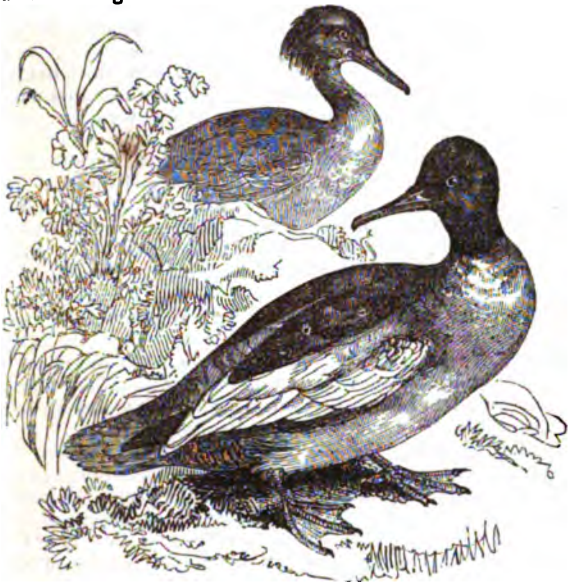
* The under plumage of the specimen described by Dr. Richardson had the under plumage rich buff orange, which faded to white.



The Goosander (Mergus Merganser, Linn.).
Lower figure, male; upper figure, female.

Mergus.

Example, *Mergus albellus*.

Description.—Old Male. A great spot of greenish black on each side of the bill, a similar coloured but longitudinal one on the occiput; the tufted crest, neck, scapulars, small coverts of the wings, and all the lower parts very pure white; upper part of the back, the two crescents which are directed under the sides of the breast, and the edges of the scapulars, deep black; tail ash-coloured; sides and thighs varied with ash-coloured zig-zags; bill, legs (tarsi), and toes bluish-ash; webs black; iris brown. Length 15 to 16 inches.

In this state the bird is *Mergus albellus* of Linnæus and others; *Le petit Harle huppé ou la Piette* of Buffon; the *Weiser Säger* of Bechstein and others; the *Witte non Duiker* of Sepp.; the *Mergo Oca minore* of the 'Stor. degl. Ucc.,' and the Smew or White Nun of the English ornithologists.

Female.—Summit of the head, cheeks, and occiput reddish brown; throat, upper part of the neck, belly, and abdomen white; lower part of the neck, breast, sides, and rump bright ash; upper parts and tail deep ash; wings variegated with white, ash, and black. Length 15 inches.

Young of the year, similar to the female.

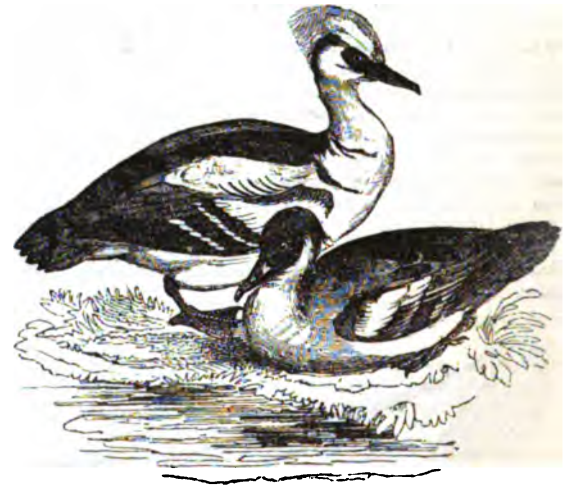
Males at the Age of One Year.—These are distinguished by the small blackish feathers which form the great spot at the side of the bill; by some whitish and white feathers scattered on the head; by the upper part of the back, which is variegated with black and ash-coloured feathers; and by indications of the two black crescents on the side of the breast. *The young of both sexes* have the great coverts of the wings terminated by a large white space, while the old ones have no white there except at the point.

The females and young of the year are the *Mergus minutus*, Linn.; *Mergus Asiaticus*, Gm.; *Mergus stellatus*, Brunn.; *Mergus Pannonicus*, Scop.; *La Piette femelle*, Buff.; *Le Harle etoilé* (young male), Buff.; *Mergo Oca minore* (female), and *Mergo Oca cenerino* (young male of the year), 'Stor. degl. Ucc.;' *De Kleine Zaagbek* (young of the year), Sepp.; and *Red-headed Smew* (young male in moult), Penn., 'Brit. Zool.'

This species is the *Kreutz-Ente* of Frisch and the Germans; the *Hviid Side* of the Danes; *Sugherone occhialino* of the Italians; *Lleian wen* of the antient British; Smew and (provincial) White Nun, Vare Widgeon and Smee of the modern British.

Food; Reproduction; Utility to Man.—The food of the Smew consists of small crustaceans, water-insects, mollusks, little fish, and water-plants. The nest, according to M. Temminck, is placed on the borders of rivers and lakes, and the number of eggs amounts to twelve; they are whitish. The bird is in no request for the table.

Geographical Distribution.—The countries of the Arctic circle in both worlds; migratory in autumn, but especially in winter, in England, Holland, France, and as far as Italy; rather abundant in Holland on the lakes and marshes (Temm.). It is seldom seen in Britain except in inclement winters. The species was not observed by Dr. Richardson, but it is noted by him in the tables compiled from the *Specchio Comparativo* as one of the birds that migrate northwards from or through Pennsylvania in spring, and may therefore be considered as returning to the fur countries to breed. The Prince of Musignano notices it as rather common in winter, particularly the young, near Rome, and as very rare and adventitious at Philadelphia (*Specchio Comparativo*). The same author, in his *Geographical and Comparative List*, notes it as occurring in Europe generally and on the northern and central coasts of America. Dr. Von Siebold and M. Bürger found it in Japan.



Mergus albellus; upper figure, male; lower figure, female. (Gould.)

M. Temminck remarks that the *Harles*, or birds of this subfamily, live upon the waters, where they swim, having generally the whole of the body submerged, and only the head out of the water.* They dive easily and often, swim with extreme agility *entre deux eaux*, and use their wings to assist them in this sort of natation. They remain long on wing, and fly very swiftly. Their walk is very vacillating and embarrassed, their legs or feet, as well as those of the sea-ducks, being more withdrawn within the abdomen than those of the ducks which have the posterior toe smooth. Their food consists principally of fish and amphibious animals, and of the first they make great destruction. In temperate climates they are only seen in winter; their habitual dwelling is in cold countries, where they breed. Th are much wilder than the different species of ducks, ar have not been domesticated. They moult once a year; b the old males, like those of the ducks, moult in the sprir whilst the old females and the young moult in the autumn. The young males, before their first or second moult, hardly differ at all from the females.

MERGER. It is somewhat difficult to give an exact definition of this legal term. In order to form an accurate notion of what is meant by it, the notion of the legal term estate [ESTATE] is a necessary preliminary. 'The accession of one estate to another, or more accurately speaking, the circumstance that two estates immediately expectant on each other, meet or are united in the same person, is the cause of the merger.' (Preston.) These words express in general terms the conditions necessary in order that merger may follow as a consequence. This consequence, called merger, is that the preceding estate ceases to exist, and the estate in which this preceding estate is said to be merged continues to be exactly the same as it was before that union which was the cause of merger.

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* The Smew does not swim with the body submerged and only the head out of the water; but with a very fair portion of its body above the surface.

It is necessary to add to this general description of the cause of merger, that the estate which is prior in point of time must not be greater (in legal estimation) that the estate which immediately follows: it may be either equal or less, but not greater. Also, the estates must both be vested estates, and both must be legal or both equitable estates.

Thus, if A is tenant for life, with reversion to B in fee, and A surrenders his estate to B, or B releases his estate to A, in either case the life-estate is merged, the consequence of which is that the estate in reversion immediately becomes a fee in possession. It seems that one term of years will merge in another, and a larger term in a less; at least this is the case when the second term is a term in reversion. Thus, if A is tenant for years, with reversion to B for years, and A surrenders or assigns his term to B, the term which belonged to A is merged. There is one exception to this rule: if the estate of A is derived from the estate of B as an underlease, the original term of B is not abridged by such merger. In fact, merger, in the proper sense of the term, can never apply to a surrender or assignment of an estate in land to the person by whom, and out of whose larger estate, that smaller estate was granted. But if A, who is seised in fee, leases first to B for five hundred years, and then to C for ten years, by way of immediate reversion, and C assigns his term to B, the estate of B is merged in that of C, which becomes an estate in possession, and can have no longer duration than ten years. Opinions vary as to the question whether a term can merge in a term in remainder.

Estates tail are not subject to merger; an exception which is a necessary consequence of the form of the gift to the heirs in tail, so long as there are any. Formerly, if an estate tail had become a base fee by the tenant in tail levying a fine, such base fee would merge by union with the immediate reversion in fee. But by a recent statute (3 and 4 Wm. IV., c. 74), such base fee will not merge in the reversion in fee, but shall be 'enlarged into as large an estate as the tenant in tail, with the consent of the protector, if any, might have created by any disposition under this act, if such remainder or reversion had vested in any other person.'

If the two estates, the union of which in one person might otherwise cause merger, do not unite in him in the same right, there is no merger.

The various exceptions to the general principles of merger are numerous enough to form the subject of an entire treatise. The whole subject is discussed at great length in the third volume of Mr. Preston's *Treatise on Conveyancing*.

The origin of the doctrine of merger is uncertain, and no hypothesis seems fully to explain all the cases of merger as now settled. In the case put by Bracton (fol. 12), the termor for years who had become the feoffee of the land, is considered as having, by the acceptance of the freehold, renounced the term (ex quo idem B se tenuit ad feoffamentum, tacite termino renuntiavit). The origin of merger is discussed in Preston's third volume, chap. iii., &c.

MERGUI. [Tenasserim.]

ME'RGULUS. [Auk, vol. iii., p. 100.] The Prince of Musignano notes the *Little Auk* (*Mergulus Alle*) as occurring in the northern and central parts of Europe, and on the northern shores of America. (*Geographical and Comparative List.*)

MERGUS. [Merganinæ.]

MERIAN, MARIA SIBYLLA, the daughter of Matthew Merian, an eminent Dutch engraver, was born at Frankfort-on-the-Mayn, April 12, 1647. Her instructor in drawing was Abraham Mignon. In 1665 she married John Andriez Graff, a painter of Nürnberg, but the celebrity which attached to her own name as an artist prevented that of her husband from being adopted. They had two children, both daughters, who were also skilled in drawing. In consequence of liberal offers Madame Merian and her husband settled in Holland, but Maria Sibylla, whose great object was the study of nature, travelled for the sake of delineating insects, flowers, and other natural objects. In 1699 she went to Surinam, for the express purpose of making the drawings which have since added so considerably to her fame, and remained there till the month of June, 1701.

She published—1, 'The Origin of Caterpillars, their Nourishment and Changes,' in Dutch, 2 vols. 4to., the first published at Nürnberg in 1679, the second in 1683, published in Amsterdam in Latin, 4to., 1717. This work, much enlarged by herself and her daughters, was published in French by John Marret, fol., Amst., 1730, under the title of 'Histoire Générale des Insectes de l'Europe.' 2, 'Dissertatio de Generatione et Metamorphosibus Insectorum Surinamensium,' fol., Amst., 1705, separately in Dutch and in Latin. These editions contain only sixty plates. To some of the later ones twelve plates were annexed by her daughters Jane Helen and Dorothea Maria Henrietta. There is an edition of this work in folio, French and Dutch, printed at Amsterdam in 1719; another in French and Latin, Hagæ, 1726; and another in Dutch in 1730. There have been also editions of the two works united, under the title of 'Histoire des Insectes de l'Europe et de l'Amerique,' fol., Par., 1768 and 1771.

Madame Merian died at Amsterdam, January 13, 1717. Many of the original drawings of this artist are preserved in the department of drawings and prints in the British Museum, in two volumes, purchased by Sir Hans Sloane at a large price. One contains the insects of Surinam, the other those of Europe. A few of the Surinam insects, though elegantly finished, appear, upon examination, not to be entirely drawings, but to have been coloured upon outline proofs of the engravings. Those of Europe are entirely original delineations. All are upon vellum. Other drawings of Madame Merian are preserved at Petersburg, in several collections in Holland, and at Frankfort. A portrait of Madame Merian, formerly Sir Hans Sloane's, is still preserved in the British Museum. An engraved portrait of her, by Houbraken, is prefixed to the Latin edition of the 'Origin of Caterpillars,' 1717.

(*Biog. Universelle*, vol. xxviii., pp. 366, 367; Brunet, *Manuel du Libraire*, 8vo., 1820, tom. ii., pp. 475, 476; Chalmers, *Biogr. Dict.*, vol. xxii., p. 72.)

ME'RIDA, a town of Extremadura in Spain, in 38° 48′ N. lat. and 6° 15′ W. long. It was founded by Publius Casirius, a Roman general under the emperor Augustus, from whom it was named Emerita Augusta. It was subsequently made the capital of the province of Lusitania (which included nearly the whole of Portugal, with part of Leon, Extremadura, and Old Castile), and was the largest and most magnificent city in Roman Spain. From the hands of the Romans it passed into those of the Goths, who made it an archiepiscopal see. In the year 587 it was the focus of a plot formed by the Arians to kill the reigning monarch and extirpate the Catholic religion from the land. It was also the seat of several provincial councils, of which that of A.D. 666 is the most known. On the invasion of the Arabs in 711 it offered a stout resistance, but was eventually obliged to capitulate to Muza, who on entering the city was amazed at its vast size and the grandeur of its buildings. According to a Moslem chronicler it was then eight miles in circumference, and was garrisoned by 90,000 men. By the Arabs its original name was corrupted into Mérida. In 1230 it opened its gates to the Christian king Alonso XI. of Castille and Leon, after a great battle, in which, aided by the apostle James and other saints in white robes (as tradition has it), he routed a greatly superior force of Moors, headed by their king Ibn Hud. Alonso, to testify his gratitude, entrusted the government of the city to the military order of St. James, in whose hands it has till recently remained.

Modern Mérida is one of the most decayed and poverty-stricken towns in the Peninsula. In extent it has shrunk to a very small compass; its population has dwindled to less than 5000; and the trade in merino wool, of which it has long been the depôt, is rapidly declining. It is situated on the right bank of the Guadiana, on a rising ground, in the midst of an open and gently undulating country, naturally very fertile, but almost uncultivated, and in summer rendered very unhealthy by malaria. The sole interest of modern Mérida lies in its numerous remains of Roman magnificence. The houses, churches, walls, and pavements, abound in Roman fragments, columns, inscriptive tablets, altars, vases, statues, and bas-reliefs. In the fields, gardens, and roads without the town, similar remains are found. But the principal ruins are an amphitheatre almost entire, which by letting in the waters of the Guadiana could at pleasure be turned into a naumachia; a circus, said to equal in size the Circus Maximus at Rome; a theatre, where in modern times bull-fights have been held; the shell of a lofty triumphal arch, now stripped of its ornaments; some baths in excellent preservation, and a gateway defaced by Arabic inscriptions. Encased in a private house is a small peripteral temple of Mars; the capitals as well as shafts of the columns are of granite. There are also two Roman bridges; one of enormous length and curious construction, with a fortress at one end. Near the town are the ruins of two grand aqueducts built of brick and granite mixed. Of the latter material are constructed all the antient edifices of Mérida, with very trifling exceptions.

At the distance from Mérida of one and two leagues respectively are two remarkable reservoirs, by some considered of Roman, by others of Moorish architecture. The first, called Albufera, is about 100 feet in length by nearly 60 feet in depth, enclosed by thick walls, with two fine towers. The other, called Albuera, is smaller, but its walls and the single tower which surmounts them are much finer.

(Mariana, *Historia General de España;* Conde, *Historia de los Arabes;* Ponz, *Viage de España:* Laborde, *Itinéraire Descriptif de l'Espagne;* Semple's *Journey through Spain and Italy;* Captain Cook's *Sketches in Spain.*)

MERIDIAN (*meridies*, mid-day). In the heavens the meridian is the circle which passes through the pole and the zenith of the spectator: on the earth it is the circle which passes through the pole and the spectator's position; consequently the terrestrial meridian is the section of the earth made by the plane of the celestial meridian.

The circle derives its name from being that on which the centre of the sun is found at mid-day, or real noon. In the case of a fixed star, the time at which its altitude is greatest is the moment of its coming on the meridian; but in that of the sun or a planet, the orbital motion prevents the moment of its culmination (or coming on the meridian) from being exactly that of its attaining its highest point; though the difference is not worth noting for ordinary purposes. [SPHERE, DOCTRINE OF THE.]

MERI'NO. [SHEEP.]

ME'RIONES. [MURIDÆ.]

MERIONETHSHIRE, a county of North Wales, bounded on the north by Caernarvonshire and Denbighshire, on the north-east by Denbighshire, on the east and south-east by Montgomeryshire, on the south by Cardiganshire, and on the south-west and west by Cardigan Bay, an inlet of the Irish Sea. Its form approximates to that of a right angled triangle, having two sides facing the north and west respectively, and the hypotenuse facing the south-east.

The area of the county is estimated at 666 square miles; it is the sixth of the Welsh counties in respect of size, being a little smaller than Cardiganshire, but larger than Denbighshire. The population in 1821 was 34,382; in 1831 it was 35,315, showing an increase of 118 persons only, and giving 53 inhabitants to a square mile. In absolute population it is inferior to all the Welsh counties except Radnorshire; and in density of population is inferior even to that. Bala and Dolgelly are the assize towns: the county election for members of parliament takes place at Harlech. Bala, the nearest of these places to London, is in 52° 55′ N. lat. and 3° 34′ W. long., about 180 miles in a direct line north-west of London, or 194 miles by the Holyhead parliamentary road to Shrewsbury, and from thence through Llangynnog.

Coast Line.—The northern part of the coast is formed by the æstuary of which the Traeth Mawr and the Traeth Bach are portions. The Traeth Mawr (of which a considerable part has been recovered from the sea by an embankment about a mile in length, reaching across this branch of the æstuary from side to side) forms the boundary between Caernarvonshire and Merionethshire. The Traeth Bach or Bychan belongs entirely to the latter: it comprehends many thousand acres, and receives the rivers Fellnrhyd, or Bychan, and Dwyrhyd. This arm of the æstuary penetrates several miles inland, becoming narrow as it proceeds. It is dry at low water, except a narrow channel in the centre, through which the united streams find their way into the sea, and is crossed by a ferry.

From the Traeth Bach the coast runs south about six miles past Harlech to the little headland on which stands the village of Mochraes or Mochras. From the Traeth Bach to the town of Harlech the immediate neighbourhood of the sea is low and marshy. Between Harlech and Mochraes it rises into cliffs. It is skirted by sands dry at low water, and at some distance out to sea are three sand-banks, the 'Dutch Bank,' the 'Pontigal Bank,' and the 'Sarn Badrig' (St. Patrick's Causeway) or 'Sarn Badrhwyg' (Ship-breaking Causeway). This remarkable shoal runs from the immediate neighbourhood of the coast 22 miles out to sea in a south-west direction; it is composed of sand and gravel. It is dry at the ebb in spring tides, and in storms is marked by fearful breakers. Tradition says that this part of the sea was once inhabited land called Cantrér Gwaelod, or the Lowland hundred, and that it was overwhelmed by the sea about the close of the fifth century. (Pennant.) The name, St. Patrick's Causeway, is said to have originated from a monkish legend, that it was formed by St. Patrick in order that he might pass from Ireland to Britain.

From Mochraes the coast runs south-south-east eight miles to the river Maw, at the mouth of which stands the town of Aber-Maw, contracted into Ber-Maw or Barmouth. Throughout Merionethshire, north of the Maw, the coast is skirted by sands of greater of less breadth. From the Maw the coast runs southward 14 miles to the wide æstuary of the Dovey, taking a circuit convex to the sea, and rising into cliffs midway between the rivers. At the southern extremity of these cliffs the river Towy, or Disynwy, flows into the sea. Between the Towy and the Dovey the coast is again skirted by sands. The whole extent of the Merionethshire coast is about 38 miles, following its principal bends.

Surface and Geological Character.—Merionethshire is the most mountainous of all the Welsh counties, and contains some of the loftiest peaks in North Wales; there are however no peaks so high nor precipices so abrupt as those of Caernarvonshire. The principal mountain-chain is that which, in one part at least, is called the mountains of Berwyn, and which traverses the county from north-east to south-west, skirting the valleys of the Dee, the Wnion, and the Maw. The principal summits of this chain are, Cader Berwyn or Ferwyn, on the border of this county and Montgomeryshire, seven miles south of Corwen, 2563 feet above the level of the sea; Arran Fowddy, near the Wnion, above Dolgelly, 2955 feet; Pen-y-Gadair (summit of Cader Idris), three miles south-west of Dolgelly, 2914 feet; and Pengarn, at the extremity of the chain near the sea, 1510 feet. West of Bala, and near the centre of the county, is a group of mountains, of which Arrenig Mawr is the highest point, 2809 feet above the level of the sea. From this central group branches run westward to the sea in the neighbourhood of Harlech, and north-westward to join the group of Snowdon. There are no plains.

The county is almost entirely occupied with the slate rocks which predominate in North Wales. Along the valley of the Dee, as far up as Bala and the valley of the Alwen, a bluish-grey limestone is found, which is quarried for lime, the principal manure employed in the county. Great quantities of white limestone are quarried and burnt for lime near Corwen. This limestone is surrounded on every side by primitive argillaceous slate, which occupies all the eastern side of the county, as far as a line drawn from Bala, north-west along the vale of the Treweryn, and southward along the Twrch and the Dovey to Dinas-y-Mowddy. The slates of this formation are quarried in the neighbourhood of Corwen.

Westward of the line described the rocks are chiefly slaty, forming abrupt and rugged mountains of desolate appearance. Lead and copper mines are worked near Towyn at the mouth of the Disynwy, and copper-mines in the neighbourhood of Barmouth. Copper ore has been produced from the peat ashes of a turf pit near Dolgelly. Slates are quarried in the Berwyn mountains; and there are quarries producing slates of excellent quality at Festiniog near the Caernarvonshire border. The slates are shipped in the æstuary of the Traeth Bychan, near the place where they are raised.

It was the opinion of some former observers that Cader Idris and some other mountains presented traces of volcanic agency. 'The steeper part of this mountain, says Mr. Pen-cent, 'to the highest peak, or Pen-y-Gadair, grows more and more rocky; the approach to the summit extremely so, and covered with huge fragments of discoloured rocks, very rugged, and cemented by a semi-vitrified matter, which gives them a very volcanic look, added to their disjoined adventitious appearance. I met with, on my ascent, quantities of pumice of the same cellular kind with the toadstone of Derbyshire, but of a green colour. The day proved so wet and misty that I lost the enjoyment of the great view from the summit. I could only see that the spot I was on was a rude aggregate of strangely disordered masses. I could at intervals perceive a stupendous precipice on one side where the hill recedes inwards, forming a sort of theatre, with a lake at the bottom; yet very high in comparison of the base of the mountain. On the other side, at a nearer distance, I saw Craig Cay, a great rock, with a lake beneath, lodged in a deep hollow, possibly the crater of an antient volcano.'

Hydrography and Communications.—The principal rivers belonging to the county are the Dee, the Maw, and the Dovey, with their respective affluents.

The Dee rises in the valley skirted by the Berwyn mountains, very near the road leading from Bala to Dolgelly; from its source it flows north-east four miles (receiving by the way the Lew and the Twrch, each considerably longer than itself) into the lake of Bala, called Llyn Tegid, *i.e.* 'the fair lake,' by the Welsh, but by the English, Pimble Meer. [BALA.] From the lower end of the lake the Dee flows 12 miles in a winding course north-east to Corwen, receiving a number of mountain streams: from Corwen it flows five miles east to the border of the county, which it divides from Denbighshire for two or three miles farther, before finally quitting it. The Treweryn, or Glettwr, a feeder of the Dee, rises in the northern part of the county, and has a south-east course of about fourteen miles into the Dee, which it joins just below the lake of Bala. Just above Corwen the Dee receives the Alwen, one of its tributaries, which though belonging chiefly to Denbighshire, has five miles of its course upon and three miles within the border of this county.

The Maw, otherwise called Mawddach, rises near the centre of the county, and has a southern course of eight miles to its junction with the Lyniauduon, which lies more to the westward, and is of about equal length. From the junction of the Lyniauduon the Mawddach flows south-south-west, four miles to the junction of the Wnion (twelve miles long), which rises close to the source of the Dee, and flows along the same valley, but in an opposite direction. For the remainder of its course, which is about eight miles south-west, the Maw is a tide river. In this part of its course it expands into an æstuary in some places a mile wide, and in great part dry at low water.

The Dovey, or Dyfi, rises just within the border of the county, east of the mountain Arran Fowddy, in the Berwyn chain. From its source it flows south-west nearly thirty miles through a winding vale into the bay of Cardigan. It receives a number of small mountain streams, of which the Tafalog, the Afon, the Dulas, and the Cwmcelli are the principal. A part of the course of the Dovey itself and of the Tafalog, and the whole course of the Afon and the Dulas, belong to Montgomeryshire. The lower part of the course of the Dovey is on the border of Merionethshire, which it separates first from Montgomeryshire, and then from Cardiganshire. Near the mouth it expands into a wide æstuary, the greater part of which is dry at low water. The Dovey is not mentioned in Priestley's 'History of Navigable Rivers' as navigable, but is marked in the map which accompanies that work as navigable up to Machynlleth, or Machynleth, at the junction of the Cwmcelli and the Dulas, twelve or thirteen miles from the mouth of the river.

The Disynwy rises in the Berwyn mountains, a little to the north-east of Cader Idris, and flows south-west sixteen miles into the sea between the Maw and the Dovey. About three miles from its source it expands into a small lake, called Llyn-y-Myngil, which in width nearly fills the valley of Tal-y-Llyn, leaving only a narrow road on one side, and extends in length about a mile. The Disynwy above its mouth expands into an æstuary of about a mile wide, but just at the mouth is contracted into a very narrow channel.

None of these streams, except the Dovey, are navigable: the æstuary at the mouth of the Mowddy forms the harbour of *Barmouth*.

There are many lakes, most of them small. The largest are Llyn-Tegid, or Bala Lake, and Llyn-y-Myngil, already noticed.

The principal roads are those from London by Shrewsbury to Corwen and Bangor, to Bala and Caernarvon, and to Dolgelley, or Dolgelleu, and Barmouth, with branches to Towyn. The first of these enters the county on the east from Denbighshire, a little beyond Llangollen, and runs along the valley of the Dee to Corwen, from which place it follows the valley of the Alwen into Denbighshire. There are two Bala roads, both branching off from this to the left, one at Corwen, which follows the right bank of the Dee up the valley to Bala, the other a little beyond Corwen, which follows a valley parallel to that of the Dee, from which it is separated by intervening hills. The Caernarvon road runs up the valley of the Treweryn by Festiniog and Tan-y-Bwlch to Beddgelert, with a branch from Tan-y-Bwlch by the coast to Harlech and Barmouth. Another road from Bala follows the valley of the Dee and the Wnion to Dolgelley and Barmouth. There is a nearer road from London to Bala by Shrewsbury and Llangynnog.

The Dolgelley and Barmouth road runs from Shrewsbury, through Welshpool and Llanfair (Montgomeryshire), enters the county by the valley of the Tafalog, and follows that valley and the vale of the Dovey to Dinas-y-Mowddy, or Mowddw, from which place it runs west to Dolgelley and Barmouth. Two branches from this road run to Towyn; one a little before reaching Dinas-y-Mowddy, which follows the vale of the Dovey and then the coast; the other a little before reaching Dolgelley, which follows the vale of the Disynwy. This first branch to Towyn is partly in Montgomery and Cardigan shires, and communicates with Machynlleth and Aberystwith.

Divisions, Towns, &c.—This county, called by the Welsh Meironydd, or Meirionydd, is the only one in Wales that, with the addition merely of the word 'shire,' retains its antient designation. This name is supposed by some to be derived from Meirion, grandson of a chieftain to whom a large territory in this part of Wales was assigned in the fifth century. If however the district was known to the Romans, as some think, by the name Mervinia, which evidently contains the same root (Mervin, or Meruin) as Meirion-ydd, the name must be of earlier origin.

Writers are not agreed as to the antient division of the county; but its limits appear to have undergone considerable change. One cantref, that of Arustly or Arwystli, south of the river Dovey or Dyfi, was by Henry VIII. added to Montgomeryshire, and the cwmwts or comots of Edernion and Glyndyfrdwy were detached from Powys-land, and added to this county.

The present divisions, with their relative situation and their population in 1831, are as follows:—

Ardwdwy, or Ardudwy,	N.W.	10,499
Edernion, or Edeyrnion,	N.E.	4,905
Estimaner, or Estumaner,	S.	4,631
Penllyn	N. & N.E.	6,654
Talybont, or Tal-y-bont, and Mowddy,	S. & S.E.	8,547
		35,236
Militia		79
		35,315

There are five antient market-towns, namely: Bala and Dolgelley, the assize-towns; Harlech, the place of county elections; Corwen and Dinas-y-Mowddy; and two, where markets have been established of late years, viz. Towyn and Barmouth. [BARMOUTH.]

Bala is in the parish of Llanykil or Llanycil, in the hundred of Penllyn, near the outlet by which the Dee quits the lake of Bala; 194 miles from London by Shrewsbury and Llangynnog, or 207 miles by Shrewsbury and Corwen. [BALA.]

The population of Llanykil parish was, in 1831, 2359: there was no separate return of the population of the town, but in 1821 it contained 1163 inhabitants out of 2467, the whole population of the parish at that time.

The living of Llanykil is a rectory, in the archdeaconry and diocese of St. Asaph; of the clear annual value of 250*l.*, with a glebe-house, in the gift of the bishop of St. Asaph.

There were in the whole parish, in 1833, two day-schools with 130 children; one of these, a grammar-school, with

75 boys, was partly supported by an endowment. There were seven Sunday-schools, with 1088 scholars.

Dolgelley, Dolgelleu, Dolgellau, or Dolgellen (from *dol*, dale, and *gelli, gellen*, or *celli*, a grove of hazels), is in the hundred of Talybont and Mowddy, on the south bank of the Wnion, a mile or two above its junction with the Maw, 208 miles from London by Shrewsbury, Welshpool, Llanfair, and Dinas-y-Mowddy. This town came into possession of Owain Glyndwr during his rebellion, and from here (A.D. 1400) he despatched ambassadors to France. It was the scene of a smart skirmish during the civil wars of Charles I., in which the parliamentarians were victorious. The town is in a delightful valley: the streets are narrow and irregularly laid out; and the houses are for the most part small, and ill built of limestone without mortar. Within the last few years however some handsome dwellings have been erected, and the general appearance of the town materially improved. The church is a neat structure, capable of accommodating a thousand persons, but destitute of any architectural pretensions. The county hall and county gaol were both erected in the present century; the former is a neat stone building, near the river Wnion. The town-hall is scarcely distinguishable from the ordinary houses, and the market-house is a low square edifice. There is a neat stone bridge of seven arches over the river Wnion.

The population of the parish (which is very extensive) was, in 1831, 4087; less than a fourth of which was agricultural. Dolgelley is the most populous and most commercial town in the county. The Population Returns give 72 males above twenty years of age as employed in the manufacture of 'webs,' or coarse woollen cloths and flannels. They are made in the houses and cottages of the weavers. Fulling-mills and bleaching-grounds have been established in the neighbourhood of the town; and the cloths, when finished, are bought up by agents, and sent to Liverpool for exportation to America, or to Shrewsbury, from whence they are sent to different parts of England. There is a good deal of business done in tanning and dressing lamb-skins and kid-skins, which are sent to Worcester and other places. The markets are on Tuesday and Saturday, and there are several yearly fairs. The summer assizes and the Easter and Michaelmas quarter-sessions are held at Dolgelley; also the petty-sessions for the division, and, commonly, the county court for the recovery of small debts.

The living is a rectory, in the archdeaconry of Merioneth and diocese of Bangor, of the clear yearly value of 440*l.* There are several dissenting places of worship in the town or parish, chiefly belonging to the Independents or the Calvinistic Methodists. There were, in 1833, five day-schools with 155 children: of these schools one with 33 children was partly supported by an endowment; one day and Sunday national-school, with about 100 children, and some adults on Sunday; and fourteen Sunday-schools, with nearly 1400 scholars.

Harlech is in the parish of Llandandwg, in the hundred of Ardudwy, near the shore of Cardigan bay, 232½ miles from London by Dolgelley and Barmouth. It has been supposed that Harlech was a Roman post, but for this opinion there is no just ground. An antient British fortress, called originally Twr Bronwen, and, at an after-period, Caer Collwyn, occupied the site of the present castle erected by Edward I. This strong fortress was held in the civil war of the Roses by Dafydd ap Jevon ap Einion, a stout partisan of the house of Lancaster. Dafydd, after a valiant defence, was obliged to surrender to Sir Richard Herbert, on an engagement that his life should be spared. Edward IV. would have put him to death in violation of this engagement, had not Sir Richard declared that if the king persisted in his purpose, he would replace Dafydd in the castle, and the king might send whom he would to take him out. In the civil war of Charles I. the castle changed masters once or twice, but was finally taken by the parliamentarians under General Mytton, March, 1647. The town of Harlech is little more than a village of small size and insignificant appearance, situated between a wild and desolate mountain country and the sea. The most striking object is the castle, the ruins of which are situated on a lofty rock facing the bay, and rising above an extensive marsh once occupied by the sea. Its walls are tolerably perfect; they form a square of about seventy yards each way, with a round tower at each corner. From these corner towers formerly rose elegant turrets, but these are in great part destroyed. There are round towers on each side of the entrance. The apartments, now open to the sky, are of large dimensions. There are traces of the antient British fortress in the foundations of the present structure. Toward the sea, the castle was protected by the inaccessible precipice on which it stood; on the land side it was strengthened by a deep ditch cut with enormous labour in the solid rock. The assizes and county court, once held at Harlech, have been long removed; the market, held on Saturday, has fallen almost or quite into disuse; and the county election and the poll for the district are the only public business transacted here. There are several fairs, chiefly for live stock. The population of the parish, in 1831, was 658, about one-third agricultural.

The living of Llandandwg is a rectory, united with the chapelry of Llanbedr, in the archdeaconry of Merioneth and diocese of Bangor, of the clear yearly value of 194*l.*

There were, in 1835, one boarding-school, with six scholars; one day-school, partly supported by endowment, with 36 scholars; and two Sunday-schools, with 153 scholars.

Corwen is in the hundred of Edernion, on the south bank of the Dee, just below the junction of the Alwen, 194 miles from London on the Holyhead parliamentary road. There was antiently a British or Welsh post near this town, called Caer Drewyn; it consisted of a circular wall a mile and a half round, still remaining, on the summit of a steep hill, and of a circular habitation, now in ruins, within this enclosure. In the invasion of Wales by Henry II., A.D. 1165, the progress of that monarch was stopped by the assembling of the Welsh forces at Corwen under Owain Gwynedd. There are said to be some traces of the Welsh encampment near the town. Corwen is a small place, but neat; it stands on a rising ground just above the river. The church is a neat cruciform building, capable of accommodating about seven hundred persons, in a romantic situation, immediately at the foot of a rocky precipice belonging to the Berwyn mountains. On the south side of the church is a stone shaft or cross, called by the common people 'the sword of Glyndwr;' and on the same side of the churchyard is a neat almshouse for six widows of clergymen. There is another almshouse for eight poor women. One of the county bridewells is at Corwen. 'It is a small house, inhabited by the keeper (who is a shoemaker), his family, and the very few prisoners who are usually to be found here.'

The population of the parish, which is extensive, was, in 1831, 1980, about half agricultural. There are no manufactures. The markets are on Tuesday and Friday, the former for corn; and there are several yearly fairs.

The living is a vicarage, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 390*l.* There is also a sinecure rectory, of the clear yearly value of 373*l.*

There were, in 1833, one day-school, partly supported by endowment and subscription, with 60 children; one day and boarding-school, with 26 children; and twelve Sunday-schools, with 748 scholars. There are several dissenting congregations in the parish, chiefly Calvinistic Methodists.

Dinas-y-Mowddy, or Dinasmouthy, is in the parish of Mallwydd, and in the hundred of Tal-y-bont and Mowddy, 203 miles from London through Ludlow, Montgomery, Welshpool, and Llanfair. It has been thought by some to have been formerly a place of greater importance, but no marks of former greatness can be traced: it was perhaps the residence of some small chieftain. The town is situated on a shelf of rock at the junction of the Cerris, a small stream, with the Dovey: it consists of a few mean cottages, one story high, built of mud, and thatched with rushes. The population of the parish of Mallwydd in 1831 was 1137; but the part which is in the county of Merioneth, in which the town stands, was 998: the town itself perhaps contains 300 inhabitants. A good deal of flannel is made in the neighbourhood, partly in the weavers' cottages, and partly in factories. There is a corporation at Dinas-y-Mowddy: the mayor exercises a conjoint jurisdiction with the county magistrates in the lordship or borough, which comprehends the parish of Mallwydd and the greater part of that of Llan-y-Mowddy. There are stocks, and a crib or little prison, which are scarcely used; and the municipal institutions altogether are characterised as 'trifling and harmless.' (*Munic. Commiss. Report.*)

The living of Mallwydd is a rectory, of the clear yearly value of 255*l.*, with a glebe-house, in the archdeaconry and diocese of St. Asaph. The church is a large building, capable of accommodating a thousand people, but very thinly attended, most of the parishioners being dissenters. There were in the parish in 1833 one day-school, with 30 children, and nine Sunday-schools, with 539 scholars.

Towyn, or Tywyn, is in the hundred of Estimaner, near the coast, between the æstuaries of the Disynwy and Dovey, but much nearer to the former, 227 miles from London by Dinas-y-Mowddy and Machynlleth. The town consists of some good-looking houses, built chiefly of a coarse grey stone quarried in the neighbourhood. It is frequented in the bathing season by visitors attracted by the pleasantness of the situation in a quiet vale commanding a view of the sea and backed by lofty mountains. The church is a spacious building of considerable antiquity: it contains some venerable monuments; and in the churchyard are two rude pillars, one of them seven feet high, adorned with a cross, and bearing an inscription in antient but illegible characters. In a field near the church is a spring, called St. Cadvan's Well, the waters of which are considered beneficial in scrofulous, rheumatic, and cutaneous disorders. The spring is now enclosed, and two baths have been formed, with dressing-rooms attached.

The population of the parish in 1831 was 2694, about half agricultural. Some webs and flannels are manufactured. Races are held near the town, and are well attended. A customary market is held on Friday, and there is a yearly fair. The village and port of Aberdovey is in the parish: it is frequented as a bathing-place, having the recommendation of a firm hard sand: it is on the æstuary of the Dovey. There are dissenting chapels here. Slate-quarries are worked near Aberdovey, and a considerable share of the coasting trade is carried on at the port, which is a member of Aberystwith.

The living of Towyn is a vicarage, in the archdeaconry of Merioneth and the diocese of Bangor, of the clear yearly value of 224*l.*, with a glebe-house.

There were, in 1833, four day-schools (one of them partly supported by endowment), each with about 50 scholars; two boarding-schools, each with about 10 scholars; and eleven Sunday-schools, with 50 to 80 scholars each, chiefly connected with dissenters.

Divisions for Ecclesiastical and Legal purposes.—The county of Merioneth is partly in the diocese of St. Asaph and partly in that of Bangor, both in the ecclesiastical province of Canterbury. It is divided into five rural deaneries, which have the same name with the hundreds, and are nearly or quite conterminous with them. The deaneries of Ardudwy, Estimaner, and Tal-y-bont are in the archdeaconry of Merioneth and the diocese of Bangor; the deaneries of Mouthwy or Mowddy, Pentlyn or Penllyn, and Idernion or Edeyrnion, are in the archdeaconry and diocese of St. Asaph. The map subjoined to the Third Report of the Church Commissioners represents all that part of the county which is in the diocese of Bangor as forming the single deanery of Ardudwy. There are in all thirty-four parishes wholly or chiefly in this county, besides a portion of one parish (Beddgelert), which is chiefly in Caernarvonshire. Four of these parishes are for ecclesiastical purposes, united with others; but there are three sinecure rectories, so that the number of benefices is thirty-three: seventeen of these are in the diocese of Bangor, nine of them in the patronage of the diocesan, and sixteen in that of St. Asaph, of which fourteen are in the bishop's own gift. The benefices are, some of them, tolerably rich; the wealthiest is the rectory of Dolgelly, 440*l.* clear annual value; but most of them are under 200*l.* a year, and eight under 100*l.* a year.

The county is in the North Wales circuit: the Lent assizes and the Epiphany and Midsummer quarter-sessions are held at Bala: the Midsummer assizes and the Easter and Michaelmas quarter-sessions, at Dolgelley. The county gaol is at Dolgelley; it is well situated, but badly arranged and deficient in many requisites. The number of prisoners is happily small. The committals to the county gaol, on the average of the years 1829 to 1835, were only about 28 annually. There are bridewells or houses of correction at Corwen, described above, and at Bala. The latter is a small building, part of the guildhall, insecure, out of repair, and slovenly. When visited by the inspectors of prisons (in 1836) there were no prisoners.

The court of election for the county, which returns one member to parliament, is held at Harlech: the polling-stations are Harlech, Bala, Dolgelley, Corwen, and Towyn There are no parliamentary boroughs in the county.

History, Antiquities, &c.—In the earliest period of the authentic history of the island, Merionethshire was included in the territory of the Ordovices, who occupied nearly the whole of North Wales, a considerable part of Shropshire, and a part of Cheshire. [BRITANNIA.] In the Roman division of the island, it was included in the province of Britannia Secunda. It is said to have been called Mervinia by the Romans.

There are several traces of Roman works in this county. There are remains of camps near Bala [BALA]; and in the immediate neighbourhood of that town is Tommen-y-Bala, an artificial mound supposed to be a Roman work, and to have had a small fort on its summit.

Tommen-y-Mûr, 'the mount within the wall,' a station, of which the ditch and bank, with vestiges of a wall, remain, near Ffestiniog, is supposed to be the Heriri Mons of Richard of Cirencester, though Stukeley places it near Bala. Castell Prysor, a hilly fort about three miles east of Trawsfynydd, is considered by Pennant to have been originally Roman. The Dovey river is considered to be the Stucia (Στουκία) of Ptolemy. A Roman road from Maridunum, or Muridunum (Caermarthen) to Segontium (Caer Seiont, near Caernarvon) led through the county. It may be traced in the neighbourhood of Trawsfynydd through Tommen-y-Mûr, where it is called Sarn-Helen, a name which is interpreted by some 'the road or causeway of Helen,' the wife of the usurper Maximus, who assumed the purple (A.D. 381) in the time of the emperors Gratian and Theodosius; and by others, 'the road of the legion.' From this road, at or near Tommen-y-Mûr, roads are supposed to have led in one direction to Conovium (Caer Rhun, near Aber-Conway), and in another direction to Bala.

The Sarn-Helen is now entirely covered with turf, and is to be distinguished only by its elevation above the rest of the surface; but on digging, the layers of stone of which it was made are discoverable throughout the whole of its visible course: the aggregate breadth of these layers is about twenty-four feet. There are several tumuli or barrows near the road. There is a group of other monuments, probably sepulchral, near Rhyd-ar-Helen, a quarter of a mile from the Sarn-Helen, of considerable but undetermined antiquity. In the neighbourhood of Rhiw Goch, not far from Trawsfynydd, is a grave, called the grave of Porus, covered with an inscribed stone, evidently Roman; and near it is a great upright monumental stone, of a kind frequent in Wales and in northern Europe. Roman coins, sepulchral urns, and other antiquities have been dug up in various places, particularly near Castell Prysor and Tommen-y-Mûr; at Caer Gai, near the south-west end of Llyn Tegid, or Bala Lake (probably the site of a Roman fort); and at Cefyn Caer, near Pennal, where was the site of another Roman fort.

There are a stone enclosure or fort and several other British antiquities near Llanddewe, between Barmouth and Harlech; and in the same neighbourhood carnedds, cromlechs, and other Druidical remains. Other Druidical remains are found near Rhyd-ar-Halen, not far from Ffestiniog. They are called Beddau Gwyr Ardudwy, 'the graves of the men of Ardudwy.'

During the Saxon period and the reigns of the earlier English kings of the Norman dynasty, Merionethshire does not appear to have been the scene of events of historical interest. One battle took place between the Saxons and the Britons under the royal bard Llywarch Hên, between Corwen and Bala: the Briton lost the last of his sons in this battle, a bereavement which he has commemorated in one of his elegies. Merionethshire was afterwards the scene probably of many of those bloody feuds which disfigure the annals of Wales; but the remote and secluded situation of the county secured it from any serious foreign invasion. In proportion however as the consolidation of the Anglo-Norman power enabled the English to press the Welsh more closely, these previously unassailed fastnesses became the scene of contest. The invasion of Henry II., his advance to Corwen, and the stop put to his progress there by the Welsh under Owain Gwynedd (A.D. 1165), have been noticed. Henry retreated into England after sustaining a great loss in men and stores.

This county was probably conquered by Edward I., a little before the final conquest of Wales; as Harlech Castle was completed before 1283, in which year Hugh de Wlonkeslow was constable of it, Merionethshire was the scene of the rebellion of Owain Glyndwr. [Glendwr, Owen.] Harlech Castle was one of his conquests.

In the war of the Roses, Harlech was held for the Lancasterians, but taken, as mentioned above, by Sir Richard Herbert. After the war was concluded, the county became and long continued to be the scene of great confusion. A multitude of outlaws and felons established themselves in the neighbourhood of Dinas-y-Mowddy, and perpetrated a variety of crimes, burning, robbing, and murdering in large bands, and driving cattle in open day with the greatest impunity. To quell these outrages, a commission was granted by Queen Mary to two gentlemen of the county; one of them Lewis Owen, vice-chamberlain and baron of the exchequer of North Wales. In pursuance of this commission, eighty of the band were seized and punished. To revenge this severity, Mr. Owen was waylaid and murdered when returning from the Montgomeryshire assizes (A.D. 1555), at a place now called, from the deed, Llydiart-y-Barwn, 'the baron's gate.' The vigorous measures to which this outrage gave rise led to the extirpation of the banditti, some of whom were executed, and the rest fled. The traditions of the country attest the terror which these ruffians excited. Travellers forsook the common road to Shrewsbury to avoid their haunts. In the civil war of Charles I., Harlech Castle was the object of contention. The repeated captures of this place, and a skirmish near Dolgelley, which had been garrisoned for the parliament, were the only incidents of the contest which occurred within the county.

The principal remains of the middle ages are Harlech Castle, already described, and the ruins of Cymmer Abbey, near Dolgelley, with two or three smaller castellated buildings. Cymmer Abbey appears to have been founded about A.D. 1198, by two Welsh chieftains, for Cistertian monks: the yearly revenue at the dissolution was 58*l.* 15*s.* 4*d.* gross, or 51*l.* 13*s.* 4*d.* clear. Part of the church is still to be seen in a rich flat near the Maw, and shows the antient greatness of the structure. The east end has three narrow pointed windows, and three smaller ones over them: it is mantled with thick ivy. The great hall and the abbot's lodgings were used as a farm-house in Mr. Pennant's time.

Llys Bradwen, between Dolgelley and Towyn, is the ruin of a rude edifice, the house of an antient Welsh chieftain; and near Llanfihangel-y-Pennant are the remains of a castle supposed to be the castle of Bere, belonging to the last Llewelyn, prince of North Wales, and taken from him by William de Valence, earl of Pembroke, a short time previous to the final conquest of Wales.

Near the road from Bala to Dolgelley is Castell Corndochon, the ruin of a fortress of unascertained date.

(Pennant's, Evans's, and Bingley's *Tours in Wales*; *Beauties of England and Wales*; *Parliamentary Papers*; Greenough's *Geological Map of England and Wales*; Walker's do.; Arrowsmith's *Map of England and Wales*, &c.)

Statistics.

Population.—Merionethshire is almost entirely an agricultural county. Of 8879 males twenty years of age and upwards, 4959 are engaged in agricultural pursuits, and only 200 in manufacture or in making manufacturing machinery. These 200 are weavers of flannel and other woollens, distributed throughout the villages in small numbers, except that 70 of the men so employed reside at Dolgelley.

The following Table contains a Summary of the Population, &c., of every Hundred, as taken in 1831.

HUNDREDS, CITIES, OR BOROUGHS.	HOUSES. Inhabited.	HOUSES. Families.	HOUSES. Building.	HOUSES. Uninhabited.	OCCUPATIONS. Families chiefly employed in Agriculture.	OCCUPATIONS. Families chiefly employed in trade, manufactures, and handicraft.	OCCUPATIONS. All other Families not comprised in the two preceding classes.	PERSONS. Males.	PERSONS. Females.	PERSONS. Total of Persons.	PERSONS. Males, twenty years of age.
Ardudwy hundred	1960	2159	18	77	1065	442	652	4,996	5,503	10,499	2535
Edernion „	1008	1036	5	23	583	257	196	2,433	2,472	4,905	1229
Estimaner „	852	951	9	43	465	218	268	2,304	2,327	4,631	1174
Penllyn „	1392	1419	8	40	717	265	437	3,200	3,454	6,654	1656
Tal-y-Bont and Mowddyw „	886	922	1	27	549	191	182	2,200	2,260	4,460	1108
Dolgelley (town)	870	871	12	28	204	442	225	1,982	2,105	4,087	1177
Militia under training	—	—	—	—	—	—	—	79	—	79	—
Total	6968	7358	53	238	3583	1815	1960	17,194	18,121	35,315	8879

The population of Merionethshire, at each time the census was taken, was, in—

	Males.	Females.	Total.	Increase per cent.
1801	„	„	27,506	..
1811	„	„	30,924	12·42
1821	16,479	17,903	34,382	11·13
1831	17,194	18,121	35,609	3·56

showing an increase between the first and last periods of 8103, or about 29½ per cent. on the whole population, being 17½ per cent. below the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the three following periods of—

		£.		s.	d.	
1811	were	12,280,	being	7	11	for each inhabitant.
1821	..	14,559	„	8	5	„
1831	..	14,865	„	8	4	„

The sum expended for the same purpose for the year ending March, 1838, was 12,228*l.*; and assuming that the population had increased at the same rate of progression since 1831 as in the ten preceding years, the above sum gives an average of 6*s.* 8*d.* for each inhabitant. These averages are below those for the whole of England and Wales.

The sum raised in Merionethshire for poor-rate, county-rate, and other local purposes in the year ending 25th March, 1833, was 18,405*l.* 11*s.*, and was levied upon the various descriptions of property as follows:—

	£	s.
On land	£17,436	5*s.*
Dwelling-houses	793	10
Mills, factories, &c.	99	7
Manorial profits, navigation, &c.	76	9
Total	18,405	11

The amount expended was—

	£	s.
For the relief of the poor	£15,247	0*s*
In suits of law, removal of paupers, &c.	379	5
For other purposes	2,442	16
Total	18,069	1

In the returns made up for the subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 18,039*l.* 14*s.*, 17,188*l.* 4*s.*, 16,458*l.* 17*s.* (not given for 1837). and 15,794*l.* respectively; and the expenditure for each year was as follows:—

	1834. £.	s.	1835. £.	s.	1836. £.	s.	1837. £.	1838. £
For the relief of the poor	14,977	4	14,216	7	13,874	4	13,440	12,293
In suits of law, removal of paupers, &c.	707	7	341	13	276	4	528	90
Payments towards the county-rate	2,322	14	1,528	7	1,077	10	not given.	1,504
For all other purposes			890	0	883	2	926	529
Total money expended	£18,007	5	16,976	7	16,111	0	14,894	14,65[illegible]

The saving effected on the whole sum expended in 1838, as compared with that expended in 1834, was therefore 3356*l.* 5*s.*, or about 18¼ per cent.; and the saving effected on the sum expended for the relief of the poor was rather more than eighteen per cent. in 1838 as compared with the expenditure in 1834.

The number of turnpike trusts in Merionethshire, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 6; the number of miles of road under their charge was 261. The annual income arising from tolls and parish compositions in lieu of statute duty was (in 1835) 4288*l.* 14*s.*, and the annual expenditure in the same year was as follows:—

	£.	s.	d.
Manual labour . .	1,098	12	0
Team labour and carriage of materials	139	10	0
Materials for surface repairs .	5	5	0
Tradesmen's bills . .	117	5	0
Salaries of treasurer, clerk, and surveyor	257	6	0
Law charges . . .	1	16	0
Interest of debt . . .	712	19	0
Improvements . . .	382	16	0
Debts paid off . . .	772	0	0
Incidental expenses . .	260	13	0
Estimated value of statute duty performed . . .	148	2	0
	3896	4	0

The county expenditure in 1834, exclusive of the relief for the poor, was 1659*l.* 13*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building and repairs, &c.	724	8	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	368	18	0
Shire-halls and courts of justice, building, repairing, &c. . .	30	0	0
Prosecutions . . .	174	6	0
Clerk of the peace . .	163	10	0
Conveyance of prisoners before trial	33	17	0
Constables, high and special .	3	12	0
Coroner . . .	11	12	0
Miscellaneous . . .	149	10	0
Total expenditure	1659	13	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 40, 25, and 63; making an average of 5 + annually in the first period, of 3 + in the second period, and of 9 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 2, 2, and 9 respectively. All these persons were charged with felonies.

The total number of committals in each of the same years was 2, 3, and 10 respectively; of whom

	1831.	1832.	1833.
The number convicted was	2	2	8
Acquitted .	—	—	1
Discharged by proclamation	—	—	1

At the assizes and sessions, in 1837, 5 persons were charged with crimes in Merionethshire; out of which number none had committed offences against the person, 1 was charged with offence against property committed with violence, and 4 for offences against property committed without violence. The first offender was acquitted, and the remaining 4 were convicted. Of those convicted, 1 was sentenced to be transported for seven years; 1 to be imprisoned two years, or above one year; and 2 for six months or under. Of the offenders, 2 were males and 3 females. Among the whole number, 3 could read and write only imperfectly, and 2 could neither read nor write.

The number of persons qualified to vote for the county members in Merionethshire, as registered in 1837, was 1336. Of these, 711 were freeholders, 103 leaseholders, 504 occupying tenants, 10 trustees, 7 mortgagees, and 1 annuitant: being one in 26 of the whole population, and one in 7 of the male population above twenty years of age, as taken at the census of 1831. The expenses of the last election of county members to parliament were, as usual, paid out of the general county-rate. There was not any contest at the last election for the county.

There is one savings' bank in this county; the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	1832.	1833.	1834.	1835.	1836.	1837.
Number of Depositors	629	670	447	435	505	555
Amount of Deposits	£17,098	£16,797	£11,578	£10,689	£12,090	£14,162

The various sums placed in the savings' bank in 1835, 1836, and 1837, were distributed as under:—

	1835.		1836.		1837.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	251	£2,197	281	£2,493	294	£2,634
" 50	127	3,831	163	4,858	190	5,701
" 100	43	2,752	51	3,368	56	3,801
" 150	11	1,304	7	866	10	1,152
" 200	2	342	3	505	4	672
Above . 200	1	263	—	—	1	202
	435	10,689	505	12,090	555	14,162

Education.—The following summary is taken from the Returns on Education laid before parliament in the session of 1835:—

	Schools.	Scholars.	Total.
Daily schools . . .	50		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		663	
Females . .		359	
Sex not specified .		878	
			1,900
Sunday-schools . . .	172		
Number of children and others at such schools; ages from 4 to 80 years:—			
Males . .		3,462	
Females . .		3,224	
Sex not specified .		7,114	
			13,800

Assuming that the population had increased between 1831 and 1833 (the period when the educational inquiry was made) in the same ratio as in the ten preceding years, and that the number of children between the ages of 2 and 15 bore the same proportion to the whole population as it did in 1821, then we find 11,753 as the approximate number of children living in Merionethshire in 1833. Ten Sunday-schools are returned from places where no other school exists, and the persons who attend them (615 in number) cannot be supposed to attend any other school. At all other places Sunday-school children have opportunity of resorting to other schools also; but in what number or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Four schools, containing 280 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is known to have been thus far created. In some of the Sunday-schools there are adults and aged persons as well as children. Making full allowance, even for these two causes, for inaccuracy, it may perhaps be fairly estimated that nearly all the children are receiving instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Daily Schools	17	445	3	249	26	1000	4	206
Sunday Schools	1	65	169	13,620	—	—	2	115
Total.....	18	510	172	13,869	26	1000	6	321

The schools established by Dissenters, included in the above statements, are—

			Scholars.
Daily schools . .	8, containing		246
Sunday-schools . .	161	.	13,143

The schools established since 1818 are—

			Scholars.
Daily schools .	23, containing		999
Sunday-schools . .	158	.	12,190

Four boarding-schools are included in the number of daily schools given above. No school in this county appears to be confined to members of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists.

MERLIN, the English name for the *Falco Æsalon* of Linnæus; *Emerillon*, *Rochier*, and *Faucon de Roche* of the French; *Stein Falke* of the Germans; *Smerlio*, *Smeriglio*, and *Falchetto* of the Italians; and *Corwalch* and *Llymysten* of the antient British.

Description.—Old Male.—Bill bluish-horn colour, palest at the base, darkest towards the tip; cere yellow, irides dark brown; top of the head blue-gray, with dark lines passing backward; the cheeks and thence round the back of the neck pale reddish brown, also marked with dark streaks, forming a collar; the whole of the back and wing-coverts fine blue-gray, the shaft of each feather forming a dark central line; wing primaries pitch black; upper surface of the tail-feathers bluish-gray over two-thirds of their length, with slight indications of three dark bands, the distal third nearly uniform black, the tips of all the feathers white; breast, belly, thighs, and under tail-coverts rufous, with brown central patches, and darker brown streaks; under surface of the tail-feathers barred with two shades of gray, a broad, dark, terminal band, and white tips; legs and toes yellow, claws black.

Female.—Top of the head, back, wing-coverts, and secondaries dark liver brown, the shaft of each feather darker, the edge tipped with red; the tail-feathers brown, with fine narrow transverse bars of wood-brown; under surface of the body pale brownish white, with darker brown longitudinal patches; bill, cere, eyes, legs, toes and claws, as in the male.

Young Males.—Resembling the females.

Birds of the Year.—The wings do not reach so far towards the end of the tail as those in the adult. (Yarrell, *Hist. of British Birds*.)

The length of this, the smallest of the British hawks, is from ten to twelve inches, according to sex.

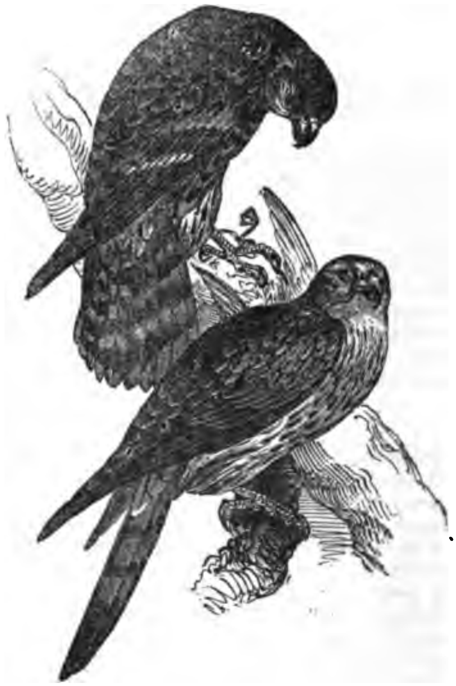
Habits, Reproduction, &c.—'Assuredly,' saith the author of the Book of Falconrie, 'divers of these Merlyns become passing good hawkes and verie skilful; their property by nature is to kill thrushes, larks, and partridges. They flee with greater fiereeness and more hotely than any other hawke of prey. They are of greater pleasure, and full of courage, but a man must make greater care, and take good heed to them, for they are such busie and unruely things with their beakes, as divers times they eate off their own feet and tallons very unnaturally, so as they die of it. And this is the reason and true cause, that seldom or never shall you see a mewed or entermewed Merlyn. For that in the Mew they do spoyle themselves, as I have before declared.' Sir John Sebright says that the Merlin will take blackbirds and thrushes, and that he may be made to *wait on*, that is, hover near till the bird be pursued and started again; 'and though a Merlin will kill a partridge, they are not strong enough to be effective in the field.' (*Observations on Hawking*.) The nest is placed on the ground, and but poorly made. The eggs (one inch seven lines long, and one inch three lines broad), vary in number from four to five, and are mottled with reddish-brown of two shades of colour.

Geographical Distribution.—Europe, as high as Denmark, and as low as the shores of the Mediterranean; Smyrna (Strickland), Cape of Good Hope (Smith), *quære tamen;* North America, according to Dr. Richardson, who says that 'a single pair were seen in the neighbourhood of Carlton House in May, 1827, and the female was shot. In the oviduct there were several full-sized white eggs, clouded at one end with a few bronze-coloured spots. Another specimen, probably also a female, was killed at Sault St. Marie, between Lakes Huron and Superior, but it could not be preserved.' Dr. Richardson was unable to ascertain the extent of its migrations on the American continent; neither Wilson, Nuttall, nor the Prince of Musignano notices it as occurring in the United States; but the latter (*Specchio Comparativo*) mentions it as very rare at Rome, and he only observed the young, and that in winter. It 'was formerly considered to be only a winter visitor to this country; but it is now very well ascertained that this species breeds on the moors of some northern countries. Mr. Selby has found the nest several times in Northumberland; and Dr. Heysham mentions three instances that came to his knowledge of Merlins' nests in Cumberland, where, he says, this bird remains all the year. Mr. Eyton tells me that it breeds on Cader Idris; and Mr. Dovaston sent a notice to his friend Mr. Bewick, "on the authority of the gamekeeper at Wynstay Park, North Wales, that he had often seen the nest of the Merlin, and that it built and bred there in the summer of 1826."

'In the more southern counties of Cornwall and Devonshire the Merlin is considered to be rare, and only seen in winter. On our eastern coast it is killed, but not very often, in Kent, Essex, and Norfolk. The specimens obtained are generally young birds, and these occur most frequently in autumn, or at the beginning of winter. In Ireland, according to Mr. Thompson, the Merlin is indigenous in several northern counties. It breeds also in Scotland, in Orkney, and in Shetland. In North Wales the young birds are called Stone Falcons; but among ornithologists the Stone Falcon is considered to be an adult bird. It is not however improbable that the habit of sitting on a bare stone or portion of rock, by which this species has acquired the name of Stone Falcon, is common to it at all ages and in other countries.' (Yarrell, *loc. cit.*)

The character of the Merlin is thus summed up in the old French quatrain:—

'L'Esmerillon beau par extremité
A le cœur gay, et fort hardy courage,
Et bien qu'il soit petit, si fait-il rage
A pour suyvir sa proye en gayeté.'



The Merlin.

Upper figure, young male of the year, which the female, unless very old resembles; lower figure, adult male.

MERLIN, or, more properly, **MERDHIN**. Some of the Welsh antiquaries speak of three Merlins: Merdhin Emrys, or Merlinus Ambrosius; Merdhin Wyllt, or Merlinus Caledonius, or Merlinus Sylvestris; and Merdhin ap Morvryn, otherwise called Merlinus Avalonius (from a poem ascribed to him, entitled 'Avallenau,' or the Orchard), and also known by the Latin names of Melchinus, Melkinus, and Mervynus. (Nicholson's *Eng. Hist. Library*.) It is generally agreed however that the second and third are the same person; and it is far from improbable that all the three Merlins are but one individual. Of Merlin Ambrosius the principal account we have is in Geoffrey of Monmouth's 'Historia Brittonum,' where he is represented as a great prophet and enchanter, who flourished in the time of King Vortigern, or about the middle of the fifth century. This is the Merlin who is celebrated by many of our old poets, especially by Spenser, in the 'Faery Queen,' book iii., and elsewhere; and he is also the subject of the English metrical romance of Merlin, of the first part of which there is a copy in the library of Lincoln's Inn, and a more antient one, containing also a second part, in the Auchinleck MS. in the Advocates' Library, and of which Mr. Ellis has given an analysis, with extracts, in the first volume of his 'Specimens of Early English Metrical Romances.

Of the Caledonian Merlin there is a life in Latin hexameters, extending to 1528 lines, by Geoffrey of Monmouth, who professes to have compiled it from an Armoric original; it is extant in one of the Cotton MSS. (Vesp., E. iv.), and has never been printed, but there is an account of it in the same volume of Mr. Ellis's work. (See also Pinkerton's *Inquiry into the Early History of Scotland*, ii. 275.) Fordun, in the third book of his 'Scotichronicon,' has a long account of Merlin the Wild, and especially of an interview between him and St. Kentigern, bishop of Glasgow, who lived in the latter part of the sixth century. This account agrees with other testimonies as to the age of the Caledonian Merlin, and also as to his having been a native and inhabitant, not of the country now called Wales, but of the Welsh kingdom of Reged, or Strathclwyd, which extended over the south-west of Scotland. That district, it may be added, still retains several traditionary recollections of the fame of Merlin; his grave, in particular, is yet shown near the village of Drumelzier, on the Tweed. (See Sir W. Scott's Introd. to Romance of *Sir Tristram*, p. 38; and Note to *Vision of Don Roderick*, p. 367, edits. of 1834.) Collections of the Prophecies of Merlin have appeared in French, at Paris, 1498; in English, at London, 1529 and 1533; in Latin, at Venice, 1554; and there are also manuscripts of them, in French and English, in the Cotton and other libraries. (See Warton, *Hist. of Eng. Poet.*, iii. 430, edit. of 1824.) We find some of them applied by the poet Laurence Minot, who wrote about 1360, to the victories of Edward III. (*Ibid.*, and Minot's *Poems*, by Ritson, *note*, pp. 100-104.) It appears to have been generally assumed by the French and English collectors that the author of these prophecies was Merlinus Ambrosius; but in the Scottish edition, printed at Edinburgh, 1615, they are attributed to Merlin the Wild, or the Caledonian. They appear to have been very famous in Scotland in the early part of the sixteenth century. (See Sir W. Scott's *Minstrelsy of the Border*, iv., pp. 134-147.) The 'Avallenau,' and some other Welsh poems, attributed to Merdhin Wyllt, are published in the 'Welsh Archaiology,' 3 vols. 8vo., 1801, &c. (See Mr. Sharon Turner's vindication of the authenticity of these productions, printed at the end of his *History of the Anglo-Saxons*, vol. iii., 1823.)

MERLON. [EPAULEMENT.]

MERLU'CIUS, a genus of fishes, belonging to the *Gadidæ*, or family of Codfishes, distinguished by the possession of only two dorsal fins and one anal fin, and the absence of barbule on the chin. This latter character distinguishes the species of the genus *Merlucius* from the Burbots (*Lota*) and Rocklings (*Motella*), and there being only two dorsal fins removes the present genus from the more typical Codfishes, where there are three dorsal fins.

The hake (*Merlucius vulgaris*, Cuv.) affords a familiar example of this genus. This fish is found on various parts of the coasts both of England and Ireland. It inhabits also the seas of the western coast of Norway, and is common on the northern shore of the Mediterranean. 'A hake of three feet eight inches long,' says Mr. Yarrell, in his 'History of British Fishes,' 'supplied the means of obtaining the following particulars. The length of the head, compared to the length of the body alone, as one to three, the depth of the body not so great as the length of the head; the ventral fins are placed in advance of the pectorals, the rays not unequally elongated; the pectoral fins commence in a line under the posterior angle of the operculum, the rays ending with the end of the first dorsal fin: the first dorsal fin itself short and triangular in shape; the second dorsal fin commences in a line over the vent; the anal fin begins immediately behind the vent; both the second dorsal fin and the anal fin terminate on the same plane, near the tail; the rays strong and stiff: the caudal rays about three inches long, and nearly even.

'The fin rays in number are:—Dorsal 10, 29; pectoral 11; ventral 7; anal 21; caudal 19.

'The head is depressed; the inside of the mouth and gill-covers black; the lower jaw the longest; teeth slender and sharp, in a single row in each jaw; the irides yellow, with a dark outer circle; the lateral line of the body straight throughout the posterior half, then gradually rising to the upper edge of the operculum; the appearance of the lateral line is that of one white line between two dark ones; the scales large; colour of the body dusky brown above, lighter beneath; dorsal and caudal fins dark; ventral and anal fins pale brown.'

The *Gadus Magellanicus* of Forster and the *G. Maraldi* of Risso are mentioned by Cuvier as species belonging to the present genus.

ME'ROE (Malacology), Schumacher's name for certain cowry-shells, *Cytheræa sulcata, scripta, hians*, &c.

ME'ROE. [NILE.]

MERO'PIDÆ, a family of Fissirostral birds which, in the opinion of Mr. Vigors, is most nearly connected with the conterminous tribe of *Tenuirostres* by the length, slenderness, and downward curvature of the bill. He adds that it exhibits at first sight a decided discrepancy with the succeeding family of *Hirundinidæ*, where the bill is short and wide; and that if we examine only the typical species of each, we must admit that in respect to these particulars there is a manifest distinction between them. Independently however of the general characters in which both families approach each other, such as the breadth of the *rictus* of the bill, the short and feeble legs, the strength of the wing, and the consequent habit of using that member chiefly in seeking their support, a gradual approximation is found to take place even in their bills; those of some of the extreme species of *Merops* becoming shorter as they approach *Hirundo;* while those of some of the latter group partially desert their own type, and by degrees assume the lengthened form of the bill of the *Bee-eaters*. The tail of *Merops* again is equally found to desert the typical characters of the group, namely, the greater length of the two middle feathers, in order to become even in some species, then slightly forked, and at length to be identified with the fully forked tail of *Hirundo*. Mr. Vigors is further of opinion that among the *Tenuirostres* the genus *Promerops* approaches nearest to the fissirostral group by means of *Merops*, the curved bill of which approaches the structure of its own. (Vigors, *On the Natural Affinities that connect the Orders and Families of Birds*. Linn. Trans., vol. xv.)

Mr. Swainson (*Classification of Birds*, vol. ii.) is of opinion that the *Meropidæ*, or Bee-eaters, succeed the Swallows, and says of the *Merops Apiaster* [BEE-EATER], that it annually visits Italy in flocks of twenty or thirty, and may be seen skimming over the vineyards and olive plantations with a flight much resembling the swallow, though more direct and less rapid. He observes that their bill is indeed considerably longer and more slender, but remarks that this difference is softened down by the intervention of the genus *Eurystomus*, containing the Swallow Rollers of India, Africa, and Australia, which have this organ very short. To these, he thinks, succeed the true Rollers, *Coracias* (Linn.), which arrive in Italy at the same time with the Bee-eaters, and associate also in small flocks. 'These two genera of Rollers,' continues Mr. Swainson, 'are so indissolubly united, that nothing but the strongest prejudice in favour of a preconceived theory could ever have induced certain naturalists (whose labours in other respects have been of much advantage to science) to have placed them in two different orders. The whole structure of the Rollers, their lengthened pointed wings, and their firm and often forked tail, at once induces the idea that they feed upon the wing; while their very short legs, scarcely longer than their hind toe, might have shown their incapacity to alight and walk, like the crows, upon the ground; but this question is at once decided by a knowledge of their economy, which, from personal observation, we have every reason to believe is much like that of the Bee-eaters. The intervention of the Rollers at once lessens the abrupt transition, which would otherwise be apparent, from the perfect-footed Swallows to the zygodactyle Bee-eaters; and we are thus prepared for all those birds whose toes, as it were, are soldered together like those of the *Meropidæ*. Here perhaps we may notice that most beautiful and rare genus *Nyctiornis*, or Night-feeder, as being in all probability that particular link by which nature connects this family with the Trogons, thereby uniting the three aberrant groups of the *Fissirostres* into one primary circle. M. Temminck, overlooking its particular structure, placed this genus with Merops, to which indeed it has a close resemblance; while its connection to *Prionites* (Ill.) in other parts of its organization is no less obvious. Its precise situation in short requires further investigation.' See also KINGFISHER and MELIPHAGIDÆ.

Mr. Swainson gives the following character as distinguishing the family:—

Wings long, pointed; the first quill as long, or nearly so, as any of the others.

And he arranges the following genera under it:—

Merops. (Linn.)

Bill very long, slender, slightly curved, compressed; the culmen carinated; the tip entire, sharp, and not bent downward. *Wings* long, pointed; the tips of the lesser quills emarginate. *Tail lengthened. Feet* gressorial. (Sw.)

Example, *Merops apiaster*. [Bee-eater.]

Nyctiornis. (Sw.)

Bill considerably curved, very long; the culmen with a parallel groove on each side. *Wings* rounded, convex. Plumage lax. Feet short, insessorial, resembling those of *Prionites*. (Sw.)

Example, *Nyctiornis amictus*.

Description.—Green; crown (in the adult) lilac; front of the throat and breast bright red. (Sw.) Total length about 13 inches, wings 5¼, tail (beyond) 3, tarsi hardly half an inch. (Sw.)

Locality, India.

Nyctiornis amictus. (Sw.)

Coracias. (Linn.)

Bill moderate, straight; the sides broad, but much compressed. The tip of the upper mandible bent over that of the lower, which is obliquely truncate. Nostrils basal, oblique, linear. Gape very wide, extending beneath the eye; the sides bristled. *Feet* insessorial, very short. All the toes cleft to their base; inner toe much the shortest. Wings moderate, pointed. (Sw.)

Coracias Abyssinica

Example, *Coracias Abyssinica.*

Description.—White round the bill; body aquamarine green; back and wing-coverts cinnamon colour; shoulders, rump, and quills blue; tail green, the two middle feathers blue; two long loose processes terminating the two external quills.

Subgenus, *Eurystomus*, Vieill.

Subgeneric Character.—Resembling Coracias, but the *bill* shorter and wider, and the wings longer. *Nostrils* very long. *Rictus* smooth. (Sw.)

Example, *Eurystomus Orientalis.*

Description.—Colour aquamarine green; throat and point of the wing (fouet de l'aile) azure; quills and tail-feathers black; a white stripe upon the wing.

Localities.—Java, the south of New Holland, and all the Polynesian Islands. It is the *Natay-kin* of the natives of the neighbourhood of Sydney, *Dollar-bird* of the colonists, and *Tiong ba tu* of the inhabitants of Sumatra,—*Coracias Orientalis*, Linn.

Eurystomus Orientalis.

Chloropygia. (Sw.)

General form between *Tamatia* and *Coracias*. *Bill* short; the tip not abruptly bent. Rictus bristled. *Nostrils* basal, linear, oblique. *Wings* short, convex, reaching only to the rump. The two first quills much graduated; the four next nearly equal and longest. Tail elongated, rounded, and broad. Feet as in *Coracias*. Madagascar. (Swainson.)

Example, *Chloropygia Leptosomus*. (Lesson; Ill., *Zool.*, pl. 22.)

Leptosomus. (Vieill.)

Bill about the length of the head, robust. The upper mandible curved and notched near the tip. Gonys straight. *Nostrils* oblong, oblique; the margins elevated, naked, and placed towards the middle of the upper mandible. *Feet* short. Toes in pairs, as in *Tamatia*. *Wings* lengthened, pointed; the first and second quills longest. Tail moderate, even. (Sw.)

Example, *Leptosomus viridis.*

Localities.—The country of the Kafirs and the coast of Zanzibar, where it is said to live in the forests on insects and fruits. The form is arranged by Lesson and others under the family *Cuculidæ*. [Leptosomus.]

Mr. Swainson makes the family of *Meropidæ* the first of the *Fissirostres*. It immediately succeeds the *Paradisiadæ* and precedes the *Halcyonidæ* in his arrangement.

M. Lesson, in his 'Table Méthodique,' gives the following genera as constituting the family of the *Meropidæ*:—*Merops, Alcedo, Dacelo, Ceyx, Syma, Todiramphus, Momotus*, and *Buceros*. See the articles Kingfishers and Horn Bills.

Leptosomus viridis.

MEROPS. [Bee-eater; Meropidæ.]

MEROVINGIANS. [France.]

MERRICK, JAMES, an English divine and poet, born in 1720, died in 1769. At the age of fourteen, while still at Reading school, he published the 'Messiah, a Divine Essay,' and in 1739, at Trinity College, Oxford, he made a translation of the poem of Tryphiodorus on the Capture of Troy. He also published, in 1741, the Greek text of Tryphiodorus. He was chosen Fellow of Trinity College, Oxford, in 1744, and took holy orders, though, owing to infirm health, he never undertook parochial duties. His chief works were, 'A Dissertation on Proverbs, ch. ix.;' 'Prayers for a Time of Earthquakes and Violent Floods,' written in 1756, soon after the earthquake at Lisbon; 'An Encouragement to a Good Life, particularly addressed to some soldiers quartered at Reading.' He appears to have paid great attention to this class of men, who at that time especially required it. He also wrote 'Poems on Sacred Subjects,' and made an excellent translation of the Psalms into English verse. This, beyond all doubt the best poetical translation we have, was unfortunately not adapted for parochial choirs, inasmuch as it was divided into stanzas for music. On this account it has not been used as generally as its merits would justify. He published several other religious treatises, and some remarks on profane as well as sacred writers. Dr. Lowth calls him 'one of the best of men and most eminent of scholars.'

(Doddridge's *Letters*; Chalmers's *Biographical Dictionary*.)

MERSEBURG is one of the three governments into which the Prussian province of Saxony is divided. It is chiefly composed of territories which Saxony was compelled to cede by the treaty of Vienna in 1815, and includes the greater part of the former electoral circle or duchy of Saxony, a small portion of Thuringia, the bishoprics and chapter-lands of Magdeburg, Naumburg, and Zeitz, part of the duchy of Magdeburg, part of the districts of Leipzig and Meissen, with the counties of Mannsfeld and Stolberg, forming an area of 4000 square miles, with a population (1st of January, 1838) of 625,000. The eastern and larger part of the government is flat, with gentle eminences, but no mountains; the western and smaller portion is more mountainous than level, being partly occupied by branches of the Harz mountains and the Thüringerwald: this portion however contains extensive and fertile levels, and the whole of the government, though the soil is unequal, may be called fertile.

MERSEBURG, the chief town of the government, is situated on the river Saale, 15 miles from Leipzig, in 51° 22′ N. lat. and 12° E. long. It is an old irregularly built town, with narrow crooked streets, consisting of the town itself, the Close, and the two suburbs Altenburg and Neumarkt, the latter lying on the opposite bank of the Saale, over which there is a large stone bridge. The town is surrounded with walls, and has four gates. The most remarkable buildings are, 1, a fine palace, with a beautiful church, formerly the residence of the bishop, and afterwards of the dukes of Saxe-Merseburg, of the Albertine line: at present it is used for the government offices; 2, the cathedral, founded in the eleventh century, in which the dukes of Saxe-Merseburg were interred: it has a fine altar-piece by Lucas Cranach, and one of the largest organs in Germany; 3, the cathedral school; 4, the monastery of St. Peter, in the suburb of Altenburg; 5, the palace of Count Zechi; 6, the military hospital; 7, the new town-hall. Several of the schools are likewise handsome buildings. There are manufactories of various kinds, and extensive breweries and distilleries. The trade of the place is considerable, and with the advantages derived from its being the seat of the government, it is a very flourishing town.

(Müller, *Wörterbuch des Preussischen Staates*, 4 vols. 8vo., 1836.)

MERSENNE, MARIN, a very learned philosopher and mathematician, one of the religious order of *Minimes*, was born in 1588 at Oyse, in the present department of Maine, and received his education at the college of *La Flèche*, where he was a fellow-student of Descartes, with whom he formed an intimacy which a similarity of pursuits ripened into a friendship that death only dissolved. He afterwards studied at the university of Paris, and subsequently at the Sorbonne. In 1612 he took the vows at the convent of the *Minimes*, in the neighbourhood of Paris, and the year following received ordination as priest, when he deemed it incumbent on him to study the Hebrew language, a thorough knowledge of which he acquired. In 1615 he filled the chair of philosophy at Nevers, and there taught till the year 1619, when he was chosen superior of the convent, and on completing the term of his office he travelled into Germany, Italy, and the Netherlands. He finally settled in Paris, where his gentle temper and his polite and engaging manners procured him a number of distinguished friends. Of these the chief was the founder of the Cartesian philosophy, who entertained the highest opinion of his abilities, and consulted him upon all occasions.

It has been stated—though the story seems highly improbable—that Descartes, by the advice of Mersenne, at once changed his intention of founding his system on the principle of a vacuum, and adopted that of a plenum. The discovery of the cycloid has been ascribed to him and also to Descartes, but it now seems pretty clear that to neither are we indebted for the first notice of this curve. [Cycloid.] Mersenne died at Paris in 1648, in consequence of drinking cold water when over-heated. The result of this indiscretion was an internal abscess in the side, which he desired should be opened. The surgeon made the incision two inches below the right place, and the patient expired under the operation.

The Père Mersenne was undoubtedly a man of great learning and unwearied research, and deserved the esteem in which he was held by the philosophers and literati of his age; but, except his *Harmonie Universelle*, his works are now unread and almost unknown. If by some he was overrated, by others he has been undervalued; and when Voltaire mentioned him as *le minime et très minime Père Mersenne*, he indulged his wit at the expense of one with whose writings, it is to be suspected, he was very little acquainted. His eulogist however, in the *Dictionnaire Historique*, admits that he very ingeniously converted the thoughts of others to his own use; and the Abbé Le Vayer calls him *le bon Larron*—a skilful pilferer. Nevertheless, the work above named, *L'Harmonie Universelle, contenant la Théorie et la Pratique de la Musique*, in 2 vols. fol., 1637, has proved of the utmost value to all later writers on the subject, and among the number, to the author of the present notice. Dr. Burney says of it, that notwithstanding all his 'partiality to his country, want of taste and method, there are (in the work) so many curious researches and ingenious philosophical experiments, which have been of the greatest use to subsequent writers, particularly Kircher, as render the book extremely valuable;' and Sir John Hawkins remarks, that 'the character of Mersennus as a philosopher and mathematician is well known in the learned world. To that disposition which led him to the most abstruse studies he joined a nice and judicious ear, and a passionate love of music: these gave a direction to his pursuits, and were productive of numberless experiments and calculations tending to demonstrate the principles of harmonics, and to prove that they are independent on habit or fashion, custom or caprice, and, in short, have their foundation in nature, and in the original frame and constitution of the universe.' The work was, in 1648, translated into Latin and enlarged, by the author; but both the original and translation are now become as rare as they are curious to the antiquary and interesting to the musical inquirer.

MERSEY. [Cheshire; Lancashire.]

MERTHYR TYDVIL, or TYDFIL, a parliamentary borough and parish in the hundred of Caerphilly and county of Glamorgan, 18 miles south by east from Cardiff and 140 miles west-north-west from London (direct distances). The parish extends from north to south about 10 miles, and has an average breadth of three miles; comprising the hamlets of Forest, Garth, Gellideg, Taff-and-Cynon, and Hoelch-Wormwood. Part of the hamlet of Forest and part of the hamlet of Taff-and-Cynon are not included within the limits of the parliamentary borough; with this exception, the borough is co-extensive with the parish. The town lies in a valley to the left of the Taff river, but the houses are so scattered that it is difficult to say where it either begins or terminates; indeed there is not in the whole parish what can be correctly denominated a street. The houses themselves are for the most part of a very mean description, consisting chiefly of the cottages of labourers, and beer and retail shops.

This place is said to take its name from Tydfil, or Tudfil, the daughter of the lord (regulus) of Garthmadrin, who was murdered here by a party of marauding Saxons. The church, subsequently erected near the spot, was dedicated to Merthyr Tydvil, or St. Tydvil the Martyr, in commemoration of the event. The present church is a neat edifice of recent erection. It is in the diocese of Llandaff, and the living, a rectory in the patronage of the marquis of Bute, has a net annual revenue of 675*l.* Besides the parish church there is a chapel-of-ease, called Dowlais Chapel. The assessed taxes of the parish, in the year 1830, amounted to 1587*l.* 13*s.* 1*d.*

Merthyr Tydvil was not represented in parliament till the passing of the 'Reform Act.' It now returns one member. The mining operations of this place were comparatively unimportant prior to the year 1755. About this time, experience having shown the importance of preparing iron by means of pit-coal, Mr. Anthony Bacon, member of parliament for Aylesbury, became the lessee of a considerable tract of land in the neighbourhood, and erected the first smelting-furnace at Cyfarthfa. During the American war that gentleman contracted with government for supplying the several arsenals with cannon, from which and other similar undertakings he ultimately realised a large fortune. At the close of the war the contract was transferred to the Carron works of Scotland, but in the mean time extensive works had been established at Pendarren and more particularly at Dowlais, in the hamlet of Hoelch-Wormwood. The latter place is now the seat of the immense smelting-furnaces of Messrs. Guest and Co., the largest in the empire. There are in all the parish twenty-four furnaces, and such has been their success, that in the year 1830 the quantity of iron produced in South Wales 'was estimated at 277,000 tons, while that made in Staffordshire and the rest of England did not materially exceed 300,000 tons.' (M'Culloch.)

The population of the parish, in 1831, was 22,083, but it is extremely fluctuating, a slight improvement or depression of the iron trade causing it to increase or decrease by thousands. A decrease of this description had taken place shortly before the taking of the last census, and it may therefore be presumed that the number above given is less than the average population. The market-days are Wednesday and Friday, and the fairs are held 13th May, 3rd September, 2nd December, and Trinity Monday.

(*Boundary, Population, and Church Revenue Reports; Beauties of England and Wales;* M'Culloch's *Statistical Account of the British Empire,* &c.)

MERTON COLLEGE, Oxford. This college was first founded at Maldon, in Surrey, in 1264, by Walter de Merton, bishop of Rochester and chancellor of England, who in 1274 removed it to Oxford.

Ela Longespè, countess of Warwick, is recorded to have been a benefactor to it about the year 1295. John Wylliott, D.D., chancellor of Exeter, gave exhibitions in 1380 for the maintenance of twelve portionistæ, called postmasters, who were afterwards increased to fourteen by John Chamber, fellow of Eton, who directed that his two additional exhibitioners should be elected from Eton College. Chalmers says, 'On the building of the chapel these postmasters officiated as choristers, and had a salary of six shillings and fourpence per annum for this service; but there was at that time no regular choir.' These exhibitioners, he adds, resided in a hall opposite to the college, which had been given to it by Peter de Abingdon, or Habendon, the first warden; and here they remained until the latter end of queen Elizabeth's reign, when they were taken into college. Henry Jackson, minor canon of St. Paul's, who died in 1727, and who had received his education at this college, founded four scholarships for natives of Oxford. His benefaction however, for whatever reason, did not pass into effect until the year 1753.

The foundation, at present, consists of a warden, twenty-four fellows, fourteen postmasters, four scholars, two chaplains, and two clerks. The natives of the following dioceses are not eligible to fellowships: viz. St. Asaph, Bangor, St. David's, Llandaff, Hereford, Chichester, Exeter, Rochester, Lichfield and Coventry, Chester, and Carlisle. In the election of a warden the fellows choose three of their number, whom they present to the visitor, the archbishop of Canterbury, who appoints one of them.

The preferment in the patronage of this college consists of the rectory of Gamlingay, in Cambridgeshire; the vicarage of Diddington, in Huntingdonshire; the vicarage of Eleham, in Kent; the rectories of Kibworth Beauchamp in Leicestershire, and Denton, in Norfolk; the vicarages of Embleton and Ponteland, in Northumberland; the rectories of Cuxham and Ibstone, in Oxfordshire; with the chapel of St. John the Baptist in Oxford, and the vicarage of St. Peter in the East, and the chapels of Wolvercot and Holywell; the rectory of Farley, and the vicarage of Maldon, with the chapel of Chessington, in Surrey; the rectory of Lapworth, and the vicarage of Great Wolford, in Warwickshire; and the vicarage of Stratton St. Margaret's, in Wilts.

Among the more eminent members of this society may be enumerated Duns Scotus; Bradwardine, and Islip, archbishops of Canterbury; Wicliffe, who was a fellow of Merton; George Owen, physician to Henry VIII.; Jewel, bishop of Salisbury; Sir Isaac Wake; Devereux, earl of Essex, the parliamentary general; Cressy, the Roman Catholic historian; Anthony à Wood, the Oxford historian; and Sir Richard Steele. Among the wardens, Dr. Chamber, another of Henry the Eighth's physicians; Sir Henry Savile; and Dr. Harvey, the discoverer of the circulation of the blood, have been the most conspicuous.

The buildings of this college consist of three courts; the outer one toward the street was rebuilt in 1589, except the tower and gate, which are of the fifteenth century. The most ancient part of the college was built by Sever and Fitzjames, two of the wardens, afterwards bishops. The chapel, at the west end of the outer court, is also a parish church, dedicated to St. John the Baptist. It contains, among other monuments, that of Sir Thomas Bodley.

The number of members of this college, December 31, 1838, was 135.

(Gutch's *Colleges and Halls of Oxford;* Chalmers's *History of the University of Oxford; Oxford University Calendar,* 1839.)

MERU'LIDÆ, *Thrushes*, a family of Dentirostral birds, placed by Mr. Vigors between the *Laniadæ*, or *Shrikes*, and the *Sylviadæ*, or *Warblers*. In the former family, he is of opinion that *Vanga*, Cuv., together with *Prionops*, *Laniarius*, and *Thamnophilus* of Vieillot, bring us in contact with the *Thrushes*, and that the extremes of the family will be found in *Graucalus* and *Ceblyperis* of Cuvier, which last has been latterly arranged with the *Thrushes*, and both of which, by their bills, in some degree depressed at the base, lead back to *Tyrannus*, and the other broad-billed groups which commence the family. Mr. Vigors feels inclined rather to leave *Ceblyperis* in its original station among the *Shrikes*, from the peculiarity of its tail-coverts, which form themselves into a kind of puffed-out cluster on the back.

'The family of *Merulidæ*,' continues Mr. Vigors, 'connected as above with the *Laniadæ*, comprises a considerable number of species and many natural genera; but which, like most of the *Insessorial* groups, have hitherto received but partial examination. The general views by which they seem to be allied among themselves, as far at least as can be judged from their present unorganised condition, may be stated as follows:—but with that expression of doubt which ever attends inquiries like the present, where the absence of accurate information to the economy of the subjects before us, and of extensive knowledge of the forms connected with them, leaves us no better foundation for our inferences than partial conjecture. The genus *Myiothera*, Ill., seems to be the first group of the present family which is connected with the *Laniadæ*, where it is met by some of the smaller species of *Thamnophilus*. This group seems to lead by *Pitta*, Vieill., and perhaps *Cinclus*, Bechst., through some intervening forms, to the true *Thrushes*, or the genera *Turdus* of authors and *Merula* of Ray, which form the type of the family. To these we may add that portion of the Linnean Orioles, which, possessing the curved and notched bill of the *Thrushes*, constitutes the genus *Oriolus*, or true Oriole, of the present day. Here we meet several groups, generally arranged without order in the Linnean genus Turdus, and hitherto entirely uncharacterised, which gradually lead from the typical groups to those which possess a more generally delicate conformation; until the comparatively strong form and robust bill of the *Thrushes* is lost in the weaker body and more slender bill of the *Warblers*. Here again the group of *Rock Thrushes*, of which the *T. saxatilis* is the type, appear to bring us round, by their general habits and assimilating characters of bill and *tarsi*, to *Myiothera*, where we entered the family. Those birds which constitute the groups which we denominate *Chatterers*, and which form the genus *Ampelis* of Linnæus, are usually assigned a place near this family; and I must confess that, from the general affinity which they appear to bear to it, I have felt, and still feel, considerable doubt whether this be not their natural station. A strong affinity however on the other hand seems to unite them with the wide-gaped *Pipræ*, and some of those other groups which, by their bill, broad and depressed at the base, appear to come in contact with the earlier divisions of the present tribe, and the extreme of the *Fissirostres* which precede it. The general rule of placing groups in a conterminous situation, according to what appears to be the predominance of their more important characters, has inclined me to arrange the birds of which I speak, provisionally among the *Pipridæ*, at the extreme termination of the tribe before us. In my present view of the case, the characters in which they accord with that family and approximate the extreme groups of the preceding tribe appear to predominate. More accurate knowledge on these subjects will clear away these and similar difficulties. But I cannot too often insist upon the point, that whatever alterations may take place hereafter in our ideas respecting the disposition of these subordinate groups, they cannot interfere with the general principles which it is the object of this inquiry to illustrate. Instead of impugning our general views, they will merely remove those doubts on minor points in which our present limited acquaintance with nature involves us.'

In Mr. Swainson's 'Classification of Birds,' the reader will find elaborate details of his views respecting the affinities and analogies of this extensive family, which our limits do not permit us to give. The following is the arrangement in the Synopsis, where the family is placed between the *Laniadæ* and the *Sylviadæ*.

MERULIDÆ.

Subfamily *Brachypodinæ*.

Feet very short. Hind toe almost as long as tarsus. Claws short, much curved. Bill distinctly notched. Wings short, rounded. Feathers on the rump very long and thickset. (Sw.)

Genera. Micropus. (Sw.)

Bill as long as the head, straight, somewhat conic, but the culmen gradually arched. Tarsus remarkably short, feathered beyond the knees. Lateral toes unequal; hinder as long as the tarsus. Wings moderate, the first quill almost spurious. Tail even. (Sw.)

Example, *Micropus chalcocephalus*, 'Pl. Col.,' 453.

(Subgenus, *Hypsipetes* (Vig.). Tail forked. Example, *Hypsipetes psaroides* (Gould, 'Cent. Himala Birds').

Brachypus. (Sw.)

Bill shorter than the head; the base broad; the sides compressed; culmen elevated and curved from the base. Rictus generally furnished with bristles. Feet very short, strong; tarsal scales entire. Tarsus longer than the hind toe. Claws curved, broad, acute, wings and tail rounded. (Sw.)

Subgenera. *Brachypus* (Sw.). Bill short. Rictus bristled. Feet small, weak, lateral toes equal, hinder toe as long as the tarsus.

Example, *Brachypus dispar*, 'Pl. Col.,' 137.

Chloropsis (Jard. and Selb.). Bill more lengthened; the tip much hooked; the notch of the upper mandible forming a small distinct tooth. Rictus of gape smooth. Feet small, lateral toes unequal, the hinder toe rather shorter than the tarsus. (Sw.)

Example, *Chloropsis Malabaricus*, 'Pl. Col.,' 512, f. 2.

Jora, or *Iöra* (Horsf.). Bill nearly as long as the head, lengthened, somewhat conic, and rounded. Rictus smooth. Tarsus rather lengthened, the anterior scales divided. Middle and hinder toe of equal length. Tarsus much longer than either. Tail very short, fasciculated; the tips truncate and even.

Example, *Jora scapularis*, Horsf., 'Java.'

Andropadus (Sw.). Bill very short, resembling that of *Brachypus*, but the upper mandible crenated near the tip. Neck with setaceous hairs. Rictus bristled. Wings, tail, and feet as in *Brachypus*. (Sw.)

Example, *Andropadus vociferus*, 'Ois. d'Afr.,' 106, f. 2.

*Hæmatornis** (Sw.). Head crested. Bill short. Rictus bristled. Feet short, lateral toes unequal, hinder toe shorter than the tarsus, which is equal to the middle toe. Wings and tail rounded. (Sw.)

Example, *Hæmatornis chrysorrhoeus*, 'Ois. d'Afr.,' 111, pl. 107, f. 2.

Tricophorus. (Temm.)

Culmen gradually arched. Nostrils and base of the bill surrounded with lengthened slender hairs. Gape very strongly bristled. Margins of the mandibles white. Feathers of the crown and chin elongated. Nape of the neck with several conspicuous lengthened bristles, considerably exceeding the surrounding feathers. Feet short. Tarsus longer than the hind toe, and feathered beyond the knees. Inner toe shortest. Wings and tail moderate, the former with the three first quills much graduated.

Example, *Tricophorus olivaceus*. (Swainson, 'Birds of West Africa,' i., 264.)

Phyllastrephus. (Sw.)

Bill as long as the head, strong, the tip rather hooked. Rictus strongly bristled. Frontal feathers small, compact, directed forwards, and compressed on the base of the bill. Wings and tail moderate, rounded. Feet short, strong, robust. Tarsus and middle toe of the same length; lateral toes unequal, the inner shortest: hinder toe shorter than the inner one. Anterior tarsal scales divided. (Sw.)

Example, *Phyllastrephus Capensis*, 'Ois. d'Afr.,' 112, f. 1.

Icteria. (Vieill.)

Bill with the general form of that of *Brachypus*, but the culmen more elevated and arched, and both mandibles entire. Wings and tail rounded. Tarsus considerably lengthened and strong. Inner toe the shortest; middle toe very long. *Locality*, America.

Example, *Icteria polyglotta*. (Wilson, pl. 6, f. 2.)

Subfamily *Myotherinæ* (Myiotherinæ).—*Ant-Thrushes*.

Bill straight, somewhat cylindrical; the tip suddenly bent down or hooked.

Dasycephala. (Sw.)

Bill as long as the head, straight; tip abruptly hooked, base wide, the rest somewhat cylindrical. Gonys strong, ascending. Nostrils and front defended by stiff feathers and bristles, pointing in different directions. Rictus strongly bristled. Tarsus lengthened, slender: lateral scales numerous, small, oval. Toes and claws slender; inner toe shortest; outer toe connected to the middle as far as the first joint. Hind claw large. Wings and tail rounded.

Example, *Dasycephala rufescens*. (*Birds of Brazil*, pl. 76.)

Myiothera. (Ill.)

Feet lengthened, rather stout. Lateral scales of tarsus in an entire piece. Claws not broad, nor greatly curved. Bill as in the small *Thamnophili*. Wings short. Tail moderate, rounded.

Subgenera *Myiothera*. Inner toe longer than the outer and cleft to its base; outer toe with its first joint united to that of the middle toe. The tarsus with the anterior scales divided.

Drymophila (Sw.). Inner toe shorter than the outer, which is only slightly connected to the middle. Tarsus (typically) very smooth: all the scales entire. (Sw.)

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* N.B.—This name is preoccupied. [FALCONIDÆ, vol. x., p. 174.]

Example, *Drymophila longipes.* ('Zool.,' Ill., ii. 23.)

Brachypteryx (Horsf.). See the article.

Myiocincla (Sw.). Legs strong. Inner toe longer than the outer. All the tarsal scales divided. Anterior claws small; hinder claw nearly straight, and as long as the toe. (Sw.)

Example, *Myiocincla Colma,* 'Enl.,' 821.

Pithys (Vieill.). Feet syndactile. The inner lateral toe shortest; the outer united by its first and second joint to the middle toe. All the tarsal scales entire.

Example, *Pithys albifrons.* Vieill., 'Gal.,' pl. 129.

N.B. Mr. Swainson remarks that *Urotomus, Formicivora,* and all the other small *Myiotheræ,* having the feet weak and the tarsal scales and claws similar to those of *Thamnophilus,* he thinks it better to refer them to that group; but as it has not been analyzed, he does not, in the *Classification of Birds,* incorporate those two subgenera, although proposed by himself some years ago. See *Zoological Journal,* vol. i., p. 301; and the paper *On the Natural Affinities that connect the Orders and Families of Birds,* by Mr. Vigors, who refers to Mr. Swainson's memoir in the 'Zoological Journal,' and observes that the reader may there see the line of connexion between *Thamnophilus* and *Myiothera* fully established by the intervention of several forms gradually passing into each other, such as *Formicivora, Urotomus,* and *Drymophila.* (*Linn. Trans.*, vol. xv.)

Pitta. (Temm.)

Bill strong, thrush-like: the culmen gradually curved. Nostrils nearly naked. Wings moderate; the first and second quills but slightly graduated. Tail remarkably short, almost hid by the covers. Feet very long, pale, the scales nearly entire. Inner toe slightly shorter than the outer. India and Australia. (Sw.)

Example, *Pitta gigas.* 'Pl. Col.,' 217.

Subgenera *Chlorisoma* (Sw.). Bill as in *Pitta,* but somewhat thicker. Nostrils protected and nearly covered by incumbent feathers. Rictus bristled. Wings rounded; the four first quills much graduated. Tail moderate or lengthened, graduated. Feet strong, rather lengthened: the inner toe scarcely shorter than the outer.—India. (Sw.)

Example, *Chlorisoma thalassina.* 'Pl. Col.,' 401.

Grallaria (Vieill.). Bill thrush-like, as in Pitta. Wings rounded; the two first quills graduated, the first half as long as the second, the three next nearly equal. Tail short and rounded. Legs very long: the tarsus slender, pale; the anterior scales divided, the lateral scales (typically) entire. Lateral toes nearly equal.

Example, *Grallaria Rex.* 'Enl.' 702.

Mr. Swainson remarks that it appears to him that *Chamæza,* Vig., is more an aberrant species of *Grallaria* than a distinct type in the genus Pitta: the only species known chiefly differing in having the tail longer and the lateral scales divided.

Cinclus. (Bechst.)

Bill moderate, rather slender, very straight, considerably depressed; tip absolutely notched; gonys ascending. Nostrils naked, membranaceous; the aperture very small and linear. Wings moderate, rounded; the first quill spurious. Tail very short, even. Feet large, very strong, pale; the lateral toes equal; tarsal scales entire and smooth. (Sw.)

Example, *Cinclus albicollis.* Selby, pl. 45.

Subfamily *Merulinæ.* *True Thrushes.*

Wings more lengthened and pointed. Bill notched, with the culmen gradually curved to the tip, which is bent, but not hooked, over the lower mandible. Feet formed both for perching and walking. (Sw.)

Petrocincla. (Vig.) Rock Thrushes.

Bill thrush-like: tip of the upper mandible abruptly bent down and nearly entire. Wings moderate; the first quill spurious; the second shorter than the three next, which are equal and longest. Tail even. Anterior scales divided. Lateral toes equal. Claws small, but slightly curved.

Example, *Petrocincla montana.* 'Ois. d'Afr.,' pl. 101.

Subgenus *Petrophila* (Sw.). Bill thrush-like: the culmen and tip of the upper mandible gradually bent and entire. Wings and tail as in the last. Legs pale; anterior scales entire. Lateral toes unequal; inner shortest. Claws moderate and fully curved. (Sw.)

Example, *Petrocincla cyanocephala.* (Gould, 'Cent. of Himal. Birds.')

Merula. (Willughby.)

See the article Blackbird.

Orpheus. (Sw.)

General structure of *Merula.* Bill more curved in the culmen; the notch small, or nearly obsolete. Rictal bristles rather strong. Wings rounded; the three first quills graduated. Tail lengthened, graduated, or rounded. Inner toe manifestly shorter than the outer.

Example, *Orpheus Polyglottus.* Wilson, pl. 10, f. 1.

Subgenus *Cossypha,* Vig. General structure of *Orpheus,* but the wings more rounded, and the tail less so. Rictus smooth. Africa only.

Example, *Cossypha leucoceps.* (Sw., 'Birds of West Africa,' 1, pl. 32.)

Chætops. (Sw.)

Bill moderate, thrush-like, notched. Nostrils basal, large, naked, membranaceous; the aperture lateral and linear. Frontal feathers rigid; the shafts composed of bristles. Chin feathers the same, but weaker. Rictus bristled. Wings very short and rounded. Tail rather lengthened, broad, convex, soft, and slightly rounded. Tarsi very long and strong: anterior scales divided. Lateral toes unequal. Claws small, obtuse, and slightly curved; the three anterior of equal size.—Africa. (Sw.)

Example, *Chætops Burchellii,* Pl. 'Col.,' 385.

Subfamily *Crateropodinæ.* *Babblers.*

Legs remarkably long and strong, with the claws but slightly curved. Wings short and rounded. Tail large, broad, graduated, and very soft. Plumage lax. Bill compressed, straight, hard; the tip nearly entire. (Sw.)

Pellorneum. (Sw.)

Bill moderate, straight, somewhat conic; tip notched; gonys ascending. Frontal feathers small, rigid, directed forwards. Rictus bristled. Wings very short, much rounded. Tail moderate, graduated. Tarsus and middle toe of equal length; lateral toes much shorter, and equal; hinder toe shorter than the tarsus. Anterior claws very small, and but slightly curved. Tarsal scales hardly divided. (Sw.)

Example, *Pellorneum ruficeps.*

Crateropus. (Sw.)—(Ianthocincla—part.)

Bill nearly as long as the head; more or less straight from the base; much compressed; obsoletely notched. Rictus bristled. Frontal feathers rigid. Wings short, rounded. Tail large, broad, soft, and rounded. Feet very large and strong. Tarsus lengthened; the anterior scales divided. Lateral toes nearly equal; hind toe large, nearly as long as the middle toe. Plumage lax, soft. (Sw.)

Example, *Crateropus Reinwardii.* ('Zool.,' Ill., i. 30.)

Grallina. (Vieill.)

Bill slender, straight, rather cylindrical above; the sides very little compressed; base broader than high; tips of both mandibles distinctly notched. Nostrils naked, basal. Rictus with a few bristles. Wings very long; first and second quills graduated, four next longest. Tail lengthened, even. Feet strong, formed for walking, black; anterior toes divided, the rest entire. Lateral toes equal; middle toe and claw short, very little longer than the hind-toe.—Australia.

Example, *Grallina melanoleuca.* Vieill., 'Gal.,' pl. 150.

Subgenus *Cinclosoma* (Horsf. and Vig.). Bill very straight; culmen and gonys equally curved towards the point, which is slightly notched. Wings very short; the two first quills graduated; the three next longest, and of equal length. Tail lengthened, broad, graduated; the feathers narrowed towards their tips. Under-tail coverts very long. Feet moderate; inner toe longer than outer. Australia. Analagous to *Accentor* among the *Sylviadæ.* (Sw.)

Example, *Cinclosoma punctata.* (Shaw, 'Zool. of N. H.,' pl. 9.)

Malacocircus. (Sw.)

Bill more or less curved, by being elevated at the base, having the sides much compressed, and the culmen high and arched; the tip almost entire, and not suddenly bent over the lower. Feet very large. Tail soft, graduated, generally lengthened. (Sw.)

Example, *Malacocircus striatus.* ('Zool.,' Ill., ii., pl. 127.)

Subgenera. *Megalurus* (Horsf.). Bill slender. Rictus bristled. Wings very short; the two first quills graduated, the four next all of the same length, and longest. Tail lengthened, graduated; the feathers narrow. Feet very large and strong. Toes lengthened; the inner toe rather longer than the outer. Claws slender, and but slightly curved. Anterior scales divided, lateral, entire.

Example, *Megalurus palustris.*

Pomatorhinus (Horsf.). General structure of *Crateropus;* but both mandibles of the bill curved and entire, and the wings shorter and much more rounded; four first quills graduated. Tarsal scales entire. Inner toe rather shorter than the outer.

Example, *Pomatorhinus montanus.*

Timalia (Horsf.). Plumage lax. Bill straight, rather short, much compressed; culmen high and arched gradually; tip obsoletely notched or entire; commissure curved. Wings short, rounded. Tail more or less lengthened, graduated. Feet strong. Lateral toes nearly equal.—India, Australia, Africa. (Sw.)

Example, *Timalia thoracica.* (' Pl. Col.,' 76.)

Pteroptochus. (Kittlitz.)

Feet of extraordinary size and thickness; all the anterior toes nearly equally long; claws long, slender, slightly curved. Tail consisting of fourteen feathers, rounded and carried erect. Wings very short. Representing *Menura* and *Orthonyx.*—Western Tropical America only. (Sw.)

Example, *Pteroptochus megapodius* (Kittl., pl. 4. 'Zool.,' Ill., ii., pl. 117.)

Subfamily *Oriolinæ.* Orioles.

Bill thrush-like, as long as the head, broad at the base, compressed beyond; the base and gape devoid of bristles. Nostrils naked; aperture large. Wings lengthened. Rump feathers thick. Lateral toes unequal. (Sw.)

Donacobius. (Sw.)

Habit and general structure of *Crateropus.* Bill lengthened, slender; the culmen arched from the base; the tip hooked and notched. Nostrils large, naked, membranaceous; the aperture large, oval, terminal. Wings remarkably short, and rounded. Tail moderate, broad, cuneated. Feet very large and strong. Lateral toes equal; claws slender, acute, slightly curved.—America only. (Sw.)

Example, *Donacobius vociferans.* (' Zool.,' Ill., ii., pl. 72.)

Sericulus. (Sw.)

Bill rather stout, resembling that of *Oriolus.* Nostrils naked. Wings moderate; two first quills equally graduated; third nearly as long as the fourth. Tail moderate, even. Feet strong, robust. Tarsus much longer than hind toe; inner shortest.—Australia. (Sw.)

Example, *Sericulus chrysocephalus.* (Lewin's 'Birds of New South Wales,' pl. 1.)

Oriolus. (Linn.)

Bill as long as the head; broad at the base; tip distinctly notched, and somewhat hooked. Nostrils short, nearly naked; aperture lateral, large, and oval. Wings rather lengthened; first quill very short; second not quite so long as the third, which is generally the longest. Tarsus rather short, longer than the hind toe and claw; anterior scales divided.—Old World. (Sw.)

Example, *Oriolus Galbula.* (' Enl.,' 26.)

Subgenus *Irena* (Horsf.). Bill of Oriolus; but the culmen much raised and considerably arched from the base, rather hooked at the tip. Nostrils partly defended by short plumes, which cover the membrane. Rictus slightly bristled. Wings and tail as in *Sericulus.* Feet small. Tarsus very short, scarcely longer than the hind toe and claw: anterior and lateral scales entire. Inner toe rather shortest. Rump feathers very thick, and slightly spinous.—India.

Example, *Irena Puella.* (Horsf., 'Java.' 'Pl. Col.,' 70.)

Dulus. (Vieill.)

Bill very short, much compressed, but with the culmen elevated and arched. Commissure curved. Nostrils as in *Oriolus.* Wings rather short; first quill not half so long as the second; third, fourth, and fifth longest; secondaries with the tips notched; tertials lengthened. Tail moderate, slightly forked. Feet as in *Oriolus.* Claws strong, broad, much curved.—South America.

Example, *Dulus palmarum.* ('Enl.,' 156, f. 2.)

Sphecotheres. (Vieill.)

Bill rather short, strong, partaking of the structure both of *Dulus* and *Oriolus;* the base broad; commissure straight, gape very wide, extending beyond the eye. Nostrils naked, the aperture large and oval. Wings, tail, and feet as in *Dulus.* Tarsus hardly longer than the hind toe and claw. Australia.

Example, *Sphecotheres viridis.* (Vieill., ' Gal.,' pl. 147.)

M. Lesson, in his 'Table Méthodique,' makes the *Turdusinées,* the fifth family of the Dentirostral birds, consist of the following genera:—

Turdus (Linn.), including *Merula, Turdus,* and *Ixos; Cinclus; Cinclosoma; Dulus; Sturnella; Timalia; Dasyornis; Jora; Pitta; Myiothera; Brachypteryx; Grallina; Acridotheres; Psaroides; Mimetes; Oriolus;* and *Sericulus.* The position assigned to the family is between the *Ampelidées* and the *Menurées* (Mænura).

The Prince of Musignano, in his 'Geographical and Comparative List of the Birds of Europe and North America' (1838), places the '*Turdidæ*' between the '*Certhidæ*' and the *Muscicapidæ,* and assigns to the first the following subfamilies and genera.

Subfam. *a. Calamoherpinæ.*

Genera—*Cettia* (Bonap.); *Pseudo-luscinia* (Bonap.); *Locustella* (Ray); *Calamodyta* (Bonap.); *Cysticola* (Less.); *Erythropygia* (Smith, *Agrobates,* Sw.); *Calamoherpe* (Meyer); *Hippolais* (Brehm.). These are for the most part formed at the expense of the genera *Sylvia* and *Motacilla* (Linn.).

b. Sylvinæ.

Phyllopneuste (Meyer, *Phylloscopus,* Boie); *Melizophilus* (Leach); *Sylvia* (Lath.); *Curruca* (Brisson); *Nisoria* (Bonap.); *Accentor* (Bechst.); *Calliope* (Gould); *Luscinia* (Br., *Philomela,* Sw.).

c. Saxicolinæ.

Dandalus (Boie, *Erythaca,* Sw., *Rubecula,* Br.); *Ruticilla* (Br., *Phœnicura,* Sw.); *Saxicola* (Bechst.); *Vitiflora* (Briss., *Œnanthe,* Vieill.); *Sialia* (Sw.); *Petrocincla* (Vig., part); *Petrocossyphus* (Boie)

d. Oriolinæ.

Oriolus (Linn.).

e. Turdinæ.

Merula (Ray); *Turdus* (Linn.); *Oreocincla* (Gould); *Mimus* (Boie, *Orpheus,* Sw.); *Cinclus* (Bechst.).

f. Motacillinæ.

Anthus (Bechst.); *Budytes* (Cuv.); *Motacilla* (Linn.).

g. Parinæ.

Regulus (Ray); *Parus* (Linn.); *Mecistura* (Leach, *Paroides,* Brehm.); *Calamophilus* (Leach, *Mystacinus,* Brehm.); *Ægithalus* (Vig., *Pendulinus,* Cuv.).

h. Sylvicolinæ.

Parula (Bonap.); *Trichas* (Sw.); *Vermivora* (Sw.); *Sejurus* (Sw.); *Sylvicola* (Sw.); *Wilsonia* (Bonap.); *Culicivora* (Sw.).

We have thus endeavoured to lay before the reader the views of some of the leading ornithologists respecting the arrangement of the *Thrushes.* The student will find a very extensive and well-arranged collection of the family in the museum of the Zoological Society of London.

MERU'LIUS, a genus of Fungi, deriving its name from Merula, a blackbird, some of the species being black. The character of the genus is to have a veiny or sinuous plaited hymenium, with the folds confluent with the pileus, and forming angular unequal perforations. Its only interest is derived from one of the species being a common cause of dry-rot. This plant, the *Merulius lachrymans* of Fries, and the *Boletus lachrymans* of Sowerby's 'Fungi,' t. 113, is very common on rotten wood in vaults and cellars, among the timbers of ships, and in similar damp situations where there is not a free circulation of air. In general it is found without fructification, its thallus, or spawn, being the only part developed, and resembling a white, dry, cottony matter, consolidated into a substance like leather. The fructification is composed of fine yellow orange or reddish-brown plicæ, so arranged as to have the appearance of perforations, and occasionally producing 'pendent processes like inverted cones:' it usually forms a circle varying from one to eight inches in diameter, and when perfect the cavities contain drops of clear water, which have given rise to the specific name. The only known means of preventing the attacks of this and other fungi upon timber is a free circulation of dry air, or the impregnation of wood with corrosive sublimate, a process now called Kyanizing, after Mr. Kyan, who invented it.

MERVILLE. [Nord.]

MERYCOTHE'RIUM, the name applied by M. Bojanus to a genus of fossil *Mammalia*, founded on three *fossil* teeth, according to the authority of the person who sold them to him. Bojanus records one species under the name of *Merycotherium Sibiricum*.

Cuvier (*Oss. Foss.*) remarks that if these teeth are really fossil, and from Siberia, this would be the first authentic example of such remains belonging to the genus *Camelus*. He observes that their size, their form (which is longer than it is wide), and the absence of an 'arête,' or small cone, between the columns, leave no doubt as to their generic character. Those of the Giraffe are more square, and with a small point, as in the stags; while those of the Ox have a cylindrical 'arête,' or ridge. Cuvier further states that Bojanus, who has very well remarked this general resemblance, has also noticed some differences which have appeared to him sufficient to justify a new name for the animal; but the French zoologist observes that Bojanus proposes this distinction with doubt, and declares his readiness to renounce it, if it should be established that these teeth belonged to a camel, a gigantic sheep, or an antelope (the only genera in fact which want ridges between the columns).

Cuvier thinks that the differences of which Bojanus speaks are owing to the skulls of the Camels examined by the latter, as points of comparison, being the heads of individuals much older than that to which the teeth in question belonged. A Dromedary only a little older, and whose teeth were nearly in the same state of detrition, appeared to Cuvier to present no difference, save that of individuality. He remarks that they are, as Bojanus truly pointed out, the penultimate and antepenultimate molars of the left side of the upper jaw, and that it remains to show in what beds they were found, and to search for other bones of the animal, in order to see whether they will furnish any specific character. Cuvier concludes by stating that M. Marcel de Serres, professor of mineralogy at Montpellier, had just communicated to him a drawing of a fossil femur from the environs of that city, which resembled much, in the parts of it which were preserved, that of a Camel. [Camel, vol. vi., p. 191.]

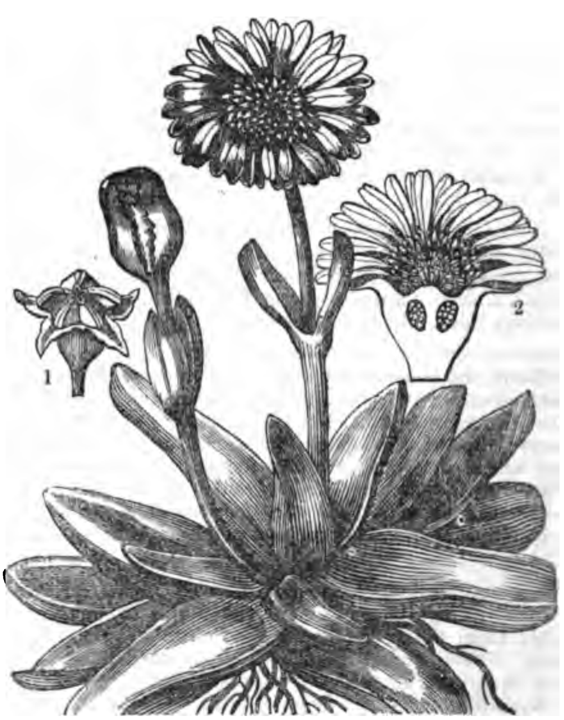
Notwithstanding Cuvier's opinion, which is worthy of all respect, there are those who still think that *Merycotherium* is a distinct genus. See Bojan., 'Nov. Act. Acad. Leop. Nat. Cur.,' xii., tab. 21, f. 1-8.

MERZLIAKOV, ALEXIUS PHEDOROVITCH, a Russian writer, more distinguished as a critic than as a poet, though not without talent in the latter character, was born at Dalmatova, in the government of Perm (where his father was a wealthy merchant), in 1778. In his fourteenth year he recommended himself to Catherine II. by an ode on the peace with Sweden, and the empress ordered him to be sent to the university of Moscow, where he was placed under the charge of Kheraskov [Kheraskov], and in 1798 was made professor of eloquence and poetry. In 1805 he quitted Moscow for the northern capital, where he held a similar professorship in the university. It was at St. Petersburg that, at the suggestion of Prince Galitzin, he commenced a popular course of lectures on literature, which were numerously attended, and obtained for him a high reputation with the public. These lectures, which were held twice a week during the winter at Galitzin's house, were then a novelty, and were the more interesting to his auditors, because the critic discussed at length the merits of the principal Russian poets and prose-writers.

His own productions consist chiefly of translations, among which are Aristotle's 'Poetic,' Virgil's 'Eclogues,' select scenes from the Greek tragedians, Eschenburg's 'Theory of Literature,' and Tasso's 'Gierusalemme.' Among his original poems, his shorter lyric pieces and songs are the best, the latter more especially, for they breathe strong national feeling, and have accordingly acquired more than a transitory popularity. Merzliakov died in 1826 or 1827.

MESA'PUS. (Zoology.) [Salicoques.]

MESEMBRYA'CEÆ, a natural order of Polypetalous Exogens, consisting of herbaceous and shrubby plants inhabiting various parts of the world, in very dry temperate climates, but especially the Cape of Good Hope, where the species are extremely numerous. They are succulent plants, with an inferior, many-celled, polyspermous ovary, numerous narrow petals, indefinite stamens, and a fruit splitting into regular stellate valves. The common Ice-plant of the gardens, Mesembryanthemum crystallinum, so called because its cuticle is elevated in the form of multitudes of crystalline points, is burnt in the Canaries for the sake of its ashes, which the Spaniards import in large quantities for their glass-works under the name of *Barilla Moradera*. Another species, the M. nodiflorum, is used in Egypt for the same purpose, and also in the manufacture of Marocco leather. This and the other species are chiefly found in sandy, desert, arid places, where they flourish in the absence of other vegetation, and afford a grateful food to cattle, which browse upon them. M. emarcidum, according to Burnett, is fermented by the Hottentots, when it becomes narcotic, and is chewed by those people like tobacco. Only four genera seem admissible into the order; the others referred to it under the name of Ficoideæ chiefly belonging to Tetragoniaceæ; but Mesembryanthemum, one of the admitted genera, alone comprehends more than 300 species.



Mesembryanthemum albidum,

1, a ripe fruit; 2, a vertical section of a flower.

MESENTERI'PORA. [Polypiaria Membranacea.]

MESENTERY is the membrane by which the intestines are attached to the posterior wall of the abdomen. It consists of a double layer of fine cellular and adipose tissue, which is attached to the abdominal wall by a comparatively narrow origin, and becoming gradually wider, spreads out like a fan, to be attached to the whole length of the canal of the small intestines. Between its layers the arteries pass to the intestines, and the veins and lacteals return from them.

The other abdominal organs are attached to the walls of that cavity and to each other by layers of membrane similar to the mesentery. Those which belong to the colon are called the meso-colon; those of the rectum the meso-rectum, &c.; while those which connect the stomach with the spleen and liver are named respectively the gastro-splenic and the gastro-hepatic, or lesser omentum.

MESMER. [Animal Magnetism.]

MESODESMA, M. Deshayes's name for a genus of Veneridæ (*Erycina*, Lam.).

MESOLABIUM, an old name for any geometrical construction or proportion for finding two mean proportionals between two given lines.

MESOLE occurs massive and globular or reniform. Structure radiating from a centre, fibrous, foliated. Hardness 3·5. Colour white, greyish, or yellowish white. Translucent. Lustre pearly or silky. Specific gravity 2·35 to 2·4. It is found in Sweden and the Faroe Islands.

Analysis by—

	Hisinger.	Berzelius.
Silica	42·17	42·60
Alumina	27·00	28·00
Soda	10·19	5·63
Lime	9·00	11·43
Water	11·77	12·70
	100·13	100·36

MESOLITE (Needle-stone) occurs crystallized and massive. Primary form a right rhombic prism. Cleavage parallel to the lateral faces of the primary form. Fracture conchoidal, uneven. Scratches fluor-spar, and is scratched by felspar. Colour white. Lustre vitreous. Transparent. Specific gravity 2·25.

Before the blow-pipe it becomes opaque, swells, and often fuses into a colourless glass; with borax it fuses difficultly.

It occurs in Iceland, Greenland, Finland, &c.

Analysis by—

	Fuchs and Gehlen.	Berzelius.
Silica	47·0	45·80
Alumina	25·9	26·50
Lime	9·8	9·87
Soda	5·4	5·40
Water	12·3	12·30
	100·4	99·87

MESOMPHYX, M. Rafinesque's name for a genus which he proposes to separate from *Helix* of authors.

MESOPOTA'MIA (Μεσοποταμία, called in the Old Testament *Aram-naharaim*, אֲרַם נַהֲרַיִם, that is, 'Aram,' or 'Syria between the two rivers'), the antient name of the country lying between the Tigris and Euphrates, was bounded on the north by Mount Masius (*Karajeh Dagh*), a branch of Mount Taurus, and on the south by the Median wall and the canals which connected the Tigris and Euphrates, by which it was separated from Babylonia. (Strabo, xv., p. 746, Casaubon; Ptol., v. 18; Plin., v. 13, vi. 9.) The name of Mesopotamia, which was never employed to designate any political division, did not come into use till after the time of the Macedonian conquest of Asia. The southern part of Mesopotamia Xenophon calls Arabia (*Anab.*, i. 5, § 1); and other writers included it, especially the northern part, under the general name of Syria. (Strabo, p. 737.) It was considered by the Romans a division of Syria. (Mela, i. 11; Pliny, v. 13.) It is called by the Arabs in the present day *Al Jezira*, 'the island.'

Mesopotamia may be divided into two parts, the physical features of which differ greatly. The northern part, from Mount Masius to about 35½° N. lat., is a fertile country watered by the Chaboras and the Mygdonius; the southern part, from the neighbourhood of Circesium to the Median wall, is a flat and desert country, which Xenophon has described in the 'Anabasis.' 'The country,' he says, 'was a plain throughout (i. 5, § 1, 2), level as the sea, and full of wormwood (ἀψινθίου); whatever other shrubs or reeds it contained had all a sweet aromatic smell, but there was no timber in it. There were all kinds of wild animals in it; the most numerous were wild asses, and not a few ostriches; there were also in it bustards and antelopes.' It was inhabited in the time of Pliny and Strabo by predatory tribes of Arabs called Scenitiæ, who were afterwards known under the name of Saracens. (Strabo, xvi., p. 747; Pliny, vi. 28, xxiii. 6.)

Little is known of the history of Mesopotamia till it became a province of the Persian empire. *Cushan-rishthathaim*, who is mentioned in *Judges* (iii. 8, 10) as king of Mesopotamia, appears to have been only a petty prince of a district east of the Euphrates. In the time of Hezekiah the different states of Mesopotamia were subject to the Assyrians (2 *Kings*, xix. 13), and subsequently belonged in succession to the Chaldæan, Persian, and Syro-Macedonian monarchies.

The northern part of Mesopotamia was divided into two parts by the river Aborras or Chaboras (*Khabour*), called Araxes by Xenophon (*Anab.*, i. 4, § 19), which rises in Mount Masius, and receiving the Mygdonius (*al Huali*) on the east, flows into the Euphrates at Circesium. Of these divisions the western was called Osroene, and the eastern Mygdonia.

The chief town of Mygdonia was Nisibis, also called Antiochia Mygdonica (*Nisibin*), situated on the river Mygdonius, in the midst of a fertile plain at the foot of Mount Masius. It was surrounded by three brick walls, and was very strongly fortified. Sapor was repulsed in three separate attacks upon the town, A.D. 338, 346, 350; but it was ceded to him by treaty in 363. The Zoba of the Old Testament (1 *Sam.*, xiv. 47; 2 *Sam.*, viii. 3) is supposed to be the same town as Nisibis, since the Syriac writers frequently mention Nisibis under the former name. To the north of Nisibis was Daras (*Dara*), which was fortified by Anastasius I. (A.D. 506), who gave to it the name of Anastasiopolis. (Procop., *Pers.*, i. 10.) According to Niebuhr, there are considerable ruins both of Nisibis and Daras.

The chief town of Osroene was Edessa (*Orfa*), in the north-west of the province, nine geographical miles from the Euphrates. This town, which was also called Antiochia and Callirrhoe (Plin., v. 21), is supposed to be the Erech (אֶרֶךְ) of the Old Testament. (*Gen.*, x. 10.) Edessa suffered greatly by an earthquake in the time of Justinian, who rebuilt a considerable part of the town, and gave it the name of Justinopolis. Orfa was plundered by the army of Timur in 1393; but it soon recovered its former importance. It contains at present about 40,000 inhabitants; and is about three miles in circumference.

At the distance of two days' journey, according to Niebuhr, south-east of Orfa, was the antient town of Charræ (*Harran*), the Haran (חָרָן) of the Scriptures, where Abraham's family dwelt after they had left Ur of the Chaldees. (*Gen.*, xi. 31; xii. 5; xxvii. 43; xxviii. 10; xxix. 4.) In the time of Hezekiah, Haran had been conquered by the Assyrians. (2 *Kings*, xix. 12; *Is.*, xxxvii. 12.) It is mentioned by Ezekiel as a place of commercial importance (xxvii. 23). Charræ is memorable in Roman history for the defeat of Crassus. (Dion. Cassius, xl. 25; Pliny, v. 21; Lucan, i. 104.)

Circesium (*Kerkesiah*), at the union of the Euphrates and Aborras, was a very antient town: it is called Carchemish (כַּרְכְּמִישׁ) in the Old Testament. (*Is.*, x. 9; *Jer.*, xlvi. 2; 2 *Chron.*, xxxv. 20.) It was strongly fortified by Diocletian. (Ammian., xxiii. 5.) A little to the north of Circesium, near Thapsacus, was an antient ford across the Euphrates.

MESOTYPE (Natrolite) occurs crystallized and massive. Primary form a right rhombic prism. Cleavage parallel to the primary faces. Fracture conchoidal, uneven. Scratches calcareous spar. Some crystals become electrical by friction. Colour white, with shades of grey, yellow, and red; colour of streak white. Lustre vitreous. Translucent, transparent. Specific gravity 2·249.

Massive varieties globular and reniform. Structure fibrous, diverging. Lustre pearly.

By the blow-pipe fuses with ebullition into a spongy enamel. Gelatinizes in nitric acid.

Found in Ireland, Scotland, Iceland, the Faroe Islands, &c., in trap, basaltic, and porphyritic rocks, and also in the cavities of the more antient lavas of Vesuvius.

Analysis of a specimen from Faroe by Smithson:—

Silica	49·0
Alumina	27·0
Soda	17·0
Water	9·6
	102·6

MESPILUS is a genus of Pomaceous plants, distinguished from Pyrus by the putamen of the carpels being bony, and their points spread open so as to give the fruit a cup-shaped appearance. In this restricted sense it is confined to those fruit-trees which are vulgarly called Medlars, whose astringent fruit does not become eatable till it has begun to arrive at that stage of decomposition which is called *bletting*. The word Mespilus has however been sometimes employed as a general name for all Pomaceous plants whose fruit has a hard putamen; it was used in this sense by Dioscorides, whose μέσπιλον ἀρωνία, or τρίκοκκόν, was either Cratægus tanacetifolia, as Sibthorp believed, because he found that species still called τρικοκκιά by the modern Greeks, or C. Aronia, as Sprengel conjectures; while his μέσπιλον ἕτερόν, or ἐπιμηλίδα, was the modern Mespilus germanica, or common cultivated medlar.

There are only two species of Mespilus proper the one Mespilus grandiflora, an ornamental tree common in shrubberies; the other M. germanica, a native of the woods and wild places of middle and southern Europe, which furnishes all the varieties of *Medlar*. These are the Large Dutch, the Nottingham or Common, and the Stoneless. The first is preferred on account of its large size, but the Nottingham possesses the finest acidity; the Stoneless is easily distinguished by its small size and the character implied by its name. The trees may be propagated by either grafting or budding upon their own species, or upon the White Thorn, Quince, or Pear. By adopting the Pear as a stock, the straightest stems can be obtained. The branches of the Medlar naturally assume so tortuous an appearance, that any attempt to produce uniform regularity by pruning would only produce injurious effects. Pruning should be performed only with a view to general symmetry, the balancing of the top (which is apt to incline all to one side), and a judicious thinning where the branches are overcrowded. It is necessary to observe that the fruit is produced at the extremities of the branches, and therefore in pruning they must not be shortened.

The fruit, when first gathered, is extremely austere; but this austerity is changed soon after gathering into an agreeable acidity. When in a soft pulpy state, it is fit for use, and, preserved by the tough skin, will continue so for some time; but a sort of mouldiness generally makes it appearance at the stalk, and as soon as it is observed the fruit may be pronounced unfit for use. Dipping the stalk in brine would doubtless prove of advantage in preventing the attack of fungi on that part.

Mespilus japonica, the Loquat, is now called Eriobotrya japonica, Mesp. Amelanchier is Amelanchier vulgaris, and M. Cotoneaster is Cotoneaster vulgaris.

MESSALINA. [Claudius Nero.]

MESSALLA, or with his full name, **MARCUS VALERIUS MESSALLA CORVINUS**, was born B.C. 59, in the same year as Livy. It would appear from a passage in Cicero's letters that he went to Athens in his fifteenth year to study. (*Ep. Att.*, xii. 32.) He was opposed in early life to the party of Antony and Octavianus (Augustus), and was in consequence included in the proscription of the second triumvirate, B.C. 43 (Dion, xlvii. 11; App., *Civ.*, iv. 38); but after the battle of Philippi, he contrived to make his peace with the conquerors, and was subsequently advanced by Augustus to offices of great trust and power. He accompanied Augustus in his campaign against Sextus Pompeius, B.C. 36, and on his return to Rome was made augur for the services he had rendered in that war. The military talents of Messalla appear to have been highly valued by Augustus; in B.C. 34, he subdued the Salassi and other warlike tribes which inhabited the Alps; and four years afterwards he conquered the Aquitani, to which victory Tibullus frequently alludes (i. 7; ii. 1, 33; ii. 5, 117). In the two following years he was sent by Augustus to Egypt and various parts of Asia on important public business; and on his return, B.C. 27, he obtained the honours of a triumph on account of his conquest of Aquitania. He was consul B.C. 31, and was appointed prefect of Rome B.C. 26. He died about A.D. 11.

Messalla was one of the most celebrated orators of his time; he is frequently mentioned by Quintilian in terms of the highest praise (*Inst. Orat.*, x. 1; compare Hor., *Sat.* i., 10, 29; *Ars Poet.*, 370); and the author of the dialogue *De Oratoribus* considers him even superior to Cicero in grace and elegance of expression (c. 18). Messalla also appears to have paid attention to the study of language, since Quintilian informs us that he had not only written treatises on separate words, but even on separate letters. (*Inst. Orat.*, i. 7; compare ix. 4.) He was a great patron of literature in general, and appears to have conferred no small benefits on Tibullus, who frequently celebrates the praises of his patron with as much subserviency as the other poets of the Augustan age.

MESSENE. [Messenia.]

MESSENGERS, KING'S, certain officers employed under the secretaries of state, who are kept in readiness to carry despatches both at home and abroad. They are not now so often employed as formerly in serving the secretaries' warrants for the apprehension of persons for high-treason or other grave offences against the state. Formerly too it was not unusual for them to keep the prisoners they apprehended at their own houses. A remarkable instance of this practice is detailed in the 'Post-Boy' newspaper of 1713. 'London, Jan. 10.—Yesterday morning the Morocco ambassador was taken into the custody of one of her majesty's messengers, by way of reprisal for his master's ordering and committing to slavery several of her majesty's subjects.' In the same paper, July 14, 1713, we read, 'The emperor of Morocco having released those of her majesty's subjects that had been carried into slavery, Don Bentura de Zari, his ambassador, who was in custody of Mr. Chapman, the messenger, by way of reprisal, was on Saturday last set at liberty.' So that his excellency must have passed six months in the messenger's custody.

MESSE'NIA (Μεσσηνία), a country of antient Greece, was bounded on the east by Laconica, on the north by Elis and Arcadia, and was surrounded by the sea on the western and southern sides. It was separated from Laconica by the mountain-chain of Taygetus; and from Elis and Arcadia by the river Neda and the high land which runs between the bed of the Neda and the sources of the Pamisus. [Arcadia.] Its area is calculated by Mr. Clinton at 1162 square miles (*Fasti Hell.*, ii., p. 385), which is about the area of Staffordshire.

Messenia is described by Pausanias as the most fertile province in Peloponnesus (iv. 15, § 3); and Euripides, in a passage quoted by Strabo (viii., p. 366), speaks of it as a land well watered, very fertile, with beautiful pastures for cattle, and possessing a climate neither too cold in winter nor too hot in summer. The western part of Messenia is drained by the river Pamisus, which rises in the mountains between Arcadia and Messenia, and flows southward into the Messenian bay (Gulf of Koroni). The basin of the Pamisus is divided into two distinct parts, which are separated from each other on the east by some high land which stretches from Taygetus to the Pamisus, and on the western side of the river by Mount Ithome. The upper part, usually called the plain of Stenyclerus, is of small extent and moderate fertility; but the lower part south of Ithome is an extensive plain, celebrated in antient times for its great fertility, whence it was frequently called *Macaria*, or the 'blessed.' Leake describes it as covered in the present day with plantations of the vine, the fig, and the mulberry, and 'as rich in cultivation as can well be imagined.' (*Travels in the Morea*, i., p. 352.) The western part of Messenia is diversified by hills and valleys, but contains no high mountains.

Messenia, called in Homer Messene, is said by Pausanias to have derived its name from Messene, the wife of Polycaon, the first king of the country, who is described as the younger son of Lelex, king of Laconica (iv. 1, § 1, 2). After the lapse of five generations, the sovereignty is said to have passed into the hands of Perieres, the son of Æolus. At the time of the Trojan war Messenia appears to have been subject to Menelaus, with the exception of Pylus and probably part of the western coast, which was under the dominion of Nestor. After the death of Menelaus, the Neleid princes of Pylus are said by Strabo (viii., p. 359) to have obtained the whole of the country. On the division of the Peloponnesus, after the Dorian conquest under the Heraclidæ, Messenia fell to the share of Cresphontes, who fixed his capital in Stenyclerus, and divided the country into five districts. (Strabo, p. 361.) Pylus however appears to have retained its independence till a much later time.

In the middle of the eighth century before the Christian æra, a series of disputes and skirmishes arose on the borders of Messenia and Laconica, which gave rise to a confirmed hatred between the two nations. Prompted by this feeling, the Spartans are said to have bound themselves by an oath never to return home till Messenia was subdued; and they commenced the contest by a midnight attack on Ampheia, a frontier town, which they took, and put the inhabitants to the sword. This was the commencement of what is called the first Messenian war, the date of which is usually given, though it cannot be fixed with certainty, as B.C. 743. After a contest of twenty years, during which the Messenian king Aristodemus distinguished himself by deeds of heroic valour, the Messenians were subdued and reduced to the condition of the Laconian helots. After bearing the yoke for thirty-nine years, the Messenians took up arms against their oppressors, B.C. 685, under the conduct of Aristomenes, a noble youth of the royal blood. [Aristomenes.] The Messenians however were again subdued, B.C. 668; and those who remained in their native country were treated with the greatest rigour. The majority of freemen however withdrew from Messenia, and a considerable number, under the two sons of Aristomenes, sailed to Italy, and settled at Rhegium. They afterwards obtained possession of Zancle, on the opposite coast of Sicily, and called it

Messene, which has retained the same name (*Messina*) to the present day.

The Messenians again revolted in B.C. 464. This war, usually called the third Messenian war, lasted ten years; at the end of which time, the Messenians, who had occupied the strongly fortified mountain of Ithome, surrendered on condition of being allowed to retire from the Peloponnesus. The Athenians, who were not at that time on good terms with Sparta, gladly allowed them to settle at Naupactus, a town at the entrance of the Corinthian gulf, which they had lately taken from the Locri Ozolæ. (Thucyd., i., 101, 103; Paus., iv., 24, § 2; Diod., xi. 70.) This place however the Messenians were obliged to quit, when, at the end of the Peloponnesian war, the Spartans became masters of Greece; but after the supremacy of Sparta had been overthrown by the battle of Leuctra, Epaminondas formed the design of restoring the independence of Messenia, and accordingly sent messengers to Italy, Sicily, and all parts of Greece, to invite the long-exiled Messenians to return to their native country. Numbers obeyed the summons, and in B.C. 369 a town was built at the foot of Ithome, which they called Messene. The independence of the Messenians was guaranteed by the peace concluded B.C. 361; and Messenia continued to remain an independent state till the dissolution of the Achæan confederacy. In the Messenian state, as restored by Epaminondas, the antient national manners are said to have been retained; and the dialect remained, up to the time of Pausanias, the purest Doric that was spoken in the Peloponnesus (iv. 27, § 5; Müller's *Dorians*, ii., p. 421, Engl. Transl.).

The chief towns on the western coast were Pylos and Mothone, or Methone. The bay of Pylos (*Navarino*), which is protected from the swell of the sea by the island of Sphacteria (*Sphagia*), is the best harbour in the Peloponnesus. Pylos was situated at the foot of Mount Ægaleus, according to Strabo, and must not be confounded with the fortress which was erected by the Athenians in the Peloponnesian war at the northern entrance of the bay, on the spot called Coryphasium by the Lacedæmonians. (Thucyd., iv. 103, 104.) Mothone, or Methone (*Modon*), is said by Pausanias (iv. 35, § 1) to have been antiently called Pedasus, a town mentioned by Homer: it appears to have been a place of some importance in the time of Pausanias. Passing the promontory Acritas (*Cape Gallo*), we enter upon the Messenian Gulf, at present called Koroni: forty stadia north of Acritas was Asine (Paus., iv. 34, § 7), originally inhabited by the Dryopes: following the coast, we come to Colonides, forty stadia north of Asine; and afterwards to Æpea, which was called Corone after the restoration of the Messenians. At the head of the gulf, and east of the river Nedon, was Pheræ, or Pharæ, which was annexed to Laconica by Augustus (Paus., iv. 30, § 2); and on the eastern coast of the gulf were Abia, which is mentioned by Homer, according to Pausanias (iv. 30, § 1), under the name of Ira, and Leuctrum or Leuctra, which belonged at one time to Laconica. (Strabo, p. 361; compare Tac., *Ann.*, iv. 43.) It is difficult to determine the boundaries of Laconica and Messenia, as they differed at various times. Müller makes the river Nedon, near Pharæ, the antient frontier line (*Dorians*, ii., p. 460); but in the time of Pausanias, the boundary was a woody hollow called Chœrius, twenty stadia south of Abia (iv. 30, § 1). Strabo blames Euripides for making the river Pamisus the boundary (p. 366); but perhaps Euripides referred to a small river of the same name, which Strabo himself tells us was in the vicinity of Leuctrum (p. 361).

The only town inland of any importance was Messene, situated, as already mentioned, at the foot of Mount Ithome, on the summit of which was the citadel. Strabo speaks of this citadel and of Acrocorinthus as the two strongest places in Peloponnesus (p. 361); and the account of Pausanias, who praises the strong fortifications of the town, is confirmed by the solid and beautiful masonry which remains to the present day.

MESSIAH (מָשִׁיחַ) is a Hebrew word, of the same signification as the Greek Χριστός (Christ) *anointed*. In the Old Testament the word is repeatedly applied to persons who were consecrated to the service of God in some sacred office. Thus the Jewish priests, prophets, and kings are called *anointed* (Messiah), or *the anointed of God*. From this general meaning the word has passed into a particular use, referring to the illustrious personage whom the antient Jews expected, and whom their descendants still expect, to confer some signal blessings on their nation and the world. The word is found in this sense twice in the Old Testament, in *Psalm* ii. 2, and in *Daniel*, ix. 25, 26.

The expectation of the Messiah, first excited by the promise given to Eve after the fall of man (*Genesis*, iii. 15), may be traced from the exclamation of Eve at the birth of Cain, 'I have gotten a man from Jehovah,' or 'a man Jehovah' (*Gen.*, iv. 1), down through the patriarchal history, the Mosaic law, and the whole series of the Jewish prophets; and it is very generally admitted that remnants of the early belief upon this subject are plainly seen in the religion and traditions of nearly all heathen nations. For information on these traditions, see Dr. J. P. Smith's *Scripture Testimony to the Messiah*, book ii., c. 2; and Bp. Horsley's *Dissertation on the Prophecies of the Messiah, dispersed among the Heathen.*

The belief of the antient Jews respecting the person and office of the Messiah is of course derived from the passages of the Old Testament which are understood as predictions concerning him. An elaborate examination of all such passages occupies the 4th chapter of the 2nd book of Dr. Smith's *Scripture Testimony to the Messiah*, and the following is his summary of the results of the inquiry (*Ibid.*, ch. v.) 'From these sources we have learned, that the Messiah was to be a real and proper human being (*Gen.*, iii. 15; xxii. 18, &c.); the descendant of Adam, Abraham, and David (*Gen.*, xxii., 18; 2 *Sam.*, vii., 19, &c.); in some peculiar sense the offspring of the woman (*Gen.*, iii. 15); the perfectly faithful and devoted servant of God (*Is.*, xlii., 1; lii., 13); the messenger, supreme in rank above all others, of divine authority and grace (*Is.*, xlviii., 16); a heavenly teacher, inspired with the fulness of divine gifts and qualifications (*Is.*, xi., 2); the great and universal lawgiver, who should be the author and promulgator of a new, holy, and happy government over the moral principles, characters, and actions of men (*Deut.*, xviii., 18, 19; *Is.*, ix., 7); a high priest, after a new and most exalted model (*Ps.*, cx., 4); the adviser of the wisest counsels (*Is.*, ix., 6); the pacificator and reconciler of rebellious man to God, and of men among themselves (*Ibid.*); the kind and powerful Saviour from all moral and natural evil (2 *Sam.*, xxiii., 1-7; *Job*, xix., 23-27; *Is.*, xl., 10; xlv., 21). The divine oracles have also informed us that, in the execution of these benevolent purposes, he should undergo the severest sufferings from the malice of the original tempter, from the ingratitude and disobedience of men, and from the especial circumstance of his devoting himself a voluntary sacrifice to procure the highest benefits to those of mankind who should concur in his plan of mercy and holiness (*Gen.*, iii., 15; *Psalms*, xxii., lxix.; *Is.*, lii., liii.; *Zech.*, xii., 10). They have assured us that, from his deep distresses, he should emerge to glory, victory, and triumph; that he should possess power, authority, and dominion terrible to his determined adversaries, but full of blessing and happiness to his obedient followers; that he should gradually extend those benefits to all nations; and that his beneficent reign should be holy and spiritual in its nature, and in its duration everlasting (*Gen.*, xlix., 10; 2 *Sam.*, xxiii., 1-7; *Ps.*, ii., xlv., lxxii., cx.; *Is.*, xi., 5; *Dan.*, vii., 13, 14). The testimony of heaven likewise describes him as entitled to the appellation of *Wonderful* (*Is.*, ix., 5); since he should be, in a sense peculiar to himself, the Son of God (*Ps.*, ii., 7; *Is.*, ix., 6); as existing and acting during the patriarchal and the Jewish ages, and even from eternity (*Ps.*, xl., 7-9; *Mic.*, v., 2, and the passages which relate to the *Angel of Jehovah*); as the all-sufficient guardian and protector of his people (*Is.*, xl., 9-11, &c.); as the proper object of the various affections of piety, of devotional confidence for obtaining the most important blessings, and of religious homage from angels and men (*Ps.*, ii., 12; xcvii., 7; *Is.*, xlv., 21-25). That testimony, finally, declares him to be the eternal and immutable being (*Ps.*, cii., 25-28), the Creator (*Ps.*, cii., 25), God, the Mighty God, Adonai (*Ps.*, xlv., 6; *Is.*, ix., 6; xlv., 21), Elohim (*Is.*, vi., 1; *Mal.*, iii., 1), Jehovah (2 *Sam.*, xxiii., 4; *Is.*, vi., 5; viii., 13; xl., 3, 10; xlv., 21-25; *Zech.*, ii., iii., vi.).' See also Hengstenberg's *Christologie des Alten Testaments.*

The expectations of the Messiah among the Jews in the period between the close of the Old Testament and the birth of Christ, as indicated by the Targums, the *Apocrypha*, the *Book of Enoch*, and the writings of Philo and Josephus, were confused and often inconsistent. Respecting the doctrines of the Targums on the *Memra of Jah*, or *Word of God*, and of Philo on the *Logos*, see LOGOS. In the *Apocrypha* the word Messiah or Christ never once occurs, and there are no passages which can be said with any certainty to refer to the Messiah, unless perhaps one in *Ecclesiasticus*, li. 10, 'I called upon the Lord, the Father of my Lord.' In the *Book of Enoch*, which was written by a Jew about B.C. 30, we have an account of a vision (evidently imitated from *Daniel*, vii. 9-14), in which the 'Son of Man' is associated with the 'Antient of Days,' and is described as a person 'to whom righteousness belongeth,' 'who will reveal all the treasures of that which is hidden,' who 'existed and whose name was called upon in the presence of the Lord of the Spirits before the world was created and for ever,' who 'will be a support to the righteous and holy' and 'the light of the nations,' before whom 'all who dwell upon the earth will fall down and worship,' who is to be a preserver and ruler, and superior to the kings of the earth, whom he will overthrow 'because they have denied the Lord of Spirits and his Messiah.' (Abp. Laurence's *Book of Enoch*, chaps. xlvi., xlviii., lxi.) From Josephus we learn nothing on the subject, a fact sufficiently accounted for by his own temporising disposition and the circumstances in which he was placed.

At the time of Christ's advent various expectations respecting the Messiah prevailed among the Jews. It is sufficiently evident from the New Testament, that, while some looked for a human prince who was deliver them from the Roman yoke and exalt them to national supremacy, others expected a divine teacher who was to confer spiritual blessings not only upon them but also on the Gentiles. (Bertholdt's *Christologia Judaeorum Jesu Apostolorumque Aetate*, and Kuinoel's *Comment. in Lib. Hist. N. T.*, *Proleg. ad Johan.*, § 7.) The opinion of the Samaritans, recorded in *John*, iv. 42, that the Messiah would be a religious teacher and 'the Saviour of the world,' is worthy of special attention, because the Samaritans received no part of the Scriptures but the Pentateuch, and were cut off from all intercourse with the Jews by national hatred. (Bishop Horsley's *Sermons*, xxiv.-xxvi.)

It is the belief of all Christians that Jesus Christ is the Messiah predicted in the Old Testament. The evidence of this fact is contained in the New Testament, especially in the four gospels, from which it appears that his lineal descent, the place, time, and other circumstances of his birth, the constitution of his person, the history of his life and death, the miracles he performed, and the doctrines he taught, all agree to the minutest particular with the prophecies respecting the Messiah. (Fuller's *Jesus the true Messiah.*)

The Jews, having rejected the claims of Jesus Christ, are still looking for the Messiah, whom they almost universally expect to be a mere man and to confer on them only temporal blessings. Most of the Rabbinical writers of the middle ages speak of two Messiahs: one, the son of David, the conquering monarch; the other, the suffering Messiah, the son of Joseph, who is to fall in battle, fighting for his countrymen againt Gog and Magog, and in this sense to die for them. This opinion may be traced up to the sixth century, and perhaps higher. In these Rabbinical writings, especially in the book *Zohar*, there are scattered valuable fragments of the more antient belief of the Jewish people on this subject. (Schöttgenii, *Horæ Hebraicæ et Talmudicæ;* and Lightfoot's *Works.*)

In different ages there have appeared numerous 'false Messiahs' (*Matt.*, xxiv. 24). Of these ecclesiastical historians reckon twenty-four, for an account of whom the reader is referred to Johannes à Lent's *History of False Messiahs.*

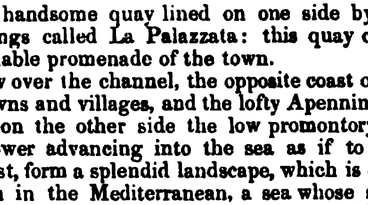
MESSI'NA, INTENDENZA, or Province of, comprehends the north-east extremity of Sicily, and is bounded on the west by the province of Palermo, on the south by that of Catania, on the north by the Mediterranean, and on the east by the Faro or Straits of Messina, which divide it from Calabria. The greatest length of the province is 60 miles, and its breadth 30 miles. A continuation of the mountainous ridge which runs across Sicily from west to east, known to the antients under the various names of Nebrodes, Heræi, Pelorias, &c., covers the greater part of the interior of the province, and terminates at Cape Pelorum. A number of torrents, called 'fiumare,' during the rainy season descend from both sides of the ridge, but they are nearly dry in summer. On the south-west the province of Messina skirts the base of Ætna, the mass of which belongs to the province of Catania. The province of Messina has no great plains, but it contains many valleys. Its chief products are wine, oil, and fruit of every sort. The towns of the province are—1, Messina. 2, Melazzo, the antient Mylæ, a seaport town on a promontory of the northern coast facing the Lipari islands, fifteen miles west of Messina, with a castle and 7000 inhabitants, many of whom are employed as sailors and fishermen. It exports much wine from the neighbouring districts, and also oil. The red Faro wine, which is made nearer to Messina, is better than that of the district of Melazzo. 3, Patti, on the same coast, fifteen miles south-west of Melazzo, and not far from the ruins of the antient Tyndaris, has several churches and convents, and between 4000 and 5000 inhabitants. 4, Taormina, the antient Tauromenium, on the east coast of the island, and at the north-east base of the group of Ætna, an old looking town with about 4000 inhabitants, is built upon a steep cliff towering above the sea; it has an antient theatre and other ruins scattered around. 5, Castro Reale, in a valley rich in oil and wine, has 12,000 inhabitants. 6, Randazzo, at the north base of Ætna, in a very fertile district, has 15,000 inhabitants.

The islands of Lipari are included in the administrative province of Messina. [LIPARI ISLANDS.]

MESSI'NA, the Town of, lies on the north-east coast of Sicily opposite the Calabrian coast, from which it is separated by the channel of the Faro, which is here about four miles wide, but becomes much narrower further north opposite Faro Point, or Cape Pelorum. The town of Messina is built partly on the slope of a steep hill, and partly along the sea-shore at the foot of it. The port of Messina is formed by a strip of sandy beach projecting into the sea at the south side of the city and sweeping round in the form of a semicircle. From the sickle-like form of this strip of land, the town received from its first Greek inhabitants the name of Zankle ('curved' or 'bent'),* which was afterwards changed into that of Messene. (Thucyd. vi. 5.) On this narrow tract of land are the citadel, the lazaretto, the lighthouse, and the castle of Salvatore at the entrance of the harbour, which faces the north. The harbour, which is more than two miles in circumference, is one of the best in the Mediterranean. The larger part of the town rises in the form of a crescent on the west side of the harbour, along which is a handsome quay lined on one side by a row of fine buildings called La Palazzata: this quay constitutes the fashionable promenade of the town.

The view over the channel, the opposite coast of Calabria with its towns and villages, and the lofty Apennines behind them, and on the other side the low promontory of Faro, with its tower advancing into the sea as if to meet the Italian coast, form a splendid landscape, which is one of the finest even in the Mediterranean, a sea whose shores are remarkable for a variety of beautiful scenery. The climate of Messina, though hot in summer, is very healthy, and is not so sultry as that of Palermo or Catania.

Messina has many remarkable buildings; the cathedral, the church of La Candelara, and that of the Capuchins, contain some fine paintings. The church of Santa Maria de Graffeo belongs to the Greek clergy, whose protopapa is the spiritual head of the Greek or Epirote colonies settled in Sicily. The royal palace, the archiepiscopal palace, that of the senate, the seminary, the great hospital, the arsenal, the loggia or exchange, the granaries, the royal college, the bank, and the two theatres, are all worthy of notice. The public library, founded by Constantine Lascaris, is rich in Greek MSS. Messina is an archbishop's see, has a court of appeal for the province, a commercial tribunal, a royal college, called Accademia Carolina, for the study of law and medicine, and about 60,000 inhabitants. (Serristori, *Saggio Statistico; Nuova Guida dei Viaggiatori in Italia*, Milan, 1830.)



Coin of Dankle (Messina). British Museum.

Messina is the most trading town of Sicily; it exports oil, currants and raisins, wine, almonds, lemons, sumach, lamb-skins and kid-skins, liquorice, and other produce of the island. The spinning and weaving of silk form the principal manufacture, and employ several thousand hands.

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* The name was also written 'Dankle,' as appears by the coin which accompanies this article.

(*Saggio sù i mezzi di moltiplicare le Richezze della Sicilia*, by G. de Welz, 4to., Paris, 1822.)

For the history of Messina see HIERON II., and SICILY.

METACENTRE is a point in a floating body, the position of which, relative to that of the centre of gravity, determines the conditions for the stability or instability of the equilibrium of that body. The equilibrium is *stable*, if, when the body receives a slight disturbance from its position, it tends, by the combined action of its own weight and the pressure of the fluid in which it is partially immersed, to re-adjust itself in that position after some oscillations; and the equilibrium is *instable* if a slight disturbance will cause the body to overset and acquire a different position, which will then necessarily be one of stable equilibrium.

The surface of a heavy fluid at rest is a horizontal plane; the portion of this plane which we may imagine to be within the floating body is called the *plane of floatation*.

When a body floating on a fluid is in equilibrium, the weight of the body applied downwards at its centre of gravity must be equal and exactly opposite to the pressure of the fluid, or, which is the same, to a force equal to the weight of the displaced fluid, applied upwards at the centre of gravity of this portion of the fluid; hence in this position the right line joining these two centres is vertical, and is called the *line of support*.

When the body is slightly disturbed from this position, the plane of floatation evidently alters its position in the floating body; the centre of gravity of the part immersed also changes, and the *thrust* of the fluid will in general no longer pass through the centre of gravity of the whole body. The magnitude of this force will however undergo but a very small change, and the body is now subjected to the action of two forces which are equal and contrary, but no longer directly opposite.

The figure and density of a body may however possibly be such that the thrust of the fluid may, after the disturbance, continue to pass through the centre of gravity of the body. The equilibrium is then said to be *indifferent*, inasmuch as the disturbance communicated only produces a new position of equilibrium. This happens when a body floats in a fluid of equal density with itself, and in other cases, as in a floating sphere. We may observe that if the disturbance of the equilibrium consisted merely of an elevation or depression of the centre of gravity, small vertical oscillations would be the consequence: the disturbance considered here is supposed such as to tend to turn the body *round* its centre of gravity, or to make the original line of support deviate in a vertical plane through a very small angle; this line is called the *axis* passing through the centre of gravity.

When the position of the body is thus disturbed, if the line of thrust when produced upwards meets the above-named axis, the point of intersection is called the *metacentre*. The consequent motion of the body will then be the same as if the centre of gravity were fixed, and the thrust applied vertically at the metacentre; hence if the metacentre be *above* the centre of gravity, the thrust tends to re-adjust the axis, and the equilibrium is stable; if *below*, that force tends to carry the axis farther from its original place, and the equilibrium is instable: if the two centres coincide, the equilibrium is indifferent. We give an example:—

Fig. 1.

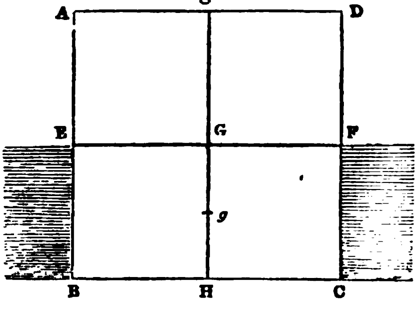

Fig. 1. ABCD is a vertical *square* section passing through G, the centre of gravity of a rectangular beam floating on a fluid of twice its specific gravity, this section being at right angles to the faces of the beam; therefore GH = ½ AB; and if $gH = \frac{1}{4}AB$, g is the centre of gravity of the fluid displaced, Gg is the line of support, and EF the plane of floatation.

Fig. 2.

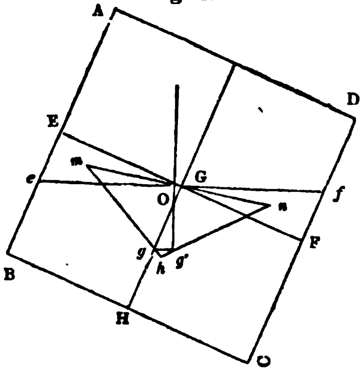

Fig. 2 represents the same body turned round its centre of gravity through a small angle F Gf or θ. Let GF = 1; we must find g', the centre of gravity of efCB, and draw g'O vertical or perpendicular to ef, cutting the axis GH in O the metacentre. Let m, n, be the centres of gravity of the portions EGe, FGf, and h that of the portion eGFCB, then $hg : gm ::$ solid EGe : solid eGFCB; and $hg' : g'n ::$ solid FGf : solid eGFCB; but the solids EGe, FGf, are equal: hence $hg : gm :: hg' : g'n$, therefore gg' is parallel to mn, or nearly horizontal, and $= mn, \frac{\text{solid EG}e}{\text{solid EFCB}}$ nearly. Now $mn = 2\,Gm = \frac{4}{3}$, and solid EG$e = \frac{1}{2}\theta \times$ length, solid EFCB $= 2 \times$ length; therefore $gg' = \frac{4}{3} \times \frac{1}{4} \times \theta = \frac{\theta}{3}$: but $\angle\, gOg' = \theta$; therefore $gO = \frac{1}{3}$, or $GO = \frac{GH}{6}$: hence the equilibrium is instable. If the equilibrium were stable, the times of the oscillations would be found by supposing the thrust applied at O, the point G remaining fixed.

METAGALLIC ACID is prepared by the partial decomposition of gallic acid by quickly heating it up to about 480°. Carbonic acid and water are formed and separated, and a black, shining, tasteless compound is left, which is not dissolved by water, but is easily taken up by the alkalis ammonia, potash, and soda in solution. It also decomposes the solutions of the alkaline carbonates, expelling the carbonic acid. Metagallate of potash gives insoluble precipitates with the salts of barytes and strontia, and also with many metallic salts.

It is composed of—

Three equivalents of hydrogen . .	3
Twelve equivalents of carbon . .	72
Three equivalents of oxygen . .	24
Equivalent	99

METALLURGY is the art of separating metals from their ores. The processes vary for every metal, and are described under each.

METALS. The metals form a numerous and highly important class of simple or elementary bodies. Different opinions are entertained as to their number, which arises from the circumstance that a few substances are regarded as metallic in their nature by some chemists, while by others their claim to this title is either doubted or denied; thus by Berzelius a substance which he discovered and called *selenium* is regarded as a metal, but it is not so ranked by any English chemist; again, the base of silica is by some classed as a metal, and by them termed *silicium*; whereas many consider it as more nearly allied in nature to boron, and call it *silicon*.

We shall consider neither of these bodies as metals. Independently of them, the metals, including those which have been longest known, as well as some whose claims are even yet somewhat doubtful, amount to forty-two; they are, given alphabetically, as follows:—aluminium, antimony, arsenic, barium, bismuth, cadmium, calcium, cerium, chromium, cobalt, columbium, copper, glucinium, gold, iridium, iron, latanium, lead, lithium, magnesium, manganese, mercury, molybden, nickel, osmium, palladium, platina, potassium, rhodium, silver, sodium, strontium, tellurium, thorium, tin, titanium, tungsten, uranium, vanadium, yttrium, zinc, zirconium.

The general properties of the metals are, that, with the single exception of mercury, they are all solid at the usual temperature of the air, and the colour of most of them is greyish white. Silver is of a pure white; tin, cadmium, platina, palladium, mercury, iridium, are white, with a slight shade of grey; antimony is white, with a slight bluish tint; cobalt, nickel, iron, manganese, and rhodium are more grey; lead and zinc are of a bluish grey; chromium, molybden, and tungsten are of a pure grey colour; uranium is brown; gold, yellow; copper and tellurium, yellowish-red; and columbium appears to have the same colour.[*]

The lustre of metals is great and peculiar, and is well known by the name of the *metallic lustre;* they differ however very considerably in the degree in which they possess this property. Professor Leslie arranges them as follows, the first possessing the greatest lustre:—platina, silver, mercury, gold, copper, tin, and lead. When reduced to a state of minute division, as by filing, or by any other means, the metallic lustre is lost, but the colour remains. The metals are generally reckoned perfectly opaque, even when reduced to thin leaves; but it is found that gold-leaf, which is $\frac{1}{200000}$ part of an inch thick, suffers light to pass through it, and it has a green colour; it is therefore extremely probable that all metals, if they could be rendered equally thin, would also be translucent. There are some metals, such as lead, tin, copper, and iron, which, when rubbed, emit a peculiar and disagreeable smell. There are others which yield a peculiar odour when heated and vaporized; this is especially the case with arsenic, and it occurs also with antimony; the greater number of the metals are however inodorous; a few of them possess taste, but it is in all cases disagreeable.

Formerly great density and a specific gravity superior to that of other bodies were considered as among the principal characteristics of metals. But the brilliant discoveries of Sir H. Davy have proved that substances which are even lighter than water, potassium and sodium for example, possess every property which belongs to metals. The density of all the metals has not been ascertained. Beginning with the lightest, their specific gravities are as follows:—potassium 0·865, sodium 0·972, titanium 5·300, columbium 5·610, arsenic 5·884, chromium 5·900, tellurium 6·115, antimony 6·702, manganese 7·05, zinc 7·191, iron 7·770, cobalt 7·834, nickel 8·279, cadmium 8·694, copper 8·958, uranium 9·000, bismuth 9·830, silver 10·474, rhodium 10·649, lead 11·445, palladium 11·860, mercury 13·568, tungsten 17·600, iridium 18·680, gold 19·361, platinum 21·530.

The following metals are ductile or malleable, arranged alphabetically:—

Cadmium
Copper
Gold
Iridium?
Iron
Lead
Mercury
Nickel
Osmium?
Palladium
Platina
Potassium
Silver
Sodium
Tin
Zinc

The following metals are so brittle that the greater number of them may be reduced to powder:—

Antimony
Arsenic
Bismuth
Cerium
Chromium
Cobalt
Columbium
Manganese
Molybden
Rhodium
Tellurium
Titanium
Tungsten
Uranium

The degrees of ductility and malleability of those metals which possess those properties are very different, and some metals are so totally devoid of them that they may be broken by the hammer, and even reduced to powder. Ductility is that property by which metals are susceptible of being drawn into wire, and malleability is that by which their form is changed, so that they are beaten into thin leaves under the hammer or extended by pressure. The annexed tables show that the metals mentioned in them do not follow in the same order as to those properties.

Order of Ductility.	Order of Malleability.
Gold	Gold
Silver	Silver
Platina	Copper
Iron	Tin
Copper	Platina
Zinc	Lead
Tin	Zinc
Lead	Iron

The ductility and malleability of metals are in general considerably increased by heat, but only to a certain extent. There are some metals which are malleable only between two very near degrees of temperature: such, for example, is the case with zinc.

The degree of tenacity of metals is indicated by the powers of their wires in supporting a given weight. The following weights are capable of being sustained by wires of the annexed metals about 0·840 of a line in diameter:—

	lbs. avoir. dec. pts.
Iron	549·250
Copper	302·278
Platina	274·320
Silver	187·137
Gold	150·753
Zinc	109·540
Tin	34·630
Lead	27·621

There are only few metals which are very hard when they are pure. The following table exhibits some of them arranged according to the degree in which they possess this property, according to Professor Brande:—

Titanium
Rhodium
Tungsten
Palladium
Manganese
Iron
Nickel
Platina
Copper
Silver
Bismuth
Gold
Zinc
Antimony
Cobalt
Tin
Arsenic
Lead

M. Dumas however arranges the metals somewhat differently: he begins with manganese as the hardest, which certainly is not the case; for titanium, which he does not mention at all, should precede that and every other metal. M. Dumas's statement is as follows:—

Manganese	Harder than tempered steel.
Chromium	Not scratched by glass.
Rhodium	
Nickel	Scratched by glass.
Cobalt	
Iron	
Antimony	
Zinc	
Palladium	Scratched by carbonate of lime.
Platina	
Copper	
Gold	
Silver	
Tellurium	
Bismuth	
Cadmium	
Tin	
Lead	Scratched by the nail.
Potassium	Soft as wax.
Sodium	
Mercury	Liquid.

The elasticity and sonorousness of metals are generally associated with their degree of hardness. There are not however any metals which are by themselves either very elastic or sonorous; but there are alloys which possess these properties in a high degree, as for example those of copper and tin.

The structure of metals is sometimes lamellar, sometimes granular, and frequently crystalline: indeed, some of them, and more especially copper, occur crystallized in the form of the cube and its varieties. Bismuth is a metal which may be artificially crystallized in cubes with great facility.

As to the action of the imponderable bodies upon the metals, it must be premised that no particular effect has been attributed to the agency of light.

The metals are good conductors of heat; they differ however greatly in the celerity with which it pervades them. According to M. Despretz, assuming the conducting power of gold as a standard, that of the undermentioned metals is as follows:

Gold	10,000	Iron	3,743
Silver	9,730	Zinc	3,638
Platina	9,810	Tin	3,039
Copper	8,932	Lead	1,796

Capacity for Heat.—MM. Petit and Dulong have deter mined with great care the calorific capacity of a great number of metals for 1° of the centigrade thermometer, that of water being taken as unity. Their results are:

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[*] This statement of colours is taken from Berthier, 'Traité des Essais par la Voie Sèche,' tome i., p. 527. It will perhaps appear on examination that scarcely any two authors agree precisely as to the colours of metals.

Bismuth	0·0288	Zinc	0·0927
Lead	0·0293	Tellurium	0·0912
Gold	0·0298	Copper	0·0949
Platina	0·0314	Iron	0·1000
Mercury	0·0330	Nickel	0·1088
Tin	0·0515	Cobalt	0·1498
Silver	0·0557		

MM. Petit and Dulong deduce from their experiments the important conclusions that the atoms of all substances have the same capacity for heat, or at least that this capacity bears a very simple relation to the weights of the atoms.

Dilatability.—Immediately that heat pervades the metals, and before it fuses them, it expands them in all directions. This dilatation is different in each metal; it varies also in the same metal with every degree of the thermometric scale; but from the freezing to the boiling point of water it may however be regarded as nearly constant; between these points the linear dilatation for the following metals is such as stated by the authorities named:—

	Laplace and Lavoisier.	Dalton and Davy.
Zinc	..	0·00296
Lead	0·00285	..
Tin	0·00217	0·00278
Silver	0·00191	0·00238
Copper	0·00172	0·00170
Gold	0·00147	0·00194
Steel (tempered)	..	0·00112
Steel (not tempered)	0·00108	..
Platina	0·00086	0·00087
Mercury	..	0·00835

Fusibility.—The fusing point of metals varies extremely, as will appear from the following table copied from Turner's 'Chemistry:'—

		Fahr.	Authority.		
	Mercury	−39°	Different Chemists.		
Fusible below a red heat.	Potassium	136	Gay Lussac & Thenard.		
	Sodium	190			
	Tin	442	Crichton.		
	Bismuth	497			
	Lead	612			
	Tellurium, rather less fusible than lead		Klaproth.		
	Arsenic, undetermined				
	Zinc	773	Daniell.		
	Antimony, a little below red heat				
	Cadmium . about	442	Stromeyer.		
Infusible below a red heat.	Silver	1873	Daniell.		
	Copper	1996	Daniell.		
	Gold	2016	Daniell.		
	Cobalt, rather less fusible than iron				
	Iron, cast	2786	Daniell.		
	Iron, malleable		Require the highest heat of a smith's forge.		
	Manganese				
	Nickel, nearly the same as cobalt				
	Palladium				Fusible by the oxy-hydrogen blowpipe.
	Molybden			Almost infusible, and not to be procured in buttons by the heat of a smith's forge.	
	Uranium				
	Tungsten				
	Chromium				
	Titanium			Infusible in the heat of a smith's forge.	
	Cerium				
	Osmium				
	Iridium				
	Rhodium				
	Platina				
	Columbium				

Volatility.—Metals also differ in this respect. Some metals are volatilized at moderate degrees of heat; among these are mercury, cadmium, arsenic, tellurium, zinc, potassium, and sodium; but there are others which may be exposed to the most intense heat of a wind furnace without being at all vaporized.

Electricity.—Becquerel has given the following table of the relative conducting powers of the metals for electricity, the wires of the several metals being of equal diameter —

Copper	100	Iron	15·80
Gold	93·60	Tin	15·50
Silver	73·60	Lead	8·30
Zinc	28·50	Mercury	3·45
Platina	16·40	Potassium	1·33

According to Pouillet, each of the following metals is positive with relation to that which follows it:—zinc, lead, tin, iron, antimony, bismuth, copper, mercury, silver, gold, tellurium, palladium, platina.

Magnetism.—There are two metals only which are capable of being rendered permanently magnetic, namely, iron and nickel; the former of these only is met with possessing this property in nature; it is an oxide of iron, and commonly called the *loadstone*. Most of the metals combine with each other and form compounds differing very materially in properties from their constituent metals. [ALLOYS.]

Oxygen and Metals.—All metals unite with oxygen, but with different degrees of facility and affinity; most of them combine with more than one proportion of oxygen and some of them with several proportions. The nature of the compounds formed is extremely various; thus some metals form with oxygen comparatively inert compounds or mere oxides, such are iron and zinc; others, such as potassium and sodium, when oxidized become alkalis; while arsenic and chromium form acids with this element. It has been already observed that some metals unite with several portions of oxygen, and these may be mere oxides, as in the case of iron; or oxides and acids, as occurs with manganese; but there is no case of any metal forming a mere oxide and an alkali with different proportions of oxygen, or an acid and an alkali under the same circumstances.

Azote and Metals.—No permanent compound of these is known.

Hydrogen and Metals do not readily combine; there are only two remarkable compounds; these result from the union of hydrogen with arsenic and with tellurium.

Chlorine and Metals combine with great facility, and the compounds are extremely important; every metal is indeed susceptible of this combination; chlorine possesses the remarkable property of forming in general volatile compounds with the metals.

Bromine, sulphur, iodine, and phosphorus combine with most of the metals: for an account of their properties, as well as those which the metals form with the preceding elements, see each particular metal. The action of the air, of water, and the acids, upon the metals, is extremely various, and depends greatly upon their respective affinity for oxygen; few of them are oxidized in dry air, but many of them tarnish and some oxidize readily in it when moist, of which iron is an example. Some metals, as potassium, sodium, and manganese, decompose water even at common temperatures, combining with its oxygen and evolving the hydrogen; others, as iron and zinc, require to be strongly heated, or the presence of an acid, to effect this decomposition.

Although most metals are dissolved by acids, yet platina and gold are exceptions to it, these and some others requiring chlorine, and generally in the nascent state called *aqua regia*. Few metals however are acted upon by acids without the presence of water, and in some instances the water, in others the acid, and often both, suffer decomposition, and it is to be observed that no metal dissolves in acid unless it be either previously oxidized or acquire oxygen from the mixture of acid or water in which the solution takes place: the salts formed are in many cases of the highest importance in chemical investigations, in the chemical arts, and in medicine.

METAMO'RPHOSIS OF ORGANS, in the Vegetable Kingdom, consists in an adaptation of one and the same organ to several different purposes; connected with which are changes in form, size, colour, and other particulars.

The plan upon which the development of plants takes place, notwithstanding the infinite variety observable in the vegetable kingdom, is extremely simple, and is executed by modifications of one kind of elementary tissue, and one kind of external organ. In the beginning, that is to say, in its embryo state, a plant is only a mass of spheroidal cellular tissue possessing vitality. But as soon as it is excited into growth, some of the cells lengthen and become woody tissue; others lengthen and generate an elastic spiral thread in their inside, acquiring the form and property of spiral vessels, while numerous other changes of a similar nature are produced; to each of which variations peculiar properties are inherent, such as the conveyance of fluids in particular directions, the conveyance of air, the strengthening of certain parts, the defence of others, and so on. In like manner a plant in the beginning consists of nothing but an axis of growth composed of fibro-vascular tissue enclosed in cellular tissue; to give it lungs and a stomach, without which it could not live, points upon its surface are expanded into leaves; these organs at particular parts of the system alter their texture, colour, and form, and become floral envelopes, or they contract, and organise in their interior a substance called pollen, when they become male organs, or finally, they roll up, and convert themselves into hollow bodies, within which are generated ovules or young seeds. These circumstances rightly understood, are found to afford the clearest explanation of the plan upon which the most complicated modes of vegetable organisation are produced, and especially of those anomalous or monstrous cases whose occurrence is so common and difficult of explanation in the absence of the light thrown upon them by Morphology, or the theory of vegetable metamorphosis.

This subject originated in the second volume of the tenth edition of the *Systema Naturæ*, published in 1759, in which Linnæus thus expresses himself:—'Leaves are the creation of the *present* year, bracts of the *second*, calyx of the *third*, petals of the *fourth*, stamens of the *fifth*, and the stamens are succeeded by the pistil. This is apparent from Ornithogalums, luxuriant and proliferous plants, double flowers, and Cardui.'

In December, 1760, these propositions were sustained by Linnæus in a thesis called the 'Prolepsis Plantarum.' He commences by remarking that 'as soon as leaves have expanded themselves in spring, a bud is observable in the axil of each. This bud swells as the year advances, and in time becomes manifestly composed of little scales: in the autumn the leaves fall off, but the bud remains, and in the succeeding spring swells, disengages itself from its envelopes, and becomes lengthened: when its outer scales have dried up and fallen off, the inner ones are expanded into leaves, which are separated by a gradual extension of the young branch, and presently each new leaf is found to contain in its bosom a little scaly bud, which in the following season will also be developed as a branch, with other leaves and other buds. Now, when we see a tree adorned with leaves, and in the bosom of these leaves provided with its little buds, we naturally inquire—of what do these buds consist? Can it be of rudimentary leaves, each with its budlets, the latter of other leaves and buds, and so on to infinity, or at least as far as the extension of the plant is likely to proceed? Nature organises living beings out of such minute particles, and even from fluids themselves, that the best eye may in vain seek to penetrate far into her mysteries. I shall however endeavour to show that the composition of buds does not extend further at one time than provision for six years; just as, among animals, we find the little *Volvox globator* containing within the mother its children, grandchildren, great-grand-children, and great-great-grand-children down to the sixth generation.'

The defects of this theory consisted, firstly, in its not accounting for the modifications of the pistil; and, secondly, in the fanciful supposition that the organs of fructification are prepared six years beforehand, and that their peculiar appearance is owing to the time of this development being anticipated by some unknown but ever-acting cause. It was this which probably caused the whole theory to be generally neglected. It was however maintained by Ludwig and Wolff; the latter of whom in particular improved so much upon the speculation of Linnæus, by rejecting what was fanciful and supplying to a certain extent an explanation of the origin of the pistil, that his paper in the *Novi Commentarii Academiæ Petropolitanæ* for 1768 would undoubtedly have deserved to be considered the beginning of a new æra in botanical philosophy if it had been known to botanists. But as it was introduced into a paper upon the formation of the intestines of animals, it does not appear ever to have attracted attention until it was discovered by Miquel a few years ago.

It is in reality to the celebrated poet Göthe that the honour justly belongs of having brought before the world in a clear and philosophical manner the doctrine of all the parts of a plant being reducible to the axis and its appendages, and consequently of having proved, to use his own words, that vegetables 'develop themselves out of themselves progressively.' By this means he led to the discovery of the real laws of structure, and of the analogies which exist between one thing and another in different tribes of plants; thus laying the foundation of vegetable comparative anatomy by 'establishing a principle in harmony with all the laws obeyed by millions of isolated facts.'

A perfect plant consists of branches successively produced out of each other from one common stock, and each furnished with exactly the same organs or appendages as its predecessor. When the fructification is produced, an alteration takes place in the extremity of the fructifying branch, which is incapable, generally speaking, of further prolongation; but as the branches, before they bore fruit, were repetitions the one of the other, so are the branches bearing fruit also repetitions of each other. If a thousand sterile or a thousand fertile branches from the same tree are compared together, they will be found to be formed upon the same uniform plan, and to accord in every essential particular. Each branch is also, under favourable circumstances, capable of itself becoming a separate individual, as is found by cuttings, budding, grafting, and other horticultural processes. This being the case, it follows that what is proved of one branch is true of all other branches.

It is also known that the elementary organs used by nature in the construction of vegetables are essentially the same; that the plan upon which these organs are combined, however various their modifications, is also uniform; that the fluids all move, the secretions all take place, the functions are all regulated upon one simple plan; in short, that all the variations we see in the vegetable world are governed by a few simple laws, which, however obscurely they may be understood by us, evidently take effect with the most perfect uniformity.

Hence it is not only true that what can be demonstrated of one branch is true of all other branches of a particular individual, but also that whatever can be shown to be the principles that govern the structure of one individual, will also be true of all other individuals. It is particularly requisite that this should be clearly understood in order that a just estimate may be formed of the nature of the proofs to be adduced with respect to the doctrines of morphology. Whatever can be demonstrated to be true with regard to one single individual is true of all other individuals: whatever is proved with reference to one organ is proved by implication as to the same organ in all other individuals whatsoever.

Moreover, the fact of one organ being readily transformed into another organ is in itself a strong presumption of the identity of their origin and nature; for it does not happen that one part assumes the appearance and functions of another, if they are originally different. Thus, while the functions of the hand may be performed by the feet, as we know they occasionally are in animals, nothing leads the heart to perform the function or assume the appearance of the liver, or the liver of any other organ. This is one of the arguments of Linnæus.

The first of the organs which are formed by a modification of leaves are the bracts; these bodies are intermediate between the leaves and the calyx. Their nature is extremely various; sometimes they have a greater resemblance to the leaves, and sometimes to the calyx. In some roses, as R. canina, they are obviously dilated petioles, to which a leaflet now and then is attached; in other species, as R. spinosissima, they differ in no respect from the other leaves. In the tulip a bract is occasionally present upon the scape, a little below the flower; this is always of a nature partaking both of the leaf and the flower. In Abies excelsa the purple scale-like bracts often become gradually narrower, and acquire a green colour like leaves. It has been stated by some botanists, that bracts are distinguishable from leaves by not producing buds in their axils; but the inaccuracy of such a distinction is apparent from a variety of cases. In Polygonum viviparum, and all viviparous plants, the flowers themselves are converted into buds within the bracts. There is a bud in the axil of every bract of the rose. The common daisy often bears buds in the axils of the bracts of its involucre; in which state it is commonly known in gardens by the name of 'hen and chickens.' In the permanent monster called Muscari monstrosum a small cluster of branches covered with minute imbricated coloured leaves resembling bracts is produced in lieu of each flower. Here all the parts of the fructification, instead of remaining at rest to perform their functions, are attempting, but in vain, to become organs of vegetation; or, in other words, to assume that state from which, for the purpose of perpetuating the species, they had been metamorphosed by nature. Hence it is clear that bracts cannot be essentially distinguished from leaves.

With the calyx begins the flower properly so named; it forms what some morphologists call the outer whorl of the fructification, and with it commences a new order of leaves, namely, those of the fructification, said to be distinguished from the leaves of vegetation by their constantly verticillate arrangement, and by the want of buds in their axils. With the leaves of the fructification all power of further increase ceases: the energies of the plant being diverted from increasing the individual to multiplying the species. The general resemblance of the calyx to the ordinary leaves of vegetation is well known: its green colour, and tendency to develop itself into as many leaves as it consists of divisions, especially in double roses, is so notorious that it need not be insisted on. In the case of Mesembryanthemum barbatum, noticed by Linnæus, there is no difference whatsoever between the leaves of the calyx and those of the stem. The resemblance however between the calyx and the stem-leaves is often not apparent; but the identity of the calyx and bracts is usually more obvious. In Cereus the transition from the one to the other is so gradual that no one can say where the distinction lies; and in numberless Ericas the resemblance of the bracts and calyx is perfect. The divisions of the calyx are also occasionally gemmiferous. A case is mentioned by Röper, in which one of the sepals of Caltha palustris was separated from the rest, and furnished with a bud. And Du Petit Thouars speaks of a specimen of Brassica napus on which branches were produced within the calyx. A monster of Herreria parviflora has been seen of the same nature. (Lindley, *Introduction to Botany*, ed. 2, p. 533.) From this it is apparent that the divisions of the calyx are not only not distinguishable from bracts, but that there is often a strong tendency in the former to assume the ordinary appearance of leaves. There is however another point to which it is necessary to advert, in order to complete the proof of the identity of calyx and leaves; this is, the verticillate arrangement of the former. Leaves are either opposite, alternate, or whorled; and these differences depend wholly upon their greater or less degree of approximation. If the leaves of a plant are rightly considered, they will be found to be inserted spirally round a common axis; that is to say, a line drawn from the base of the lower leaf to that of the one above it, thence continued to the next, and so on, would have a spiral direction. When leaves become approximated by pairs, the spire is interrupted, and the leaves are opposite; let the interruption be a little greater, and the leaves become ternate; and if the interruption be very considerable, what is called a whorl is produced, in which several leaves are placed opposite to each other round a common axis, as in Galium. Now a whorl of this nature is exactly of the nature of a calyx, only it surrounds the axis of the plant, instead of terminating it. As we know that such approximations often take place in the stem in the direct line of growth, where the propulsion of the matter of vegetation exists in its greatest activity, there is no difficulty in comprehending the possibility of such an approximation constantly existing at the end of the system of growth, where the propulsion of the matter of vegetation ceases. But the calyx and more inner whorls of the fructification do not always retain their verticillate position; on the contrary, they occasionally separate from each other and assume the same position with regard to the axis of vegetation as is naturally proper to the leaves. This is particularly striking in a very common permanent monster of Lilium album, known in the gardens by the name of the double white lily. In this plant the whole verticillation of the parts of fructification is destroyed; the axis is not stopped by a pistil, but is elongated into a stem, around which the white leaves of the calyx are alternately imbricated; and in double tulips the outer whorl, representing the calyx, frequently loses its verticillate arrangement, and becomes imbricated like the leaves of a stem. The same structure also occurs in the double white Fritillaria meleagris. Hence it cannot be doubted that the calyx consists of leaves in a particular state.

The corolla forms the second line or whorl of the fructification. It consists of several divisions, usually not green, and always alternate with those of the calyx. It is a series of leaves arising within those of the calyx, from which it is sometimes indeed very easy to distinguish it; but from which it is so often impossible to discriminate it, that the difference between the calyx and corolla has been one of the most debatable subjects in botany. No limits can be found in Cereus; the same is true of Illicium, and several similar plants. In all Liliaceæ, Orchidaceæ, and Zingiberaceæ, the only distinction that can be drawn between the calyx and corolla is, that the one originates within the other; they are alike in figure, colour, texture, odour, and function. Whatever therefore has been proved to be true of the calyx is also true of the corolla. There are also cases in which the petals have actually reverted to the state of leaves. In a Campanula Rapunculus, seen by Röper, the corolla had become five green leaves like those of the calyx; the same was found in a Verbascum pyramidatum, described by Du Petit Thouars; proliferous flowers of Geum and Rosa, in which the petals were converted into leaves, are adduced by Linnæus.

The third whorl or series of fructification is occupied by the stamens. These often consist of a single row, equal in number to the divisions of the corolla, with which they are in that case alternate. The exceptions to this in flowers with a definite number of stamens are not numerous; and such as do occur are to be considered as wanting the outer row of stamens, and developing the second row instead. Thus in Primulaceæ, in which the stamens are opposite to the petals, and therefore belonging to a second whorl, the first makes its appearance in Schwenckia in the form of clavate or subulate processes arising from the sinuses of the limb. These and similar processes, which are far from uncommon in plants, and which are known by various names, such as scales of the orifice of the corolla, glands, nectary, cup, &c., are in most cases metamorphosed stamens. In Narcissus the cup is formed of three stamens of the first row, become petaloid and united at their margins; while the six which form the second and third rows are in their usual state and within the tube. This is shown, firstly, by the frequent divisions of this cup into three lobes, which then alternate with the petals; secondly, by a distinct tendency in double Narcissi, particularly N. poeticus, to produce abortive anthers on the margin of the lobes of the cup; and thirdly, by the genus Brodiæa and its allies. In that genus the crown of the original species consists of three petaloid pieces, not united into a cup, as in Narcissus, but wholly separate from each other: in Leucocoryne ixioides these pieces are not petaloid, but clavate; and in Leucocoryne odorata the species have the same figure as in L. ixioides, but almost constantly bear more or less perfect anthers. That the anthers are mere alterations of the margins of petals, there is no difficulty in demonstrating. In Nymphæa the passage from the one to the other may be distinctly traced. In double roses the precise nature of this metamorphosis is shown in a very instructive way. If any double rose is examined, it will be seen that those petals which are next the stamens contract their claw into the form of a filament, and a distortion of the upper part, or limb, also takes place; the two sides become membranous, and put on the colour and texture of the anther; and sometimes the perfect lobe of an anther will be found on one side of a petal, and the half-formed, mis-shapen rudiment of another on the opposite side. In Aquilegia vulgaris this transformation is still more curious, but equally distinct: the petals of that plant consist of a long sessile purple horn or bag, with a spreading margin; while the stamens consist of a slender filament, bearing a small oblong, two-celled, yellow anther. In single and regularly-formed flowers nothing can be more unlike than the petals and stamens; but in double flowers the transition is complete; the petals, which first begin to change, provide themselves with slender ungues; the next contract their margin, and acquire a still longer unguis; in the next the purple margin disappears entirely; two yellow lobes like the cells of the anther take its place, and the horn, diminished in size, no longer proceeds from the base, as in the genuine petal, but from the apex of the now filiform unguis. In the last transition the lobes of the anther are more fully formed, and the horn is almost contracted within the dimensions of the connective, retaining however its purple colour: the next stage is the perfect stamen. The conversion of stamens into green leaves is far more uncommon: this indeed very rarely occurs. It was seen by Röper in the Campanula Rapunculus already referred to; and Du Petit Thouars found the stamens of Brassica napus converted into branches bearing verticillate leaves. In Plantago major and Sieversia montana permanent instances are known of a conversion of the stamens, with all the other floral organs, into leaves. Thus it appears that the stamens, like the petals, calyx, and bracteæ, are merely modified leaves.

The disk is so frequently absent, and is of so obscure a nature, that few morphologists take it into their consideration. In many plants it consists of a mere annular fleshy ring encompassing the base of the ovary; in others it forms a sort of cup, in which the ovaries are enclosed, as in certain Pœonies, and it very frequently makes its appearance in the form of hypogynous glands or scales: it is almost always between the stamens and pistil. That it is not an organ of a distinct nature may be inferred from its having no existence in a large number of flowers; but if it is not an organ of itself, it must be a modification of something else, and in that view, from its situation, it would be referrible either to the stamens or pistil. It has so little connection with the latter, from which it always separates at maturity, that it can scarcely belong to it. With the stamens it has a stronger relation: it consists of the same cellular substance as the connective of the anthers, is very often of the same colour; whenever it separates into what are called hypogynous glands or scales, these always alternate with the innermost series of stamens. In the Pœony the disk may in some measure be compared to the inner row of scales which exist between the stamens and pistil of the nearly-related genus Aquilegia. Dunal has noticed half the disk of a Cistus bearing stamens; and a variety of instances may be adduced of an insensible gradation from the stamens to the most rudimentary state of the organ.

The fifth and last series of the fructification is the pistil. The simple pistil, that of the pea for instance, consists of an ovary, bearing its ovules on one side in two parallel contiguous rows, and at its upper extremity tapering into a style, which terminates in a stigma. If this organ be further examined, it will be found that there is a suture running down each edge from the style to the base; it will be also seen that the ovules are attached to one of these sutures, and that the style is an elongation of the other: further, it will be perceived that the two sides of the ovary are traversed by veins emanating from the suture that terminates in the style, and that these veins take a slightly ascending direction towards the suture which bears the ovules. Now if, when the pod of the pea is half grown, it be laid open through the latter suture, all these circumstances will at that time be distinctly visible; and if it then be compared with one of the leaflets of the plant, it will be apparent that the suture that bears ovules answers to the two edges of the leaf, the suture without ovules to the midrib, and the style to the mucro. Hence it might, without further evidence, be suspected that the ovary is an alteration of the leaf; but if the inquiry be carried further in other plants, this suspicion becomes converted into certainty. In the first place, the suture without ovules, which has been said to be the midrib, is always external with respect to the axis of fructification, as would be the case with the midrib of a leaf folded up and terminating the fructification. In the next place, nothing is more common than to find the pistil converted either into petals or into leaves. Its change into petals is to be found in numerous double flowers, as for example double Narcissi, Hibiscus Rosa sinensis, wallflowers, ranunculuses, saxifrages, and others. These however only show its tendency to revert to petals as the representatives of leaves. The cases of its reverting to other organs are much more instructive. In the double Ulex Europæus the ovary is extremely like one of the segments of the calyx; its ovuliferous suture is not closed; in the room of ovules it sometimes bears little yellow processes like miniature petals, and its back corresponds to what would be the back of the calyx; no style or stigma is visible; sometimes two of these metamorphosed ovaries are present: in that case the sutures which should bear ovules are opposite to each other, just as the inflexed margins of two opposite leaves would be. In Kerria Japonica, which is only known in our gardens in a double state, the ovaries are uniformly little miniature leaves, with serrated margins corresponding to the ovuliferous suture of the ovary, and an elongated point representing the style; their interior is occupied by other smaller leaves. Nothing is more common among roses than to find the ovaries converted into perfect leaves;' in such cases the margins uniformly occupy the place of the ovuliferous suture, and the midrib that of the sterile suture. But the most instructive and satisfactory proof of the pistil being merely a modified leaf is to be found in the common double cherry of the gardens. In this plant the place of the ovary is usually occupied by a leaf altogether similar to those of the branches, but much smaller: it is folded together; its margins are serrated, and, in consequence of the folding, placed so as to touch each other; and they occupy the place of the ovuliferous suture of a real pistil. The midrib of this leaf corresponds to the station of the sterile suture of the ovary, and is not only lengthened into a process representing a style, but is actually terminated by a stigma. There is thus a greater identity of function between the pistil and the other series of the fructification than would at first appear probable. The pistil is seldom indeed found converted into stamens; but it often takes upon itself the form of petals, as has been shown above; and although cases are very rare of pistils bearing pollen, yet several instances are known of ovules being borne by the stamens. This occurs continually in Sempervivum tectorum.

It appears then that there is not only a continuous uninterrupted passage from the leaves to the bracts, from bracts to calyx, from calyx to corolla, from corolla to stamens, and from stamens to pistil, from which circumstance alone the origin of all these organs might have been referred to the leaves, but that there is also a continual tendency on the part of every one of them to revert to the form of a leaf.

The pistil in a state of composition differs much in appearance from its simple form. At section 78 of *Die Metamorphose der Planzen* of Göthe, are the following remarkable words:—'Keeping in view the observations that have now been made, there will be no difficulty in discovering the leaf in the seed-vessel, notwithstanding the variable structure of that part and its peculiar combinations. Thus, the pod is a leaf which is folded up and grown together at its edges, and the capsule consists of several leaves grown together; and the compound fruit is composed of several leaves united round a common centre, their sides being opened so as to form a communication between them, and their edges adhering together. This is obvious from capsules, which, when ripe, split asunder, at which time each portion is a separate pod. It is also shown by different species of one genus, in which modifications exist of the principle on which their fruit is formed: for instance, the capsules of Nigella orientalis consist of pods assembled round a centre, and partially united; in Nigella damascena their union is complete.'

As it may thus be proved that all the parts of a flower are merely modified leaves, the following propositions may be stated to constitute the basis of morphology:—

'Every flower, with its peduncle and bracteolæ, being the development of a flower-bud, and flower-buds being altogether analogous to leaf-buds, it follows as a corollary, that every flower, with its peduncle and bracteolæ, is a metamorphosed branch.

'And further, the flowers being abortive branches, whatever the laws are of the arrangement of branches with respect to each other, the same will be the laws of the arrangement of flowers with respect to each other.

'In consequence of a flower and its peduncle being a branch in a particular state, the rudimentary or metamorphosed leaves which constitute bracteæ, floral envelopes, and sexes, are subject to exactly the same laws of arrangement as regularly formed leaves.' (Lindley's *Outline of the First Principles of Botany*, edit. 2.)

Therefore all theories of structure inconsistent with these propositions must be vicious.

The reader who would occupy himself further with this curious subject, may consult Martius's edition of the *Œuvres d'Histoire Naturelle* de Göthe, Paris, 1837;

Miquel's *Commentatio de Organorum in Vegetabilibus Ortu et Metamorphosi*, Lugd. Bat., 1833; and Röper's Treatise *De Organis Plantarum.*

Engelmann has moreover (*De Antholysi Prodromus*) attempted to classify the principal aberrations from normal structure, and has collected a very considerable number of cases under the following heads:—

1. Retrograde metamorphosis (*Regressus*), when organs assume the state of some of those on the outside of them, as when carpels change to stamens or petals, hypogynous scales to stamens, stamens to petals or sepals, sepals to ordinary leaves, irregular structure to regular, and the like. 2. Foliaceous metamorphosis (*Virescentia*), when all the parts of a flower assume more or less completely the state of leaves. 3. Disunion (*Disjunctio*), when the parts that usually cohere are separated, as the carpels of a syncarpous pistillum, the filaments of monadelphous stamens, the petals of a monopetalous corolla, &c. 4. Dislocation (*Apostasis*): in this case the whorls of the flower are broken up by the extension of the axis. 5. Viviparousness (*Diaphysis*), when the axis is not only elongated, but continues to grow and form new parts, as in those instances where one flower grows from within another. And, finally, 6, Proliferousness (*Ecblastasis*), when buds are developed in the axils of the floral organs, so as to convert a simple flower into a mass of inflorescence. A very considerable number of instances are adduced in illustration of these divisions, and the work will be found highly useful as a collection of curious or important facts.

METAPHOR (*μεταφορά*, literally 'a transference'), a figure of speech which renders the subject of discourse striking, by the aid of expressions primarily referring to other objects. A common kind of metaphor is that called personification, where inanimate beings are represented as endowed with life, and even with feeling, reason, &c., as 'the fields do laugh and sing,'—'stern winter.' If this kind of metaphor spiritualises the corporeal, another kind, on the contrary, embodies the spiritual, as 'the star of renown'—'the pinnacle of honour,' and so on. A third kind is little else than a shortened simile, two objects in the same sphere being brought together, only on account of their resemblance. To this kind belong such expressions as 'the silver moon'—'the golden sun,' &c., where it will be seen at once that 'silver' and 'moon,' 'gold' and 'sun,' are connected merely on account of their obvious similarity of colour and brightness. The origin of the first two kinds of metaphor is not so apparent, for though they likewise express a similarity, yet the similarity of a series of bodily objects to a series of objects merely of the mind, where there can of necessity be no sensible resemblance, is a subject for psychological investigation. The application of certain metaphors, in all languages and among all people, attracted the attention of Jean Paul Richter, who remarked that 'no nation called error, light, or truth, darkness.' If we attend to the state of language, we shall find that a great part of the commonest discourse is composed of metaphors of the second kind, and that nearly all words expressing mental states, operations, and affections are in fact metaphorical. Thus we say every day 'a man of extended views'—'a man of good capacity, acute judgment,' &c., where the words 'extended,' 'views,' 'capacity,' 'acute,' evidently belonged originally to material objects, but have been applied to things immaterial by metaphors. The circumstance that material objects are more apparent, that language seems primarily to have them for its sole objects, and that when a higher degree of reflection brings with it objects belonging to the mind alone, nothing is left but to apply in a new sense the words already formed, is sufficient to explain the use of these metaphors generally. But still the fact that such and such bodily attributes are universally predicated of such and such spiritual objects alone, may still furnish matter for consideration to the curious in psychological speculation.

METAPHYSICS, a name originally applied to those books of Aristotle which followed his 'Physics,' and which his editors called 'the books after the Physics' (*μετὰ τὰ φυσικά*). In modern times the word has been variously applied, and seems to assume quite a distinct meaning as employed by different authors. With the Germans, metaphysics is a science purely speculative, which soars beyond the bounds of experience. The objects of this science are supersensual ideas, unattainable by experience, and the difficulty of defining the word lies in the circumstance that the very knowledge of the ideas sought requires some proficiency in the study. Hence to one altogether unacquainted with speculative philosophy it is almost impossible to explain the meaning of the word 'metaphysics' as used in this sense. The very possibility of a science beyond experience has been denied by a great number of philosophers, and many works called metaphysical should rather be termed inquiries into the possibility of metaphysics. Thus Kant's celebrated work, the *Critik der reinen Vernunft*, is a mere inquiry into the possibility of a theoretical science of things beyond experience, which terminates with a denial of such possibility, and hence some modern philosophers have considered Kant as no metaphysician, but as a critic of the mental faculties, whose labours were to be the precursors of a new system of speculation. On the other hand, a work like Spinoza's 'Ethics' is purely metaphysical. He assumes the possibility of his science, and, proceeding from a number of axioms, speculates accordingly. Those who deny the possibility of metaphysics deny even the right to assume any axioms as applicable to a sphere beyond experience; and those who did assume them, as Spinoza, Leibnitz, and Wolf, were called by the Kantians dogmatists, in opposition to their own appellation of critics. The great point to be established prior to metaphysical speculation is the identity, or at least the necessary concurrence, of thought and being. This once established, speculative inquiry may proceed, as the results of logical investigation must in such a case, of course, concur with the nature of being itself; but the sceptics always deny the right of assuming such identity or concurrence, while on the other hand different theories have been adopted to prove them, such as those of harmony between body and spirit,—of the non-being of body altogether, except as an affection of spirit,—of an absolute identity between thought and being, &c. It may be as well to observe that the critical philosophy, which assumes nothing but the 'I' or 'ego,' and the laws of thought (Fichte deducing even the latter from the axiom, 'I am I'), has Descartes for its author, whose 'Cogito, ergo sum,' lies at the basis of most modern systems. [DESCARTES.]

In England, the word metaphysics is usually applied to denote the philosophy of mind, as distinguished from that of matter. This science treats of the association of ideas, memory, and various phenomena of mind; and as it consists merely in collecting facts and making inductions like any other experimental science, its possibility is no more questionable than that of chemistry or electricity. However, Locke's 'Essay on the Human Understanding,' as a denial of any source of knowledge other than experience, may be put at the side of Kant's 'Critik,' as containing inquiries of a similar nature, though the results be different; Berkeley's 'Idealism' may be compared with the 'Wissenschaftslehre' of Fichte, and the common-sense theory of Reid with the views of Jacobi. The philosophy of mind as an experimental science has been chiefly treated by the modern Scotch philosophers.

METASTA'SIO, PIE'TRO, was born at Rome, on the 6th of January, 1698. His father, once an opulent citizen of Assisi, afterwards a soldier, then an amanuensis, and finally a small pastrycook at Rome, was enabled, by the profits of his trade, to place his son at a little grammar-school, where he soon displayed that talent for poetry which so highly distinguished him in after-life. Before he was ten years old, says his biographer, Dr. Burney, he could make verses on any subject, and it was no unusual sight to see his father's porch surrounded in the evening, after school hours, by groups listening to the poesy of a child. During one of these tuneful fits, the celebrated lawyer and critic Gravina happened to pass by, and was forcibly struck by the extraordinary talent displayed by the youthful improvvisatore. He offered the young poet money, which was refused in a manner so firm, yet so polite, that Gravina's admiration of him was increased, and he instantly formed the resolution of adopting him. The father, Felice Trapassi, willingly consented, and the next morning Pietro was consigned to the care of his patron, who changed his name to Metastasio (Μετάστασις, *mutatio*, a changing), a term expressing his situation by adoption.

Gravina immediately determined to educate his charge for the profession of the law, wishing rather that he should become an orator than a poet, well knowing that the former profession leads to fortune, and the latter, most commonly, to empty fame. He nevertheless caused him to study the antient poets, in which pursuit his ardour and success were so great, that at the early age of fourteen he produced his tragedy *Giustino*, written after the Greek models. His patron now not only allowed but encouraged his devotion to the muses; and when Metastasio had reached his eighteenth year, Gravina accompanied him to Naples, that he might meet and sing with the most eminent improvvisatori of the day. He became a universal favourite. The harmony of his verse, the grace and dignity of his elocution, and the expressiveness of his countenance, were the topics of all conversations. Still he continued to study the law; and, to secure an opening into the only other road to preferment, entered into a minor order of priesthood.

Within two years after his arrival at Naples, his patron died, and Metastasio mourned his loss like an affectionate son. By Gravina's will he became sole possessor of all his property, consisting of 15,000 crowns, a fine library, and a little estate in the kingdom of Naples. But such was the generosity, not to call it by a harsher name, of the poet's disposition, that, in the short space of two years, all that remained to him of this property was the small landed estate. He now applied to the law, and during a whole year was most assiduous in his studies under Paglietti, a mortal enemy to the muses. But at the end of that time he was again attracted to his poetic pursuits, and produced an *Epithalamium*, at the request of the Countess of Althau, who likewise prevailed on him to write the drama *Endimione*. Under the patronage of the viceroy of Naples, he next produced *Gli Orti Esperidi* (*the Gardens of the Hesperides*), and then *Angelica*, the plot from Ariosto. The former of the two was most successful, and especially admired by Signora Bulgarini, better known as *the Romanina*. She was the first singer of her day, and performed the part of *Venus* in the favoured opera. Such were her admiration and esteem for the author, that she persuaded him to renounce the law, to take up his abode under her husband's roof, and to dedicate the whole of his energies and time to the muses and to friendship. Feeble was the struggle between Paglietti and the Romanina: he acceded to the tempting proposal, and henceforward

> 'Apollo beat Ma'am Themis hollow.'

His *Didone Abbandonata* was written at the request of his female friend, to whom, it has been surmised, the poet is indebted for some of the finest dramatic incidents. Such was the celebrity of this drama, that it was set by all the great Italian composers of that period, and not only established the author's fame, but brought him a large pecuniary recompense. In 1727 he accompanied the Romanina to Rome, where he produced his *Semiramide*, *Ezio*, *Alessandro nell' Indie*, *Catone in Utica*, and the opera so well known by our English version of it, *Artaserse*. But praise was nearly the whole of the reward he reaped from his labours in the pope's dominions.

In the year 1729 Metastasio received an invitation from the court of Vienna, whither he repaired, and became the successor of Apostolo Zeno, the Imperial laureate. This appointment was rendered more gratifying to him, as it was made on the recommendation of Zeno himself, who had long enjoyed the office, and had written a vast number of lyrical dramas, among which are many of the best that the Italian language can boast. [ZENO.] The stipend assigned to Metastasio was considerable for that time—3000 florins was then a large salary; and other advantages were added. This came rather opportunely, for at Rome he had suffered much from the slenderness of his income, and was often indebted to his friend for assistance. To her, when he left Italy, he entrusted his affairs, and deposited with her a small sum for the temporary support of his father, till he could make an arrangement of a permanent kind. His reception by Charles VI. was most gratifying, and promised everything for the future, a promise not disappointed. During the succeeding three years, his correspondence with his 'inestimable counsellor and friend' amounts almost to an autobiography; but in 1734 he sustained an irreparable loss by her death, who to the last proved the sincerity of her attachment by bequeathing to him, after the decease of her husband, the whole of her property, amounting to 25,000 crowns. Metastasio however, guided in this instance, as he was in every other, by the strictest rules of honour, declined to derive any advantage from the will so generously made in his favour, and immediately transferred to the husband all right to the reversionary property. What may have been the nature of the connection between the poet and Signora Bulgarini (or the Romanina), it is now impossible to say. From Metastasio's letter to the husband on the death of his wife, the sorrow expressed is in a tone of candour which looks as if there had been nothing to conceal or disguise. He says, 'I know not how to begin this letter. The tidings are so intolerable to me on many accounts, that I can devise no means to diminish the acuteness of my sufferings; therefore I trust you will not accuse me of want of feeling if I am unable to suggest to you any consolation for your loss, as I have hitherto been totally unequal to finding any for myself.' At what age the lady died is unknown, but as she was first singer at Genoa in 1712, it is likely that she was much the senior of her friend.

Metastasio's mode of life, from his first settling in Vienna till the moment of his death, was that of a poet and man of letters, who devoted his time and thoughts to the muses, to general literature, and to the conversation of persons more or less connected with his pursuits. In 1733 he produced, among other pieces, *L'Olimpiade*, which the Italians distinguish as *il divino*, and his very popular canzonetta, *La Libertà*. For the emperor's birth-day in 1734 he wrote the noble opera, so well known in every part of Europe, *La Clemenza di Tito*, which was set by the Imperial composer, Caldara, but not a vestige of the music remains. The same drama however was in 1790 chosen by Mozart, whose magic notes have assisted in bestowing on it immortality. It is not unworthy of remark, that though all the poet's operas were set as soon as written, yet not even a single piece of the original music is now known, or, we believe, to be found, except perhaps in the Imperial library of Vienna.

He continued supplying the court with lyric dramas and oratorios, and also employed himself in the production of various detached pieces of poetry, till the year 1740, when the death of the emperor brought on the long and devastating war in Germany, and this led to the closing of the theatre, for which he had so successfully laboured. He now employed his pen in translating into blank-verse the *Ars Poetica* of Horace, together with one of his Satires and Epistles, and Juvenal's third Satire. He likewise wrote notes on the Greek tragedians, and translated a portion of Aristotle's 'Poetic,' adding a very learned, luminous, and ingenious commentary, which appeared in print after his decease. But though his dramatic labours for the Imperial city were suspended, he produced in 1744 *Antigono* for the court of Dresden, and *Ipermestra* in the same year. His health however appears now to have suffered from the anxieties occasioned by the long war, and he entertained serious thoughts of hastening back to Rome; but the return of peace operated on him like a charm; it removed the nervous disease which had hung on him, it restored his wonted tranquillity, and in 1751 he wrote *Il Re Pastore* for the ladies of the Imperial court, by whom it was performed, and the 'bold sentiments on the duty of sovereigns, which he ventured to put into the mouth of one of characters, do equal honour, Dr. Burney remarks, to his Imperial patrons, who could listen to them with pleasure, and to the laureate who had the courage to preach them.' His last drama was *Il Ruggiero*, performed in 1771 at Milan, on the marriage of the archduke Ferdinand.

Of Metastasio's seven sacred dramas, or oratorios, *La Passione*, *La Morte d'Abel*, and *Isacco* are best known; but all of them, Calsabigi justly observes, are as perfect as this kind of composition will allow. Of his cantatas, *La Primavera*, *La Libertà*, and *La Partenza* are admired by all who have any acquaintance with Italian poetry. His occasional short dramatic pieces, sonnets, and other miscellanies are too numerous to be mentioned here; a *catalogue raisonné* of them is given in the work whence we have drawn most of our materials for the foregoing portion of this article. (Dr. Burney's *Memoirs of Metastasio*.)

One of the occupations of the poet when far advanced in years was the preparing corrected copies for the magnificent edition of his works printed at Paris in 1780. This may be considered his last labour. On the first of April, 1782, he was attacked by symptoms of fever, alarming at his age, and on the 12th he expired. His remains were deposited in the church of St. Michael at Vienna. His property, consisting of a well furnished house, carriage, &c., many princely presents, an ample library, and 130,000 florins, he bequeathed to the son of his old friend Signor Martinetz, whose house was his first abode in Germany: but from this sum were to be deducted 20,000 florins for each of the executor's sisters, and 3000 for each of his younger brothers.

The genius of Metastasio, says Arteaga, 'may be compared to the goddess Chloris of the Greeks, who, in flying through the air, scattered roses wherever she went.' He did indeed ornament and cast a fragrance on whatever he touched. His reputation soon obscured that of Apostolo Zeno, W. Schlegel observes, because, having the same object in view, he showed more flexible talent, and knew better how to adapt himself to the views and means of the composer. A perfect purity of diction, adds the same acute critic, a grace and unalloyed delicacy, have rendered Metastasio, in the eyes of his countrymen, a classic author, the Racine of Italy. He has above all a ravishing softness in his verses designed for music. Perhaps no poet ever possessed in the same degree the gift of compressing in a short space situations so pathetic, so touching. It is said of him, by Schlegel, that in order not to endanger his originality, he carefully abstained from reading the chefs-d'œuvre of the French stage. However this may be, we will add, that in all his works it is clear that he was no imitator: his style, his chasteness, his tenderness, were his own. In deep tragedy he could not excel; he had not the power to wring the heart; his life was too serene, he was too happy in himself to imagine scenes of bitter anguish, of complicated misery; but in depicting gentle grief, that grief which does not pass the confines of reason, he has no superior. He has been described as, *par excellence*, the poet of love, but his most passionate expressions never are sullied by the slightest breathing of indelicacy. His morality is unimpeachable, is exemplary. In all his works he stands high; in his operas he is unrivalled.

METATARSUS. [Skeleton.]

METELLI, a distinguished family of the Cæcilian *gens* in antient Rome. Those most worthy of notice are—

1. Q. Cæcilius Metellus Macedonicus, who was sent when prætor (B.C. 148) into Macedonia against Andriscus, who pretended to be a son of Perseus, the last king of Macedonia, and who had excited a revolt against the Romans. In this war Andriscus was defeated and taken prisoner by Metellus. (Liv., *Epit.*, 50; Paus., vii. 13, 1; Eutrop., iv. 13.)

In B.C. 146, Metellus defeated the Achæans near Thermopylæ, and on his return to Rome obtained a triumph on account of his conquest of Macedonia. (Liv., *Epit.*, 52.) Metellus, in his consulship, B.C. 143, was sent into Spain to oppose Viriathus, who had obtained possession of the whole of Lusitania, and had defeated successively the prætors Vetilius and Plautius. Metellus remained in Spain two years, and obtained several victories, but was succeeded in the command, before the conclusion of the war, by Q. Pompeius. (Liv., *Epit.*, 52, 53; Val. Max., iii. 2, 21; vii. 4, 5; ix. 3, 7; Appian, *Iber.*, 76; Eutrop., iv. 16.)

During the censorship of Metellus and Q. Pompeius, B.C. 131, it was decreed that all citizens should be obliged to marry. The oration which Metellus delivered on this subject was extant in the time of Livy, and is referred to by Suetonius (Liv., *Epit.*, 59; Suet., *Octav.*, 89.) We are told by Livy and Pliny that when Metellus was returning one day from the Campus Martius, he was seized by command of C. Attinius Labeo, a tribune of the plebs, whom he had in his censorship expelled from the senate, and dragged to the Tarpeian rock; and that it was with the greatest difficulty that his friends were enabled to preserve his life by obtaining another tribune to put his veto upon the order of Attinius. (Liv., *Epit.*, 59; Plin., *Hist. Nat.*, vii. 45.)

Pliny refers to Metellus as an extraordinary example of human happiness. 'For besides the possession of the highest dignities,' says Pliny, 'and having obtained a surname from the conquest of Macedonia, he was carried to the funeral pile by four sons, of whom one had been prætor, three had been consuls, two had enjoyed a triumph, and one had been censor.' (*Hist. Nat.*, vii. 45.)

2. Quintus Cæcilius Metellus Numidicus derived his latter *cognomen* or surname from his victories in Numidia, whither he was sent in his consulship, B.C. 109, in order to oppose Jugurtha. He remained in Numidia, B.C. 108, as proconsul; but in the beginning of the following year he was superseded in the command by Marius, who had formerly been his *legatus*, or lieutenant-general. On his return to Rome, Metullus obtained the honour of a triumph. (Sallust, *Bell. Jugurth.*; Vell., ii. 11; Eutrop., iv. 27; Liv., *Ep.*, 65.) [Jugurtha.]

Metellus was censor B.C. 102. He took an active part in the civil commotions of his time, and was one of the most powerful supporters of the aristocratical party. In B.C. 100 he was obliged to go into exile in consequence of opposing the measures of the tribune Saturninus; but on the execution of the latter, Metellus was recalled from exile in the following year. [Marius.]

3. Q. Cæcilius Metellus Pius, son of Numidicus, belonged to the same political party as his father, and supported Sulla in his contest with Marius. Metellus received especial marks of favour from Sulla, and was consul with him, B.C. 80. In B.C. 78 Metellus was sent against Sertorius in Spain, where he appears to have remained till the conclusion of the war, in B.C. 72. From the year 76 Pompey was his colleague in the command; and they triumphed together at the end of the war. [Sertorius.] (Vell., ii. 30; Eutrop., vi. 5; Plut., *Pomp.*) Metellus was Pontifex Maximus; and on his death, B.C. 63, in the consulship of Cicero, he was succeeded in that dignity by Julius Cæsar.

METEMPSYCHO'SIS (μετεμψύχωσις), derived from a Greek word signifying the passage or transmigration of souls, forms a part of the philosophical or religious belief of many nations. The Hindus believe that the souls of men pass after death into different bodies, either of men or animals, unless an individual has lived a most holy and religious life; in which case his soul is absorbed into the divine essence. 'The soul passes from one state to another invested with a subtile frame consisting of elementary particles, the seed or rudiment of a grosser body. Departing from that which it occupied, it ascends to the moon, where, clothed with an aqueous form, it experiences the recompense of its works; and whence it returns to occupy a new body with resulting influence of its former deeds. But he who has attained the true knowledge of God does not pass through the same stages of retreat, but proceeds directly to reunion with the Supreme Being, with which he is identified, as a river at its confluence with the sea merges therein altogether. His vital faculties and the elements of which his body consists are absorbed completely and absolutely; both name and form cease; and he becomes immortal without parts or members.'

('Extracts from the *Brahma-sûtras*, or Aphorisms on the Vedanta doctrine, by Bâdarâyana,' translated by Mr. Colebrooke, in *Trans. of the Roy. As. Soc.*, vol. ii.)

The migration of souls from one body to another also formed, as is well known, a leading feature of the Pythagorean doctrine, and seems also to have been maintained by Plato, although there is considerable difficulty in ascertaining the opinions of Plato on this subject. This doctrine was also a part of the Egyptian religious system. The Egyptians, says Herodotus (ii. 123), are the first who believed in the immortality of the soul. As soon as the body begins to decay, the soul passes from one animal to another; and when it has passed through the forms of all animals, terrestrial, aquatic, and winged, it again enters a human form. This period of transmigration is completed in 3000 years. Some of the Greeks, he adds, both in early times and more recently, have maintained this doctrine and claimed it as their own; and though he could mention names, he declines to do so.

METEOROLOGY, in its extended sense, embraces all physical causes which affect the state of the atmosphere or are affected by it. Hence it is connected with the phenomena of heat and cold, dew, rain, hail and snow, clouds, winds, auroræ boreales, haloes, parhelia, &c. The sense in which Aristotle (Μετεωρολογικά, i.) uses the term is still more extensive, comprehending, in addition to what are now called meteors, every affection (πάθος) common to the air and water, with the characters of the different parts of the earth, and their affections, as winds and earthquakes, and everything incident to such kinds of motion.

Our first inquiry shall be, what is the nature and what the probable extent of the terrestrial atmosphere? Essential as it is both to animal and vegetable life, to the distribution of heat, and to various modifications of light, the knowledge of its nature and composition is eminently useful. The air, though composed of several elastic fluids, obeys the same laws to which they are individually subject, namely, its elasticity and density at a given temperature are proportional to the pressure which it sustains, and for every degree of the centigrade thermometer under a given pressure it expands $\frac{3}{800}$ of its volume at the temperature zero. Hence if its density be represented by δ and its temperature by t (in centigrade degrees), its elastic force will be proportional to $(1+\alpha t) . \delta$ (where α represents the decimal ·00375) as well as the pressure sustained. Lastly, the pressure is equal to the weight of a vertical column of atmosphere, having the portion pressed on as a base, and extending upwards to its extreme limit.

According to Dalton's views, the various constituent gases constituting the air are not chemically combined by the law of definite proportions, but only mechanically mixed, co-existing in the same space, and producing by the sum of their independent pressures the elevation of the mercury in the barometric tube: an ingenious theory, which however appears open to objections from the known laws of the specific gravities of fluids.

We have seen that heat increases the elastic power of air, and hence the equilibrium of a mass of air unequally heated is constantly disturbed. The currents of warm and cold air change places, the cold air moving to the warm region, and thence, when warmed, repeating the course of the previous warm air. Thus the atmosphere is a great agent in *tending* to equalise the mean temperatures of climates in various latitudes. Besides, the aërial currents are vehicles for the transfer of clouds, for producing electrical discharges, for clearing away malaria, and are turned by the ingenuity of man to promote his industry and extend his knowledge of the globe which he inhabits.

The atmosphere, considered as a transparent medium, has also great effects on light by its refractive power, and the reflection of the aqueous masses it contains. Hence arises twilight, which mitigates the transition of day to night, and from the duration of which it is easy for the astronomer to compute that altitude of the atmosphere at which it ceases to act sensibly on light, either from its total absence or extreme tenuity. This altitude is from forty to fifty miles above the level of the sea. Again, by the refractive power of the atmosphere distant terrestrial objects are elevated to the view when the spherical curvature of the earth would otherwise have caused their concealment; various optical illusions, as the mirage, fata morgana, &c., are all easily explained from the same refractive power under peculiar circumstances of temperature. By this medium sound is conveyed and odours are disseminated; the clouds which float in it soften the direct glare of the solar beams, and its aqueous particles, fluid or frozen, produce the beautiful phenomena of halos, rainbows, false suns, &c. Its greater specific gravity elevates the balloon, by means of which the nature of the upper strata of the air may be ascertained, and the barometric elevation and temperature observed, which furnish data for calculating the physical limits of the atmosphere.

With regard to the extent of the atmosphere, we may consider it under two points of view: first, the extreme limits to which it is possible for it to extend, considered mathematically as a mass rotating round the terrestrial axis in the same time; secondly, the much narrower physical limits founded on its nature as an elastic fluid, and having regard to the great diminution of temperature at high altitudes.

Any particle of the revolving atmosphere is acted on by two forces, namely, gravity, which is directed nearly to the centre of the earth, and the centrifugal force produced by rotation, which is directed according to the line by which that point is orthographically projected on the earth's axis, and tends directly from that axis. The former force varies inversely as the square of the distance from the earth's centre; the latter, directly as its perpendicular distance from the earth's axis. At any point taken in the external surface of the atmosphere, the resultant arising from both forces must be normal to that surface, in order that its form may be permanent. At the terrestrial equator the ratio of these two forces is known; as we ascend in the atmosphere along an equatorial radius produced, gravity diminishes and centrifugal force increases, both in this instance being directly opposite: hence it is easy to calculate the distance of a point in that radius where the two forces are exactly equal. Beyond that point the centrifugal force predominates, and no particle there situated could remain attached to our atmosphere, revolving with the earth both in its diurnal and orbital motions.

The above point therefore defines the extreme limit to which it is *possible* for our atmosphere to extend, and which is at a distance of about 25,000 miles from the centre, though it by no means follows that it must extend so far. Other data would be necessary to give the actual extent; for instance, the height of the barometer at the surface of the sea, and the law of the diminution of temperature in the upper strata of the air. The figure of the extreme surface can however be determined from these considerations, which is that of an oblate spheroid flattened at the poles, and in which the polar axis is to the equatorial in the ratio of 2 to 3.

As the phenomenon of twilight indicates an extreme degree of rarefaction in the atmosphere at an inconsiderable altitude above the earth's surface, we shall now consider some of the physical causes which demonstrate that the actual limits of that fluid are much more contracted than the extreme possible limits given above.

Representing by p, δ, and t respectively, the pressure, density, and temperature of the air at the surface of the earth, and by p', δ', and t', like quantities for a portion of air at a certain elevation, it follows from the general laws of gaseous bodies that $\frac{p'}{p} = \frac{(1+\beta t')\ \delta'}{(1+\beta t)\ \delta}$, where β represents the fraction $\frac{3}{800}$. Now the pressure measures the elastic force of the aërial particles: this elasticity cannot become negative, and ceases to exist when $p' = 0$, which may happen either because $(1+\beta t') = 0$, or $\delta' = 0$. This last supposition would bring us to the consideration of the mathematical limits above treated on; the former, to the physical limits depending on the decrease of temperature at high altitudes. hence the air ceases to be an elastic fluid when $t' = -\frac{1}{\beta} = -\frac{800}{3} = -266\frac{2}{3}°$ centigrade. Now the law of the decrement of heat in the atmosphere proceeds in a progression quicker than an arithmetical, and as the plane of perpetual snow is at a comparatively small altitude in climates of mean temperature, it is easy to see that from 100 to 200 miles altitude would be sufficient to diminish the temperature to the above number of 266° below zero. Even if the simple law $p = (1+\beta t)\ \delta$ was not strictly rigorous at such low temperatures as $-266°$ centigrade, still a diminution of temperature for a given density would produce a diminution of elasticity, and scarcely interfere with the general conclusion arrived at from that law.

But even limits thus obtained would, in all probability, be still too extensive, for it is not necessary that the elasticity should be totally destroyed: it is sufficient that the repulsive power of two contiguous particles of air at that altitude shall be less than the force of gravity, and if these two forces are equal, it will be the extreme extent at which the air can remain attached to the globe, leaving out of consideration the centrifugal force, which at that altitude is inconsiderable, and which would itself tend to remove those particles. Hence the limits become still more contracted by this consideration, and it will not be necessary that the temperature should be as low as $-266°$.

Some have imagined that planetary atmospheres are due to the attraction of the masses of the planets on a rare elastic fluid disseminated through space, but this supposition will not bear investigation; for putting aside the consideration of the extreme cold of the planetary spaces, this hypothesis is not corroborated by the dimensions of the atmospheres of the sun and planets, which would then depend on their masses, and the present total disappearance of the satellites of Jupiter behind their primary would be converted into an annular appearance round his body at the time of the eclipse of a satellite.

We have seen that the unequal distribution of heat in the atmosphere is a main source of the velocities and directions of winds, and consequently of the distribution of climate; but on the other hand, the earth itself, having its own distribution of heat, reacts on the atmosphere and produces dew, hoar-frost, &c. In like manner the sea and the Polar fields of ice materially affect the general distribution of heat.

The general causes of the temperature of the globe are the proper heat of the earth and the radiation of the sun; their effects however are greatly modified by various local circumstances, such as the vicinity of seas or mountains, and the radiating power of the soil, together with the conducting powers of the strata subjacent to the particular places, with other causes less permanent.

With respect to the proper heat of the earth, we observe in any latitude that at a depth which is small compared with the radius of the globe, the temperature is permanent throughout the year, the effects of solar radiation being confined to a superficial stratum of inconsiderable thickness. This fact has been fully established by long continued observations in the cellars of the Observatory at Paris, and by observations in the mines of Cornwall, in Scotland and other countries. If this stratum be supposed to be stripped off, the internal nucleus may be considered as nearly a spherical mass, arrived at a permanent state of temperature in each part, and subject at its external surface to a given distribution of heat, or to a given power of exterior conductibility. The depth at which this permanence of temperature occurs is different in different latitudes, inasmuch as the solar action on the superior stratum is also different on account of the greater or less obliquity of its rays, and likewise on account of the earth's elliptic annual motion. Thus we have the following observed relations between the permanent temperatures and the corresponding latitudes:—

	Lat.	Permanent temperatures
Equator . .	0° . .	78°
Cairo . .	30°.2 . .	72°.50
Paris . .	48°.50 . .	53°.60
Berlin . .	52°.40 . .	49°.28
Vadso . .	70° . .	36°.

The analytical equation for the propagation of heat in solids of any form, is—

$$\frac{dv}{dt} = \mathrm{K}\left\{\frac{d^2v}{dx^2} + \frac{d^2v}{dy^2} + \frac{d^2v}{dz^2}\right\},$$

where v represents the temperature at a point of which the rectangular co-ordinates are x, y, z, and the constant K depends on the interior conducting power, and t is the time. In the case of a sphere with a radius R, we may place the origin of co-ordinates at the centre, and transforming the above from rectangular to polar co-ordinates (viz. r, the distance from the centre, θ the angle formed by the radius vector with an axis, and ϕ the inclination of the plane of θ to one of the co-ordinate planes, the angles necessarily disappear from the transformed equation, and) it becomes

$$\frac{dv}{dt} = \mathrm{K}\left\{\frac{d^2v}{dr^2} + \frac{2}{r}\cdot\frac{dv}{dr}\right\},$$

on the supposition that the exterior permanent temperatures were uniform; to which we must annex the following equation for the surface, $\frac{dv}{dr} + h\,(v - a) = 0$, where a represents the temperature of the medium in contact with the globe, and h the index of exterior conductibility of the globe. But in the case of the earth both K and h are variable, and the former must then be brought under the sign of differentiation. After there shall have been a greater number of observations on the permanent interior temperatures of the earth, the above equations will be very useful in enabling us to calculate the temperatures at depths under the surface greater than it is probable man can ever penetrate, and they will assist in the explanation of the numerous phenomena which depend on the internal heat of various parts of the globe, as volcanoes, thermal springs, &c. Regarding the interior parts which are sufficiently remote from the surface as in a state of permanent temperature, we should have $\frac{dv}{dt} = 0$; when the preceding equations admit of easy integration on the supposition that K is constant, and of approximate solutions on a probable form of the function K when variable.

With respect to the heat of the external stratum, it is principally dependent on the radiation of the sun, the effect of which depends on the duration and the obliquity of the solar rays, both of which are dependent on the declination of the sun and the latitude of the place. The integral taken throughout the year depends therefore solely on the latitude: from this integral the calculated mean temperature is derived, but differs in most cases from the observed inasmuch as the propagation of heat in the sea and in the air affects unequally those places in the same parallel which are near to or distant from the coasts, and the unequal quantity of continent in the northern and southern hemispheres produces a similar result with respect to them.

The direct heat of the sun being unequally distributed over different parts of the globe is the primary cause of the variation of climate; the effect of its rays is felt to a considerable depth in the sea, but its diurnal action on land is sensible only for a few inches in depth; the annual action however extends throughout the superior stratum of variable temperature above mentioned. The mean temperature of a place is generally estimated by taking the average of the diurnal temperatures during the four seasons of the year, and again taking the average of these four averages.

As there is a great variety of temperature in the same parallel of latitude, we cannot have a formula dependent only on this element to express the heat of places on continents, but in the sea there is much greater uniformity in this respect. The first approximate formula to that effect which deserves the name, is that given by Mayer, the celebrated astronomer; though empirical, it is found to possess considerable exactness. If t be the mean temperature in degrees of Fahrenheit's thermometer, he makes $t = 84 - 52 \sin^2 \mathrm{L}$, where L is the latitude of the place. The supposed facts which evidently suggested this formula were the equatorial mean temperature of 84°, which is now generally supposed to be too high; the Polar mean temperature of 32°, or the freezing point, which, from the recent observations of Parry, Scoresby, &c., is now known to be far too great; and thirdly, that the diminution of heat from the equator to the poles must proceed according to some even power of the latitude in order to amount to the same quantity in equal latitudes north and south, for which reason he chose the least even positive power of the sine. However, since the quantity of land in the northern hemisphere is about three times as great as in the southern, the solar heat accumulates more in the former, and in the latter is more equable between winter and summer. Dr. Brewster has substituted for Mayer's the formula $t = 81°\cdot50 \cos \mathrm{L}$, which bears an exceedingly good comparison with observations, but for the reasons above given he has found it necessary to modify it for the New World. Mr. Atkinson has shown that the mean of the errors of Mayer's and Brewster's formulæ for ten places nearly on the level of the sea are respectively $+ 1°\cdot72$ and $- \cdot12$. The temperatures of April and October are generally nearly the mean of the year, which also is found to vary but little in a considerable succession of years. If T be the mean temperature at an altitude h in feet, in a given place where t is the temperature of the surface, to express T, Mr. Atkinson has proposed the formula $\mathrm{T} = t - \dfrac{h}{251 + \dfrac{h}{200}}$, giving for the extreme asmospheric cold the temperature − 200°, which is probably near the truth.

The names of Isotheral, Isocheimal, and Isothermal lines have been given to lines passing through places which have equal mean summer, winter, or annual temperatures, the two former having contrary courses, and the third intermediate. The difference of latitude between places in the New and Old Worlds, on the same isothermal line, is considerable, as appears from the following table:—

Isothermal line of Temperature.	Places.	Latitude.	Longitude.
32°	Near Uleo, Lapland, and .	67° .	20° E.
	Table Bay, Labrador .	54° .	58° W.
41°	Stockholm . . . and	60° .	18° E.
	St. George's Bay, Newfoundland . .	48° .	59° W.
50°	Belgium . . . and	51° .	2° E.
	Boston, U. S. . .	42½° .	71° W.
59°	Near Rome . . . and	43° .	11⅓° E.
	Raleigh, N. Carolina .	36° .	76½° W.

or we may average according to latitude thus:—

Latitude.	Mean Temperature of West of Old World.	Mean Temperature of East of New World.
30° .	70·52 .	66·92
40° .	63·14 .	54·50
50° .	50·90 .	37·94
60° .	40·64 .	23·72

The mean temperature in the latitude of 34° in different continents, and at places near the sea, is found to vary but little, thus:—

Places.	Continents.	Latitudes.	Temperature.
Cape of Good Hope	Africa	33° 51′	66°·7
Port Jackson, N. Holland	Australia	33° 53′	66°·9
City of Buenos Ayres	America	34° 36′	67°·5

The sea varies in temperature much less than the air; the region of warmest water extends about 5½° on each side of the equator, but rather farther to the south than to the north; there appear to be two points of greatest cold near the North pole, attributable to the different propagation of heat in the New and Old Worlds above remarked. Dr. Brewster supposes them to be about 80° of lat., and situated in 95° E. and 100° W. long.; the temperature at these points appears to be decidedly below zero of Fahrenheit.

The production of winds in the atmosphere, we have already stated, is mainly attributable to the unequal distribution of heat in the atmosphere. The attractive action of the sun and moon on that fluid, though producing atmospheric tides, which have been recognised by barometrical observations, could only produce a tropical wind with a velocity of 4 miles per day, which would be evidently inappreciable amongst the numerous disturbances arising from temperature; but the heating action of the sun in tropical climates produces some well-known winds in the following manner.

On account of the annual accumulation of heat from the solar rays between the tropics, two currents of air from the north and south rush forward to occupy the place of the rarefied air of this region. Now since the earth in its diurnal rotation moves from west to east, these currents appear to deflect to the west on account of the increased velocity of the parallels of latitude near the equator, which have greater radii than the arctic parallels, the apparent excess of motion towards the west being the excess of the space described in rotation by the equinoctial above that described by the tropical and even polar circles; the velocities perpendicular to the equator, being nearly equal and contrary, produce no sensible wind, but those parallel to it produce a wind directly west and enduring, called the 'trade-wind,' with this exception, that the northern hemisphere being the warmer, the resultant is a few degrees north of the equator, crossing the Atlantic from Africa to Brazil, and the Pacific from Panama to the Philippine Isles, and the Indian seas from Sumatra to Zanguebar. But when the continents stretch into the torrid zone, the local accumulation of heat being great, two opposite periodical winds, known by the name of *monsoons*, are produced, approaching the north tropic in summer, and the south in winter, and blowing in the Arabian and Indian seas north-west from April to October, and in the contrary direction during the rest of the year: the reverse occurs south of the equator.

Now as the cold air rushes into the tropical regions, expelling the warm air of that locality between 28° on each side, the latter forms a countercurrent, still possessing equatorial velocity, and produces in both hemispheres exceeding the above latitude a westerly and genial breeze, which is felt during three-quarters of the year from Newfoundland to the west of England, and from South America to the Cape of Good Hope. On the same principle the easterly, or rather north-easterly winds originate in the polar currents, and are piercingly cold in general. The great radiation of arid plains produces many local winds, such as the sirocco from Africa to Italy, and the destructive simoom of Arabia, &c., but they do not depend on general atmospheric causes.

The meteors so frequently visible in summer and in frosty weather have not yet received a satisfactory explanation, that most generally received being the existence of inflammable gases in the atmosphere: this undoubtedly is the case in the *ignis fatuus*, which, as the writer has witnessed, will change the direction of its motion by the slight current of air produced by a person walking towards it; but we are not yet able to test with great accuracy the gaseous matters which may occupy the higher regions of the atmosphere. The asteroids of November, so well described by Sir W. Herschel, have in all probability an origin independent of the atmosphere, from the regularity of their appearance about the 18th of that month, but having now become subjects of curiosity and very general observation, we may hope ere long to learn something more precise of their nature, and to take another opportunity of noticing them more at length.

Among subjects connected with meteorology which are treated in separate articles, we may notice CLOUD, DEW, AEROLITE, AIR, BAROMETER, THERMOMETER, HYGROMETER, MIST, &c., to which articles the reader is referred.

METHODISM, a very memorable word in the English vocabulary, as the thing signified is also very memorable in the history of the Christian church, and especially of that part of it which consists of inhabitants of the British Isles.

The people of England have been described by foreign writers as being beyond all other nations *religiosissimi*, or very strongly devoted to religious thoughts and exercises. The success of Christianity on its introduction into this island is one proof of it; but still more is the great encouragement given to the religious orders and the multitude of churches which were erected in the very earliest periods. A few centuries later, we have the proof which is afforded by the great encouragement which the different orders of friars received, who were a species of Methodist preachers of the middle ages. Again, when the system of Christian instruction and edification as settled by authority was in complete operation, there were for ever arising large and powerful bodies of people who pressed for something more exciting, greater freedom, greater holiness, or greater labour in the ministers, each distinguished by its own peculiarities, but all exhibiting that part of the national character to which we have adverted, the being *religiosissimi*, being men deeply impressed with the important truths of religion, and earnest in the desire to please God, and make their own calling and election sure.

Each century seems to have had its schism arising in this national characteristic. In the fifteenth there were the *Lollards*, who were easily put down by the Church; in the sixteenth, the *Gospellers*, who, having the court with them, brought about the Reformation: in the seventeenth, the *Puritans*, who were for a short time triumphant, but who were finally reduced to the several denominations of dissenters still existing, the *Presbyterian*, the *Independent*, the *Baptist*, and the *Quakers*. In the eighteenth century, when not only the Church but the several dissenting bodies were thought by many to have lost much of the spirit and fervour of religion, there arose the *Methodists*, who, being allowed to proceed unmolested, have produced, without having attempted to overturn the Church, no small change in it, in modifying its ministrations, in calling back attention to the supposed doctrines of its founders, and in rousing its ministers to more strenuous exertions.

Methodism then designates the great English schism of the eighteenth century, differing little in essence from the Puritanism of the century before. In both cases it was the desire of services of a more exciting character than were presented by ministers such as then were the ministers of the Christian religion in England, and the desire of a greater admixture of doctrinal matter in the instruction which was delivered from the pulpit. *Evangelicalism* is a kind of form of Methodism, but is perhaps sufficiently distinguished from it to be regarded as the manifestation of the extreme of religious feeling in the nineteenth century. The chief difference between Puritanism and Methodism lies in this: that the Puritans had within their body a much larger proportion of persons of rank and opulence, and that they never contemplated the attainment of their object by the introduction of an illiterate ministry. In the Methodists of the last century were found not many great, not many noble, and the instruments of the propagation of Methodism were, with very few exceptions, persons taken from the lower classes of society, men without learning or attainment, and supposed to be qualified for the work chiefly by possessing qualities which are indeed truly valuable in a Christian teacher, zeal for the promotion of holiness and virtue, and a familiarity with the letter of the Word of God. The Huntingdon family, in the female portions of it, took it under their patronage, and there were two or three other ladies of rank who attached themselves to the Countess of Huntingdon, and encouraged the labours of the Methodist preachers. But it was not till the present century that Methodism, if we may regard it as identical with Evangelicalism, obtained the countenance of many persons high in rank. This change is chiefly to be attributed to two persons, the late Mr. Wilberforce and the late Mrs. Hannah More, who were Methodists in one sense of the term, but not in the other and more common sense of it; that is, they continued in the Church pleading for greater strictness of life and greater zeal in the ministry, more energetic preaching of what they regarded the distinguishing doctrines of the gospel, and more assiduous labour in the clergy; but not, like Lady

Huntingdon, forming societies and placing pastors over them, who were to be dissenters, and not comprehended in any way within the pale of the Established Church.

It is interesting to observe the various forms in which Methodism is presented. We see it in the Church of England in the character of those ministers and congregations which are called Evangelical; we see it in a large body of dissenters now calling themselves Independent or Congregational; and we see it more strikingly in the various sects which are called the Methodist sects, and which are in fact so many different classes of persons who collectively are called Methodists. There are:—1, the Wesleyan Methodists; 2, the Methodists of Lady Huntingdon's Connection; 3, the Methodists of the New Connection; 4, the Primitive Methodists; 5, the Bible Christians; 6, Protestant Methodists; 7, Association Methodists; 8, the Inghamites. There is also a large body of persons, chiefly in Wales, calling themselves Calvinistic Methodists, who are not included in what is called Lady Huntingdon's Connection.

The year 1729 is considered as the time at which Methodism begun. John Wesley, who is universally considered as the founder, was at that time residing at Oxford, being a member of that university. A brother, whose name was Charles, was residing at Oxford at the same time, and there were a few other young men who, like them, were intended for the ministry in the Church, who formed a little association for their common spiritual and religious improvement. They were soon remarked for a greater strictness of life and for wearing more of the form of religion than was then usual at Oxford. It is said that these persons very soon got the name of Methodists, arising out of a casual observation of a member of Merton College, who said, 'Here's a new sect of Methodists sprung up;' but to what set of persons in ecclesiastical or other history he referred is not quite settled. The name, it is manifest, is a very absurd one.

The Wesleys were sons of a country clergyman who resided on his living at Epworth in Lincolnshire, a part of the kingdom where at that time the inhabitants were singularly rude and uninformed. It has not been remarked by the writers of the life of Wesley that his father was educated for the ministry among the dissenters, but conformed to the Church early in life. It is not intended in this article to give a biographical notice of the founder of Methodism. This will be given in its more appropriate place. [Wesley.] Under the word Whitefield will also be found a notice of George Whitefield, another student at Oxford, who joined the Wesleys in 1732, and who had a large share with them in laying the foundation of Methodism. It may suffice for the present to say that the Wesleys and Whitefield, instead of following the usual course of clergymen, in settling down on livings, after studying in the university, undertook the wider duty of rousing their countrymen generally to a higher tone of devotional feeling, and to a regard to the doctrines of the Church, to which there was then, owing in a great measure to the writings of such men as the Latitudinarian divines originally, and, after them, of Locke, Addison, Burnet, Hoadly, Clarke, Whiston, Peirce, and others, a growing indifference: men were beginning to think that the all-in-all in Christianity was the doing justly, loving mercy, and walking humbly, looking for that blessed hope and glorious appearing of our Lord and Saviour Jesus Christ, when every man should receive according to his works. Wesley went forth proclaiming that he came to call men back to *old Church of England principles*. This was his favourite phrase, as appears by many passages in his journals, and this object (at first, at least) was what he himself considered the chief purpose of his mission. What he meant was original sin, regeneration, the atonement by the blood of Christ, the influence of the Spirit, justification by faith, freedom of the will, accountability, and eternal reward or suffering; Whitefield added to these the eternal decrees, the extreme doctrines of Calvinism.

The object of neither of them was to be founders of sects out of the Church, but to produce a change within the Church. It was soon however manifest that their end could not be attained by remaining, even outwardly, conformable to the rules of the Church in regard to its ministers. The doors of the parish churches were soon closed against them, and the meeting-houses of the dissenters were closed likewise. They then preached wherever a congregation could be gathered together, in rooms or in the open air, and preaching with the zeal and energy of Apostles, it was in vain, with a population like the English, to attempt to prevent them from making a deep impression. Such energy of preaching had not been witnessed since the time of the old Puritans. The effect indeed may be described as marvellous. The cry, 'What shall I do to be saved?' was heard from many voices wherever they had an audience; sometimes this cry was accompanied by dreadful shriekings and faintings. The accounts given by friends and enemies are in respect of this the same. Many well-meaning persons regarded it only as a mischievous enthusiasm. By the profane the preachers were not unfrequently assaulted, and their lives placed in jeopardy. But many were soon found ready to assist them in their work, either by forming into societies persons convinced by them, and erecting chapels for their assembling together, or by taking upon themselves the office of preacher, and following in the track which their masters had trod. There were at the same time a few persons who were ministers in the Church, and who did not leave the parishes in which they were settled, who seconded the labours of these men. Such were Fletcher, Sellon, Perronett, Dickinson, Venn, Grimshaw, and others.

Whitefield died early, worn out by his extraordinary exertion. He was the founder of the Calvinistic section of Methodists. But the life of Wesley was prolonged to his eighty-seventh year; and when he died, which was in March, 1791, he had been sixty-five years in the ministry, and fifty-two years an itinerant preacher; he lived also to see in Great Britain and Ireland about three hundred itinerant preachers and a thousand of what are called local preachers 'raised up from the midst of his own people,' and eighty thousand persons in the societies under his care.

Such was the state of this one principal branch of Methodism at the time of Wesley's decease. Some thought that as it had grown with him, it would die with him; but they were mistaken. He had provided (as far as human means go) for its perpetuity by binding up his members in a church, with a frame and constitution as strong as could be given to it by subordination, authority, rules, common interest, and the bond of common property. Thoroughly regardless of accumulating personal wealth, the contributions of the members of his societies, which had long far exceeded the expenses, enabled him to transfer to the body of preachers, in whom, as in an assembly of presbyters, he vested it, whatever interest he had in a multitude of chapels in every part of England, and a large surplus fund; and this property, it is understood, has gone on year by year constantly increasing, notwithstanding the vast exertions which have been made in the erection of chapels, schools, and other buildings, the support of an additional number of preachers, and in missionary exertions among the people not yet Christianized.

It was in the year 1740 that the first Methodist society was formed. It met at a chapel in Moorfields, and it was in 1743 that the rules, which still continue in force, were drawn up for this and other societies, especially those of Bristol and Kingswood, the part of the kingdom in which, at the beginning of his ministry, Wesley had chiefly laboured These rules set forth, that the Methodists are a people who, in addition to the form of Christianity, seek the power of godliness, and manifest it by good works: the societies are united, that by counsel, exhortation, and prayer, they may assist each other in the great work of religion.

We have next to describe the constitution of these societies and of the general union of them, forming the highly important class of Christians called the Wesleyan Methodists.

These societies are divided into classes of ten, twenty, or more persons, and he that is supposed the best qualified by mental and religious excellency, is appointed the leader. His duty is to see his members weekly, to receive the voluntary contributions of his class, and to take the amount to what is termed the 'leader's meeting,' that is, the stated meetings of all the leaders and the society stewards in a certain locality, where the society of the place is represented, and its affairs transacted. The society stewards take the monies from the leaders, pay the ministers their weekly stipend, and take the surplus to the circuit stewards at the quarterly meeting. In the leaders' meetings are stewards for the poor also, who at the direction of the meeting give to the leaders, for their poorer members, whatever funds may be furnished by any society and congregation for that purpose.

A number of these united societies lying around some cen ral town or large chapel is known as a circuit. The villages or chapels in the vicinity of the centre are regularly visited by the ministers at stated times for the purpose of conducting worship, and the discharge of other pastoral duties. In the origin of Methodism these circuits included not merely one county, but sometimes parts of several; but now, owing to the spread of Methodism, the circuits are limited to a diameter of twenty, ten, and in some cases of fewer miles. The societies and congregations in these circuits are committed to the care of the ministers yearly appointed by the Conference; and more especially to one who is termed the superintendant; generally, when compared with his fellow-ministers in the same circuit, he is of the longest standing in the connection, but not always so, as the Conference claims the right of appointing to this office the person whom it judges the most proper. To the superintendant principally the direction of the other ministers is committed, as well as that of the local preachers also, who are men in business and only occasional preachers; and in addition to the above, the superintendant has the care of the leaders, stewards, and, in one sentence, the whole circuit: he is accountable to the Conference for the use of the power committed to him.

About the termination of every quarter, the ministers, circuit-stewards (who are two principal members in the circuit, nominated yearly by the superintendant and chosen by the quarterly meeting), society-stewards from every separate society in the circuit, and other leading friends meet, for the purpose of receiving the respective accounts of the separate societies, and the balances, if any, from the society-stewards, out of which the circuit-stewards pay the quarterly stipends of the preachers, balance all the accounts of the circuit, and determine everything within the province of the quarterly meeting, according to the Statutory Laws of Methodism, which are found in the 'Minutes of Conferences.'

A number of these circuits, as for example the collective number in any county, are united and known as a district. The Conference appoints one of the ministers therein, by ballot, as the chairman; to whose care its Methodistical direction is chiefly committed. In the month of September in every year the superintendants of the circuits in the district, and the circuit-stewards of every circuit, are called together in some central or convenient town, to arrange prospectively the financial affairs of every circuit therein, for the coming Methodistic year; that is to say, the probable amount that the connectional collections will be able to allow to every needy circuit, so that means may be taken to supply from its own resources whatever may be deficient.

In the month of May, the district, as above, is again assembled; the ministers alone the first day, to examine the moral character, Methodistical orthodoxy, and obedience of every minister therein; afterwards, in the presence of the circuit-stewards, they wind up the financial affairs of the circuit for the Methodistic year, which in May has nearly expired. The result is carefully recorded in minutes, which are authoritatively required from every chairman of every district-meeting at the next Conference.

At the May district-meeting, when the circuit-stewards have taken their departure, one of its ministers is chosen by ballot, as its general representative at the coming Conference. Then the meeting determines how many additional ministers belonging to the district shall be allowed to proceed to the Conference. The Conference, strictly and truly, consists only of one hundred preachers, whose names are in the deed that gives it a legal existence, but all the preachers allowed to go from the respective districts are suffered to sit therein, and vote as integral parts thereof. At the assembling of the Conference, one of its first acts is the choosing by ballot the president and secretary, who must be of the hundred, the legal Conference. The business which follows comprises the supplying of the places of those who by death, &c., have been removed, by the hundred, partly by ballot and partly by nomination; the examination of the character of every minister as to his moral conduct, Methodistical orthodoxy, &c.; the examination of the minutes of the several districts; the appointments of the ministers for the coming year. Further, they legislate for and determine the multifarious concerns of the connection.

In Methodism, the members are divided into two great classes, the ministers and the people; and each, if accused, is tried at its separate tribunal, and by its own peers. The members are tried by the leaders' meeting; and the ministers by the ministers only, at a district-meeting. If either the members or ministers are dissatisfied with the decision of their respective judicatories, they may appeal to the Conference the highest court of Methodism.

Methodism furnishes its ministers from the members, who first are known as local preachers, and then nominated at the March quarterly meeting as persons proper to be recommended for examination at the coming May district-meeting by the ministers alone. If the churches in the circuit, by their representatives at the quarterly meeting, recommend the person nominated, he appears before the district-meeting and undergoes an examination as to his personal acquaintance with Christianity, his Methodistic orthodoxy, and attachment to its discipline. If approved and recommended by the district-meeting, his name is brought before the next Conference. If all inquiries here are satisfactorily met, he is either immediately employed as a probationer, in which state he must continue for four years, before he can be admitted into full connection, that is, be ordained and permitted to administer the sacraments, or he may be placed on the list of reserve, and if approved, when again examined by the preachers in the London district, he will be admitted to the Theological Institution, and by training for some two or three years, be prepared for his work.

The doctrinal test of the Methodists is found in certain volumes of Mr. Wesley's Sermons, and his notes on the New Testament. Among the most prominent of these doctrines, next to the being of God, his perfections, and worship, are—original sin, moral impotency, the sufficiency of grace, the atonement, general redemption, justification by faith, the witness and work of the Spirit, entire regeneration, good works as the fruits thereof, eternal life, and everlasting punishment.

The disciplinary test is found in the minutes of Conferences, the statute-books of the Wesleyans. While the ministers appointed by the Conference keep within the above limits, they have a right to the pulpits, and are beyond control. But any departure from the above will give authority to the trustees of any chapel in which un-Methodistical doctrine is preached, to require the chairman of that district to summon the ministers of the district, and the trustees of the circuit in which the supposed transgressor is found, and if at the district meeting so constituted his delinquency is proved, he may be suspended until the next Conference, when the whole case will be reviewed, and finally adjudicated.

While the ministers are irreproachable, the Conference claims the right of appointing them to all the chapels in the connection settled on the Conference plan, and this right is beyond dispute or control; but over the property of the chapels the Conference has no control, except it be the giving or withholding permission to the trustees to sell, when this is craved by them.

The labours of Wesley had not been wholly confined to England. He had made little impression upon Scotland, where the number of members at the time of his decease scarcely exceeded a thousand. But in Ireland he had about fifteen thousand, and in the United States there were about thirty thousand. Since his decease, the prevalence of Wesleyan Methodism in North America has been very great, the number of members reported at the Conference of 1838 being 658,574 under the care of the American conference; and 14,000 under the care of the Wesleyan Methodist church in Upper Canada.

The following table will show the progress made by them in England:—

Year.	Circuits.	Preachers.	Supernumeraries.	Members.
1767	27	76	1	22,642
1777	43	118	—	32,290
1787	69	176	10	49,946
1797	106	272	9	81,451
1807	170	431	37	117,054
1817	297	644	48	190,323
1827	331	715	77	233,581

The number of Scotch members, in 1827, was 3658. In 1838 the number of members in Great Britain was 296,801, which is not half the number reckoned in the United States of America.

The Wesleyan Methodists have established foreign missions at Stockholm; in Germany, France, Gibraltar, and Malta; in Hindustan and Ceylon; in New South Wales, Van Diemen's Land, Newfoundland, and the Friendly Islands; in Africa, in the West Indies, and in British North America. The number of persons reported to the last Conference (1838) as under the care of their foreign missionaries in their various stations was 66,808.

This is to be regarded as the state of only one branch of Methodism, a principal branch undoubtedly, or rather the main branch, but there are the several branches besides of which we have already spoken, each with chapels, preachers, and numerous members, and most of them having some special missionary service for the extension of the knowledge of Christ's Holy Gospel.

Some of them have separated from the main body of Methodists since the death of Mr. Wesley. The respect paid to him has not been so generally transferred to the hundred ministers, in whom he vested the power of managing the affairs of his community, as he probably wished and expected.

In 1793 great dissensions existed about the sacraments, whether they should or should not be administered by the ministers, in the chapels, to the members of the society who required them as a part of Christianity. This led to secessions at Bristol and elsewhere. In 1795 many influential societies chose delegates, and sent them to the Conference then held at Manchester, for the purpose of claiming some share in the government of Methodism. This led to concessions as they may be found in the Plan of Pacification,—the Bill of Rights of the Methodists.

With these concessions many were not satisfied, and, being led principally by the Rev. Alexander Kilham, they seceded and formed the New Connection, a truly respectable body. Mr. Bryant, of the North Cornwall district, was the founder of the Bible Christian Methodists. The Primitive Methodists, who are sometimes known as Ranters, originated in Staffordshire: their professed object is to recall the Wesleyans to the antient spirit and fervor with which their fathers met rude and uncivilised mobs. Dissension in Leeds some ten years since gave birth to the Protestant Methodists, who declared that the Wesleyans had violated their own laws by the erection of an organ in one of the chapels in that town, contrary to the decision of a leaders' meeting. Some four years since, the establishment of the Theological Institution, the expulsion of Dr. Samuel Warren, and contentions on the rights of leaders' meetings, gave existence to the Association Methodists. These are the leading offshoots from the Wesleyan body.

The reader who wishes to see how Methodism appears to a person of an acute and discerning mind, who is not of the body, may consult the 'Life of Wesley,' by Robert Southey, a work in which there is much profound reflection. The work has however found little favour in the eyes of the Methodists themselves; and one of their ministers, the Rev. Richard Watson, has published Observations upon it, in which Dr. Southey is rather severely handled. Other Lives of Wesley there are by Hampson, by Dr. Coke, Dr. Whitehead, Henry Moore, and by the same Mr. Watson. Dr. Adam Clark's 'Memoirs of the Wesley family' is but a poor and tasteless performance. We may mention also a little volume entitled 'A Miniature of Methodism, or a Brief Account of the History, Doctrines, Discipline, and Character of the Methodists,' by Valentine Ward, of which the sixth edition was published in 1834. There is also 'The Portraiture of Methodism,' by Joseph Nightingale, and many histories of the rise and progress of Methodism in particular districts. Those who wish thoroughly to understand Methodism in its genius and true character, to see its defects and its excellences, the difficulties with which it had to contend, and the means by which it triumphed, would do well to read the 'Journal of John Wesley,' published by himself, a piece of autobiography worthy the attention of all, but especially of the philosophic observer of the actions of mankind when under the influence of strong religious excitement, or of an individual, when under a sense of duty, or by whatever impulse, he emancipates himself from those restraints which society has endeavoured to impose (though such endeavours are but vain) upon private judgment in affairs relating to religion, and private religious thought and action.

METHO'DIUS and CYRILLUS, two brothers, the apostles of Christianity among the Slavonians in the eighth century, and the inventors of the Slavonian alphabet, were natives of Salonica or Thessalonica in Greece. Methodius held a high command in the Greek army under the emperor Michael III. Constantine, or according to the monastic name he afterwards assumed, Cyrillus, who had been educated at the court of Constantinople, was in holy orders, and was keeper of the library of Santa Sophia. He was first sent by the emperor as a missionary to convert the Saracens inhabiting the banks of the Euphrates; and about the year 863 he and his brother Methodius proceeded on a religious mission to the Slavonians, at the request of the princes Rotislav, Swiatopolk, and Kozel, who had made application to the court of Constantinople for instructors in the Christian faith. The choice both of the emperor and the clergy fell upon Methodius and Cyrillus, the first being selected on account of his knowledge of the Slavonian, and the other because he was well skilled in many Oriental languages. Whether both brothers had a share in the formation of the Slavonian alphabet is doubtful, some writers attributing it to both of them, others to only one, and of these latter some to Methodius, others again to Cyrillus. They translated the Psalter, the Gospels, and many other parts of the Scriptures into Slavonic. Cyrillus however did not continue there above four years and a half, after which he visited Bulgaria, and next proceeded to Rome, where he died, according to Schlozer in 871; according to others, in 873. Methodius, on the contrary, remained, and continued his labours for about thirty years, in the course of which time he is said to have translated all the Scriptures. None of the original manuscripts are extant, but it is supposed that the Slavonic version adopted by the Greek church is derived immediately from that of Methodius and Cyrillus.

METHO'NE, MODON. [MESSENIA.]

ME'TIUS, ADRIAN, was born at Alkmaar, a town of North Holland, 9th of December, 1571. His father, whose name, according to Lalande, was likewise Adrian, although Montucla calls him Peter, was a military engineer of considerable reputation. His skill contributed greatly to the successful defence of Alkmaar, when besieged by the Spaniards in 1573. It was he also, and not his son, who first gave 355 : 113 as the ratio of the circumference of the circle to its diameter.

From his father young Adrian soon acquired a practical knowledge of the mathematics, which his natural inclinations towards such pursuits enabled him greatly to improve. After studying law and medicine at the university of Franeker, he passed into Germany and Denmark, where he became a pupil of Tycho Brahé. Upon his return to Holland he assisted his father in his professional avocations, until the year 1598, when he was appointed professor of mathematics in the university of Franeker. He retained this appointment until his death, which took place at Franeker, 26th of September, 1635. A considerable part of his fortune was expended in the study of alchemy, but he either ridiculed or disregarded the speculations of astrologers. The following list of his works is given by his friend P. Winsem, in his 'Elogium Adriani Metii,' printed in the 'Memoirs of the Academy of Franeker:'—'Doctrina Sphærica,' Francq., 1598, 8vo.; 'Institutionum Astronomicarum Libri III.' Ibid., 1606, 1608, 8vo.; 'Arithmetica et Geometria Practica,' Ibid., 1611, 4to.; 'De Gemino Usu utriusque Globi, Amst., 1611, 4to.; 'Praxis nova Geometrica per usum circini et regulæ proportionalis,' Francq., 1623, 4to.; 'Calendarium perpetuum articulis Digitorum computandum,' Roterod., 1627, 8vo.; 'Astrolabium,' Francq., 1627, 4to.; 'Opera omnia Astronomica,' Amst., 1633, 4to.

(*Biographie Universelle*; Montucla, *Histoire des Mathém.*; Hutton's *Dictionary*.)

METIUS, JAMES, was a younger brother of the preceding, and the reputed inventor of the refracting telescope. On this point Montucla quotes the following passage from the 'Dioptrics' of Descartes, wherein the latter says, 'It is now about thirty years since this admirable invention was first ascribed to James Metius, a man who had never studied the mathematics, notwithstanding that both his father and brother had made them their profession. This individual, while one day amusing himself with a few burning-glasses, after looking through them singly, began to look through them by pairs, placing one at each extremity of a short tube. In this way a convex and concave lens happening to be employed together, the first refracting telescope is said to have been constructed.' (Montucla, tom. ii., p. 230.) The reputed date of this discovery is the beginning of the seventeenth century.

A somewhat similar story is related of the children of a spectacle-maker of Middelburg, in Zealand. There is however as much or more reason to suppose that the discovery took place in England, more particularly when it is remembered that the satellites of Jupiter were observed in

England by Harriot in 1610. (See the 'History of Optics,' by Mr. Barlow, in the *Encyclopædia Metropolitana.*) Weiss adds (*Biog. Univers.*) that Metius guarded his secret with such extreme caution, that, even when about to die, the priest who attended him could not induce him to divulge it; another story is that he confided the secret reluctantly to Prince Maurice, on an occasion when that prince honoured him with a visit for that especial purpose. We have not been able to find the year in which James Metius was born, or that in which he died.

METON, METONIC CYCLE. The astronomer Meton was living at Athens at the beginning of the 87th Olympiad, B.C. 432. He was, according to some, a Lacedæmonian (λάκων), but the best authorities call him a Leuconian (λευκονιεὺς). All we know which is worth recording here is, that the solstices which he observed with Euctemon are preserved by Ptolemy, and that he was the founder of the celebrated lunar cycle which is still preserved by the Western churches in their computation of Easter.

The Metonic cycle takes its rise as follows: 235 revolutions of the moon are very nearly 19 revolutions of the sun, and one complete revolution of the moon's node. If these approximations were exact, all the relative phenomena of the sun and moon, particularly those of eclipses, would recommence in the same order, at the end of every nineteen years. There is however an error of some hours in every cycle. [CALIPPUS; MOON; PERIOD OF REVOLUTION.]

The first year of the first Metonic period commenced with the summer solstice of the year 432 B.C.; and if the reckoning had been continuous, what is now called the *golden number* of any year would have denoted the year of the Metonic cycle, if the summer solstice had continued to be the commencement of the year. On reckoning however it will be found that A.D. 1, which is made the first year of a period of 19 years, would have been part of the fourteenth and part of the fiftoenth of a Metonic cycle.

METOPE. [BASSO RILIEVO.]

METO'PIA (Ornithology), Mr. Swainson's name for a subgenus of *Pipra*.

METRE (from the Greek *μέτρον, metron*) is that quality of verse by which it is to the ear distinguishable from prose. It is generally held to be one of the essentials of poetry; imaginative thought being the other. No reason can be assigned for this opinion, the truth being that it is attributable only to our nature as men, by which we feel pleasure in rhythmical arrangement of words, and consistently with which we cannot consider imaginative writing as perfect, unless couched in metre.

A distinction has been drawn between antient and modern metres, one being said to depend on quantity, the other on accent; quantity and accent being further supposed to differ in kind. A little reflection however will tend to convince us that delicacy of ear has as much to do with the difference between antient and modern metres as any fancied change from quantity into accent.

The southern nations still retain this delicacy of ear, as we know from the marked difference in Italian between the pronunciation of double and single consonants, a difference to which our language is a stranger as far as *time* is concerned. Though *we* see no distinction in time between the second syllable of the words *laborare* and *liberare*, there is no reason why the Romans should not, and with that assumption the whole difference between accent and quantity vanishes. It would be useless to enumerate the names which have been given to metres. The Greek and Roman metres differ from our own in being more numerous, and in allowing collocations of syllables (called feet) such as we could scarcely feel to be consonant with rhythm. The cause of this difference seems to lie in the form of each language.

Another grand distinction between antient and modern metres is that of rhyme, which occurs but seldom in the former, and which, until the time of Shakspere, was nearly universal in the latter. Antient and modern languages both afford specimens of the alliterative measure. It may be traced in the older Latin writers, and was the distinguishing peculiarity of the Anglo-Saxon verse. 'Piers Plouman's Visions' are the best known compositions of this kind. Those who seek for further information on the subject of English metres, particularly on peculiarities which have occasioned so much difficulty to the readers of Chaucer, will do well to consult Mr. Guest's 'History of English Metres.' Some observations by Coleridge, prefixed to 'Christabel,' are also worth attention.

METRIORHYNCHUS, Dr. Hermann von Meyer's name for a genus of fossil *Gavials*, found, according to him, in the lias, the Oxford clay, at Honfleur, and the Kimme ridge clay at Hâvre.

Example, *Metriorhynchus Geoffroyi* (H. von Meyer); 2nd, *Gavial de Honfleur*, Cuv., 'Oss. Foss.,' v., pl. 2, pp. 143 and 525; *Steneosaurus rostro-minor*, Geoff.

METRONOME (from *μέτρον, measure*, and *νόμος, a division; also, a song*), a very ingenious instrument, a pendulum, the point of supension of which is between the extremities, invented, and introduced about the year 1814, by John Maelzel (civil engineer, and mechanician to the emperor of Austria), for the purpose of determining the movement, *i.e.* the quickness or slowness of musical compositions.

Of the utility of a *time-measurer*, both to composers and performers, and for some account of its early use, see CHRONOMETER.

Of Maelzel's Metronome there are two kinds. The one is a pendulum kept in motion by a spring and wheelwork, and which ticks the vibrations:—the other is also a pendulum, as above described, but without any machinery, and acting only so long as the force of the impulse given shall last. The former, therefore, it will be obvious, is complicated and expensive; the latter is simple and cheap.

The inventor thus describes and explains the manner of using this instrument:—

'1. A sliding weight is attached to the rod (which is graduated) or steel pendulum; the higher up this weight is shifted, the slower will be the vibrations, and *vice versâ;* so that when the weight corresponds with the number 50, the vibrations will be the slowest possible; at No. 160 they will be the quickest.

'2. These numbers have all reference to a *minute of time; i.e.* when the weight is placed at 50, fifty beats or ticks will occur in each minute; when at 60, 60 beats, or seconds exactly, in a minute; when at 100, 100 beats in a minute, &c.; any stop-watch, therefore, will show how far the correctness of the metronome may be depended on.

'3. The doubles of the numbers of the scale answer to a precisely *double* degree of velocity. Thus, if 50 be the proper number for a minim, 100 will be the number for the crotchet *in the same movement*, &c. The numbers omitted on the scale have been found practically unnecessary.

'4. The composer is best able to judge, from the nature of his movement, whether to mark its time by minims, crotchets, quavers, &c. Generally speaking it will be found, that in *adagios* it is most convenient to mark the time on the Metronome by quavers; in *andantes* by crotchets; in *allegros* by minims, and in *prestos* by whole bars. As often however as the case may admit, it is desirable that the pendulum should be made to beat integral parts of a bar, just as a master would beat or count the time.'

Much opposition was made to the use of this excellent instrument, when first introduced; but no sensible composer or performer now entertains a doubt of the usefulness of the Metronome, or of some kind of pendulum answering the same purpose.

METRO'POLIS. [COLONY, vol. vii., p. 359.]

METZ, a city in France, capital of the department of Moselle, situated on the Moselle at the junction of the Seille; 172 miles in a direct line east by north of Paris, or 191 miles by the road through Château-Thierri, Châlons-sur-Marne, and Verdun; in 49° 6′ N. lat. and 6° 12′ E. longitude.

This city existed in the time of the Romans, to whom it was known by the name Divodurum, and was the chief town of the Mediomatrici, one of the Belgic nations. At a later date it took the name of the nation, Mediomatrici, for which, early in the fifth century, was substituted the shorter designation of Mettis or Metis, whence the modern Metz. In the civil dissensions which followed the death of Nero, A.D. 70, Divodurum was nearly destroyed by a sudden outbreak of the troops of Vitellius. (Tacit., *Histor.*, i. 63.) Divodurum was ruined in the invasion of the Huns under Attila, A.D. 452; but afterwards became the capital of Austrasia, which was sometimes termed the kingdom of Metz.

In the division of the Carlovingian empire, Metz was comprehended in the kingdom of Lotharingia or Lorraine.

[Lorraine.] The grants of the emperors to the bishops of Metz, Toul, and Verdun, rendered those prelates feudal lords of their respective dioceses, subject only to the supremacy of the emperor; and this part of Lorraine became known in history as Les Trois Evêchés, 'the three bishoprics.' The city of Metz was however made, by the emperor Otho II., a free Imperial city, with a voice in the diet of the empire, the right of choosing its own magistrates, and of coining money. The city became exceedingly flourishing, being the centre, apparently, of a great inland trade between France and Germany; and in A.D. 1444 was enabled to resist an attack from the combined forces of Charles VII. of France, and René of Anjou, king of Sicily and duke of Lorraine. The attempts to check the progress of the Reformation appear to have occasioned some troubles at Metz; but the principles of the reformers made such progress, that A.D. 1543 they were allowed the free exercise of worship. In the troubles of the empire near the close of the reign of Charles V., Henri II. of France, with whom the German Protestant princes had formed an alliance, entered Lorraine with an army, and was admitted into Metz by the townsmen, A.D. 1552. In the same year the emperor besieged the place with 100,000 men; but the duke of Guise, who commanded the garrison, made so stout a defence, that the emperor was obliged, in Jan., 1553, to raise the siege. From this time the town remained under the protection of France, though the bishops recognised the authority of the emperors, and received their investiture from them. This arrangement lasted until 1633, when the king of France assumed the sovereignty of Les Trois Evêchés, which was confirmed to him by the treaty of Münster, or Westphalia, A.D. 1648. The siege of the town, subsequent dissensions, and the loss of its municipal freedom, caused a decay of trade and population; and at the close of the seventeenth century, the town numbered only 22,000 inhabitants.

In the division of France before the Revolution, Metz, with the rest of Les Trois Evêchés, was included in the province or military government of Lorraine.

The Moselle and the Seille are divided in and near the town into several channels, enclosing small islands, on some of which, as well as on the mainland, the town is built. Metz is a fortress of the first class. [Horn Work.]

There are nine gates with drawbridges. The interior of the town, which is principally in the angle formed by the two rivers, is in general handsome. The streets are wide, straight, and well paved. The square called 'Quartier Coislin,' in the south part of the town, is very handsome, and the esplanade of the citadel affords a pleasant promenade. The square of St. Louis is surrounded with arcades. The houses are for the most part well built. The cathedral is a Gothic building, remarkable for the boldness and lightness of its architecture: its length is estimated at 363 feet (probably French feet, equal to about 387 English feet), and the height of the tower at 373 French, 398 English feet. There are nine other churches, four nunneries, a consistorial Protestant church, and a Jews' synagogue. The Jews had formerly a particular quarter of the town assigned to them, which is still distinguished by its dirty and narrow streets. The most remarkable of the churches are those of St. Simon, Notre Dame, and St. Vincent, the last distinguished by a portal with a triple row of columns. The town-hall, the Palais du Gouvernement, built at a great expense in the reign of Louis XVI., where the courts of law sit, the prefect's office, the theatre, a building of greater external than internal beauty (these two last-named édifices are on an island of the Moselle), the royal college or high school, the military hospital, a vast building, the arsenal, the different barracks, the building for the school and staff of the artillery, the workhouse, and the covered market, lately erected,—are among the public buildings most worthy of notice. There are twenty bridges, ten over the arms of the Moselle, and as many over those of the Seille.

The population of the town has been gradually increasing since the commencement of the eighteenth century. In 1741 it was 30,000; in 1789, 36,000; in 1800, 32,000; in 1814, 41,000; in 1831, 44,416; in 1836, 42,793. The chief branches of manufacture are woollen cloths, flannels, and stuffs, cotton yarn, leather (formerly the staple of the place, diminished by the continuance of war, but now reviving), hats, especially military hats, braid trimmings, and embroidery (in which 1200 people are employed), starch, soap, beer (which is very good), brushes, pencils, iron wares, cutlery, buttons, jewellery, clocks, paper-hangings, and confectionary. There are workshops connected with the arsenal and other military establishments. In the neighbourhood of the town are quarries of good limestone, tile kilns, beet-root sugar-houses, and other industrial establishments. Trade is carried on by means of the Moselle, which is navigable to Nancy, many miles above Metz. High roads communicate with Luxembourg, Namur, and other places in Belgium; with Mainz and Frankfort in Germany; and with Strasbourg, Nancy, and Paris.

Metz is the seat of a bishop's see, the diocese of which comprehends the department of Moselle, and the bishop of which is a suffragan of the archbishop of Besançon. It has a Cour Royale and an Académie Universitaire, the jurisdiction of which embraces the departments of Ardennes and Moselle. Here also are the head-quarters of the third military division, including the departments of Moselle, Meurthe, and Vosges. There are a variety of other government offices, fiscal, judicial, and administrative. There are also a number of establishments connected with the military department, a royal practical school of artillery and military engineering (the finest institution of the kind in Europe), regimental schools of artillery and engineering, a central military pyrotechnic school, and a miners' school. For general or special instruction there are the faculties connected with the Académie Universitaire; a college or high school, a normal school, a society of literature, science, and art; a society for the encouragement of agriculture and of industry; a philharmonic society, free courses of instruction or schools for drawing, painting, music, and geometry and mechanics applied to the arts; public lectures on midwifery and botany, a school of trade, a society for the encouragement of elementary instruction, a departmental society for medical science, a society for the encouragement of arts and trades, maintained by the wealthier Jews (of which nation there are many at Metz) for their poorer brethren; a maternity society, and a mont de piété, or loan society; a public library of 31,000 volumes, three other libraries, a botanic garden, a departmental nursery ground, and museums of natural history and mineralogy. There is a school or schools taught by the Frères de la Doctrine Chrétienne, with a thousand pupils.

The arrondissement of Metz comprehends an area of 620 square miles: it is divided into nine cantons or districts, each under a justice of the peace, and comprehends 218 communes. Its population in 1831 was 150,840; in 1836, 150,811.

In the neighbourhood of the town are the remains of a Roman aqueduct, which conducted the waters of a stream, seven or eight miles distant, to the Naumachia, which was in the south part of the town. Seventeen arches of this aqueduct yet remain. The ruins of an amphitheatre and of a Roman palace have been also discovered.

The territory known as Le Pays Messin comprehended the territory immediately around the city, included in the diocese and jurisdiction of the bishops, to which alone the name was in strictness applicable, and the lordships scattered through Lorraine, which formed part of the temporalities of the see. The former is entirely and the latter are partly comprehended in the department of Moselle; some of the lordships are in the departments of Meurthe and Vosges.

MEUDON. [Seine et Oise.]

MEULAN. [Seine et Oise.]

MEULEN, ANTHONY FRANCIS VAN DER, born at Brussels in 1634, was a disciple of Peter Sneyers, an eminent battle-painter, under whom he improved with extraordinary rapidity. While he was pursuing his profession at Brussels, it happened that some of his works were taken to Paris, and shown to the minister Colbert, who was so pleased with them that he invited him to Paris on very honourable and advantageous conditions. His talents as a battle-painter recommended him to Louis XIV., whom he always accompanied in his campaigns. He designed on the spot the most remarkable events, and the views of the cities and fortresses which had been the scene of the most memorable victories, and from these sketches he composed the paintings which were to perpetuate the remembrance of the king's successes. Such opportunities enabled him to attain that perfection in his art, of which his numerous works give such evidence. They are distinguished by truth to nature, excellent colouring, freedom of touch, and the happiest distribution of light and shade. No painter excelled him in designing the motions and attitudes of horses; and this induced his friend Le Brun, whose niece he married, to give to him the execution of the horses in his celebrated paintings of the battles of Alexander the Great. Van der Meulen painted also landscapes, and other subjects, with equal excellence. His principal works are at Paris; but many of his easel pictures are preserved in England, France, and Flanders. In the 16th and 18th vols. of the *Cabinet du Roi*, there are 152 engravings after his works. He was chosen member of the French Academy of Painting in 1673. He died in 1690, at the age of 56 years. His most celebrated scholar was I. Van Huchtenburg, battle-painter to Prince Eugene.

MEUN [LOIRET.]

MEURSIUS, JOHN (the Latinized form of his real name, which was De Meurs), was born near the Hague, in 1579. He was educated at the university of Leyden; and after he had completed his studies, was entrusted with the education of the children of Barneveldt. [BARNEVELDT.] In 1610, Meursius was appointed professor of history at Leyden, and in the year following professor of Greek. After the execution of Barneveldt, on the 14th of May, 1619, Meursius was exposed to great annoyance and persecution from the enemies of his illustrious patron; and it was therefore with great pleasure that he accepted an invitation from the king of Denmark, in 1625, to settle in his dominions. Meursius died on the 20th of September, 1639.

Meursius was a diligent and laborious scholar. He edited several Latin and Greek writers, and wrote many works on historical and archæological subjects, which were collected and published by Lami, Florence, 1741-63, 12 vols. folio. The following are a few of his principal works:—1, 'Glossarium Græco-barbarum,' Leyd., 1614. 2, Various treatises on different branches of Greek and Roman antiquities, most of which are reprinted in the 'Thesaurus' of Grævius. 3, 'Rerum Belgicarum Liber Primus,' Leyden, 1612. 4, 'Historia Danica,' Copenhagen, 1630.

MEURTHE, a department in the north-east of France, bounded on the north by that of Moselle, on the north-east and east by that of Bas Rhin, on the south-east and south by that of Vosges, and on the west by that of Meuse. Its form is compact; the greatest length is from east to west, from the neighbourhood of Phalsbourg to that of Commercy (Meuse), 70 to 71 miles; its greatest breadth, at right angles to the length, is from the bank of the Moselle, between Pont-a-Mousson and Metz, to the neighbourhood of Mirecourt (Vosges), 46 miles. It area is estimated at 2357 square miles, which is nearly the average extent of the French departments, and rather greater than the conjoint areas of the English counties of Kent and Surrey. The population in 1831 was 415,568, in 1836 it was 424,366, showing an increase in five years of 8798, or above 2 per cent., and giving 180 inhabitants to a square mile. Both in amount and density of population it considerably exceeds the average of the departments, but falls considerably short of the average density of population in England. Nancy, or Nanci, the capital, is in 48° 41′ N. lat., 6° 11′ E. long., 172 miles in a direct line east of Paris, or 204 miles by the road through Château-Thierri, Châlons-sur-Marne, Vitry-sur Marne, Bar-le-Duc, and Toul.

The department is hilly, and even mountainous. The principal chain of the Vosges crosses the eastern extremity between Sarrebourg and Phalsbourg; and branches from this mountain chain, of gradually diminishing height, extend over the eastern portion of the department. Near the principal chain of the Vosges the mountains are intersected by narrow valleys, which frequently present picturesque scenery. Amid the lower slopes are several lakes, as those of Lindre, Stock, &c.; there are also several marshes. The western side of the department is traversed by the hills which bound on the east side the narrow valley of the Meuse, and separate it from that of the Moselle. Between these hills and the Vosges is the valley of the Moselle. The Vosges in this department are composed chiefly of the new red or saliferous sandstone and the subjacent secondary rocks; the rest of the department is occupied by the rocks which intervene between the chalk and the red sandstone. The mineral treasures of the department comprehend freestone for building, and limestone, which are quarried in numerous places; gypsum is also abundant, and good marble is quarried near Nancy. Various ores of iron are found, but not in sufficient quantity to make it worth while to extract them. There are two forges for producing wrought-iron. The most important mineral is rock-salt, of which a vast bed was discovered in 1819, within a mile of the town of Vic on the Seille, at a distance of rather more than 200 feet below the surface. In penetrating about 100 feet lower, five strata of rock-salt were found, having an aggregate thickness of nearly 90 feet, separated from each other by thin strata of gypsum or clay. A sixth stratum has been discovered a few feet below the others: these strata have been ascertained to have a superficial extent of 230 square miles. The salt is pure muriate of soda. The working of the mine commenced in 1823. The cost of raising the salt and breaking it small is very trifling, about 8*s.* to 8*s.* 6*d.* per ton. The department has long been known for its brine springs, which have been estimated to produce yearly 41,000 to 42,000 tons: the principal springs are in the valley of the Seille at Dieuze, Château Salins, and Moyenvic; there are some in the valley of the Moselle, as that of Mousson near Pont-à-Mousson, and of St. Thiébault near Nancy. The cost of refining this salt is nearly double that of preparing the rock-salt.

The department belongs almost entirely to the basin of the Moselle: a small portion at the eastern extremity, which passes over the principal ridge of the Vosges, is included in the basin of the Rhine, of which indeed that of the Moselle is only a subdivision, and another small portion on the south-western border is included in the basin of the Meuse.

The Moselle enters the department on the south side, a little below the town of Charmes (Vosges), and flows north-west in a rather circuitous channel to Toul; at Toul it turns to the north-east, and flows in a circuitous channel to the junction of the Meurthe, from which point it flows north by west into the department of Moselle. Its whole course in the department may be estimated at 65 miles, for 18 of which (22 according to the government statement), viz. from the junction of the Meurthe, it is navigable.

The principal tributary of the Moselle in this department is the Meurthe. This stream, which rises in the western slope of the Vosges, several miles south-east of St. Dié (Vosges), and has a north-west course, enters this department just below the town of Raon l'Etape (Vosges), and flows north-west to Lunéville, where it receives the Vezouze on the right bank, and a mile or two lower down the Mortagne on the left. Below Lunéville the river makes a bend, but after passing the town of Rosières, and receiving the little river Sanon, it resumes its north-western course, and flows past Nancy into the Moselle. Its whole course may be estimated at 75 miles, of which nearly 50 are in this department; the navigation, which commences at Nancy, is of seven miles. It is used for floating timber from the neighbourhood of its source, and a considerable quantity of deals and firewood are sent down by it. It is subject to frequent inundations from the melting of the snow or the falling of heavy rains in the mountains where it rises.

The Madon, another considerable feeder of the Moselle, enters this department on the south side, and flows into the Moselle above Toul. Its source is in the heights south-west of Epinal (Vosges), and its whole course is above 40 miles, about 16 of which are in this department. It receives the little river Uory. The Math, a small stream, waters the north-west part of the department, and joins the Moselle just within the border. The Seille, a more considerable stream, waters the northern side of the department, and receives the Verbach and the Petite Seille; it joins the Moselle at Metz, in the adjacent department of Moselle. The Sarre, another and more important feeder of the Moselle, rises in the Vosges and waters the east side of the department, a few miles beyond which it becomes navigable. The Zorn, which rises just within the eastern boundary, flows into the Rhine; and the Deuil, which waters the south-western border, belongs to the system of the Meuse. There is one navigable canal, that of Les Salines de l'Est (the Eastern Salt-works), 22 to 23 miles long. It commences at the little town of Dieuze, on the Seille, and runs north-east into the Sarre at Sarrealbe (Moselle); only a part of it is in this department.

The department has eight Routes Royales, or government roads, the aggregate length of which (on January 1, 1837) was 261 miles, viz. 223 in repair and 38 out of repair. The principal road is that from Paris to Nancy and Strasbourg, which enters the department on the west side, and runs by Toul to Nancy, from whence it is continued, first along the valley of the Meurthe to Lunéville, and then along that of the Vezouse to Blamont, from which town it runs north-east across the Vosges by Sarrebourg and Phalsbourg into the department of Bas Rhin. Another road branching off from this at Nancy, and rejoining it at Sarrebourg, runs through Château Salins and Moyenvic. Roads run from Nancy along the valley of the Moselle, downward to Pont-à-Mousson and Metz (Moselle), and upward to Charmes and Epinal (Vosges), and across the Moselle and the Meuse to Neufchâteau (Vosges) and Langres (Haute Marne). Roads lead from Château Salins, one to Metz, and another to Sarreguemines (Moselle); from Pont-à-Mousson to Commercy (Meuse) and Bar-le-Duc (Meuse), and from Luneville to St. Dié (Vosges) and Colmar (Haut Rhin). The aggregate length of the Routes Departmentales was (January 1, 1837) about 233 miles, viz. 168 in good repair, 42 out of repair, and 23 unfinished. The bye-roads and paths had an aggregate length of 3000 miles.

The climate of the department is colder than the latitude would lead us to suppose, a circumstance which is ascribed to the elevation of the eastern parts, the quantity of woodland, and the extent of water. The air is in most parts tolerably healthy. In the neighbourhood of the Vosges however the inhabitants of the valleys are very subject to putrid fevers. Intermittent fevers are prevalent in some districts, and in others the inhabitants are afflicted with large goitres, with scurvy or rupture.

About 760,900 acres, half the soil of the department, is under the plough; it is of various degrees of fertility, but the produce in grain is on the whole very far above the average of France; in wheat, which is the grain chiefly cultivated, the produce is twice the average; and in oats, which are cultivated to nearly or quite the same extent as wheat, the produce is nearly three times the average. In barley the produce is about equal to the average of France; of rye and maslin, or mixed corn, a comparatively small quantity is raised; and of maize and buckwheat scarcely any. Potatoes are cultivated very extensively.

Besides corn and potatoes, a considerable quantity of rape, colza, &c., for oil is grown; also flax, hemp, chicory, and pulse. A few hops are grown. The cultivation of the vine has much increased of late years. The vineyards now occupy above 40,000 acres, which is below the average of the departments, but the produce in wine is considerably above the average. The wine is for the most part thin and poor; some of the growths, as the red wines of Pagny-sous-Preny, Thiaucourt, Arnaville, Baudonville, Neuviller, and Vic, are agreeable and delicate. About 16,000 acres are laid out in orchards, gardens, and nursery-grounds. The fruit-trees are generally trained as espaliers. The stone-fruits are chiefly cultivated, particularly an oval plum of excellent flavour, called the Coëtche, of which great quantities are dried. The apricots of Nancy are in good repute. The quantity of woodland is about 280,000 acres; the abundance of fuel is a great advantage to the various manufactures of the department.

There are about 180,000 acres of meadow land, and about 15,000 acres of heath or common. The number of horned cattle is on the whole rather below the average of France. The quantity of cheese and butter made in the department is not equal to the consumption. Sheep are not numerous, and are of a large coarse-wooled breed. Horses are numerous but small. The antient dukes of Lorraine had done much to improve the breed by importing stallions from the Levant; they have however been suffered to degenerate. Horses are chiefly used for agricultural labour.

Poultry is abundant; but there are few bees. Wolves and foxes are numerous in the woods; there are also some wild boars, roebucks, and smaller game. Rats, mice, field-mice, and moles commit considerable devastations, and caterpillars are numerous and destructive.

The department is divided into five arrondissements, as follows:—

	Area in sq. miles.	Population. 1831.	1836.	Communes.
Nancy, central .	551	127,944	129,841	187
Château Salins, north	418	69,810	70,287	147
Lunéville, south .	468	82,851	84,698	145
Sarrebourg, east .	461	72,546	75,499	116
Toul, west . .	459	62,417	64,041	119
	2357	415,568	424,366	714

There are 29 cantons, or districts, each under a justice of the peace.

In the arrondissement of Nancy or Nanci are—Nancy (pop. in 1831, 29,000 town, 29,783 whole commune; in 1836, 31,445 commune) [NANCY]; Rosières (pop. 2463 town, 2507 whole commune), and St. Nicholas (pop. 3006 town, 3043 whole commune) on the Meurthe; Pont-à-Mousson (pop. 6993 town, 7218 whole commune) on the Moselle; Haroué, on the Madon; Vézelize (pop. 1742) on the Uory; and Nomeny on the Seille. At Rosières (still distinguished as Rosières aux Salines, though the salt-works from which it gained its name have been long abandoned) is one of the finest of the royal studs in France; there is much meadow land round the town, and many horses are bred. St. Nicholas has a fine old Gothic church, a town-hall, and an abattoir, or public slaughter-house, lately built. There are mills, moved by water, for spinning cotton and woollen yarn, trimming manufactories, and tan-yards. Pont-à Mousson is on a slope in the midst of a valley surrounded by fruitful hills. It is divided by the Moselle into two parts, which communicate by a bridge. There are some good houses in the town, and the streets, which are inconveniently paved with round stones, are tolerably straight. It has a good place or square surrounded by arcades; the town-hall is in this square. The principal church and the church of the Seminary are on the right bank of the Moselle; the first has two towers resembling crowns; the second has a portico overcharged with ornaments. The manufactures of the town are chiefly earthenware, especially artificial stone, much used for water-courses, reservoirs, flat roofs, &c.; and beet-root sugar, of which last there are four factories. The earthenware is exported into the adjacent departments. On an eminence near the town have been found antiquities which show that its summit was antiently occupied by a temple of Jupiter. There was formerly a university at Pont à-Mousson, founded by Charles III., duke of Lorraine.

In the arrondissement of Château Salins are—Château Salins (pop. in 1831, 2708; in 1836, 2621), on the Petite Seille; Dieuze (pop. 3892), Marsal, Moyenvic, and Vic (pop. 3119 town, 3186 whole commune), on the Seille; Vergaville, on the Verbach, and Insming, near the Albe, a feeder of the Sarre. Château Salins derives its name, and formerly derived its importance, from its brine-springs; but the salt-works have been given up. The town is in a pleasant valley at the junction of four roads leading respectively to Metz, Nancy, Sarrebourg, and Sarreguimines. The inhabitants trade in saffron and hosiery. Dieuze has brine-springs, a salt-mine, and salt-works; there is also a manufactory of artificial soda from the refuse of the salt-works and from rock-salt. Salt has been made from the brine-springs of Dieuze for 800 years. It was a place of some importance under the Romans, who called it Decem Pagi. There are some Roman antiquities in an islet in the étang or lake of Lindre, which is near Dieuze.

Marsal is a fortress; it was bombarded by the allies in 1815, and has now a population of scarcely 1000. It is situated in a marshy plain; the foundation of the town consists of a layer of brickwork formed by the Romans. Moyenvic is a town of about 1500 inhabitants, who are chiefly engaged in making salt from the brine-springs. The town was dismantled by Louis XIV. Vic has also salt-works. The salt-mine opened in the bed of rock-salt near this town was inundated with water from a subterraneous reservoir; but another mine has been opened at Dieuze.

In the arrondissement of Lunéville are—Lunéville (pop. in 1831, 12,216 town, 12,341 whole commune; in 1836, 12,798 commune) [LUNEVILLE], on the Vezouze, very near its junction with the Meurthe; Baccarat (pop. 1670 town, 2809 whole commune), on the Meurthe; Gerbevillers (pop. 3044) on the Mortagne; Bayon on the Moselle; Einville on the Sanon; Blamont (pop. 2281) on the Vezouze; and Badonviller (pop. 1814 town, 2297 whole commune) on the Blette, a small feeder of the Vezouze. Baccarat is at the foot of a steep hill, and near an extensive forest. One of the principal manufactories of flint and cut glass in France is in this little town. The river Meurthe brings down the timber for fuel from the Vosges, and supplies a moving power to the machinery for cutting glass, for which purpose there are two hundred lathes. The artisans with their families are lodged in the establishment, and form a population of 600. Many females in the neighbourhood find employment in different branches of this manufacture. Blamont was formerly the residence of the princes of Salm-Salm. It is now a busy little town, where calico is woven and printed, leather in considerable quantity made, woollen yarn spun, and common iron goods and hardwares manufactured. There are manufactories of earthenware and pottery in the neighbourhood. Badonviller has a manufactory of dies and punches.

In the arrondissement of Sarrebourg are—Sarrebourg (pop. in 1831, 2136 town, 2164 whole commune; in 1836, 2340 commune), Lorquin, and Fenéstranges on or near the Sarre; and Lixheim and Phalsbourg (pop. 1981 town, 3529 whole commune) amid the steeper slopes of the Vosges. Sarrebourg existed in the time of the Romans, by whom it was called Pons Saravi, 'the bridge of the Saravus or Sarre.' The townsmen manufacture cottons, paper, cordage, architectural ornaments, and ornaments for the fitting up of rooms. At Phalsbourg fine liqueurs are prepared. This little town, which is fortified, and defends one of the defiles the Vosges, was built in 1570 by George John, count Palatine of the Rhine, from whom it obtained its name, which in its German form, Pfalsburg, means 'the town of the Palatine.' The town is supplied with water by a fountain of admirable construction.

St. Quirin (pop. 1523 village, 1960 whole commune) and Cirey (pop. 1768 village, 2193 whole commune), though only villages, require notice for the extensive plate and other glass works established in them. Coloured glass and mirrors like those of Nürnberg are made here. St. Quirin is surrounded by vast forests which supply fuel to its glass-houses. At Cirey earthenware is manufactured.

In the arrondissement of Toul are—Toul (pop. in 1831, 7208 town, 7304 whole commune; in 1836, 7333 commune) and Dieulouard on the Moselle; Essey and Triaucourt on the Math; and Colombey near the Deuil. Toul existed in the time of the Romans, by whom it was called Tullum; it was the capital of the Leuci, a Belgic people. In some deeds of the time of the Carlovingian princes, it is called Leuci. The fortifications, which were commenced under Henri IV. and carried on under Louis XIV., have been lately repaired. It was formerly the seat of a bishop. The former cathedral is an antient Gothic building with two towers resembling those of the principal church of Pont-à-Mousson. The ex-episcopal palace is a handsome building. Toul is not a place of much trade. There is a manufactory of earthenware and porcelain, which is noted for its strength and whiteness, the beauty of its enamel, and the variety of its colours. There are a high-school, an agricultural society, and several military establishments. Wine (of which the surrounding district produces abundance) and brandy are articles of trade.

The population of the above towns, where not otherwise mentioned, is of the whole commune, and from the census of 1831.

The manufactures of the department are considerable; the principal are woollen, linen, and cotton goods; trimmings and embroidery; hats, salt, glass, oil, leather, earthenware, and pottery; beet-root sugar, paper, cordage, hardwares, liqueurs, and some chemical productions. There are bell and type foundries.

The department constitutes the diocese of Nancy, the bishop of which is a suffragan of the archbishop of Besançon. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of that city; and in the third military division, the head-quarters of which are at Metz. It sends six members to the Chamber of Deputies.

In respect of education this department is the eighth in France. Of every hundred young men enrolled in the military census of 1828-29, sixty-eight could read and write; the average of the departments of France being only about thirty-nine.

At the time of the Roman conquest, this department formed part of the territories of the Mediomatrici in the north, and the Leuci in the south. A very small portion of the eastern side may have been included in the territory of the Tribocci, a Germanic people, who had settled on the left bank of the Rhine. Under the Romans the Mediomatrici and the Leuci were comprehended in the province of Belgica Prima, the Tribocci in that of Germania Prima or Superior. The Roman or Gallic towns within the limits of the department were Tullum (Toul), the capital of the Leuci; Scarpona, another town of the Leuci (near which Jovinus, a Roman general of horse, defeated the Allemanni, A.D. 366, and which sustained a siege against Attila), now Scarponne, or Charpagne, near Dieulouard on the Moselle; and Decem-pagi, now Dieuze, and Pons Saravi, now Sarrebourg (not Sarrebruck, as some from the name have supposed), two towns of the Mediomatrici. The department was early comprehended in the conquests of the Franks. Its subsequent history is given elsewhere. [Lorraine.]

MEUSE, or **MAAS**. [Rhine.]

MEUSE, a department in the north-eastern part of France, bounded on the north by the Belgian frontier and the department of Ardennes; on the north-east by the department of Moselle; on the south-east by that of Meurthe; on the south by that of Vosges; on the south-west by that of Haute Marne; on the west by that of Marne; and on the north-west by that of Ardennes. Its form approximates to that of an oval, having its greatest length, from north by west to south by east, from the neighbourhood of Mouzon (Ardennes) on the Meuse, to the neighbourhood of Gondrecourt on the Ornain, 85 miles, and its greatest breadth, at right angles to the length, from the neighbourhood of Revigny on the Orne, to that of Triaucourt (Meurthe) on the Math, 46 miles. Its area is estimated at 2402 square miles, which is rather below the average area of the French departments; and rather exceeds the conjoint area of the adjacent English counties Hants and Berks. The population in 1831 was 314,588; in 1836 it was 317,701; showing an increase in five years of 3113, or about 1 per cent., and giving 132 inhabitants to a square mile. Both in amount and density of population it is considerably below the average of the French departments, and still farther below the English counties with which we have compared it.

Bar-le-Duc, the capital, is on the Ornain, in 48° 46′ N. lat. and 5° 9′ E. long., 126 miles east of Paris in a direct line, or 152 miles by the road through Epernay, Châlons, and Vitry-sur-Marne.

The department is traversed in the direction of its length by the two ranges of hills which enclose between them the narrow valley of the Meuse. The westernmost of these ranges separates the basin of the Meuse from that of the Seine; and is known in one part by the name of 'the heights of Argonne.' A range of hills branches off from these in the south part of the department, and runs northwest by Ligny and Bar-le-Duc, separating the valley of the Aire from that of the Ornain. The heights to the east of the valley of the Meuse separate it from the basin of the Moselle.

The department belongs to the district occupied by the rocks which intervene between the chalk and the new red or saliferous sandstone. There are numerous iron-mines in the hills, also quarries of excellent freestone, and vast slate-quarries. Potters' earth and marl are dug; and the strata afford a variety of curious fossils. There were, in 1834, thirty-six iron-works in the department, chiefly in the southern part. There were in these establishments twenty-eight furnaces for smelting the ore and making pig-iron; and sixty-seven forges for the production of wrought-iron. Charcoal is the fuel chiefly employed; the extensive forests of the department afford great facilities for procuring it. In the iron-works of Abainville near Commercy coal is used.

The central valley which traverses the department in the direction of its length, and the north-eastern portion of the department, belong to the basin of the Meuse; which river enters the department about 38 miles from its source and flows north-north-west through the central valley 95 to 100 miles, past Commercy, St. Mihiel, Verdun, Dun, and Stenay, into the department of Ardennes. The navigation commences at Verdun. The Meuse receives scarcely any tributaries in this department. The Othain and the Loison (with its feeder the Tinte), which water the north-eastern parts, fall into the Chiers, a tributary which flows across the north extremity of this department and joins the Meuse in the adjacent department of Ardennes.

The eastern side of the department belongs to the basin of the Moselle, a subdivision of the great Rhenish basin; and is watered by the Ornes, the Longeau, the Yron, the Math, and other small streams belonging to the system of the Moselle.

The western side of the department belongs to the basin of the Seine. The Aire, a tributary of the Aisne, rises in the south part and flows nearly parallel to the Meuse, about 50 miles past Clermont-en-Argonne and Varennes, into the department of Ardennes. The Aisne itself has its source and a small part of its course in the department. The Ornain, or, as it is called in the lower part of its course, the Orne, enters the department on the south and flows north-west, 50 miles past Gondrecourt, Ligny, and Bar-le-Duc, into the department of Marne. The Saulx, a feeder of the Orne, also waters this part.

There are several étangs, or pools, in the department, especially in that part which belongs to the basin of the Moselle. The most considerable, which is about two or three miles long, and in one part nearly two miles broad, is near the village of Woel. The river Yron flows through it.

The navigation of the Meuse within this department is given in the official statements at 53 miles; there are no navigable canals.

The Routes Royales, or government roads, had in 1837 an aggregate length of 317 miles, of which the whole, excepting 5 or 6 miles, were in good repair. The principal roads are those from Paris by Châlons-sur-Marne (Marne) to Metz (Moselle); and from thence to Mayence and Frankfort in Germany; and from Paris, also by Châlons to Nancy (Meurthe) and Strasbourg (Bas Rhin). These roads both cross the department from west to east, the former in the northern part, through Clermont-en-Argonne and Verdun; the latter in the southern part, through Bar-le-Duc and Ligny. The road from Paris by Longwy (Moselle) to Luxembourg in Belgium, and Treves and Coblentz in Germany, branches off from the Metz road at Verdun, and runs north-eastward through Etain. A road from Dijon (Côte d'Or), Langres (Haute Marne), and Neufchâteau (Vosges), runs along the valley of the Meuse by Commercy, St. Mihiel, and Verdun, into the department of Ardennes, and so into Belgium; with a branch from between Neufchâteau and Commercy, to Ligny and Bar-le-Duc. A road from Troyes (Aube) to Nancy (Meurthe) crosses the southern part of the department.

The Routes Départementales had at the same time an aggregate length of 170 miles; of which the whole (except about 20 miles) was in good repair. The bye-roads and paths had an extension of above 6000 miles.

The climate of the department is cold (especially on the higher lands, some of which are of considerable elevation) and moist, but it is considered healthy. The soil in the valleys and on the hill sides is very fertile: a large portion of it consists of a rich loam. About 840,000 acres, rather more than half the surface of the department, is under the plough. The produce in grain is very considerable, especially in wheat, barley, and oats: that of barley is nearly three times as much as the average produce of the French departments; that of oats is above the average, but, from the great number of horses reared, is insufficient for the consumption of the department. But little rye and maslin, or mixed corn, is grown; and neither maize nor buckwheat is at all cultivated. Potatoes are grown in considerable quantity, also rape-seed for oil, flax, hemp, pulse, and fruit of every kind, but especially gooseberries. Orchards and gardens occupy above 18,000 acres. The vineyards occupy about 35,000 acres, and are chiefly in the south-west part of the department. The wines are in general of good quality, especially the red wines of Bar-le-Duc. The woodlands occupy from 340,000 to 350,000 acres, of which about 100,000 acres belong to the state, about 220,000 to the communes and to the public establishments; the rest is private property. The chief forest trees are the oak, beech, and elm. The timber and firewood supply the wants of the department, and furnish an article of export to the department of Ardennes and the departments in the basin of the Seine.

There are about 124,000 acres of meadow land, the best of which is in the valley of the Meuse; and 30,000 acres of heath or other open pasture. A great number of horses of a small breed are reared; the whole number in the department may be estimated at more than 60,000, above twice the average number in the other departments. They are employed, to the exclusion of oxen, in nearly all the labours of agriculture. The number of horned cattle is about equal to the average of the departments, viz. about 80,000. The dairy is much attended to; excellent butter is made, and cheese, which resembles that of Gruyère. The number of sheep is not great; the breeds have been improved by crossing them with those of England and Holland. There are some pigs reared, and a few goats; poultry is abundant. The forests contain wild boars and roebucks; and small game abounds in all parts of the country. A great number of red-breasts are taken every winter. The rivers and pools furnish plenty of fish, especially the pike, perch, loach, salmon-trout, and cray-fish.

The department is divided into four arrondissements as follows:—

		Area in sq. Miles.	Population in 1831.	Population in 1836.	No. of Communes.
Bar-le-Duc,	S.W.	569	82,134	80,952	128
Commercy,	S.E.	755	84,610	86,013	181
Montmédy,	N.	498	66,947	68,495	131
Verdun,	Central.	580	80,897	82,241	149
		2402	314,588	317,701	589

It is subdivided into 28 cantons, or districts, each under a justice of the peace.

In the arrondissement of Bar-le-Duc are—Bar-le-Duc (pop. in 1831, 12,496) [BAR], Ligny (pop. 3212), and Revigny (pop. 1598), on the Ornain; Vaubecourt, on the Aisne; Beauzée, on the Aire; and Ancerville (pop. 2239) near the south-western boundary of the department. Ligny, distinguished as Ligny-en-Barrois, is a pleasant little town, antiently fortified, but the walls are now in ruins. The parish church contains the monument of the Maréchal de Luxembourg. The inhabitants spin cotton-yarn and weave cotton goods, and carry on trade in wool and timber.

In the arrondissement of Commercy are—Commercy (pop. in 1831, 3622; in 1836, 3716), Maxey, Vaucouleurs (pop. 2157), Void, Sorey, or Sorcy (pop. 1634), and St. Mihiel (pop. 5822) in the valley of the Meuse; and Gondrecourt on the Ornain. Commercy is a pleasant town on the left bank of the Meuse, surrounded by a thickly wooded district. The streets are remarkably straight. There is a fine range of cavalry barracks, formerly a château built by the Cardinal de Retz. The inhabitants manufacture cotton-yarn and goods; there are also some iron-works. Vaucouleurs is built on the slope of a hill on the bank of the Meuse, and is surrounded by meadows. The inhabitants manufacture stockings, linens, and cotton goods. There are some tan-yards. Void is the depôt for rape-oil, which is made in abundance in the neighbouring part of the valley of the Meuse. It has some tan-yards, also paper-mills, and oil-presses moved by water. St. Mihiel was formerly a fortified town, and was besieged by Louis XIII. in person, who incurred so much danger in the siege, that on capturing the place he caused the fortifications to be razed. The situation of the town is very picturesque, but the houses are old. There was antiently a Benedictine abbey, the foundation of which gave rise to the town. The parish church, formerly conventual, contains the remains of several princes of the house of Lorraine and counts of Bar. Another church, that of St. Etienne (St. Stephen), is adorned with a fine piece of sculpture, a 'holy sepulchre' carved out of a single block of fine white stone, by Ligier Richier, a native of this part of France, and a pupil of Michael Angelo. There are at St. Mihiel cotton and woollen cloth manufactures, oil-presses, and tan-yards. The inhabitants trade in corn and wine; there are three yearly fairs. There are a subordinate court of justice, and one or two fiscal or administrative government offices; a high school, and a public library. There is a camp, supposed to have been occupied by Julius Cæsar, near the town.

In the arrondissement of Montmédy are—Montmédy (pop. in 1831, 2195; in 1836, 2201) on the Chiers; Marville on the Othain; Jametz on the Loison; Damvilliers on the Tinte; and Dun and Stenay (pop. 2681 town, 3140 whole commune) on the Meuse. Montmédy is an ill built town, but is of some consequence as a fortress. In 1815, being defended by about 100 soldiers of the line, and some national guards and custom-house officers, making in all 600 men, it resisted the attempt of a corps of 1500 Prussians to surprise it; the assailants lost 500 men. The inhabitants manufacture hosiery and hats, and leather: there are saw-mills and oil-mills. Stenay is a pleasant situation, and was formerly a place of strength, but was dismantled, A.D. 1654, by Louis XIV. There are barracks. There is in the town an extensive cooperage, in which the moving force of water is employed. There are considerable iron-works near Stenay In the village of Avioth near Montmédy is an antient church accounted one of the finest specimens of Gothic architecture in France.

In the arrondissement of Verdun are—Verdun (pop. in 1831, 9978; in 1836, 10,577) [VERDUN], in the valley of the Meuse; Clermont-en-Argonne [CLERMONT] and Varennes (pop. 1652), on the Aire; Etain (pop. 3034), on the Ornes, and Fresnes, on the Longeau. Varennes was the place where Louis XVI. and his family were stopped in their attempt to escape from France. There is a glass-house in the town. Etain or Estain is a tolerably neat town in a marshy plain. The inhabitants manufacture woollen cloth, flannel, leather, and paper. This town gave title to the French admiral Count d'Estaing.

The chief manufactures of the department are iron goods, glass bottles, paper, earthenware, and leather; cotton hose, lace, and cotton and woollen fabrics; and wicker-work. There are brandy distilleries and oil presses. The chief trade is in agricultural produce, corn, wine, oil, timber, &c., and in iron.

The department forms the bishopric of Verdun, the bishop of which is a suffragan of the archbishop of Besançon. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Nancy; and in the second military division, of which the head-quarters are at Châlons. It sends four members to the Chamber of Deputies.

In respect of education this department is in advance of every other in France. Of every hundred young men enrolled in the military census of 1828-29, seventy-four could read and write; while the average of the departments was under forty.

The department antiently formed part of the territories of the Verodunenses and of the Leuci: small portions of it were comprehended in the territories of the Remi, the Medromatrici, and the Treviri or Treveri: all these were Belgic nations. In the Roman division of Gaul the Remi were included in the province of Belgica Secunda; the other nations in Belgica Prima. Verodunum (or, as it is written in the Itinerary of Antoninus, Virodunum), capital of the Verodunenses, was the modern Verdun; Nasium, a town of the Leuci, was the modern Naix or Nais, a village on the Orne above Ligny; and Caturigis was in the vicinity of Bar-le-Duc. On the overthrow of the Western empire, the department came into the hands of the Franks, and formed part successively of the kingdoms of Austrasia and Lotharingia or Lorraine. The greater part of it was comprehended in the duchy of Lorraine and Bar; and the remainder in the bishopric of Verdun, one of Trois Evêchés (three bishoprics); or in the county of Champagne and the county of Clermont.

MEW, a name for the *Gull*. [LARIDÆ.] In falconry it signifies the place where hawks are kept.

MEXICAN STATES, THE UNITED, a federal republic in America, occupy the north-western and by far the greatest part of the Mexican isthmus, together with the south-western portion of the main body of North America: they lie between 15° and 42° N. lat. and 87° and 125° W. long. On the east the United Republic is washed by the Gulf of Mexico and the Bay of Honduras, a division of the Caribbean Sea; and on the south-west and west by the Pacific, which here forms the long Gulf of California. On the south-east it borders on Guatemala, one of the states of Central America, and on the British colony of Belise. On the north-east and north it is bounded by the states and territories of the United States of North America. The boundary-line on this side, according to a treaty, begins on the east at the mouth of the river Sabine, and follows its course northward to the point where it is intersected by 32° N. lat.; it then continues along the meridian of 94°, until it reaches Red River. The line ascends the last-mentioned river to the point where it passes the meridian of 100°, and proceeds along this meridian northward to the Arkansas river, which constitutes the boundary-line westward to its very source in the Rocky Mountains. From this range westward to the shores of the Pacific, the parallel of 42° separates the territories of both republics. As large tracts along the northern boundary are quite unknown, the area of this extensive country can only be approximated to. It probably occupies a surface of about 1,600,000 square miles, or more than seven times the area of France.

Surface; Soil; Climate; Rivers.—This immense country is divided by nature into three regions, each of which is marked by different features. The first comprehends the countries lying to the east of the isthmus of Tehuantepec, which is crossed by the meridian of 95° west of Greenwich: we shall call it the Eastern Region. The second extends from the meridian of 95° in a curved line to the mouth of the Rio del Norte on the east (26° N. lat.), and to the most northern recess of the Gulf of California (32° N. lat.) on the west: it is the Central Region, or Anahuac. The third or Northern Region comprehends the countries situated north of a line drawn from the mouth of the Rio del Norte to that of the Colorado

The *Eastern Region* comprehends the peninsula of Yucatan, the western declivity of the table-land of Guatemala, the plain of Tabasco, and the isthmus of Tehuantepec. The north-eastern extremity of the peninsula of Yucatan, near Cape Catoche, is hardly more than 150 miles distant from Cape S. Antonio, the most western extremity of the island of Cuba. Through the strait formed by these headlands a current with considerable velocity sets in to the north. The earthy particles brought by this current are deposited along the northern and western shores of the peninsula, where the current is much less rapid. These shores have no harbours, but only roadsteads, which during the northern gales are very unsafe; but along the eastern shores there are several harbours. The shores are sandy and flat. The level country extends to a considerable distance inland, whilst the centre of the peninsula is occupied by a range of low hills, or rather a long and comparatively narrow table-land enclosed by two ranges of low hills. The country along the Bay of Honduras is well watered, and exhibits a vigorous vegetation, both in its trees, which are of heavy growth, and in the great variety of its plants; but the soil is nearly uncultivated, the scanty population being chiefly employed in cutting mahogany, with fustic and several other dye-woods. The hilly district in the interior, as well as the flat country on the northern coast, has a sandy soil, and no spring-water is found from Cape Catoche to the mouth of Rio de S Francisco, which empties itself into Campeachy Bay; and even as far south as the Laguna de Terminos spring-water is scarce. Its vegetation is scanty: the trees are stunted, and the plants of a languid growth, except during the rainy season (from May to September); but as the climate, though exceedingly hot, is healthy, it is much better inhabited and cultivated than the eastern shores. The rains, though commonly abundant, sometimes fail, and such an event is followed by dearth.

The hills in the interior grow higher towards the point where the peninsula is connected with the table-land of Guatemala. The larger and higher portion of this table-land belongs to the state of Guatemala, and it is traversed by a ridge of high hills between the towns of Totonicapán and Gueguetenángo. [CENTRAL AMERICA.] From this ridge, which stands on a base elevated probably about 5000 feet above the sea, the country descends rather rapidly to the west, and where the boundary-line of Mexico and Central America crosses the table-land it is probably less than 3000 feet high. It continues to descend until it meets the plain of Tabasco, north of 17° N. lat. Its surface is far from being level, as it is furrowed by numerous watercourses; so that it may rather be considered as a succession of ridges of hills and of valleys than as an inclined plane. The climate is in general healthy, and its productions vary according to the different elevations of the surface. In some the productions of the West Indies are cultivated; in others wheat and some European plants are grown.

The plain of Tabasco begins on the east, at some distance east of the lagune of Terminos, and extends westward to Partida Rock, a moderately elevated cape, in which a range of hills, including the volcano of Tuxla, terminates (96° W. long.) on the shores of the Gulf of Mexico. This plain is more than 250 miles long, and extends inland from 50 to 120 miles. Its surface is a dead level, and the soil alluvial. Being very fertile, it is covered with a thick forest of heavy growth, but is little cultivated on account of its being subject to inundations, and generally under water for several months during the rainy season. It seems that this part of the Mexican States suffers as much from the superabundance of water as other parts from the want of it. To this circumstance, and to the great heat of the summer, the unhealthiness of this tract is to be attributed. Besides the common objects of agriculture in countries similarly circumstanced, as maize, plantains, and manioc, it produces a large quantity of cocoa and some coffee. Vanilla and indigo are stated to be common in the woods. Though the coast is generally low, parts of it are higher than any other portion of the coast of the American continent along the Gulf of Mexico. Between the lagune of Terminos and the mouth of Tabasco river are the heights of S. Gabriel, a range of hills running east and west about 30 miles, at a short distance from the shore; and where the plain terminates on the west is Cape Partida Rock, the extremity of a somewhat elevated and rocky shore, which extends about 30 miles south-south-east and north-north-west. The Laguna de Terminos is about 60 miles long from north-north-east to south-south-west, and 30 miles wide on an average; but in many places it has hardly four feet of water, and the three or four channels by which it is connected with the gulf are hardly passable for large boats. The water is brackish. The plain of Tabasco is watered by a considerable river, the Rio de Tabasco, and its two branches the Usumasinta and the Grijalva, of which the former rises in two branches on the eastern corner of the table-land of Guatemala, and flowing in a direction generally north by west, forms a considerable cataract south of 17° N. lat., where it descends from the table-land. Above this waterfall it is navigable for canoes, and below it for larger boats. This is also the case with its tributary, Chacamas: this river rises in the hills on which stand the ruins of Palenque, the most northern offsets of the table-land of Guatemala. The Usumasinta joins the Rio de Tabasco a few miles above its mouth, after a course of more than 300 miles. The other branch, the Grijalva river, rises in the range of high hills in Guatemala, between the towns of Totonicapán and Gueguetenángo, and runs with many bends in a wide valley in a north-west direction, until it issues from it near the isthmus of Tehuantepec, where it turns to the north-east by a bold sweep, and receives the name of Rio de Tabasco. It traverses the whole plain in a rather oblique direction, and appears to be navigable in this part for boats of considerable burden. Before it joins the Usumasinta it is navigable for vessels of moderate size, which ascend as far as Villa Hermosa. After having joined the Usumasinta, it falls into the Gulf of Mexico at Port Victoria, after a course of about 350 miles.

The plain of Tabasco occupies the northern portion and about one half of the isthmus of Tehuantepec. The southern half comprehends a mountain-ridge and a smaller plain. The most western declivity of the table-land of Guatemala assumes the form of a ridge at about 94° W. long., which, running due east and west, connects the last-mentioned table-land with the elevated plains of Anahuac. This ridge (or rather these ridges, for there are several, running nearly parallel to one another) occupies between 35 and 40 miles of the isthmus. It is called Cerro Pelado, and probably does not rise above 2000 feet. Being entirely covered with trees of heavy growth, it is also known by the name of the Forest of Tarifa. The southern plain, or that of Tehuantepec, is about 25 miles wide, and extends along the Pacific from the boundary of Guatemala to some distance west of the town of Tehuantepec. It has a very hot but rather dry climate, and the soil, though not distinguished by fertility, is capable of producing several tropical plants. It is supposed that an easy line of communication may be established across the isthmus of Tehuantepec, between the Gulf of Mexico and the Pacific, as the two seas are only 140 miles distant, and the two plains are watered by navigable rivers. The river Chimalapa, descending from the Cerro Pelado, traverses the plain of Tehuantepec; and though its whole course perhaps does not exceed 50 or 60 miles, it has much water, and is navigable to S. Miguel de Chimalapa, a distance of about 30 miles. On the same Cerro, but within the northern ridges, rises the Rio Huasacualco, which first turns to the west, and then to the north, breaking through some of the ridges of the Cerro Pelado. In this part of its course it is joined by numerous small rivers, which descend from the western declivity of the table-land of Mixtecapán, and it soon becomes a powerful river, though it is not navigable on account of rapids or cataracts. As soon as it enters the plain of Tabasco its course is gentle, and there is no further obstruction to the navigation. Its mouth, which is situated in the south-western recess of the Gulf of Mexico, is however so choked by a bar and shoals, that vessels even of small size cannot enter it.

The *Central Region* of the Mexican States may be called Anahuac, though this name was used before the Spanish conquest to designate only the country as far north as 21° N. lat., and did not comprehend the northern district, which we include in this region. In its natural features it exhibits great variety.

We begin our survey with the eastern coast, which is low and sandy from the Punta de Rocca Partida (18° 40′ N. lat.) to the most north-eastern corner of the Gulf of Mexico (about 29° N. lat.), and still farther eastward. It runs on in a continuous line, without being broken by inlets or bays; and consequently it contains no harbours except those formed by the mouths of the rivers; and even these are only unsafe roadsteads, as the rivers of this coast (between 18° 40′ and 22° N. lat.), with the exception of the Rio Alvarado, have only water enough in the rainy season. North of 22° several rivers of considerable size fall into the sea, but except at their mouths the coast cannot be approached by vessels, as it is lined by long, low, and narrow islands, which lie parallel to, and from two to six miles from it. The channels by which these islands are separated are too shallow to admit even boats. The country adjacent to the shores, and from three to ten miles inland, is very low, but is defended from the sea by sand-hills rising from 50 to 200 feet high. The soil is sandy and destitute of vegetation, with the exception of a few stunted shrubs and some hardy plants. At the back of this low sandy tract the country rises gradually to the foot of an extremely steep ascent, which constitutes the eastern edge of the extensive table-land farther west. The country which lies between the shores and the steep ascent varies in width. At Vera Cruz (near 19° N. lat.) it is only about 60 miles wide, and this may be considered as its average breadth south of 22°. Farther north it widens, and at Saltillo (26° N. lat.) it is more than 180 miles across. Its acclivity can only be called gradual in comparison with the steep ascent which borders it, for, as far as is known, it attains an elevation of 2500 or 3000 feet at a distance of only 50 miles from the sea. In the wider portion of this tract, north of 22° N. lat., a small number of isolated hills, generally of considerable height, are scattered over the inclined plain; those north of Monterey are the highest, and are visible at a great distance.

This tract is comprehended in the Tierras Calientes, or 'hot countries.' The seasons are divided into the winter, or the season of the north winds, and the summer, or season of the breezes. The former lasts from October to April, during which time the north winds (los nortes) are prevalent, and frequently blow with the force of a hurricane, sometimes for days together. They are the terror of navigators on these shores. During this period the coast is healthy, and the vomito prieto, or yellow fever, ceases. The mean heat of this season is 71° of Fahrenheit, but whilst the north winds are blowing the thermometer sometimes descends to 60°. Rain is not rare during this season, but the showers are only of short duration. During the summer the heat is great; the mean temperature is about 81°, and in July and August is about 82°. The rains are not heavy before June, but in that month they descend in torrents nearly every day for several hours. In July alone about fifteen inches of rain fall, or two-thirds of the mean annual quantity at London. In this season, but especially towards the end of it, in September and October, the vomito prieto is prevalent, and very destructive among the white inhabitants. This disease however only occurs in the lower part of the country: places which are at an elevation of 2500 feet are entirely free from it. The mean annual heat of this tract is 77°. It is extremely well adapted for the cultivation of all tropical products, and as its soil, with the exception of the sandy shores, is possessed of a considerable degree of fertility, it produces rich crops of Indian corn and rice where it can be irrigated. Bananas, pine-apples, oranges, and manioc are also cultivated. The products adapted for exportation are chiefly coffee, sugar, and cocoa, and a small quantity of cotton; vanilla and jalap are collected in the woods, with which a great part of this region, especially that near the steep ascent, is thickly covered.

The steep ascent which bounds this tract on the west rises in some places in terraces, which lie between the declivities; and in such places the ascent occupies a considerable space; but in other parts it rises from 5000 to 6000 feet in a distance generally not exceeding ten miles in width, and frequently much less. The acclivity is so steep that on the whole line there are only two places where it is practicable for carriages, namely, at Xalapa, near Vera Cruz (19° N. lat.), and at Santillo, west of Monterey (26° N. lat.), though its whole length probably does not fall short of 600 miles. The rocks are generally too steep to maintain any vegetation beyond a few plants, but in the narrow ravines which intersect the acclivity a vigorous vegetation is found; in the lower part there are many oak-trees, and in the higher large pines.

The steep ascent just described constitutes the outer edge of the elevated plains of Anahuac, which extend westward to a great distance. The edge itself is lined by a continuous series of hills rising in general only to a moderate elevation above the table-lands, but some of them attain a great height, as the Coffre de Perote, near the road leading from Vera Cruz to Mexico, which is 13,415 feet above the sea-level, and 5723 feet above its base, and the peak of Orizáva, which attains a height of 17,373 feet. The heights which line the margin of the table-land do not form a continuous chain, but appear rather isolated in the southern districts. North of 22° N. lat. however they constitute a continuous range of high mountains, considerably elevated above the adjacent table-land; and this chain extends to the north of the Real de Catorce (24° lat.). North of the group which surrounds this place they again sink down nearly to the level of the table-lands.

The elevated plains of Anahuac are divided into two parts by a range of mountains, which traverses them in a general eastern and western direction, and is called Sierra Madre. This chain begins not far from the eastern edge, near 21° N. lat., west of Tlacolula, with the mountains of La Encarnaçion, whence it continues in a west by north direction to San Felipe (21° 40′ N. lat.), which town is situated in a compatively small plain enclosed by two branches of the range. Here an elevated and wide offset branches off to the southward, and stretches over the plain for about 50 miles, terminating with the group in which the mines of Guanaxuato are situated.

West of S. Felipe the range declines to the north-north-west, and its continuity seems to be broken into isolated ridges, as the Sierra de Altamira, about twenty miles east of Aguas Calientes, and the group of mountains which contain the mines of Zacatecas. But at no great distance west of Zacatecas the Sierra Madre re-appears in the decided shape of a mountain-range, and occupies a width of a hundred miles from east to west. Its direction is from south-east to north-west as far north as 28° N. lat., where it declines to the north, and terminates near 32° N. lat., in an isolated mountain-group called the Sierra de las Espuelas, having gradually diminished both in elevation and width. The elevation of this range is almost entirely unknown. The mountains of La Encarnaçion rise more than 10,000 feet above the sea, and about 4000 above their base; those enclosing the plain of S. Felipe are probably as high, especially those of La Tlachiquera. It would also seem that the range stretching north-west from Zacatecas is not less elevated for a considerable extent, though it sinks lower north of 28° N. latitude.

The elevated plains which spread out west of the steep ascent occupy the greatest part of the surface of Mexico. They are widest between 19° and 20° N. lat., where they occupy 360 miles from east to west. This extensive tract of country however is not one plain, but divided into four plains, unequal in extent, and separated from each other by ranges of hills, which rise from 500 to 2000 feet above their base. The most eastern plain may be called the plain of Tlascala, from the town of that name, which is situated nearly in its centre. Its surface is from 7000 to 7500 feet above the sea, and it occupies the space between 97° and 98½° W. long., and between 18½° and 20° N. lat. Its surface is pretty level: the hills, which occur on it at considerable distances from one another, rise only to a very moderate height, and the depressions are few and of small extent. Two isolated peaks of considerable elevation, the Cerro de Pizarro and Mount Malinche, are near the road which leads from the sea to Mexico. The parts of this plain which are contiguous to the eastern edge of the table-land are very sterile, the ground being covered with lava, and producing only a coarse grass, on which sheep pasture. This sterile tract, called *el mal pais*, occupies about one-third of the plain. Farther west the soil improves, and in many places the ground is covered with maize, wheat, and barley, or laid out in plantations of American aloes. The chain of hills which divides the plain of Tlascala from that of Tenochtitlan, contain the peak of Istaccihuatl (15,704 feet above the sea), and the volcano of Popocatepetl (17,884 feet), which last is the highest mountain in Mexico. The plain of Tenochtitlan, lying west of that of Tlascala, is between 19° and 20° N. lat. and 98° 30′ and 99° 30′ W. long., and about 7480 feet above the sea. Farther west is the plain of Toluca, which extends to 100° W. long., and is somewhat smaller in extent than that of Tenochtitlan, but likewise surrounded by chains of hills. In the southern chain is the Nevado de Toluca, which is 15,160 feet above the sea, and through the northern chain the Rio de Lerma forces its course. The surface of this plain is in many places uneven and broken, but it contains also extensive levels. As it is nearly 9000 feet above the sea-level, it is too cold to produce wheat, and it serves chiefly as pasture-ground. The most western of these extensive plains is that of Michoacan, which between 19° and 20° N. lat. extends from 100° to 104° W. long., and appproaches the Pacific within about 30 miles. Its surface in the eastern districts is about 6500 feet high, but towards the west it sinks down to 5500 feet. Far from being so level as that of Tlascala, this plain exhibits several broken and high ridges of hills, which enclose valleys of moderate width and great fertility. The mountains are covered with a fine growth of timber. The level country is fertile, and produces abundantly every kind of grain, but its elevation above the sea is still too great to admit the cultivation of tropical products. Nearly in the centre of this plain is the lake of Patzcuaro, famous in the history of the antient kingdom of Michoacan, whose capital, Tzintzontzan, was built on its banks. Towards the western extremity of the plain is the peak of Tancitaro, which is probably more than 10,000 feet above the sea.

From the western edge of the table-land of Michoacan, on which the small town of Zapotlan is built, the country declines rapidly to the plain of Colima, which seems to resemble in most respects the low tract along the Gulf of Mexico. It appears to be generally level and not much elevated above the sea. On this plain the isolated volcano of Colima rises to a great height. This country is fertile, and is capable of producing all the tropical plants; but it is badly cultivated.

On the north the table-lands just mentioned border on others of a similar description. On the south the country descends rapidly and with a very irregular surface, except where it borders on the plain of Tlascala. This plain is joined on the south by that of Mixtecapan, which stretches from about 18° 30′ N. lat. southward to the very shores of the Pacific, where it terminates with high mountains, leaving only a narrow tract between them and the sea, from the plain of Tehuantepec on the east to the mouth of the Rio Yopez on the west, a space of 300 miles. We are less acquainted with the features of the table-land of Mixtecapan than with other parts of Mexico, as it has rarely been visited by European travellers, though it contains the best cultivated and most populous districts of the republic. It is however certain that the whole region, with the exception of a few depressions and the low tract on the coast, forms a table-land about 5000 feet above the sea. Its surface appears to be undulating, and sometimes to rise into hills. Towards the plain of Tabasco a chain rises to a greater elevation, though the highest summit, the peak of Senpueltepec, probably does not exceed 7500 feet. Indian corn and other grains are grown in abundance, and a great quantity of cochineal is collected on this table-land.

The table-land of Mixtecapan, stretching south and north, and extending westward to 98° 30′, forms nearly a right angle with the table-land which stretches east and west over the Mexican isthmus, between 19° and 20° N. lat. The countries which fill up this angle do not present in the least degree the features of a table-land, being covered with numerous narrow ridges running generally east and west, with valleys between these ridges sometimes wide enough to be called plains. Both the ranges and the valleys grow lower as they approach the shores of the Pacific. In passing the low ridges which enclose the table-lands of Tenochtitlan, Toluca, and Michoacan, on the south, we descend immediately to a country hardly 3000 feet above the sea, as is indicated by the sugar plantations which occur at Istla (3100 feet) and at Cuantla y Amilpas, not more than 30 or 40 miles south of the table-land of Tenochtitlan. Farther south the descent is less rapid, as the valleys, which are only 30 or 40 miles from the Pacific, are still about 2000 feet above it. The descent again becomes more rapid near the shores, on the margin of which there is a narrow level tract intersected with salt lagunes. This region is traversed nearly in its whole width from east to west by a river of considerable magnitude, the Rio Bolsas, or Rio de Zacatula, whose course exceeds 200 miles, its source being near the western edge of the plain of Mixtecapan. But this river is not navigable, its course being very rapid, even at its mouth. Towards the northern margin of this region is the volcano of Jorullo, which stands in the middle of a plain 2890 feet above the sea, the volcano itself being 4114 feet above the sea, or 1224 feet above its base. This volcano was formed on the 29th September, 1759, in a violent eruption, by which a surface of between 24 and 30 square miles was raised several feet above the level of the plain. The volcano is surrounded by numerous conical hills of moderate elevation, from which smoke is continually issuing. From the mouth of the Rio Bolsas westward a low level plain extends along the Pacific, which joins that of Colima, and spreads about 30 or 40 miles inland. It is a tierra caliente, resembling, in climate, fertility, and productions, the low coast along the Gulf of Mexico, and, like the latter, it is very unhealthy; but the yellow fever, or vomito prieto, does not visit the shores of the Pacific. The mean annual temperature of these shores is considerably higher than that of the shores of the Gulf of Mexico, the thermometer, even during the cold season, hardly descending below 82°, and nearly all the year round maintaining itself in the day-time between 86° and 95°. This difference must be attributed to the absence of cold winds on this coast. The gales by which it is visited rather resemble hurricanes, and blow during the months of July and August from the south-west: sometimes they occur as late as September and October. From October to May the air is in general calm, and the sky cloudless; but the sun is nearly invisible on account of a fog, of an olive colour, which covers the whole sky in its upper regions, and does not affect the hygrometer. In this season some gales blow from the north-east or north-north-east, which are called the gales of Tehuantepec.

North of 20° N. lat. is the table-land of Queretaro, which extends to the ridge of the Sierra Madre, on the east to about 21° N. lat., but on the west to 21° 30′. That portion of it which lies east of 100° W. long. is in general about 6500 feet above the sea-level. Its surface is broken by single groups or short ranges of hills, which rise from 1000 to 1500 feet above the plain; but still there occur many level tracts of considerable extent and great fertility. This region contains numerous productive mines. The western and greater portion of the table-land (between 100° and 102° W. long.) is nearly a plain, rarely interrupted by hills. Its surface is on an average only 200 or 300 feet lower than that of the eastern portion. The central part of it is occupied by one of the richest agricultural districts on the Mexican isthmus, known under the name of Baxio, which extends from the neighbourhood of Queretaro along the Rio Santiago westward for several miles west of Salamanca, and thence in a northern direction to Leon. Its length exceeds 100 miles, and its average width probably 30 miles. It is covered with corn-fields, which, being irrigated by canals, yield rich crops of Indian corn and wheat. In the other districts many sterile tracts occur, which are either covered with stones, and then called *pedregal*, or with lava, in which latter case they always receive in Mexico the name of *mal pais*. The remainder is rather fertile, but cannot be cultivated where there are no means for irrigation, as the rains are far from being abundant in this region. Where a depression occurs in which the rain-water accumulates, a stone wall is generally erected to prevent it from running off, and the artificial pond or tank so made is called *presa*. By far the greater part of the country however cannot be irrigated at all, and is used only as pasture-ground. Some of the cattle estates are of immense extent, and keep many hundred thousand head of cattle and sheep. On this table-land the *barrancas* are more frequent: they indeed occur in other parts of the isthmus of Mexico, but not in such number nor of such dimensions. A barranca is a depression in the level country, having always a steep declivity, and descending frequently 1000 feet below the general surface of the country. These depressions are sometimes three or four miles wide, and still longer: they are covered with trees of a vigorous growth, which form a striking contrast with the bare surface of the table-land. The climate of these barrancas is considerably milder than that of the country about them, and approaches in some cases to that of the tierras calientes. Vegetation follows the course of a small stream which runs in the centre of the barranca. Several small towns are built in these depressions of the table-land.

It is hardly possible to determine the western boundary of the plain of Queretaro, as it is not marked by a continuous ridge of hills. From about 101° 30′ W. long., and from that point where the Sierra Madre turns northward, the country descends very gradually to the west, but with a broken surface, so as to present a succession of hills and valleys with some intervening plains, usually of no great extent; the plains in some places occupy the summit of the higher country, and are called *mesa* (table-land). The descent terminates about the meridian of Zapotlan, or Zapotlanéjo (102° 30′), where the productions of the tierras calientes appear, and the general level of the country extending to the shores of the Pacific may be estimated at about 4000 feet above the sea. This region, called the Plain of Xalisco, cannot be called a table-land, as its surface is very uneven, being in many places intersected with hills, frequently rising to a great height, with a steep ascent, though flat tracts of great extent are numerous, among which that about the town of Guadalaxàra is distinguished by fertility. Though this region, as being among the tierras calientes, might produce most tropical plants, Indian corn and wheat constitute the principal articles of agriculture. The extent to which wheat is grown shows that the greatest part of this region cannot be below 4000 feet above the sea. In this country is the lake of Chapála, which is about 90 miles in length, and from 12 to 18 miles in breadth: the surrounding hills rise to a considerable elevation, and descend rapidly to the water's edge. The lake contains the island of Mescála, on which a number of Indians resisted the arms of the Spaniards from 1811 to 1814. The lake is noted for a kind of fish called *pescado blanco*, which occurs in most of the lakes of the table-lands, but nowhere attains such a size as in the lakes of Páscuaro and Chapála, whence it is sent to Mexico, slightly sprinkled with salt or preserved in snow.

The Rio Santiago, or Rio Grande, the largest of the rivers of the Mexican isthmus, principally traverses the regions just mentioned, having its mouth at S. Blas (21° 32′ N. lat. and 105° 18′ W. long.). This river rises in the highest of the table-lands, in that of Toluca, in a lake situated at the base of the range which divides this table-land from that of Tenochtitlan, and in an extensive morass surrounding the small town of Lerma, whence it is called, in the upper part of its course, Rio de Lerma. Its course across that region is rather gentle, until it breaks through the range of hills which separates the table-land of Toluca from that of Queretaro. It flows through the Baxio with a gentle course, and its waters are abundantly used for irrigation. Where it leaves the plain of Queretaro, it is closely hemmed in by precipitous mountains, full of rapids and bars, and runs quickly over a stony bed; in this part of its course navigation is entirely impossible, except for small canoes in the spaces between the rapids. On approaching the lake of Chapála its course becomes gentle, and before it enters the lake it passes through an extensive level tract, which is inundated by the river during the rains and is swampy all the year round. It enters the lake a few miles below La Barca, where it is 90 yards wide. The waters of the river may easily be distinguished from those of the lake, from which it issues on the north side not far from the town of Ocotlan, where it is 200 yards wide, and flows with an even and uninterrupted course to the Puente del Rio Grande, near Guadalaxara, where there occur in the space of less than three miles between fifty and sixty falls. Its course farther down, though less obstructed, is still very rapid, and at present at least not used for navigation. The course of this river considerably exceeds 400 miles in length.

The eastern part of the table-lands is drained by the river Panuco, which rises in the lake of Zumpango on the table land of Tenochtitlan. The waters of this lake are carried by the canal called the Desague de Huehuetoca to the Rio de Tula or Moctezuma [Mexico], which runs in a northern direction, inclining a little to the east to Tamasinchali, where it is called the Rio de S. Juan. From this place it passes in the same direction to Miraflores, S. Juan, and Tanquichi. In this latter part of its course the river, which near its source is extremely rapid and frequently rushes forward like a torrent, becomes more gentle, and canoes may ascend it to S. Juan; but above Tanquichi the rapids are numerous and violent. From the last-mentioned place to Panuco, a distance of 87 miles by the numerous windings of the river, it may be navigated by large boats. Between these places the Rio de San Juan is joined, from the west, by the river Tamoin, and after this junction it is called Rio de Panuco, and changes its northern course into an eastern one. Five miles above Panuco, a ledge of rocks runs across the river, which, except in the rainy season, has only four feet water on it, and thus prevents large vessels from ascending it farther. Schooners therefore can only sail as far as Panuco, which is 80 miles by water and about 40 miles by land from the sea. The course of the river below Panuco is exceedingly winding. It traverses a low and frequently swampy tract, covered with extensive forests, in which mahogany and different kinds of dye-wood are cut. At its mouth the river forms the harbour of Tampico. Its whole course, including the windings, can hardly be less than 400 miles.

The climate of these table-lands varies in proportion to their elevation above the sea. In those of Tenochtitlan and Tlascala, which are nearly equal in this respect, the mean annual temperature is 62°. In winter the thermometer generally ranges between 45° and 47°, and sometimes, though rarely, descends below 32°. In summer it never exceeds 75° in the shade. On the table-land of Toluca, which is the most elevated, the air is so cold during the greatest part of the day, that the thermometer generally varies between 42° and 46°, and even persons who have been brought up in northern regions find the climate very unpleasant. On the table-land of Valladolid, Mixtecapan, and Michoacan, which are considerably lower than Tenochtitlan, the mean annual temperature probably varies between 66° and 68°. All these countries, being more than 5000 feet above the sea-level, are called by the inhabitants Tierras Frias (cold countries). The winter is indeed not severe, but the summers are not warm. To the small difference of the temperature in the different seasons, and to the want of sufficient heat in summer, is to be attributed the fact that several plants do not grow in these countries, which thrive very well without the tropics and in places the mean annual temperature of which is considerably below that of the table-lands.

The seasons on the table-lands are only two, that of the rains (estacion de las aguas) and the dry season, or summer (el estio). The rains commence in June or July, and terminate in September or October; the rainy season consequently lasts only four months. The rains occur earlier in the countries approaching the eastern shores, and extend afterwards farther west. They are accompanied by thunderstorms, which are experienced successively at Mexico, Guadalaxara, and on the western shores. We are not acquainted with the quantity of rain which falls on any of the table-lands, but it is probably much less than that which falls on the low shores of the adjacent seas. The greatest quantity appears to fall along the range of the Sierra Madre and its branches. It would also seem that the table-lands which approach the Pacific have more abundant rains than those lying nearer the Gulf of Mexico. The table-land of Mixtecapan seems particularly favoured in this respect, as the rains begin in the month of May, and always continue to October; they are also more abundant. Though the rains are much less abundant on the table-lands than on the coast, they would be sufficient to maintain a vigorous vegetation, but for the rapid evaporation. To this must be added the peculiar nature of the soil, which covers rocks of a porous nature, by which the moisture is absorbed and carried too far below the surface; consequently all these table-lands have rather an arid soil, which can only be employed in the cultivation of grain where it can be watered; and even many of the rivers disappear in fissures of the rocks. The plains are entirely destitute of trees, but are covered with several kinds of cactus, a plant which grows best on an arid soil, and endures a considerable degree of cold. Forests of trees occur only on the hills and short ranges, which in several places are dispersed over the plains, and especially on their western declivities: the eastern declivities generally present bare rocks. For want of the means of irrigation, perhaps nine-tenths of the table-lands are only used as pasture, and the grass is sufficient for that purpose to the months of March and April, when the south-east wind, called viento de la Mistica, begins to prevail, which, being very dry and hot, withers the smaller plants and grass. In this part of the year the country has a very dismal aspect, and the cattle suffer much where there are no pasture-grounds that can be irrigated, until the beginning of the rainy season, when the surface of the ground is suddenly changed. The elevated table-lands of Mexico, like those of Tibet and Central Asia, which are still more arid, have also a large portion of their surface covered with muriate of soda and other saline substances, in the dry season, like a hoar-frost, which considerably diminish the productive powers of the soil.

The countries which are elevated from 2500 to 4000 feet above the sea-level, such as the broken region lying between the table-lands of Tenochtitlan, and Toluca and Michoacan on one side, and between the table-land of Mixtecapan on the other, and the uneven plain of Xalisco, are called Tierra Templadas. Their mean annual temperature amounts to between 75° and 78°, and they enjoy nearly a continual spring, as the difference of the temperature in the colder and hotter season does not exceed 8°, or at the utmost 10°. These tracts produce the tropical fruits and the sugar-cane in abundance; and, as well as the table-lands themselves, enjoy a very healthy climate all the year round, whilst the inhabitants of the low tracts along the coast are subject to dangerous diseases.

We pass to the countries lying to the north and east of the Sierra Madre. The country, which is bordered by this range on the south and west, is a plain of great length, terminating on the north on the banks of the Rio del Norte, between 30° and 32° N. lat., and at the Sierra de las Espuelas, the most northern offset of the Sierra Madre. Its length is nearly 700 miles. Its width, which between 22° and 24° N. lat. hardly exceeds 100 miles, widens considerably farther north, so that at 29° N. lat. it is probably more than 300 miles. The southern portion of this plain, as far north as a line drawn from Zacatecas on the west to Catorce on the east, may be on an average about 6000 feet above the sea-level. Its surface is in many places traversed by ranges of hills, running east and west, and its soil in general resembles that of the plain of Queretaro, but is not equal to it in fertility, a great portion of it being covered with sand, and other parts with stones. Some districts, being possessed of the means of irrigating the land, are distinguished by fertility, as the country about S. Luis de Potosí, and the Valle del Maiz, which lies on the banks of the Rio Tamoin, a tributary of the Rio Panuco. A great portion of the country serves as pasture-ground for numerous herds of cattle, sheep, and goats. The rains are less abundant than farther south, and fall mostly in October and November; the heat in summer is less and the cold in winter greater than on the table-land of Queretaro.

The northern portion of the plain is still less favoured by nature. Near a line drawn from Zacatecas to Catorce it is about 6000 feet above the sea-level, but in the neighbourhood of the Rio del Norte probably not more than 3000 feet. It suffers greatly from the scarcity of rain, which in the southern districts is far from being abundant, and north of 27° N. lat. is very rare. It is consequently badly supplied with water, the springs being few in number, and the water of a very disagreeable taste. This latter circumstance is principally owing to the soil, which contains a great portion of carbonate of soda. The plain contains numerous dry salt-lakes, whence large quantities of carbonate of soda are collected and taken to different parts of the republic for the manufacture of soap. All the rivers which water this plain rise along the eastern declivity of the Sierra Madre, and running northward, are lost in some lake having no communication with the sea, with the exception of the Rio Conchos, which rises with several branches between 26° and 28° N. lat., and falls into the Rio del Norte near 31° N. lat. In the southern districts are the Rio Grande de las Nieves, which runs about 300 miles, and loses itself in the lake of Parras, and the Rio Nasas, which after a course of about 200 miles enters the lake of Mapimi. In the northern districts are the Rio de S. Buenaventura, and the Rio de las Casas Grandes, which run hardly more than 100 miles, and fall into the lakes of S. Maria and of Guzman. The cultivable land of this plain is limited to the river bottoms, which extend from two to four miles along the banks, and produce Indian corn and other grain. In the valley of the Rio Nasas much cotton is grown, and in the neighbourhood of the lake of Parras are extensive vineyards, from which a good wine is obtained. All the extensive tracts which separate the river bottoms from one another are level, and consist mostly of a firm soil, the sandy or stony tract being rare and of comparatively small extent; but they are quite destitute of wood or even shrubs, and in certain seasons even dry grass is rare. Gales of wind are very frequent, and from whatever point of the compass they blow, they are very cold and raise immense clouds of dust filled with saline particles. The last-mentioned circumstance is considered as the cause of the insalubrity of this region. Within this plain is situated a mountainous region, called the Bolson di Mapimi, which occupies the tract of land extending from the northern shores of the lake of Mapimi to the banks of the great southern bend of the Rio del Norte. But its extent to the east and west is imperfectly known. It is in possession of an unsubdued tribe of natives, called the Appaches, and has never been examined by European travellers, but it is said to contain an abundance of metals, which have never been worked.

The Sierra Madre, which extends along the western side of this plain in a north-western direction, lowers towards it with a gradual descent, or, more probably, in terraces, separated from each other by abrupt declivities, and traversed by deep and steep transverse valleys. The crest of the chain is situated towards its western declivity, and between the ridges which compose the mountain-region are longitudinal valleys, narrow, but of considerable extent, which contain rich mines. Towards the plains, which lie along the Pacific, the descent is very rapid, and only furrowed by ravines.

The country between the Sierra Madre and the Pacific is naturally divided into two different regions, the plains of Cinaloa and the hilly region of Sonora. The former extends between 24° and 28° N. lat., and the latter between 28° and 32° N. lat. The plains are perfectly level, and only hills of moderate elevation divide them from the Sierra Madre. Their soil consists of a sandy clay, almost without a pebble, which is fertile wherever it is irrigated; but as this country has not been in possession of the Spaniards much more than a century, agriculture has not yet made much progress. The rains set in regularly on the 24th of June, and last about two months. The greatest heat is experienced before the rains, from the month of March, when the country is parched up and resembles a desert. The rivers running across the plain flow in beds considerably below its surface, and it does not appear that even after the most abundant rains they rise high enough to water the adjacent tracts. The most considerable of these rivers are the Rio de Culiacan, the Rio del Fuerte, and the Rio Mayo, each of which may run upward of 100 miles in a wide and deep bed. The greater part of the plain seems to be considerably elevated above the sea, as there is a sensible descent some miles in length from it to the low and sandy tracts which skirt the shore.

Sonora, which begins at some distance north of the Rio Mayo, has likewise a tract of level and low land along the sea, but it soon rises to some elevation, and then extends nearly on a level many miles inland. This part of the country is rather sterile, but more from want of moisture than from want of good soil, which resembles in every respect that of the plain of Cinaloa. The hilly country begins from 30 to 40 miles from the shore, and is traversed by several ridges running south and north, parallel to the Sierra Madre. It is not yet known how they are connected with the principal mountain-chain. In some places the hills rise to the height of mountains, but their elevation has not been ascertained. Between these hills run rivers in valleys, generally several miles wide, and possessed of a considerable degree of fertility. The largest is the river Yaqui, which is formed by two branches: the Rio Babispe, flowing along the base of the Sierra Madre southward, and the Rio Oposura, which runs parallel to it farther west. The first runs about 200 miles, and the second 120 miles, before they unite upon emerging from the hilly region. After their junction they take the name of Rio Yaqui, and flow about 150 miles more, until they fall into the Gulf of California, south of 28° N. lat. The central districts of Sonora are also traversed from north to south by the rivers Arispe and Dolores, which flow parallel to each other until they unite a few miles above the town of Pitic at S. Jaunitz; a few miles below Pitic the united river enters a lake of some extent, which has no communication with the sea. The whole course of this river may be about 200 miles. In the north-western corner of Sonora is the Rio de S. Ignacio, which runs more than 100 miles, and is likewise lost in a lake. None of these rivers are navigated, but they are used to irrigate the valleys, in which maize and wheat are grown to a considerable extent. Without this irrigation the country would be a desert, as the rains, which come in September, do not last more than four weeks, fall only in short showers, and are very irregular and uncertain. It would seem that in the most northern district there is no rain at all. As this part of the Mexican States is situated within the temperate zone, it partakes of the great changes in temperature which commonly occur in these countries. The thermometer ranges during the year between 30° and 95°. During the northern and north-eastern winds, which blow from the Rocky Mountains, and probably pass over elevated plains, it sometimes freezes every night for several weeks at Pitic (29° N. lat.), and the thermometer then sinks as low as 18° in the night-time. It seems that frost occurs in these parts every year. But the summer is excessively hot, and the hot weather continues for several months: the rains take place much later here than farther south.

The countries hitherto described are situated on the Mexican isthmus, which is divided from the main body of North America by a plain extending from the shores of the Pacific eastward to the lower course of the Rio del Norte, between 32° and 33° N. lat. This plain seems to be interrupted by two mountain-groups only: one of them, the Arizona, is situated near 109° W. long., and noted for the fabulous stories of its great wealth in the precious metals; the other occurs near the bank of the Rio del Norte, where the river begins to flow in a south-south-eastern direction, and is called Sierra del Florido. Nothing is known of these mountain-groups. The plain is drained by the river Gila, which runs more than 500 miles in a western direction, and unites with the Rio Colorado near its embouchure in the Gulf of California. It rises in the Sierra de Mogollon, the most southern extremity of the principal range of the Rocky Mountains; and though it may have a considerable volume of water in its upper course, it loses it imperceptibly by flowing through an arid plain of great extent, in which not a drop of rain falls during the whole year, and in which it does not seem to be joined by any tributary of importance. The plain itself is a desert, in which only a few families of the Appaches lead a wandering life. An exception however is to be made in favour of the district where the extensive ruins called Casas Grandes (near 110°) are found, as such ruins generally occur in spots favoured by natural fertility.

The Mexican States extend much beyond this natural boundary, and comprehend a considerable portion of the mainland of North America, namely, the two Californias; the unknown region extending between Upper California and the Rocky Mountains; the Vale of the Rio del Norte, or New Mexico; and Texas, or the country extending east of the Rocky Mountains to the boundary-line of the United States of America. As to the Californias, see CALIFORNIA, vol. vi., p. 158. Of the country lying north and east of Upper California little is known: two lakes of great extent are stated to occur in it, of which one is said to be salt. The reports of the monks respecting this wide tract are mentioned in the article COLORADO. We shall conclude our survey with New Mexico and Texas.

New Mexico is a valley of great extent, included by the two mountain-ranges with which the Rocky Mountains terminate on the south. The western range, called Sierra de Mogollon, commences about 34° N. lat., and is in the plain which lies along the upper course of the Rio Gila. It is not known if this range is connected with the Sierra del Florido, which is about 80 miles south-south-east of it. The other range, called Sierra del Sagramento, rises farther east, opposite the mountain-region called the Bolson de Mapimi, in the most southern bend of the Rio del Norte, near 29° N. lat., and extends northward to 40° N. lat., where it joins the Sierra de Mogollon. Both ranges run nearly parallel to one another, from 34° to 40° N. lat., and the long longitudinal valley between them is New Mexico. Its southern district, between 34° and 35° 30′ N. lat., is a desert, covered with arid hills, which come close up to the banks of the river, and are nearly without vegetation, except in some narrow valleys traversed by rivulets. This district is called Deserto del Muerto. The northern district, between 35° 30′ and 38° N. lat. is a valley, from 20 to 40 miles across: this part has been settled, and produces grain enough for the consumption of the population. But the greatest wealth of the people consists in their pasture-grounds, which feed numerous herds of sheep, their plantations of tobacco, and the wild animals which inhabit the adjacent mountains. The most northern part of the valley, between 38° and 40° N. lat., is uninhabited, probably on account of the severity of the climate, which even in the settled part is so great that the Rio del Norte, though a rapid river, is annually covered with ice for several months. This circumstance is partly to be attributed to the ranges enclosing the valley, which in some places are covered with eternal snow, but chiefly to the elevation of its surface, which Humboldt thinks cannot be less than from 2000 to 2500 feet, an estimate probably rather below than above the truth. Rain is very scarce and usually falls only once a year, and in some years no at all; the snow however, which covers the ranges to th month of June, supplies the soil with the moisture requisite for the growth of grain and grass.

The Rio del Norte, also called in its lower course Rio Grande, and on the maps incorrectly Rio Bravo, is the largest of the rivers of Mexico. Humboldt estimates its course at nearly 1400 miles. It rises in the most northern angle of the Vale of New Mexico, near 40° N. lat., not far from the sources of the Arkansas, a tributary of the Mississippi, and of the Rio Colorado, which falls into the most northern recess of the Gulf of California. The Rio del Norte runs southward from 40° to 29° N. lat., and even in the vale of New Mexico is a considerable river, which has water enough for small boats, but is not navigated. In the mountains between 35° 30′ and 34° N. lat. it seems to be too full of rapids to permit of any kind of navigation. Where it enters the plain, south of 34° N. lat., its waters are abundantly used for irrigating the fertile district which surrounds the Passo del Norte, and its water is considerably diminished. Afterwards it receives a small supply of water by the Rio Conchos: and after having changed its course by a great bend to the east and north-east, it receives a larger supply by the Rio Puerco, which runs in a longitudinal valley east of the Sierra de Sagramento; but as its course lies through an arid plain, which is rarely refreshed by abundant rains, the volume of its waters is too small even for small craft, until it has changed its course to the south-east, and has arrived at the Presidio de Rio Grande, about 200 miles from its mouth. At this place or in its neighbourhood, as it seems, the river leaves the elevated plain and descends into the lower country which extends along the shores of the Gulf of Mexico, and from this place downward it may be navigated by small boats. The waters of the Rio del Norte rise, as those of many other rivers, annually: this rise begins in the month of April, is highest in May, and at the end of June the waters attain their greatest height. This change is owing to the melting of the snow on the surrounding mountains. The rise of the water is not perceptible in the lower course of the river. The mouth of the river is south of 26° N. lat., at Braxos de Santiago, and about twenty miles below Matamoros, to which town vessels of small burden may ascend; but larger ones cannot enter the river on account of its bar and of numerous shoals.

The country east of the Sierra del Sagramento, and north of the lower course of the Rio del Norte, which is comprehended almost entirely under the name of Texas, differs greatly in its natural features from all other parts of the Mexican States. That portion of it which lies along the Sierra del Sagramento and extends eastward to 102° W. long. is considerably elevated above the sea, probably not less than 2000 feet. Its northern portion, embracing the country on both sides of the Red River as far north as the Arkansas, is an extensive plain, considerably elevated above the watercourses, along the course of which are bottoms of moderate extent, covered with trees of heavy growth, which indicate a considerable fertility of the soil; but the spaces between these river-valleys have an arid though commonly a firm soil, which is covered with vegetation only in the early season of the year, and on the approach of summer is deprived of it. Like the extensive plains along the base of the Rocky Mountains, it wants water and wood, and seems to be incapable of cultivation. This region is joined on the south by an extensive tract of mountainous country, called the hills of San Saba, which is connected with the Sierra del Sagramento, and extends southward to the mouth of the Rio Puerco. Its eastern offsets extend to the meridian of 100°. The mountains probably do not rise above their base more than 2000 feet; but this is only a supposition, as the whole region, being in possession of a tribe of natives, the Comanches, who are enemies to the white settlers, is unknown. In this mountain-tract most of the large rivers that water Texas take their origin. Between this region and the elevated plain on the Red River a salt swamp of great extent is stated to exist, in which one of the branches of the Rio Brazos rises. When the salt, which crystallizes on its surface after long dry weather, is dissolved by abundant rains, the water of the Rio Brazos becomes brackish.

The remainder of Texas, included between the meridian of 100° N. lat., the Red River on the north, the Sabine on the east, and the Gulf of Mexico and Rio del Norte on the south, is considered one of the most fertile countries of North America. The coast is low, and skirted by a number of long flat islands, separated from the main by narrow straits; but these straits are much deeper than those farther south, and afford in several places good anchoring ground for vessels of moderate size; so that Texas has more and better harbours than all the Mexican States on the Gulf of Mexico taken together. The bars on the rivers have deeper water on them, probably because their course is less rapid and their waters less troubled, as they do not descend from countries at a great elevation above the sea-level.

The low country along the coast extends about ten or twelve miles inland; it is not, like the country south of the Rio del Norte, a sandy desert without vegetation, but suffers rather from superabundance of water, being a great part of the year inundated or in the condition of a swamp. Behind this low swampy tract the country rises imperceptibly for some miles, and then appears to stretch out in a wide plain with a nearly level surface. The width of this plain varies considerably, as its northern and western borders form nearly a crescent. Near the boundary-line of Louisiana it is from 40 to 50 miles wide. At the north-western corner of the Gulf of Mexico, between the rivers Trinidad and Guadalupe, its width is stated to be 70 or 80 miles; but on approaching the Rio del Norte it narrows to 20 or 25. This plain is from 10 to 30 feet above the water-courses, and with the exception of the low bottoms along the banks of the rivers, it is not subject to inundation. The tide, though it varies only from two to three feet, ascends the rivers to the distance of 45 or 50 miles from the sea in a straight line. The whole of this plain is wooded, with the exception of the highest tracts of land between the rivers, which are destitute of trees, and exhibit fine prairies. The forests consist of different kinds of oak, hickory, iron-wood, sugar-maple, and other useful trees, which are found in the southern states of the American Union. It is supposed that the whole of this tract might be cultivated and changed into an immense field, producing cotton, sugar, Indian corn, tobacco, wheat, and every kind of plants and fruit-trees which grow in the temperate zone and on the borders of the tropics, whilst the prairies, which hardly occupy one-fifth or sixth of the region, would, in their natural state, serve as pasture-ground for cattle.

The country at the back of this plain is less favoured by nature, the proportion between the cultivable land and the prairies being nearly inverted. The former is chiefly limited to the bottoms of the rivers, which are numerous, and generally wide, so that they perhaps occupy one-fourth of the surface. Their soil is alluvial, and in the present state covered with trees of large growth, a certain indication of great fertility. As the rivers are not impeded in their course, and have sufficient fall to draw off the superabundance rapidly, the inundations are of short duration, and serve only to impart new vigour to the soil. The country between these bottoms generally rises from them with a gentle acclivity to an elevation of 200 to 400 feet, and presents for the most part an undulating surface, on which isolated hills of moderate elevation are dispersed. By far the greatest part of this tract is destitute of trees, which occur only in isolated clumps, and at considerable distances from one another. The most extensive of these wooded islands cover the bases and declivities of the hills. The remainder of the country is covered with grass, which affords excellent pasture. As the grass maintains its verdure for many months, it appears that the soil is less arid and destitute of moisture than farther north, or on the table-lands of Mexico, and it is thought that extensive tracts of it may be cultivated with wheat or other grains. The least fertile district of this tract occurs about the sources of the Sabine river, where the country rises into hills, covered with a light sandy soil and overgrown with pine-forests. It resembles that part of Louisiana which lies between the Red River and Arkansas west of Natchitoches.

Texas owes its great capability for agricultural purposes to its numerous rivers and the regularity of their course. These rivers, when the country shall be well settled and cultivated, will materially contribute to its prosperity, as all of them, even those which run only fifty miles, are navigable for small craft in the greatest part of their course. The most remarkable of these rivers from west to east are—the Rio Nueces, which flows about 250 miles with a general south-eastern course; the Rio Guadalupe, which is nearly as long, and which falls into a lagune forming the harbour of Espiritu Santo; the Colorado, which traverses in its upper course the mountain-tract of San Saba, flows upwards of 400 miles, and falls into the lagune constituting the harbour of Matagorda; the Rio Brazos, or Brazos de Dios, whose origin is near to that of the Red River, and which, flowing chiefly in a south-south-easterly direction, intersects nearly the centre of Texas and the most fertile districts. It enters the sea after a course of more than 400 miles, forming at its mouth a harbour, with a bar on which only from three and a half to five and a half feet of water are found. The Rio Trinidad, after a course of more than 300 miles in a south-south-easterly direction through a very fertile tract, falls into Galveston Bay. As to the Red River and Sabine River, which separate Texas from the United States of North America, see LOUISIANA.

Productions.—As there is so great a difference in the climate of the different regions of Mexico, there must be a corresponding variety in their productions. Humboldt asserts that within these states almost all the vegetable productions may be grown which are found between the equator and the polar circle. The agricultural productions which actually are grown prove the justice of this observation. On the highest of the table-lands, that of Toluca (9000 feet) wheat does not succeed, nor does it succeed in Europe beyond 60° N. lat. On this table-land agriculture is limited to the cultivation of barley and the plantations of the American aloe, which may be considered as the vineyards of Mexico, the juice of this plant being converted into a kind of wine, called *pulque*. [AGAVE.] It is however remarkable that Indian corn grows on this table-land, a circumstance which shows the difference in the climate of countries which have a great elevation above the sea, and those in which it depends on geographical position only. Most of the table-lands however are from 6000 to 7500 feet above the sea; and as their climate may be compared with that of the southern countries of Europe, we find that they produce all the cerealia of Europe, with the exception of oats, which are not used, as horses in Mexico are fed on barley. The fruits also are those of Europe, as cherries, peaches, plums, apricots, apples, pears, figs, and pomegranates. The vegetables too are those of Europe, among which capsicum, called *chile*, is most abundantly grown, as it is used all over the country nearly as salt is in Europe. The plantations of American aloes on these table-lands are also very extensive. The difference between the agricultural productions of the Tierras Templadas and Calientes is not well established. Maize is grown everywhere, and constitutes the principal food of the lower classes; and it is the only grain which is cultivated for food, rice being only grown to a small extent in the wet countries along the Rio Huasacualco. But the plantations of plantains and those of manioc are extensive; and besides these, Oxalis tuberosa, Dioscorea alata, and batatas are cultivated on a large scale. Oranges and lemons, which do not succeed on the table-land, are abundant in the Tierra Templadas; and besides these, many fruits of hot countries, especially pine-apples, guavas, and others.

The agriculture of the table-lands does not supply any article for exportation. Cotton is grown along the shores of the Pacific, and in the valley of the Rio Nasas, in a deep depression of the northern table-land; and coffee on the eastern coast, west of the town of Vera Cruz; sugar is cultivated in many places, and a considerable quantity is exported: cocoa is collected in the low country along the river Huasacualco; and indigo along the southern coast, but only for home consumption. Tobacco, which in many parts succeeds very well, is only permitted to be grown in certain places, as government, which derives a considerable income from a heavy duty laid on its consumption, has limited the cultivation to certain spots to prevent all evasion of the tax. Three plants grow wild in the forests, at the base of the steep ascent which divides the low eastern coast from the table lands, and supply articles of export—the jalapa, sarsaparilla, and the vanilla.

All the domestic animals, which have been brought over from Europe by the Spaniards, have multiplied greatly in Mexico, owing to the wide tracts which are not or cannot be cultivated, and which afford pasture-ground for nine or ten months of the year. Cattle is abundant, both on the table-lands and the lower tracts; among the latter, especially on the wet plain of Tabasco and the arid plain of Yucatan. Jerked beef and horns are exported. Sheep are numerous on the table-lands, especially on the northern, which are much drier; and wool is an article of exportation. Horses abound generally, and in the north-eastern provinces a great number are found in a wild state: they are easily taken and broken in. Horses and mules are exported in great numbers to the United States. On the great plains bordering on the Red River and Arkansas the American buffalo abounds. In winter the buffaloes traverse the hills of San Saba, and pasture on the plains along the lower course of the Rio del Norte. Carnivorous wild animals are not numerous. Game is abundant, especially deer and hares. Among the birds are various kinds of parrots, mackaws, and humming-birds. The lakes abound in fish. Bees seem to abound on the peninsula of Yucatan, and the cochineal insect is reared with great care on the table-land of Mixtecapan, whence by far the greatest part is brought to the market of the world. In the Gulf of California pearl shells are found, and formerly many pearls were collected, but it seems that this branch of industry has declined.

Mexico is noted for its mines of gold and silver. The gold-mines occur chiefly on the western side of the Sierra Madre, north of 24° N. lat.: the silver-mines are richest on the mountains which rise on the table-lands, and in those which border their margin. During the civil war, which began in 1810 and lasted for many years, the greatest part of the mines were neglected. Their working was however renewed in 1825, chiefly by the English mining companies which sprung up about that time. Before that event (from 1810 to 1825), the produce was much less than it had been before 1810. Since the year 1825 it has considerably increased, though not so much as was expected. Besides the precious metals, Mexico has abundance of copper, iron, and lead, which are worked. The iron-mines however have only been opened since the year 1825. A quicksilver-mine is worked at S. Onofre, on the northern declivity of the Sierra Madre, in the state of Queretaro. Tin is also stated to exist. The carbonate of soda, called *tequesquite*, which is necessary for the smelting of the silver ore, is collected in several lakes, where it is found crystallized on the surface in great abundance. It is also common in most places of the table-land in the upper layers of the soil, where it appears in the state of an efflorescence in the month of October, after the rains have ceased.

Inhabitants.—The population of these states is composed of creoles or descendants of Europeans, of Indians or natives, and of those of mixed blood. The number of Europeans, who are called *Gachupines*, and formerly amounted to 80,000 individuals, has been much reduced by the expulsion of the natives of Spain; and though many individuals of other nations, especially Englishmen, have settled in these states during the last twenty years, it is supposed that the whole number of Europeans hardly amounts to more than 20,000 or 25,000.

The bulk of the population still consists of the descendants of those nations which inhabited the country at the time of the Spanish invasion. Humboldt thought that they constituted two-fifths of the whole population; but as he asserts that no natives were mixed up with the white population in Sonora, where modern travellers have found that they really constituted more than half the number of the inhabitants, it is probable that the natives form one-half of the whole population, especially if we take into the account the numerous tribes which occupy the large tract of unknown country between Upper California and the vale of the Rio del Norte, and which are computed to amount to 300,000 individuals; though this number is probably exaggerated.

The aboriginal tribes of America resemble one another in the principal features of their face and body, which, according to Humboldt, are the following: the colour of their skin approaches that of copper; their hair is black, lank, and so smooth, that it always appears as if it had been wetted; and they have little beard. Their figure is rather short and stout; their eyes small, long, and a little raised towards the temple-bones, as in the tribes which belong to the Mongol race. Their cheek-bones are prominent, their lips thick, and their mouths exhibit an expression of softness, which forms a strange contrast with the rigidity of their looks. Though they thus greatly resemble one another in personal appearance, the tribes into which they are divided speak languages which are said to differ as far from each other as the English from the Russian. Humboldt states that twenty languages of this description were spoken within the territories of the states south of 33° N. lat.; but it would seem that he has not comprehended in this number the eight nations which live within the boundary of Sonora, or the northern portion of the state of Occidente. The number of tribes which are still entirely independent, and live north of 33° N. lat., is not known, and seems to be very great. The language which is most extensively spoken is that of the Azteks, which seems to be understood by nearly all the tribes which inhabit the country between 18° and 23° N. lat. The language of the Otomites, which is spoken in the countries along the Pacific between 20° and 24° N. lat., is remarkable for its structure, which resembles that of the Chinese language, being composed of monosyllables. (Naxera, *De Lingua Othomitorum Dissertatio*, Philad., 1835, and *London Geographical Journal*.) Next to the language of the Azteks, that of the Otomites is the most widely spread.

The natives who have submitted to the dominion of foreigners have attained different degrees of civilization. Those who inhabit the country between 18° and 23° N. lat. were, on the arrival of the Spaniards, subjects to the kings of Tenochtitlan and Michoacan, or united in the republics of Tlaxcallan (Tlascala), Huexochingo, and Chollollan, and had then attained a considerable degree of civilization, as is proved by the ruins of their religious buildings, or *teocallis*, their causeways and dikes, their hieroglyphics, paintings, and sculptures; and though the objects of their agriculture were only few in number, their cultivation was extensive, and carried on with considerable care. They submitted to the conquerors, and continued to cultivate the ground on which they were born. Their present condition is not worse than that of the lower classes who cultivate the ground in most parts of the European continent, but they appear to have fewer wants, and accordingly indulge more in indolence. Among them are some very rich families, but they are not distinguished by their mode of life or their dwellings from the other members of their tribe. In most places they live mixed with the whites and metis; in others they occupy large tracts, to the exclusion of all foreigners. The countries north of 24° N. lat. were inhabited at the time of the conquest by tribes resembling those of the United States of North America. They had no fixed dwellings, and lived mostly on the produce of the chase; and as this produce could not be abundant in countries whose vegetation is so scanty, and which are destitute of trees, their numbers were small, and they speedily retired from the large plain east of the Sierra Madre to the mountain-tract called the Bolson de Mapimi, where they still continue their savage life. They have also disappeared from the plain which extends along the Pacific to the Rio Mayo. In these two plains a few natives are only found along the southern boundary-line, and these seem to have settled there since the conquest. But in the hilly tract north of the Rio Mayo the natives resisted the invasion of the Spaniards, and were only subjected by the Jesuit missionaries. The padres accustomed them to a civilised life, and taught them the principal mechanic arts: their success here was hardly inferior to that which they had in the famous missions of Paraguay. Though these Indians inhabit the same country with the numerous white families which have spread among them, they live in separate places, and no close intercourse exists between them, except for the purposes of trade. In the arts of domestic life they seem to approach nearer to the Europeans than the Azteks, and they certainly exhibit a greater degree of energy and mental power than the last-mentioned nation.

The *Indios Bravos*, or savage tribes, inhabit the countries north of 33° N. lat., along the Rio Gila, the Bolson de Mapimi, the mountain-ranges which include the vale of the Rio del Norte and the north-western district of Texas. Many of them, especially the Appaches and Comanches, the most numerous of the tribes, were and still are at open war with the white settlers. For the protection of the latter the Spaniards erected presidios: a presidio consists of a wooden wall of a quadrangular form, within which the houses are built, and the gates are shut at sunset. They are inhabited by a few white families and a small number of soldiers for their protection. The inhabitants of the presidios cultivate the adjacent grounds, and keep large flocks of cattle and sheep, but do not venture to pass the night without the walls. The Indios Bravos generally live on the produce of the chase, and are most numerous in the tracts which are visited by the buffaloes. It does not seem that they cultivate the ground. Where the states of Yucatan and Tabasco border on Central America there is still an independent tribe, the Mayas, who speak a language different from that of the Azteks, and have made some progress in civilization: they cultivate maize, cocoa, and tobacco, and clothe themselves with cotton and the bark of the India-rubber trees, but they still depend principally on fishing and hunting for their support.

The mixed race is mostly composed of the descendants of Europeans and the aboriginal tribes: these are called *Metis*, or *Mestizos*, and constitute more than one-fourth of the population. The descendants of Africans and Indians, and of Africans and Europeans, are much fewer. The former are called *Zambos*, and the latter *Mulattos*. In the neighbourhood of Acapulco there are a few Chinese and Malays, who have emigrated from Asia. There are very few negroes in this country.

The whole population, which probably at present considerably exceeds seven millions, is composed of these different elements, according to a rough estimate, in the following proportions:—

Aboriginal nations . .	3,500,000
Mestizos . . .	2,000,000
Mulattos and Zambos . .	600,000
Creoles, or descendants of Spaniards	1,200,000
Europeans . . .	25,000
	7,325,000

Political Division and Towns.—The confederation called the United Mexican States consists of nineteen republics or states, besides three territories, and an immense tract of country which has not been annexed to any of them. According to an estimate, the states contain the following number of inhabitants and extent in square miles:—

	Population.	Extent in sq. miles.	Number of Inhabitants on a sq. mile.
1. Chiapa . .	130,000	38,500	4
2. Yucatán . .	520,000	48,500	11
3. Tabasco . .	55,000	10,500	5
4. Oaxaca . .	600,000	34,500	17
5. Vera Cruz .	250,000	22,000	11
6. Puebla . .	820,000	21,000	39
7. Mexico . .	1,200,000	30,000	40
8. Michoacan .	450,000	26,500	17
9. Xalisco . .	800,000	74,500	10
10. Guanaxuato .	450,000	8,600	52
11. Queretaro .	230,000	15,500	15
12. S. Luis de Potosi .	220,000	17,500	13
13. Zacatecas .	275,000	18,500	15
14. Durango .	200,000	56,500	4
15. Occidente .	180,000	148,000	1¼
16. Chihuâhua .	120,000	72,500	1½
17. Cohauila with Texas	46,000	136,500	⅓
18. Nuevo Leon .	85,000	20,000	4
19. Tamaulipas .	60,000	40,000	1½
	6,691,000	833,600	8

To these the territories are to be added:—

	Population.	Extent in sq. miles.	Number of Inhabitants on a sq. mile.
1. The territory of Santa Fé, or New Mexico	45,000	45,000	1
2. Territory of Lower California .	4,000	30,000	⅛
3. Territory of Upper California, comprehending the whole country north of the Rio Gila, and between the Pacific and the mountains, including the vale of Rio del Norte	325,000	600,000	
	374,000	675,000	

1. The state of Chiapa, called also Las Chiapas, comprehends the whole of the western declivity of the table-land of Guatemala, as far as it belongs to the Mexican States,

and a portion of the plain of Tabasco, the river of that name forming for a considerable distance the boundary-line between Chiapa and Tabasco. Though its soil is in general fertile, and the climate favourable to the growth of tropical productions, it does not appear to contribute any article to commerce, except logwood, which is floated down the rivers Usumasinta and Tabasco to Villa Hermosa. Near the banks of the Rio Chacamas, a tributary of the Usumasinta, are the ruins of Palenque, in a country which at present is a desert overgrown with trees. They are stated to extend for more than twenty miles along the summit of a ridge, and, as far as can be inferred from their architecture, they seem to owe their origin to a people more resembling in taste the Europeans than the Azteks. This state formed a part of Central America up to 1825, when it was united to Mexico, without the republic of Central America having renounced its claims on it. The capital is Ciudad de las Casas, formerly Ciudad Real, in a very fertile country, with about 4000 inhabitants. It has a college for Catholic clergymen, and a monument has been erected here to the famous Las Casas, the protector of the Indians, who was bishop of this province, and died in 1566. Some other places are still more considerable: as Chamula, with 6000 inhabitants; S. Bartolomeo de las Llanos, with 7500 inhabitants; Commitan, with 6000 inhabitants; and Tuxtla, with 4500 inhabitants.

2. The state of Yucatan comprehends the peninsula of that name as far south as 18° N. lat. It exports much campeachy-wood and fustic, which grow mostly on the eastern coast, and also on the western, south of 20° 30′ N. lat., and also a considerable quantity of bees-wax. The Mayas, who live in a state of independence, occupy its southern district. The rivers Champoton and Pacaitun are navigable, for small craft, for many miles inland. The capital is Merida, with 28,000 inhabitants, situated on an arid plain about twenty-five miles from the sea. It carries on a considerable commerce by means of the harbour of Sizál, which is properly only a roadstead formed by a sand-bank called Bajo Sizál, twelve miles long. Farther east is Valladolid, with a population of 3000 inhabitants, in a district in which much cotton is grown. On the eastern coast is Salamanca de Bacalar, with 2000 inhabitants, whence much mahogany and fustic are shipped to Belize. On the western coast is Campeachy [CAMPEACHY], and a number of populous villages inhabited by Indians.

3. The state of Tabasco extends over the greater part of the low plain, from the lake of Terminos on the east, to the Rio de Huasacualco on the west. It is traversed by the Rio de Tabasco. It exports cocoa, coffee, Tabasco pepper, indigo, and vanilla. The capital is Villa Hermosa, also called San Juan Bautista, on the river Tabasco, about fifty miles from the sea, to which place vessels of moderate size may ascend the river. It carries on some commerce, and contains 8000 inhabitants.

4. The state of Oaxaca extends over the whole of the table-land of Mixtecapán, and is rich in agricultural products: the industrious inhabitants rear the cochineal-insect and the silkworm, and apply themselves to the cultivation of indigo. It has some mines of gold and silver in the mountain-ridge which separates it from the low plain of Tabasco, but they do not appear to be rich. This state contains several antiquities, among which are the ruins of the palace at Mitla, which differ from the ruins of the edifices erected by the Azteks, and approach in style nearer to those of Greece. They lie on the table-land, 5300 feet above the sea. The capital, Oaxaca, which contains 40,000 inhabitants, is built in a depression of the table-land, 4800 feet above the sea-level. It is well-built, has fine houses, squares, and aqueducts, and contains some manufactures of sugar, chocolate, and silk. Tehuantepec is situated about ten miles from the sea, on a plain on which indigo and cocoa are grown, and salt collected in the lagunes which skirt the sea. It contains about 7000 inhabitants, and carries on some commerce by the harbour called Ventosa, or Tehuantepec Road, which is only an open roadstead, but has good anchorage.

5. The state of Vera Cruz comprehends the whole coast of the Gulf of Mexico, from the river Huasacualco on the south-east, to that of Panuco on the north-west, and, in some parts, extends over the mountains which border the table-lands on that side. Accordingly it exhibits a great variety in climate and vegetation: its most elevated parts are covered with pine-forests. Within its boundary-line are situated the Peak of Orizava, the Coffre de Perote, and the small volcano of Tuxtla. Its commercial products are sugar, coffee, jalap, sarsaparilla, and vanilla. Tobacco is extensively grown. In the northern districts of this state, in a forest near the village of Papantla, is a pyramid built of hewn blocks of porphyry, which are worked with great care and skill. The capital is Vera Cruz. [VERA CRUZ.] Alvarado, about three miles from the mouth of the Rio Alvarado, is a small town, which however carries on some commerce, its port being good, of sufficient space and depth, and well defended from the winds; but the bar at the entrance of the river does not admit vessels that draw ten feet of water. The harbour of Huasacualco, at the mouth of the Rio Huasacualco, has still less water, and is little frequented. At the most northern extremity of the state is the town of Tampico, or rather Pueblo Viejo de Tampico, built on the border of a large shallow lake, the Laguna de Tamiagua, which communicates with the Rio Panuco near its mouth. It contains about 4000 inhabitants, and is ill-built. It carries on a considerable commerce, which however has lately decreased since the new town, called Pueblo Nuevo de las Tumaulipas, has been founded on the northern side of the river, about three miles from it. In the interior of the state are the towns of Cordova and Orizava, built near the base of the steep ascent, each containing about 3000 inhabitants; in their neighbourhood much tobacco and coffee are grown. On a level spot, situated on the steep ascent, is the town of Xalapa, or Jalapa, 4335 feet above the sea-level, in a very beautiful country: it contains 13,000 inhabitants. To this place the merchants of Vera Cruz retire when the vomito prieto is raging along the coast.

6. The state of Puebla comprehends by far the greatest portion of the table-land of Tlascala, and also a considerable portion of the lower but very hilly country, which extends to the Pacific, between the table-land of Mixtecapán and those of Tenochtitlan and Michoacan. It contains the elevated peaks of the Popocatepetl and Istaccihuatl. Near the town of Cholula are three remarkable antiquities. [CHOLULA.] The western and southern districts are fertile and well cultivated. In the country about the capital great quantities of carbonate of soda are collected; but this state does not produce any article for exportation. Puebla, the capital, formerly called Puebla de los Angelos, is built in a well-cultivated plain, on the south side of a hill which is wooded to its summit. The houses are all of stone, large, and commodious. The churches and convents are very numerous, and generally well built. The cathedral is considered the finest and most magnificent edifice in the whole republic, and very rich. The town contains between 50,000 and 60,000 inhabitants; it has some manufactures of cotton, wool, and earthenware, which however have greatly declined since the commerce of Mexico has been thrown open. Its trade with the neighbourhood is considerable. South-east of it is the town of Tehuacan, which is stated to contain a population of 10,000. North and north-east of Puebla are the towns of Tlascala (4000 inhabitants) and Huamantla (3000), whose inhabitants, with those of the country about it, enjoyed some privileges before the revolution. For a notice of Cholula see CHOLULA.

7. The state of Mexico comprehends the two table-lands of Tenochtitlan and Toluca in all their extent, the north-western part of the table-land of Tlascala, and a considerable part of the lower but much more hilly country, which lies to the south of the two first-mentioned table-lands, and extends from them to the Pacific. The river Bolsas drains its southern districts, and the Rio Santiago rises in the north-western, under the name of Rio de Lerma: not far from the morass, in which it takes its origin, is the Nevado de Toluca. Though nearly all the productions of the tropics, together with those of the temperate zone, might be grown in the different regions belonging to this state, none of its agricultural productions supply an article for exportation; the sugar cultivated in the plain of Cuantla y Amilpas, south of the table-land of Tenochtitlan, and in some other places, to a considerable extent, is consumed in the country. It contains several rich mines of silver. This metal does not appear to occur in the mountains which enclose the table-land of Tenochtitlan, but only in the mountainous district which constitutes the most north-eastern portion of the state, and where the Sierra Madre is connected with the mountains border-

ing the eastern margin of the table-lands. In this district are the mines of Real del Monte, Actopan, and Zimapan: there are also some mines of lead and iron. Another mining district lies south of the table-land of Toluca, the principal mines of which are in the neighbourhood of the small towns of Temascaltepec, Sultepec, Tasco, Huetamo, and Tetela del Rio, of which the three last-mentioned places are at no great distance from the Rio Bolsas. Carbonate of soda is collected in the districts surrounding the lakes of Tezcuco and S. Christoval. In the vale of Tenochtitlan are several antiquities. Near the town of Tezcuco are two large Mexican pyramids, or teocallis; and about twenty miles farther north, near the small town of Teotihuacan, is a group of nearly 200 of such pyramids, two of which, erected in honour of the sun and moon respectively, are of great dimensions. On the mountainous descent by which the road leads from Tenochtitlan to the Pacific, near the town of Cuernavacca, are some remarkable ruins, which seem to have been a fortress; they are called the fortress of Xochialco. For the description of the federal capital, see MEXICO. The capital of the state is Tezcuco, situated on the eastern border of the lake of that name, whose waters formerly approached the town, but are now about three miles from it. It is a small place, but has much increased since it has been made the capital of the state; it contains above 5000 inhabitants, and some manufactures of cotton. Chalco, with 3000 inhabitants, lies at the eastern extremity of the lake of Chalco. Toluca, with 12,000 inhabitants, ten miles north of the Nevado de Toluca, has a fine cathedral, and is well built. Zimapan, a considerable place, with 9000 inhabitants, is situated in the centre of the northern mining district. This state has two harbours on the Pacific, Acapulco [ACAPULCO], and Zacatula, at the mouth of the river Bolsas; but they are little frequented.

8. The state of Michoacan extends over the whole of the table-land of Michoacan and the low country lying between it and the Pacific; a portion of the hilly country south of both these districts also belongs to this state. The river Santiago traverses its north-eastern districts, and within its territories are the lake of Patzcuaro, the peak of Tancitaro, and the volcano of Xorullo. Its productions are various, but no article of export is supplied, except from the mines, which are situated along the eastern border of the state, in the mountain-range which runs between the table-lands of Toluca and Michoacan. The richest mines are near Tlalpujahua, Agangeo, and Zitaquaro. In the districts along the northern boundary-line carbonate of soda is collected, especially in the valley of Ystan, which is enclosed by hills, and situated on the descent from the table-land of Michoacan to that of Xalisco. In this valley are many hundred wells of hot water, of all forms and sizes, from a hole not larger than an inch, to ponds several yards in diameter: in some of them the temperature varies only from 110° to 130°, but in the greater number the water is in a state of constant ebullition. The capital of the state is Valladolid, at present called Morelia, in honour of general Moréles, a large town, with more than 25,000 inhabitants. It consists of one principal street, which is wide and straight, and several lanes. The chief square is spacious; and on its eastern side stands the cathedral, a fine building, which is loaded with ornaments, but they are tastefully arranged. The town is well supplied with water by an aqueduct, erected in later times, at the expense of the bishops, who reside here. Patzcuaro, containing 6000 inhabitants, is built near the lake of that name, at whose northern extremity is the town of Tzintzontzan, with 2500, formerly the capital of the kingdom of Michoacan. In the northern districts of the state are Zamora, with 6000 inhabitants, and Cuisco, a considerable place, on the banks of an extensive lake. Tlalpujahua, in the principal mining district, has 9000 inhabitants. This state has only one harbour, that of Manzanillo, which is little frequented.

9. The state of Xalisco comprehends the whole of the hilly region of Xalisco, and the lower country between it and the Pacific; its eastern districts extend over the hills which form the ascent to the table-land of Queretaro, and comprise also a small portion of that plain. Within its territories are the lake of Chapala, and the lower course of the Rio Santiago, from its efflux out of the lake to its mouth. The productions are as various as in all those states which are so diversified in climate; but it supplies for exportation only a small quantity of cotton and some cochineal. The mines are not important, with the exception of those of Bolaños. Carbonate of soda is collected in some places along the eastern border, and salt is made along the coast. At the south-eastern extremity of the state, in the district of Colima, is the volcano of Colima. The capital of the state is Guadalaxara, with 60,000 inhabitants. [GUADALAXARA.] The second place in importance is Lagos, near the eastern boundary, on the table-land of Queretaro, which contains 15,000 inhabitants, and is well built. Farther west is S. Juan de los Lagos, nearly as large a town, built in a deep barranca, and noted for its annual fair, which is held in the month of December. The town of Tepic is situated in a small plain, surrounded by volcanic hills, and considerably elevated above the Rio Santiago, which flows at some distance north of it. It is rather well built, contains 7000 inhabitants, and is forty miles from San Blas, which is its port. Between it and the town of Guadalaxara is a difficult mountain-pass, through the barranca of Michetiltic, and the populous town of Tequila. San Blas, the principal port of the state, is on the top of a rock a hundred and fifty feet high, which is precipitous on three sides, and very steep on the fourth: it rises out of a low swampy plain, which in the rainy season is completely under water. At this season the place is unhealthy; and the inhabitants, amounting to 3000, remove to Tepic. The harbour has good anchorage, but is not sheltered against south-western winds. The rocky islands called Tres Marias lie off this harbour. South of Cape Corrientes are the two small harbours of Navidad and Guatlan, which are little frequented. The low country surrounding the Volcano de Colima constitutes a separate district, which is under the general government. This district contains about 150,000 inhabitants, and much cotton is grown in it.

10. The state of Guanaxuato comprehends the western districts of the table-land of Queretaro, a part of the Sierra Madre, and a tract north of that range. A range which issues from the mountain-chain of the Sierra Madre traverses the plain in a southern direction, terminating south of the town of Guanaxuato. The widest and most fertile part of the Baxio lies within the territory of this state, which exports great quantities of wheat and Indian corn to other states. Rich mines surround the town of Guanaxuato. Besides the capital [GUANAXUATO], it contains several populous places. In the Baxio are—Zelaya, with 10,000 inhabitants, and a fine cathedral; Salamanca, with 15,000 inhabitants; Irapuato, with 16,000 inhabitants, and manufactures of cotton; and Villa de Leon, with between 25,000 and 30,000 souls. In the last-mentioned town are considerable manufactures of cutlery and saddlery. San Felipe, in a wide valley between two branches of the Sierra Madre, was formerly a considerable town, but is now in ruins. S. Miguel el Grande has 16,000 inhabitants, and manufactures of cotton and iron.

11. The state of Queretaro extends over the eastern portion of the table-land of Queretaro, and over a considerable part of the plain north of the Sierra Madre. It contains numerous and extensive fertile tracts, and a portion of the Baxio. It has some productive silver mines, which lie near its eastern boundary-line, along the river Moctezuma or Panuco, in the district of Cadereita; the most famous is El Doctor. North of it is the quicksilver-mine of San Onofre. There are also some lead-mines. The capital is Queretaro. [QUERETARO.] Cadereita, in the mining district, is a considerable place.

12. The state of S. Luis de Potosi comprehends by far the larger part of the southern portion of the great northern plain, and is traversed from west to east by the river Tamoin, an affluent of the Panuco. It is only rich in cattle. The mines are not numerous, but among them is the rich mine of Catorce. There are also some mines of copper. The capital, S. Luis de Potosi, is a large town, containing, with the adjoining villages, from 50,000 to 60,000 inhabitants. It has wide and well-planned streets, which are lighted by night. There are many large and substantial buildings, and numerous churches. The Palacio, or House of Congress for the state, a well-built edifice, occupies one side of the Piazza de las Armas; on the opposite side stands the cathedral: the two other sides are composed of shops and dwelling-houses. In the centre is a fountain. The town is well supplied with water by an aqueduct. The surrounding country is very productive in fruits, and the commerce is considerable.

13. The state of Zacatecas extends on both sides of the Sierra Madre, which traverses it towards its southern extremity in a north-western direction: the larger portion of

its territory lies on the great northern plain. The southern portion is productive in grain, and the northern arid plains contain abundance of cattle. Of the numerous mines, all of which are situated in the Sierra Madre, the most celebrated are those of Zacatecas and Sombrerete. The territory has nine lakes, from which carbonate of soda is collected in a crystallized state. Not far from the western boundary of this state, and south of the capital, an extensive tract is covered with immense ruins, called Los Edificios, which seem to mark one of the resting-places which the antient inhabitants of Mexico, the Azteks, erected on their emigration towards the south. This state contains several populous towns. Sombrerete, Freznillo, Ierez, Pinos, and Nochistlán have each a population varying from 14,000 to 18,000: they are all situated near the mines. The capital, Zacatecas, with the adjacent village of Veta Grande, contains 28,000 inhabitants, and is built in a ravine between high hills. The streets are narrow and crooked, but the churches are very large buildings of stone: the most remarkable is La Búfa, which stands on a high eminence, and looks like a fortification. Aguas Calientes, situated towards the southern extremity of the state, in a richly cultivated country, has 35,000 inhabitants, and manufactures of cloth. The streets are narrow, and the houses substantially built. Its cathedral has the appearance of a Moorish mosque.

14. The state of Durango includes the Sierra Madre from 24° to 27° N. lat., and comprehends also an extensive tract of level country skirting the range on the east, and belonging to the great northern plain. The terraces by which the mountains descend on the east are rich in agricultural products, the plain itself in cattle, and the Sierra Madre in metals. The richest mines are near Guarisamey, San Dimas, and Gavilanes, situated in narrow valleys in the Sierra Madre, at an elevation of more than 9000 feet above the sea. There are also mines of lead and abundance of iron ore. Between the town of Durango and that of Nombre de Dios is a plain, covered with basalt, about thirty miles in length and fifteen in width. This plain contains an extinct crater, more than 100 yards in circumference, and thirty yards deep. This sterile tract is called Breña. The capital is Durango, or La Ciudad de Victoria, with 22,000 inhabitants, a well-built place, with wide streets and several fine buildings. Nombre de Dios has 7000 inhabitants. Papasquiaro, in a valley of the Sierra Madre, near the rich mines, has a population of 6000. In the plain are S. Juan del Rio, with 10,000 inhabitants, and Villa de los Cinco Señores, on the Rio Nasas, along the banks of which cotton is grown.

15. The state of Occidente comprehends the provinces of Cinaloa and Sonora, or the whole tract extending between the Sierra Madre and the Gulf of California from 23° to 33° N. lat. It is rich in agricultural produce and fruits, though agriculture is in a backward state. It contains several mines of gold and silver; those of copper are still more important. At the most northern extremity, on the banks of the Rio Gila, and rather beyond the boundary of the state, are the Casas Grandes, ruins of numerous edifices which cover a large space. They are considered as one of the stations of the Azteks in their emigration to the south. South of the Rio Mayo the population consists only of whites, but north of it are seven native tribes, Opata, Ceres, Pimas, Yaqui, Mayos, Yumas, and Turumaras, which subsist by agriculture. Along the northern boundary, on the Rio Gila, the Appaches and Axua Indians lead a wandering life. The most remarkable places from south to north are—El Rosario, with 6000 inhabitants, in the neighbourhood of some mines. It carries on some commerce by means of the harbour of Mazatlan, which is about sixty miles distant. This harbour is spacious, but not safe, as it has many dangerous shoals and islands at its entrance. Cosalá, a well-built town, contains 5000 inhabitants: in its neighbourhood are several rich gold-mines. Culiacan, with 11,000 inhabitants, is built on rising ground on the south bank of the river Culiacan, just above its confluence with the Rio Mayo. It carries on a considerable trade. El Fuerte, the capital of the state, was till lately a small village, and has only risen to be a thriving town since it has been made the seat of the state government. It is built on the southern bank of the Rio del Fuerte, and contains 5000 inhabitants. Los Alámos, between the Rio del Fuerte and Mayo, has about 6000 inhabitants, and considerable silver-mines in its neighbourhood. It contains many well-built houses, and carries on a considerable commerce. Santa Cruz, near the mouth of the Rio Mayo, the principal town of the Mayo Indians, contains 10,000 inhabitants. Guaymas is the best port of Mexico on the Pacific, and capable of containing 200 vessels. It is secured from all winds by the elevated hills which surround the bay, and by Bird Island, which lies in the entrance. The town contains 3000 inhabitants, but suffers for want of water: the climate is hot, but healthy. Its trade with all the ports of the Mexican states along the shores of the Pacific is considerable. Pitic, on the Rio Pitic, has 8000 inhabitants, and is irregularly built; there are no streets, and the houses are scattered in every direction. It contains however some good houses, and carries on a considerable trade. Arispe, the most northern town of any importance, contains 3000 inhabitants, and is the principal seat of the military force which is situated in this part for the protection of the state against the Appaches. The hilly country which lies to the west of this town, called Pimeria Alta, had the reputation of containing rich gold-mines, which however, on examination, have been found to be of little value. There are however valuable copper-mines.

16. The state of Chihuáhua comprehends that portion of the northern plain which lies between the northern part of the Sierra Madre and the middle course of the Rio del Norte, together with the mountain-region of the Bolson de Mapimi, and a tract of country south of it. The soil is in general very dry, and unfit for agricultural purposes: cultivation is limited to the river bottoms and a narrow strip of country along the declivity of the Sierra Madre; but this state has many herds of cattle, horses, and sheep. The mines are rather numerous. The most important are in the Sierra Madre, at El Parral, Botapilas, and Jesus Maria; those of S. Eulalia are in a hill which stands isolated on the plain, about twelve miles from Chihuáhua. Near the base of the Sierra Madre, and not far from the boundary-line between this state and Sonora, are ruins of great extent, called Casas Grandes, like those on the Rio Gila: these also are considered as one of the stations of the Azteks in their emigrations. The population of the plain consists entirely of descendants of Europeans; but in the Bolson de Mapimi are the Comanches, and, along the northern frontier of the state, the Appaches and Chichimequos. The capital, Chihuáhua, is a well-built town, with regular streets and many large houses. Its cathedral is an extensive building; and the town is well watered by means of an aqueduct, which is supplied by a river about eight miles above the town. Its population once amounted to 70,000, but at present it does not exceed 12,000. S. Bartolomeo, situated towards the boundary of Durango, contains a population of 28,000. It is badly built, and the streets are narrow, but it carries on a considerable commerce with the agricultural produce of the fertile district in which it is situated, consisting of wool, maize, cotton, and wild honey. Not far from it to the west is El Parral, which contained 50,000 inhabitants when the mines were productive, but now only 7000. Parras, near the lake of that name, is a small town in a district noted for its vineyards.

17. The state of Coahuila or Cohahuila extends over the north-eastern portion of the northern plain, over that which lies between the Bolson de Mapimi on the west, and the lower course of the Rio del Norte on the east, and which stretches southwards to the boundary of Zacatecas (25° N. lat.). To this extensive country is added the still more extensive tract to the north and east of the Rio del Norte, or the province of Texas. The most sterile portion of the northern plain is included in this state, and lies along the boundary of Zacatecas. Farther north, between 27° and 29° N. lat., are several watercourses with fertile bottoms, and considerable tracts of cultivable ground. But cattle, and particularly mules and horses, constitute the commercial wealth of this country, and are exported in considerable numbers to the United States of North America. Texas is very fertile, but little cultivated. The north-western parts of the state are much exposed to the predatory incursions of the Appaches and Comanches, who inhabit the Bolson de Mapimi and the hills of San Saba. The capital of the state is Saltillo, situated near its eastern boundary and the edge of the table-land. It contains about 12,000 inhabitants, and is remarkable as the only place at which the steep declivity with which the table-lands of Mexico terminate towards the east can be passed by heavily laden carriages; farther south at least no such place is known to exist. It has several good streets, communicating at right angles with the Plaza, in the centre of which is a large reservoir, which supplies the

town with water. It carries on considerable commerce. In this town a fair is held, which is much frequented by merchants from the adjacent states. Montelovez, farther north, has 3500 inhabitants. Santa Rosa, to the north-west of Montelovez, has 4000 inhabitants, and some mines in its neighbourhood. El Presidio del Rio Grande is situated where the Rio del Norte begins to be navigable for larger boats, and has 2500 inhabitants. Monclova, farther down, is a thriving place, with some trade.

Texas is almost entirely in its natural state. The Spaniards have only formed a few settlements in the districts adjacent to the Rio del Norte and the Rio Guadalupe, and their principal town is S. Antonio de Bexar, a small place. In the country farther east numerous emigrants from the United States of America and Europe have settled, but none of their settlements have attained any degree of importance, except S. Felipe de Austin, a small town.

This country has a good harbour in Galveston Bay, which is an extensive sheet of water, separated from the Gulf of Mexico by Galveston Island. The entrance to it, between the mainland and the eastern extremity of the island, has always twelve feet of water on the bar. The bay has generally about nine or ten feet of water, but towards its northern extremity, into which the navigable rivers Trinidad and S. Jacinto empty themselves, the bay is crossed by a bar, called Red Fish Bar, which at high tides has only five feet, and in northerly winds not more than three feet of water. The anchorage between Galveston Island and another smaller one, called Pelican Island, is good, in five fathoms of water, with a muddy bottom. The inhabitants of Texas who are not descendants of Spaniards have been for some years in a state of rebellion against the government of the United Mexican States.

18. The state of Nuevo Leon lies almost entirely to the east of the table-land, in the lower region which extends from it to the Gulf of Mexico, but it does not reach the shores of the sea, being separated from it by the intervening state of Tamaulipas. Though this country is not much elevated above the sea, and its climate resembles that of the Tierras Calientes, its surface is far from being so level as the country farther south. That part which lies south of the Rio del Tigre is indeed rather level, or undulating, but north of the river are mountains of great elevation, probably more than 10,000 feet above the sea, and in which some rich mines are found near Pesqueria and Salinas. The lower parts of the country are very fertile, but only cultivated in isolated places. Though the climate is hot, it is healthy. Monterey, the capital of the state, contains 15,000 inhabitants, and its commerce is considerable on account of the neighbouring rich mines. Linares has 4000 inhabitants, and the neighbourhood abounds in cattle.

19. The state of Tamaulipas extends along the Gulf of Mexico from the mouth of the river Panuco to that of the Rio del Norte, and still north of the latter to the Rio Nueces, but it does not reach farther inland than from 50 to 70 miles, except at its northern extremity, where it may be about 150 miles across. It is a low country, in which only a few hills occur, and it is unhealthy. Though very fertile, except along the sandy sea-shore, it is badly cultivated and thinly inhabited. Its coast-line, which is about 400 miles, is inaccessible on account of the long narrow islands which skirt it, but the navigation is not dangerous, as the soundings are very regular along the whole line. There are harbours only where the rivers join the sea, but their entrance is always crossed by bars, with only a few feet water on them. This circumstance is attributed to the current which, during the northern gales, sets with some force to the south. The commercial wealth of this state consists in its forests, in which fustic and logwood are cut to a great extent. The capital of the state is Pueblo Nuevo de Tamaulipas, situated at the southern extremity of the state, on the northern bank of the river Panuco, about six miles from its mouth. The harbour is good and safe, and the bar at its entrance has generally twelve feet of water, but the navigable channel is scarcely a cable's length across. The town, which was founded in 1825 or 1826, is rapidly increasing. Its commerce is considerable, as most of the European goods which are consumed on the northern plain are landed here. Sotto la Marina is a small harbour, not much frequented, near the mouth of a little river, the Rio de Santandero, on the banks of which is the small town of Santandero, formerly the capital. Matamoros, on the Rio de Norte, about 40 miles from its mouth, has about 3000 inhabitants; vessels not drawing more than eight or nine feet water may ascend the river to this place.

20. The territory of New Mexico comprehends the whole vale of the Rio del Norte, extending from its source along its upper course to 35° N. lat., and also the desert del Muerto and a fertile tract of country south of it, extending from 32° 30′ to 31° N. lat. From the northern district great numbers of sheep are sent to the southern states, and wool is exported. The southern district contains some tracts which are adapted to raising agricultural products and fruits. The mountainous country between these two districts contains copper-mines. The mountains to the east and west of it are inhabited by several tribes of Indians, as Utahs, Nanahaws, and Keres. Many of them are settled among the whites in the villages in the level country. Santa Fé, the capital, is built on a small stream which joins the Rio del Norte from the east, and at no great distance from the last-mentioned river. It contains about 4000 inhabitants, and has some commerce with the United States of America and the state of Chihuahua. North of it is the town of Taos, which, according to Humboldt's statement, has a population of about 9000 souls. Paso del Norte, in the district south of the desert del Muerto, has a population of more than 5000 souls, and is situated on the northern border of the northern plain. The surrounding country produces abundance of maize, wheat, and excellent fruits. Its wine and grapes are celebrated over the whole of the Mexican confederation. It owes its fertility to irrigation by means of canals which convey the abundant water of the Rio del Norte over a district of considerable extent.

21. Lower California, and—22, Upper California. [CALIFORNIA.]

Manufactures.—Before the Revolution (1810) there were many flourishing manufactures, the annual produce of which amounted to from eight to ten millions of Spanish dollars, or about two millions of English money. The most considerable were those of cotton and wool in the towns of Puebla, Cholula, Tlascala, Queretaro, Lagos, Guadalaxara, and Tezcuco. The manufactures of soap, leather, and saddlery were also considerable. The manufacturers owed their prosperity to the high price at which, under a system of monopoly, European goods were sold in that country. After the harbours were thrown open to a free trade (in 1820) they began to decline. The manufactures of cotton are now almost completely destroyed. Those of wool are in a lingering state, but those of soap, leather, and saddlery seem to be on the increase.

Commerce.—The commercial intercourse between the coast and the table-lands is difficult on account of the steep ascent to the table-lands from the coast. On the east there are only two carriage-roads, as has been already observed, which lead to the table-land; and this is also the case on the western coast, where the communication between Acapulco and Mexico, and between San Blas and Guadalaxara, is carried on by roads which are only passable to mules and horses. No such obstacle exists between the harbours of Masatlan and Guaymas on the western coast, and the country farther back, but no road leads from them over the Sierra Madre, by which the goods landed at these places could be carried to Durango or the towns of the northern plain. Even in those parts where there is no obstacle to the use of carriages, the goods are commonly carried by mules, on account of the great number of these animals, and the low price at which they are bought.

The maritime commerce is considerable. In the beginning of the present century the exports, according to Humboldt, amounted to twenty-two millions of Spanish dollars, and the imports to fifteen millions of dollars. Between 1820 and 1830 however the exports considerably diminished, on account of the comparatively small produce of the mines, the precious metals constituting the principal article of exportation; and as they have not yet been restored to that flourishing condition in which they were before 1810, the amount of the exports probably still falls considerably short of the amount stated by Humboldt, for the other articles have not increased much. According to Humboldt's estimate the exports in 1803 consisted of the following articles, and their value in dollars:—

Gold and silver	17,000,000 dollars.
Cochineal	2,400,000
Sugar	1,300,000
Flour	300,000
Indigo	280,000

Salt meat	100,000 dollars.
Hides	80,000
Sarsaparilla	80,000
Vanilla	60,000
Jalap	60,000
Soap	50,000
Campeachy wood	40,000
Tabascan pepper	30,000
Spanish dollars	21,780,000

Ward, following the statement of official documents, found that in this estimate Humboldt had overrated the exports by 2,618,648 dollars; as no flour had been exported, and the exports of cochineal amounted only to 1,100,327 dollars, and those of sugar to 281,025 dollars. Though the facts which have come to our knowledge are isolated, and in many instances not well authenticated, we shall attempt to make a rough estimate of the exports for the years following 1830, preserving Humboldt's statement where we have no more recent data:—

Gold and silver	14,000,000 dollars.
Cochineal	1,100,000
Sugar	300,000
Indigo	200,000
Salt meat	100,000
Hides	80,000
Sarsaparilla	80,000
Vanilla	100,000
Jalap	80,000
Soap	50,000
Campeachy wood	100,000
Fustic	80,000
Tabascan pepper	40,000
Coffee	20,000
	15,230,000

This may be considered as an approximation to the amount of the exports from the harbours of the Gulf of Mexico, namely, from Sizal, Campeachy, Villa Hermosa, Alvarado, Vera Cruz, Tampico, Tamaulipas, Sotto Marina, and Matamoros. No estimate can be formed of the exports from the harbours of the Pacific, from Acapulco, San Blas, Mazatlan, and Guaymas, and from those of Upper California. We only know that a considerable quantity of sugar is sent to Guayaquil and Lima; that at the port of Guaymas much copper, which contains gold, is shipped for China, where, as it appears, an easy method is known of separating the metals; and that large quantities of tallow and salted hides, with some flour, are exported from S. Diego in Upper California. No kind of commercial intercourse seems to exist between Central America and the Mexican states, but a considerable number of mules and horses, and some wool, are exported to the United States of North America, chiefly from Cohahuila and New Mexico.

For want of a general and more recent estimate of the imports, we shall transcribe that of Humboldt, founded on facts which refer to the beginning of the present century. It may still be useful as showing the principal articles consumed in Mexico, and their proportion. Though the consumption of all these articles, with the exception perhaps of cocoa and wax, must have greatly increased, and especially that of cotton goods, yet it seems probable that their value in money is not greater than was paid for them at the time of Humboldt, as most of the articles were then sold for double and some even for four times the present prices. Cocoa does not appear at present to form a large article of import, great quantities of it being grown in the state of Tabasco.

Humboldt's estimate of the imports at the beginning of the present century is:—

Articles.	Value in dollars.
Ropas (linens, cottons, cloth, and silk)	9,200,000
Paper	1,000,000
Brandy	1,000,000
Cocoa	1,000,000
Quicksilver (for the mines)	650,000
Iron	600,000
Steel	200,000
Wine	700,000
Wax	300,000
	14,650,000

The commerce is mostly carried on in foreign vessels, as these states have a comparatively small number of merchant ships. The vessels of the United States of America almost exclusively visit the smaller ports, as Villa Hermosa, Alvarado, Sotto Marina, and Matamoros. In addition to the vicinity of the United States, their products differ from those of the Mexican states. All the products exported from Mexico find a ready market in the United States, and are easily paid for by the manufactured goods of those states and of Europe. The American vessels, being in general of a smaller size, can safely pass the bars of the rivers, which cannot be done by the larger British vessels, which are therefore chiefly confined to the harbours of Vera Cruz, Tampico, and Tamaulipas. Next in number to the American are the British vessels, and then those of France, from Bordeaux and Hâvre, and lastly those of the free German towns of Hamburg and Bremen. Swedish and Danish vessels rarely appear in these ports.

History and Constitution.—Though Columbus in his last voyage approached the peninsula of Yucatan, he did not come in sight of it. Thirteen years later (1517) the peninsula was discovered by Francisco Hernandez Cordova, who sailed along the coast from Cape Catoche to Campeachy Bay. The following year, Juan de Grijalva continued the discoveries along the same coast northward to the mouth of the Rio Panuco; he visited the islands of Sacrificios and S. Juan de Ulua, opposite the present town of Vera Cruz, and gave them the names which they still preserve. His account of the wealth of the country excited the desire of conquest. In 1519 Hernan Cortes landed at the place where Vera Cruz now stands, but the town which he founded and called Villarica was some miles farther to the north, near a small harbour named Chihauitzla. With his little army he soon ascended the table-land, numerous inhabitants of which he found united under a powerful sovereign, the king of the Azteks, Montezuma, or more correctly Moctezuma. Within the limits of this empire there were some small republics, of which that of Tlascala united with Cortes. Cholula was also a republic, and the name of a third is preserved, that of Huajocingo; all three were situated within the territories of the present state of Puebla. The empire of the Azteks did not extend over all the table-lands; the table-land of Michoacan constituted a separate and independent kingdom. After two years of continuous and laborious warfare, Cortes succeeded in overturning the empire of the Azteks, and the smaller states were subjected to the Spaniards almost without a struggle. The position which the Spaniards held with respect to the natives of the country very much resembled that of the nations of German origin who overturned the Roman empire and settled in the countries of Western Europe. Like them, the Spaniards were obliged to establish a kind of feudal system, to protect themselves against the much more numerous native population. In Europe the victors and vanquished in the course of time united so as to form one nation, but such a change has not taken place in Mexico, and probably never will take place. The Spaniards and natives belong to two different races of men, differing in colour and in many other respects. The Spanish conquerors also had attained a higher degree of civilization, whilst in Europe the conquerors learned from the conquered the most useful arts of civilised life. Even now, more than three centuries since the conquest, the Spaniards and natives constitute two perfectly distinct classes.

As the number of the conquistadores, or companions of Cortes, was very small, in comparison with the native population, they were anxious to bring over more of their countrymen. A considerable number of Spaniards accordingly annually emigrated to Mexico, and there acquired great wealth, as officers of government, merchants, and adventurers in mining. As many of these Spaniards were possessed of extensive property in land within Mexico, their descendants the Creoles settled of course in that country, and their numbers were continually increasing. The Spanish government however seems not to have formed a correct idea of their condition among the natives, and to have thought that the government of that country could only be entrusted to persons who considered Spain as their native country; it therefore excluded all the Creoles, or descendants of Spaniards born in Mexico, from all offices of government, and even from commissions in the army. Such exclusion excited in them a considerable degree of ill-will against Spain and the Spaniards, which would probably have manifested itself in resistance and rebellion, if they had not feared that the native population would take advantage of such a circumstance to effect their own destruction. They had still to fear another enemy, which had grown up imperceptibly among them. Few of the Spaniards had brought wives with them. From their intercourse with the native women sprung up a race called metis, or mestizos, which increased still faster than that of the Creoles, who however, being in possession of great wealth, were well aware that as long as a regular government subsisted they had nothing to fear either from the natives or the mestizos. This will account for the fact, otherwise difficult of explanation, that no signs of active dissatisfaction manifested themselves in Mexico during the first thirty years after the United States of North America had obtained their independence, though the Mexicans were well acquainted with the advantages which their neighbours had obtained. It is even possible that the political condition of Mexico would not have undergone any change for a long time, but for the events in Europe and in Spain in 1808. By the intrigues of Bonaparte the royal family were compelled to abdicate the throne of Spain, and he conferred the whole Spanish monarchy on his brother Joseph, then king of Naples. The Spaniards in Mexico and the Creoles were unanimous in declaring their resistance to the government established by the French. The viceroy could no longer receive orders from Spain, and it was necessary to organise a government which should act independently under a certain sanction, and with authority. But as to this point they disagreed. The Creoles wished to establish a national representation; the Spaniards opposed the measure, and prevented the establishment of a system of national representation for Mexico. The Creoles submitted: but the public mind had been agitated by the discussions which had taken place, and soon afterwards, in 1810, the natives and the mestizos rose against the government. They were headed by Don Miguel Hidalgo y Castilla, the cura or parish priest of Dolores, a small town in the state of Guanaxuato. The Creoles sided with the Spanish government. Hidalgo, who had soon an immense force with him, took Guanaxuato by storm, and occupied Valladolid, whence he advanced over the table-land of Toluca to that of Tenochtitlan. The Spanish governor sent a small corps against him, which was defeated by Hidalgo on the 30th of October at Las Cruces, a pass in the chain which separates the table-lands of Tenochtitlan and Toluca. But notwithstanding this victory, Hidalgo retreated, and eight days afterwards was in his turn defeated by Calleja at Aculco. Hidalgo retired to Valladolid and Guadalaxara; and in the neighbourhood of the last-mentioned town he was again defeated, and soon afterwards taken prisoner and shot. In the meantime the whole country had risen in insurrection, and many leaders began to act separately. The most remarkable among them was Don Jose Maria Morelos, cura of Nucupetaro, who with great activity, talents, and success maintained the southern provinces in rebellion against the governor, and formed a *junta*, or central government, which in September, 1811, assembled in the town of Zatacuaro, in the state of Michoacan. But that town was soon afterwards taken by Calleja, and the junta were dispersed. Calleja however was soon obliged to march against Morelos, who had penetrated into the table-land of Tenochtitlan from the south. He was attacked by Calleja in the town of Cuantla y Amilpas, and after defending himself for nearly three months with great skill and gallantry, he abandoned that place and took Oaxaca. The junta was now increased by new members, and under the title of the National Assembly it declared the independence of Mexico, on the 13th of November, 1813. But after that event Morelos had less success in his daring enterprises; and in November, 1815, he was taken prisoner, conducted to Mexico, and shot. Many of his companions in arms maintained the conflict for some time, but they did not act in concert with one another, especially after one of them, Terán, had dissolved the congress, which had been transferred from Oaxaca to Tehuacán in the state of Puebla. The viceroy Venegas, supported by the gallantry and skill of Calleja, destroyed successively the armies of these chiefs, so that when Don Xavier Mina, the famous Spanish guerilla chief, landed in Mexico in 1817, the fortune of the insurgents was at so low an ebb, that he was unable to restore their cause, and he perished in the attempt. The country gradually became more tranquil, and in 1820 it was restored nearly to the same degree of order which it had enjoyed before 1808, to which fortunate result the mildness of the new viceroy Apodáca materially contributed.

The events which occurred in Spain in the beginning of 1820 suddenly changed the aspect of affairs, and deprived Spain of the most valuable of her possessions in America, which it had regained at the cost of much blood and money. The Spaniards and the Creoles, who had formerly made common cause, were now divided into two parties, royalists and constitutionalists. Apodaca, who inclined to the former party, wished to overthrow the constitution in Mexico, and chose for his instrument Don Augustin de Iturbide, a young man, born in the province of Valladolid, of respectable but not wealthy parents. He had distinguished himself in the battle of Las Cruces, and always shown great attachment to the Spanish party. Iturbide had about 800 men under his command, when, on the 24th February, 1821, at the little town of Iguála, on the road from Mexico to Acapulco, he issued a proclamation, which since that time has been called the Plan of Iguála. Its object was to conciliate all parties. It was to establish the independence of Mexico, and still to preserve its union with Spain. To effect this, the crown of Mexico was to be offered to the king of Spain, and in case of his refusal, to one of his brothers, Don Carlos or Don Francisco de Paulo, provided they would consent to reside in the country. Though Iturbide had certainly exceeded the powers which he had received from Apodaca, the viceroy, seeing that this proposal met the wishes of most persons, took no step to crush Iturbide; and the Spaniards of the capital, alarmed at this delay, deposed him, and placed Don Francisco Novella at the head of affairs. But the disorders which always attend such violent changes gave Iturbide time to unite his troops with those of Guerrero, the only insurgent chief still existing in the country, and to bring over to his party all the western and northern provinces. Before the month of July, the whole country recognised his authority, with the exception of the capital, in which Novella had shut himself up with all the European troops. At this moment he received intelligence of the arrival at Vera Cruz of the new constitutional viceroy Don Juan O'Donoju. Iturbide hastened to the coast, obtained an interview with O'Donoju, and persuaded him to accept the Plan of Iguála as an armistice and final settlement, if it should be approved in Spain. This is called the treaty of Cordova, from the place where it was made. Iturbide thus got possession of the capital, where a junta and a regency were established, but in such a form that all power remained in the hands of Iturbide. By a decree of the Cortes, dated the 13th February, 1822, the treaty of Cordova was declared to be illegal, null, and void; and Iturbide, who had the power in his hands, and a great number of adherents, found no difficulty in ascending the throne. The army declared him emperor of Mexico on the 18th of May, 1822, and he took the title of Augustin I. He was acknowledged by the Mexican congress, which had been opened on the 24th of February; but a struggle for power soon arose between Iturbide and the congress, which the emperor terminated by dissolving the assembly in the same manner as Cromwell dissolved the Long Parliament, on the 30th October, 1822. On the same day he formed a new legislative assembly, composed of persons favourable to his wishes and intentions. But he had not skill enough to reconcile his companions in arms to these changes. Several generals declared against his proceedings, and prepared for resistance. Iturbide, terrified at the storm which was ready to burst on all sides, called together the old congress, abdicated in March, 1823, and went to Europe, whence however he returned to Mexico in 1824. He had been outlawed by the congress, and upon landing on the coast, he was shot at Padilla, in Tamaulipas. Thus Mexico obtained its indedence and a constitution, without a civil war. But as this object had only been obtained by the energetic cooperation of the army, it was to be feared that the peace of the country would be interrupted by the discontents of the generals. This has in fact occurred several times; but happily such insurrections have been easily suppressed, with the exception of that got up by Santanna, who had distinguished himself in the struggle against Iturbide. Under pretext of the country being discontented with the administration, he collected an army in 1832, brought some other generals over to his side, and, after several conflicts, he succeeded in placing himself at the head of government. Being aware that he was less distinguished as a statesman than as a general, he undertook in person an expedition against Texas, the population of which, consisting almost entirely of emigrants from the United States of America, had risen into open rebellion against the government. After some success, he was taken prisoner. This circumstance was favourable to the government, and since that time the peace of the country has not been materially disturbed.

The constitution of the republic was formed immediately after the fall of Iturbide, and the Fundamental Act was published on the 4th of October, 1824. The constitution is modelled on that of the United States of America, and most of the articles are transcripts of the corresponding articles in the constitution of that confederation. The legislative power is vested in a congress, which consists of two chambers, the house of representatives and the senate. The house of representatives is composed of members elected for a term of two years by the citizens of the states. Each state elects a representative for every eighty thousand inhabitants, and one more if there is a fraction exceeding forty thousand. Native Mexicans alone can be chosen, or such as have resided in the republic for more than eight years, who must also possess landed property to the amount of 8000 dollars, or some trade or profession which produces 1000 dollars annually. The senate is composed of two senators for each state, elected by a plurality of votes in the state legislatures. He who has the greatest number of votes retains his seat for four years; the other only for two years. The members of the senate must possess all the qualifications requisite for a deputy, and must also be thirty years of age; a deputy may be only twenty-five years of age. The congress meets every year on the 1st of January, and closes its ordinary sessions on the 15th of April; but an extraordinary congress may be called by the executive. The executive power is vested in a president and vice-president, both elected by the state legislatures for a term of four years. Native Mexicans only, who are thirty-five years of age and resident in the country, can be elected to these high offices. Though the great outlines of this constitution resemble, in all important points, those of the United States of America, the Mexican congress is vested with much greater power. It has not only a larger revenue, and the right of deciding on all matters respecting religion, but it has likewise the power of determining many points which in the United States of America belong to the several states. This difference arises from the different way in which the general congress was formed. In the United States of North America the state governments were fully organised before the formation of a general government, and in the Act of Confederation the states preserved all their original power which it was not thought expedient to confer on the general government. In Mexico however the general government had to establish the state governments, and could appropriate to itself as much power as it thought fit.

(Humboldt, *Essai Politique sur la Nouvelle Espagne;* Poinset, *Notes on Mexico;* Lyon's *Journal of a Residence and Tour in the Republic of Mexico;* Ward's *Mexico in* 1827; Hardy's *Travels in the Interior of Mexico in* 1826-1828; Pike's *Exploratory Travels through the Western Territory, &c.; A Sketch of the Customs and Society in Mexico;* Coulter's 'Notes on Upper California,' in the *London Geogr. Journal,* vol. v.; Galindo's 'Description of the River Usumasinta,' in the *London Geogr. Journal,* vol. iii.; Iuarro's *History of the Kingdom of Guatemala;* Holley's *Observations on Texas; Constitucion Federal de los Estados Unidos Mexicanos,* Mexico, Oct. 14, 1824.

MEXICAN ARCHITECTURE. Although some light has of late years been thrown upon this subject, it is still involved in much obscurity; nor can we do more than advert to one or two points that deserve attention. The first of these is, that the older and more important monuments of Mexico are not, strictly speaking, Mexican, but the productions either of the Toltecans or of some still more antient nation. Secondly, these remains are by some supposed to exhibit affinity, both in their general character and mode of construction, and the style of sculpture and the costume represented in them, to those of the Egyptians. Thirdly, hieroglyphic inscriptions on the walls of their edifices were employed by both people.

With regard to the aboriginal architecture of this part of America, it resembles that of Egypt, not only in the vast scale and massiveness of its monuments, but in the application of the pyramid, or of forms composed of it. Pyramids not inferior to those of Egypt, and some of even still larger dimensions in their plan or base, exist in the Mexican territories; and examples of the second class occur in pyramid towers, consisting of a series of truncated pyramids placed one above another, each successive one being smaller than the one on which it immediately rests, so that it stands upon a platform or terrace. Of this kind was the pyramid tower or temple at Xochicalco, which, according to Nebel's restoration of it, consisted of five stories, and consequently had four terraces: its sides were ornamented with rude bas-reliefs, the figures of which were about four feet high and had a projection of three inches. The pyramid tower of Cholula resembles in no small degree the temple of Belus as described by Herodotus, inasmuch as it consists of eight stories, each forming a platform on which stands the one above it. The angle of inclination of these truncated pyramids is seldom less than 70 degrees, which differs little from that of the sides of the Egyptian temples.

Some of these edifices appear to have been not temples only, but to have contained sepulchral chambers and apartments for the priests; they had also descending galleries leading down into caverned recesses or halls, that were doubtless used either for religious mysteries or as places of concealment for treasure.

One of the most stupendous monuments of the style of architecture was the great temple at Palenque (built, according to the bold assumption of Lord Kingsborough, after the model of that of Solomon), which comprised within its extensive precincts various sanctuaries and sepulchres, courts and cloisters, subterraneous galleries, and cells for the habitation of the priests. The whole rests on a platform, composed of three graduated terraces, and forms a spacious quadrangle enclosed by porticoes. On each side of the exterior is an ascent or flight of stairs, and on the east a second flight leading down, after the first is ascended, into the cloistered court. Beneath the cloisters are what are conjectured to have been initiatory galleries; and in the centre of the quadrangle is what appears to be the ruins of an altar or 'high place.' The city of Palenque itself exhibits a variety of buildings, temples, palaces, baths, and private houses, all manifesting excellence of workmanship combined with considerable skill in design.

The remains of a palace at Mitla show that it must have been an edifice of great extent and grandeur; and the walls appear to have been sculptured or tooled externally, in imitation of mat or basket work, a species of decoration characteristic of Toltecan taste, and often found in sepulchral chambers. This same building has also a portico with plain cylindrical columns differing from any found elsewhere.

In order to give an idea of the extraordinary vastness of some of these Mexican or Toltecan constructions, we may adduce the instance furnished by the great teocalli, or pyramid, of Cholula, the side of whose base is 1440 feet, whereas that of the great pyramid of Jizeh is only 763 feet. The height however is, according to Humboldt, not more than 177 feet, and as the receding terraces are very wide, and the area of the upper platform or terrace small in comparison with the area of the base, the outline of the whole would not be that of a continuous pyramid, but merely such as might be inscribed within such figure.

At Teotihuacan, about eight leagues to the north-east of the city of Mexico, are an immense number of pyramids, several hundred small ones ranged in files or lines, and two larger ones consecrated to the sun and moon. Each of the latter is divided into four platforms, the slopes between which consisted of steps, and on the summit was a colossal stone statue covered with plates of gold, which were stripped off by Cortes's soldiers, and the statues themselves destroyed.

Besides monuments which are chiefly works of magnificence, others exist which attest the high degree civilization attained by the Toltecans, such as Cyclopean roads and bridges. The former of these were constructed of huge blocks of stone, and frequently carried on a continued level, so as to be viaducts across valleys. There are also throughout Central America numerous excavations or rock-hewn halls and caverns, called by the natives 'granaries of the giants.' They resemble the Cyclopean fabric near Argos known by the name of the Treasury of Atreus, are generally dome-shaped, and the central apartment is lighted through an aperture in its vault. Other points of resemblance to Cyclopean masonry may be found in the doorways to these subterraneous galleries and apartments, which are similar to the gate of Mycenæ; and also in the peculiar triangular arch formed by courses of stones projecting over each other. Arches of this mode of construction are found in the cloisters of the building at Palenque. The remains of sculpture found in Mexico are numerous, and of great variety both of form and material. Captain Vetch has described (*London Geog. Journal*, vol. vii., p. 1) a collection of stone figures in his possession, which were recently procured from the banks of the river Panuco.

MEXICO, or, as it is now commonly written, Mejico, the capital of the United Mexican States, is situated in 19° 25′ N. lat. and 99° 10′ W. long., 7468 feet above the level of the sea. It stands nearly in the centre of an extensive plain, which, from being surrounded by high hills or mountains, is commonly called the Vale of Tenochtitlan, which was the name given to the town before the year 1530. This vale has an oblong form, extending from south to north fifty-two miles, and from east to west thirty-four miles. Its circuit, measured along the crest of the ranges which enclose it, is nearly 205 miles; and its area is 1710 square miles, or nearly equal in extent to the county of Lancaster; but about one-tenth of its surface, or 164 square miles, is occupied by four lakes. The largest of these lakes, that of Tezcuco, which covers a surface of 77 square miles, occupies the centre of the vale, and is only about three feet and a half lower than the great square of the town, which stands on its western shores, on swampy ground. Towards the southern extremity of the vale is the lake of Chalco, which contains a small island and the pleasant village of Xico, and is separated by a dike from the lake of Xochimilco. The surface of these two lakes is nearly four feet above the great square in the town, and they occupy nearly fifty square miles. Their water is fresh, while that of the other lakes is brackish or salt. North of the lake of Tezcuco is the lake of St. Christoval, which covers about twenty-seven square miles, and is nearly twelve feet higher than that of Tezcuco. It is divided into two parts by a dike, and its northern portion is called the lake of Xaltocan. The north-western corner of the vale is occupied by the lake of Zumpango, which is likewise divided into two portions by a dike: the eastern is called the lake of Coyotepec, and the western that of Zitlaltepec. This lake is nearly thirty feet above the lake of Tezcuco, but occupies only ten square miles. During the rainy season the water, descending abundantly from the ranges which enclose the vale, is poured into these lakes, which have no outlet: the greatest quantity enters the lake of Zumpango, which is the most elevated. It frequently happened that in very wet seasons the water which accumulated in these lakes inundated the lower portion of the vale, and rose several feet in the streets of Mexico. To prevent such an occurrence the Spanish government caused a canal to be made through the mountains of Nochistongo, which lie north-west of the lake of Zumpango, by which the superabundant water from the lake is carried off. This stupendous work, known by the name of the Desague of Huehuetoca, is above twelve miles long, and for more than 1000 yards is cut through rocks from 60 to 75 feet high. It is justly considered one of the most astonishing hydraulic works in the world.

The mountains which enclose the vale are lowest on the north side, where they rise only a few hundred feet above the level grounds of the vale, but they are higher on the other sides, especially on the south and south-east. Near the south-eastern angle is Mount Istaccihuatl, which is 15,704 feet above the sea-level, and is always covered with snow. It is connected by a ridge with Mount Popocatepetl, which lies farther south, and attains the height of 17,884 feet. The surface of the vale itself is not a level plain, but is intersected by very irregularly shaped rocks, which are sometimes isolated and sometimes in groups singularly arranged. The most elevated are the Cuesta de Barientos, north of the town, which rises 288 feet above its base; and the Cerro de Chiconautla, which lies to the north-east, and rises 1055 feet above the lowest part of the vale. The districts between the western range and the lakes are richly studded with villages and towns, and contain extensive tracts of cultivated ground, where wheat and the other grains and vegetables of Europe are raised in abundance; but large tracts of country east of the lakes are sterile, the surface being covered with a saline efflorescence, and the cultivated spots and villages are distant from one another.

Mexico is one of the finest cities in the world. In the dry season it is at some distance from the lake of Tezcuco, whose waters in the rainy season are sometimes driven by easterly winds to the eastern border of the town, which is protected against inundations by dikes. The streets are very wide, and at right angles to each other, so that by looking down any two at the point where they intersect each other, the spectator commands a view of nearly the whole town. They are all well paved, and have side-walks of flat stones. The private houses, though spacious, are rather low, seldom exceeding one story; but being constructed either of amygdaloid or porphyry, they have an air of solidity and even of magnificence. The moderate height of the public as well as private buildings is owing partly to the difficulty of laying a good foundation, as water is uniformly found at a very few feet from the surface, and partly to the frequency of earthquakes. In consequence of the water all the larger buildings are raised upon piles. The roofs of the houses are flat, and as they sometimes communicate with one another for a considerable distance, when seen from an elevation they look like immense terraces. The houses are all squares, enclosing open courts, which are surrounded by corridors. The entrance leads through a large gate into the court, and the stairs are opposite to the gate. The best apartments, which are generally painted, are towards the street, and all the windows are ornamented with balconies.

The squares are spacious and generally surrounded by buildings of hewn stone in a good style of architecture. The principal square is the Plaza Mayor, which, on two sides, is surrounded by the cathedral and the palace, and on the two other sides by shops and dwelling-houses, with the exception of the Casa del Estado, or the palace of Cortes. In the centre of the square was formerly a magnificent equestrian statue of Charles IV. of Spain, which has been removed since the Revolution. This square is the market for vegetables and fruits, those of the south of Europe being cultivated in the vale of Tenochtitlan itself, whilst the fruits of the tropics are brought from the plain of Cuantla Amilpas and from Istla. [Mexican States.] Manufactured goods are sold in the Portales, or covered colonnades, of which there are several on a large scale, and all well supplied with goods from Europe and China. Several principal shops open into the Portales, and innumerable petty venders display their wares, crowded on tables, in boxes and in baskets. The Parian, or bazaar, is a square building, divided into uniform compartments by two principal cross streets, and others subdividing it. The palace, in which the viceroy formerly was lodged, and which at present serves as the residence of the President of the United Mexican States, and also contains the senate-house and all the principal public offices, is a building of great extent, including a number of squares and inner courts with separate staircases and suites of apartments. One of these courts contains the botanic garden, which however has been much neglected of late. The College of Mines is a large edifice, built in a pure taste and magnificent style, but though finished hardly fifty years ago, it is falling to ruins, owing to some defect in the construction. It contains a rich collection of minerals, and in one of its rooms a professor gives lectures on chemistry and mineralogy. The Acordada, or great prison, is a substantial and large building, which will contain above 1200 prisoners. The hospital, now converted into artillery barracks, occupies a large site, and is well built. The university building is not distinguished by taste or magnificence; it contains a collection of Mexican antiquities, among which is the celebrated stone of sacrifice. The Academy of Arts, which is a fine building, contains a great collection of models, with casts of all the best statues of antient and modern times, and a school for drawing.

The numerous churches and convents with their cupolas and steeples give the town a magnificent appearance. The cathedral stands on the ruins of the great *teocalli*, or temple, of the god Mixitli. One part is low and of bad Gothic architecture; but the other, built in the Italian style, is very handsome. The interior is lofty, magnificent, and imposing. In the outer wall of this church is fixed the *kellenda*, a circular stone, covered with hieroglyphic figures, by which the Aztecs or Mexicans used to designate the months of the year, and which is supposed to have formed a perpetual calendar. Among the numerous convents that of San Francisco is distinguished by its extent, architectural beauty, and wealth.

The Alameda, or public walk, at the western extremity of the town, resembles a park: it is laid out in lines, diverging from different centres, and is planted with a great variety of trees. In the centre is a fountain, which is supplied with water from the great aqueduct leading from S. Fé to the city. The water is carried along in trenches, so as to water the plants and trees, and is then discharged into the lake of Tezcuco. As the ground on which the city stands is low, all the roads leading to it are raised six or eight feet above its level; they are broad, paved in the middle, and planted on both sides with double rows of trees. These roads, called paseos, afford delightful rides.

As the water of the lake of Tezcuco is even salter than that of the Baltic, according to the experiments of Humboldt, and as the water which is found a few feet under the surface is also brackish, the city is supplied with drinkable water by two aqueducts, which bring it down from sources situated in the mountains west of the vale. The larger aqueduct, leading from S. Fé to the Alameda, and thence to the lake, is 11,155 yards long, and in one third of its course is supported by arches of stone and brick plastered over. Its water, which is very pure, is distributed through the city. The other aqueduct, that of Chapoltepec, is 3608 yards long, and rests on 904 arches, which are nine and a half feet apart, and the columns four feet thick. The width is about six feet and a half. The stream of water is two feet and a quarter wide, and three feet deep. This water, which is less pure, is consumed in the suburbs contiguous to the city on the south.

The city is partly supplied with provisions and vegetables by small boats, which bring them over the lake of Tezcuco; but as the lake is very shallow in January and February, the supply is then generally stopped, and the city depends, especially for vegetables, on the supply by the canal of Iztapalapan, which leads from the lake of Xochimilco to the town. This canal is narrow, but always covered with small canoes loaded with fruits and vegetables: it passes through the chinampas, or floating gardens, which, in their present state, are long narrow strips of ground, redeemed from the surrounding swamp, and intersected by small canals. They are well cultivated, abound in fine vegetables, and their edges are planted with poplars. It is stated that they originally consisted of wooden rafts, covered with earth, and floated about in the lake when it was full of water, whence their name is derived. At present they are stationary, but it is said that there are still some floating gardens in the lake of Xochimilco.

The most remarkable object in the environs of Mexico is the palace of Chapoltepec, which is built on a rock, to the foot of which the water of the lake of Tezcuco extended at the time of the conquest by Cortes (1521). The palace, which was built by one of the viceroys of Mexico, is properly a fortress; but it is now in a very dilapidated state. The place is frequently visited by the natives and foreigners on account of the fine view it affords over the city and the greater part of the vale of Tenochtitlan. For the *teocallis* of Tezcuco, see MEXICAN STATES.

The population of Mexico amounts to between 140,000 and 150,000 souls, and consists mostly of Creoles, or descendants of Spaniards; the Mestizos, or descendants of Spaniards and Indians, not amounting to half that number. The lowest class of the people, called Saragates, Guachinangos, or Lepores, live in a state of abject poverty, which is owing to their indolent habits. They amount to about 30,000. The manufactures are not important, except those of plate and tobacco, which latter is carried on for the benefit of the government, as in all the Mexican states. Gold lace is also made. There are also a few manufactures of soap, cotton, and hats; but by far the greatest part of the manufactured goods for the consumption of the inhabitants are imported from Europe: silk stuffs, and especially stockings, also from China. The commerce of Mexico is limited to the importation of these foreign goods, and to the exportation of the produce of the mines. The city owes its present importance to the circumstance of being the residence of the federal government of the Mexican states, and of a great number of very wealthy individuals.

(Humboldt's *Essai Politique sur la Nouvelle Espagne*; Ward's *Mexico in* 1827; Poinset's *Notes on Mexico*; Lyon's *Journal of a Tour in the Republic of Mexico*; *A Sketch of the Customs and Society of Mexico*.)

MEXICO, GULF OF, is a mediterranean sea, which is united by numerous straits with the Atlantic, from which it is separated by a row of islands and widely extended banks. The long chain of the Antilles forms its eastern boundary between 10° and 20° N. lat., and several small banks with the Great and Little Bahama Bank, extend along it from 20° to 26° N. lat. It is divided from the Pacific Ocean by the Mexican isthmus, which unites the two Americas. The length of the whole sea, from east-south-east to west-north-west, is not much short of 3000 miles. It is divided into two portions by the island of Cuba, which lies across the sea from east to west. Of these portions the southern, in modern times, has obtained the name of the Caribbean Sea, whilst that of Gulf of Mexico has been limited to the northern portion.

The Caribbean Sea, which extends from east to west nearly 2000 miles, or the distance from the British Islands across the Atlantic to Newfoundland, with an average breadth of less than 500 miles, is free from rocks and dangers to navigation between the Lesser Antilles and 80° W. long., except along the coast of Venezuela, where there are numerous steep rocks and islands which extend westward to 70°. West of 80°, and indeed from the innermost recess of the Gulf of Darien, the coast is lined by numerous reefs and low wooded islands, called keys, which in the Mosquito Gulf and the Bay of Honduras increase in number, and render navigation more intricate and dangerous. The Gulf of Mexico, or the northern portion of the mediterranean, is united to the Caribbean Sea by a strait about 120 miles wide, which is formed by Cape S. Antonio, the most western extremity of the island of Cuba, and Cape Catoche, the most northern point of the peninsula of Yucatan. The length of the Gulf, from Cape Sable in Florida to the eastern coast of Mexico, is more than 1000 miles, and its breadth towards the west more than 700 miles; but between Yucatan and Cuba, on the south, and the shores of Louisiana and Alabama, on the north, it does not exceed 550 miles. Shoals and small islands are rare within the body of the sea, and occur only along the northern coast of the island of Cuba and along the peninsula of Yucatan. Along the coast of Mexico the soundings are very regular, beginning at a distance of about 30 miles with 100 fathoms, and decreasing gradually as we approach the shores. At the eastern extremity, where the Gulf terminates in the old Bahama Channel and Florida Strait, the navigation is rendered very intricate by the Florida Reef, the Key Sal Bank, the Great Bahama Bank, and the numerous keys, shoals, and islets which surround the northern coast of Cuba.

The eastern trade-winds prevail in this sea during the summer from May to November, and on its eastern border along the islands all the year round. But along the coast of Venezuela and the shores of the Mexican isthmus the winds are subject to a regular change from November to April. In the Caribbean Sea calms and light winds succeed the trade-winds in November until the month of December, when the wind settles in the north-west, and varies only to the north up to the month of April. This wind blows in violent gusts and is attended with rain, but does not appear to extend beyond 12° 30′ N. lat., to the north of which parallel the trade-wind always blows. Calms and light airs in April indicate the change of the wind, which soon settles in north-east and east. In the Gulf of Mexico the *Nortes*, or northern gales, are much dreaded by navigators. They begin in September or October, and become prevalent in November: they blow with the greatest force in March, and sometimes last to the month of April. These violent gales generally blow three or four days in succession, and last sometimes ten or twelve days. They are interrupted by moderate winds from the east, which commonly last three or four days. At the setting in of a 'norther' the larger vessels, which cannot enter the shallow harbours of this coast, are obliged to slip their anchors and leave the shore.

The currents in this sea are mostly independent of this change of winds. A strong current sets into the Caribbean Sea from the Atlantic. In the wide strait between the islands of Trinidad and Grenada it runs from one to one mile and a half per hour, but not so quick in those which lie farther north, yet the rate is about twenty miles per day as far as the island of Dominica; it then diminishes gradually to ten and even eight miles, which latter rate occurs near the Virgin Islands. The strongest current within the Caribbean Sea is met with along the coasts of Venezuela and New Granada: it runs westward the whole year round as far as the Gulf of Venezuela, but west of that bay only from May to November. When the easterly wind ceases in November the currents begin to run to the westward some days before the north-west winds come on, and continue to flow in that direction to the month of April. But in the Gulf of Darien, the most southern corner of the Caribbean Sea, the order of the currents is inverted; they run westward from December to April, and eastward from May to November. These currents extend only about 24 or 30 miles from the shores, and in the body of the sea they are always westerly, and commonly weak, except in January and February, when they run with great force. This westerly current turns northward in the strait between Cape S. Antonio and Cape Catoche, and carries the water into the Gulf of Mexico, in the western portion of which sea a strong northerly current, running about ten miles a day, is perceptible, even during the northers. But along the shores of Mexico, and at a considerable distance from them, no current is met with, except when the northers blow, when a strong southerly current runs along the shores; and to this circumstance is ascribed the formation of the numerous long-extended islands which line these shores, as also the bars which lie before the embouchures of the rivers. Near the mouth of the Mississippi river the northern current turns eastward, and afterwards to the south-east. At the western extremity of Florida Reef the current divides: the greater portion of the water, turning eastward, forms the Gulf Stream; while the remainder, running westward along the reefs called the Colorados, winds about Cape S. Antonio and Cape Corrientes, and returns to the Caribbean Sea. The Gulf Stream carries the water back to the Atlantic. [Atlantic Ocean.]

The Mexican Gulf may be entered by vessels through all the straits which divide the Lesser Antilles from one another; but navigators prefer the straits between Trinidad and Grenada, and between S. Vincent and S. Lucie, when they sail to the northern coast of South America. Vessels bound to Jamaica, Cuba, Mexico, and Louisiana, commonly choose the strait between Guadaloupe and Antigua; they rarely sail through the Mona Passage between Porto Rico and Haiti. But most of the vessels returning from these countries to Europe sail through the strait between Cuba and Florida, and follow the Gulf Stream, until they have entirely got out of the Florida Strait, when, turning eastward, they enter the Atlantic. Some vessels however, on leaving Jamaica and the countries farther south, direct their course to the Windward Passage between Haiti and Cuba, and thence to the Crooked Island Passage, by which they enter the Atlantic.

The Gulf of Mexico is remarkable for the high temperature of its waters. It raises the thermometer to 86°, while in the Atlantic, between the same parallels, the water does not exceed 77° or 78°. This high temperature is considered as the cause of the high temperature which the waters of the Gulf Stream preserve to a great distance from the Straits of Florida. In the centre of this sea, between the northern coast of Yucatan and the shores of Louisiana, great quantities of *fucus natans* are met with, extending in parallel lines from south-south-east to north-north-west. It was formerly supposed that the enormous quantity of this plant which is found in several parts of the Atlantic [Atlantic Ocean] was derived from this sea, and that it had been brought down by the Gulf Stream; whence it obtained the name of Gulf-weed: but at present it is thought that this plant grows on the bottom of the sea, in those parts where it is met with, and that at certain seasons it is detached from its root.

(Humboldt's *Personal Narrative, &c.*; Rennell's *Investigation of the Currents, &c.*; Ulloa's *Voyage to South America*; and Lyon's *Journal of a Residence and Tour in the Republic of Mexico.*)

MEYER, JAMES, was born on January 7, 1491, at Vleter, a village near Bailleul in Flanders, from which place, agreeably to the custom of his time, he took the name of Baliolanus. After acquiring the knowledge of antient languages, he came to Paris, and went through a course of philosophy and theology. Subsequently returning to Flanders he embraced the clerical profession, and establishing himself at Ypres, opened a school, which in a short time acquired great celebrity. On being appointed incumbent to the living of the church of Saint Donatien, he removed his school to Bruges, and finally renounced it to accept the curacy of Blankenburg, where he died on the 5th of February, 1552. His remains were carried to Bruges and interred at St. Donatien. His principal works are: 'Flandricarum Rerum Decus,' containing the origin, antiquity, nobility, and genealogy of the counts of Flanders; Bruges 1531, 4to.; and 'Chronicon Flandriæ, ab anno Christi 445 usque ad annum 1278,' Nürnberg, 1538, 4to.; 'Chronicles of Flanders, from the year 445 to the year 1278,' which was continued by his nephew to the year 1476, and published under the title of 'Annales Rerum Flandricarum,' Antwerp, 1561, fol.

MEYER, FELIX, was born at Winterthur in the canton of Zürich, in the year 1653. He studied first under an artist at Nürnberg, and afterwards under Ermels, a good landscape painter, whose manner he adopted. He went to Italy for improvement, but the climate not suiting his constitution, he returned to Switzerland. The beautiful and sublime scenery of that country supplied him with ample materials for numerous designs which deservedly gained him a high reputation and also fortune. To a lively and fertile imagination he added great facility of execution, of which he gave a remarkable proof at the abbey of St. Florian, in Upper Austria, where he happened to stop on his travels.

The abbot desiring to have two grand apartments painted in fresco, and having consulted another artist, who was very dilatory, asked Meyer for his advice as to the manner in which it should be executed. Meyer, after some minutes' consideration, took a long stick, to which he fastened a piece of charcoal, and immediately began to design, saying, 'Here I would have a tree;' which he sketched as quickly as possible; 'in the distance I would have a forest, thus; here a fall of water tumbling from great rocks, and so on;' designing as fast as he spoke, to the astonishment of the abbot, who immediately engaged him to undertake the work, which he entirely completed in the course of the summer. This adventure spread his reputation through all Germany, and from this time he was constantly employed by the princes and nobility.

In the latter part of his life he endeavoured to adopt a manner which should be at once more expeditious and more pleasing; but these latter performances are not equal to his earlier works, which give him a high place among the most eminent landscape painters. He was not skilful in drawing figures. His most esteemed works have figures by Roos or Rugendas. He died in 1713, at the age of sixty.

MEZEREUM. [Daphne.]

ME'ZERAI, FRANÇOIS EUDES DE, was the son of a surgeon named Eudes, and born in 1610, near Argentan, in the village of Rye. He studied in the university of Caen, and afterwards obtained the post of *Commis de Guerres*, which situation he subsequently gave up, and at Paris took the name of De Mezerai. Owing to great application he became dangerously ill, on which occasion the Cardinal Richelieu sent him 200 crowns, and the promise of his patronage. At Paris he produced his 'History of France,' which he afterwards enlarged by the introduction of verses, made by his friend Jean Baudoin, upon the principal persons of each reign; this latter edition had great success in 1646 and 1651; and a second and third volume appeared, both of which were equally fortunate. He also published several pamphlets directed against Cardinal Mazarin, under the name of Sandricour. An abridged edition of his 'History of France' appeared in 1668, and in 1662 his 'History of the Turks,' which is a translation from Chalcondylas. He succeeded Voiture in the Academy, and died in 1683.

Among other singularities, it is said of Mezerai, that he would shut himself up from the light of the sun at noonday, and in the middle of summer, pursuing his avocations by candle-light; and, as if fearful that this eccentricity would not be generally known, he lighted his visitors to the door.

Mezerai, besides the harvest reaped from his works, which much exceeded his expectations, had several foreign pensions. His merits as an author are exceedingly doubtful; for, according to the writer in the *Biographie Universelle*, the extraordinary success of his 'History of France' was, in a great degree, due to the number of engravings it contained, consisting of portraits of kings and queens, which however were inserted without much regard to historic truth. His style is sometimes coarse, but generally clear, distinct, and forcible. Voltaire observes, that he lost his pensions for having told what he thought to be the truth. The same author observes, that he is more bold than accurate, and that his style is unequal.

ME'ZIE'RES, a town in France, capital of the department of Ardennes, situated on the Meuse, in 49° 46′ N. lat.

and 4° 44′ E. long.; 121 miles in a direct line north-east of Paris, or 144 miles by the road through Soissons, Reims, and Réthel.

This town is chiefly remarkable for the strength of its fortifications. In 1520 or 1521 it was successfully defended by the Chevalier Bayard against an army under the count of Nassau, sent by the emperor Charles V. to besiege it. It was taken by the Prussians in 1815, after sustaining a long bombardment.

The town is built on the slope of a hill, and is washed both on the north and south sides by the Meuse, which here makes a bend to the west, in the form of a horse-shoe. The houses are ill built, and the public buildings little remarkable. There are three churches, an hospital, an arsenal, and a theatre. Altogether the town suffers by the contrast between it and the neighbouring town of Charleville, which is to the north of it, separated only by the Meuse, and is larger and more regularly laid out, and better built than Mézières. [CHARLEVILLE.] The population of Mézières, in 1831, was 3737 for the town, or 3759 for the whole commune; in 1836, it was 4083 for the commune. The inhabitants manufacture leather, which is in high repute, and carpenters' and other mechanics' tools: there are some breweries. Trade is carried on in leather, serge, hosiery, and linen cloth. Building stone, lime, and sand are abundant round the town. There are three yearly fairs. There are some fiscal and administrative government offices here and at Charleville. There are a society of agriculture, sciences, and arts; a public library; and courses of instruction in geometry and mechanics applied to the arts.

The arrondissement of Mézières has an area of 363 square miles, and comprehends 99 communes. It is divided into seven cantons or districts, each under a justice of the peace. The population, in 1831, was 62,737; in 1836, it was 69.294.

MEZZOTINTO, in engraving, a peculiar mode of engraving designs of any description upon plates of copper or steel, with the view of obtaining impressions therefrom. In this style of engraving, which essentially differs from every other, the surface of the plate is first indented or hacked all over by the action of an instrument something like a chisel, with a toothed or serrated edge, called a *cradle*, or mezzotinto *grounder*. This tool being rocked to and fro in many directions, indents or barbs the plate uniformly over its face, and produces what is called the mezzotinto grain or ground.

The barb, or nap, thus produced retains the printing-ink; and if in this state of preparation an impression were taken from the plate upon paper, it would be uniformly of a deep-black colour.

The directions, or *ways*, as they are technically called, given to the grounding-tool, are determined by a regulated plan, and for this purpose an ingenious sort of scale is used which enables the workman to pass over the plate in almost any number of directions without repeating any one of them. The mezzotinto ground being thus laid, it is at this period that the business of the artist properly commences. Having traced or drawn, with a pencil or other instrument, his outline upon the paper (unless indeed, as is sometimes the case, this should have been etched by the ordinary process, previous to the mezzotint ground having been laid), he proceeds to excise away the nap or ground, in conformity with the design, from all those parts which are not intended to be perfectly black in the impression. The instruments required for this purpose are scrapers and burnishers; with the former he scrapes away more and more of the ground in proportion to the brightness of the light, and the burnishers are used to produce perfect whiteness where it is required, as the high lights on the forehead or tip of the nose, or white linen in a portrait, &c. As the work proceeds it may be blackened with ink, applied with a printer's ball or otherwise, to ascertain the effect; after which the scraping may again be proceeded with, the artist taking care always to commence where the strongest lights are intended to appear.

The great facility with which mezzotintos are executed, as compared with line-engravings, will be obvious, seeing that it is much easier to scrape or burnish away parts of a dark ground corresponding with any design sketched upon it, than it is to form shades upon a white ground by an infinite number of strokes, hatches, or points, made with the *graver* or *etching-needle*. Herein consists the leading difference between this and all other modes of engraving; for while the process in each of these is invariably from *light* to *dark*, in mezzotinto it is from *dark* to *light*; and even the very deepest shades are produced, as we have seen, before the design is commenced. The characteristic or distinguishing excellence of mezzotinto engraving would seem to consist in the rich profundity of its shadows, the obscurity of which especially sympathises with fine effects of chiar'oscuro. It is therefore properly employed upon subjects where the quantity of dark predominates, as in the works of Rembrandt for example; and there can be little doubt that, had this process been known to that great master, he would have availed himself of it in multiplying his works. This opinion is sufficiently corroborated by the fact of his having sought and obtained the same effect, or nearly so, by leaving the *burr* on his etchings [ENGRAVING], which, retaining the printing-ink, through a limited number of impressions at least, produced a result so nearly corresponding with mezzotinto, that many persons have been deceived by it, and led to attribute to Rembrandt van Rhyn the discovery of this more modern mode of procedure.

Having mentioned what we conceive to be the characteristic excellence of mezzotinto, viz. the richness and profundity of its shadows, it is but fair to add that its chief defect seems to be a corresponding poverty in the lights; and this objection will be felt to have much weight, when it is considered that it is to the lights in a picture that the eye is invariably attracted. On the lights therefore the line-engraver displays all that delicacy and beauty of line which agreeably irritates the eye and compensates for the absence of colour, by rendering the lights more interesting than the shadows. The lights in mezzotinto, on the contrary, where they occur in broad masses, have been ever felt by the judicious to be comparatively cold and poor. Of late however this objection has been much obviated by a judicious admixture of *etching* with the mezzotinto, which, by enriching the lights, has done much towards uniting the energies of both styles. Objection has also been taken to mezzotinto on account of the very limited number of good impressions which an engraving in this style would yield, in consequence of the very superficial nature of the ground. A work of this sort however was always susceptible of renovation by retouching, under more easy and satisfactory circumstances than one produced by any of the other modes; and latterly the introduction of steel plates, which are now commonly substituted for those of copper, has removed the objection entirely, a very large number of good impressions being thus ensured without the necessity of retouching. As copper-plates however are still occasionally used, it may be proper to state the respective numbers of good impressions that each may be expected to yield. On copper, the wear and tear of the plate much depend upon the number of *ways* it has been passed over in grounding, or the closeness of the teeth in the grounding-tool, the fineness of the grain depending upon these circumstances.

If the grain be not particularly fine, a copper-plate will furnish about one hundred and fifty good prints. When the plate begins to wear, the practice is to work it over again, partially, with the cradle; and afterwards to again have recourse to the scrapers, and in this way impressions of fifty at a time may be taken; so that by alternately retouching and printing by fifties, five hundred prints are frequently obtained from one copper-plate.

But from a *steel* plate eight or ten times that number may be obtained. The process is the same in the one case as in the other, but heavier *pressure* on the grounding-tool is requisite on a steel plate. A greater number of *ways* also is desirable, and these may be effected without rendering the subsequent engraving liable to more rapid deterioration, as would be the case upon copper. As many as ninety *ways* are frequently used on steel, while the number on a copper-plate varies from twenty-four to forty, which latter is rarely exceeded. It is scarcely necessary to say that steel plates, being especially liable to rust, require particular care in laying by.

From what has been said, it will be inferred that the manual operation of laying the mezzotinto ground is a very important, at the same time that it is a very laborious process. It is much to be wished that some means of effecting it by machinery could be devised; and we see no reason to doubt that this could be accomplished with equal and perhaps superior results to those obtained by the present mode of procedure.

The discovery of the art of engraving in mezzotinto has been a subject of some controversy, and, almost up to the time of our writing, of much uncertainty; but circumstances have recently transpired which we are among the first publicly to announce, and which enable us to set the matter completely at rest, and to give the honour of the invention to its real author, the rarity of whose productions has hitherto favoured the pretensions of one who has shown himself but too willing to strut in borrowed plumes. The account commonly given of its discovery is, that Prince Rupert, observed one morning a soldier engaged in cleaning from his musket the rust which the night-dew had occasioned, and perceived upon it, as he thought, some resemblance to a figure; it occurred to him whether or not, by corroding or grounding a plate all over in a manner resembling the rust, he might not afterwards scrape away a design upon it, from which impressions might be obtained. In short, it is said that he tried and succeeded, and thus became the inventor of mezzotinto engraving. If mezzotinto really had its origin in such circumstances as these, which is far from being improbable, they must have occurred to another rather than to Prince Rupert, since he was certainly not the discoverer of this art, as we shall presently show.

The merit of the discovery has been claimed by some authors (and even of late by a writer now living) for Sir Christopher Wren, on the ground of a communication which he made to the Royal Society in 1662, the Journals of which Society for October in that year record that 'Doctor Wren presented some cuts, done by himself in a new way, whereby he could almost as soon do a subject upon a plate of brass or copper, as another could draw it with a crayon upon paper.'

Previous to setting up the claims for Sir Christopher Wren, one would have thought that an ordinary spirit of research would have led his biographer to consult the engraved works in mezzotinto of Prince Rupert, which are not numerous, and, we believe, do not exceed twelve in number. He would then have found that his principal work (which is the Decollation of St. John the Baptist, after a design by Spagnoletto) bears date 1658, which is four years earlier than Sir Christopher Wren's communication to the Royal Society. In 1662, the year in which Sir Christopher Wren made this communication, the Royal Society was founded; and in the same year the celebrated John Evelyn (who was nominated by the king one of the original members, and of the council) published his 'Sculptura,' in which the first announcement of the new art, in England at least, appears; and he distinctly claims the honour of the invention for Prince Rupert, in a chapter 'on the new method of engraving, or mezzotinto, invented and communicated by his highness Prince Rupert, count palatine of Rhine,' &c. He embellishes the chapter with a specimen from the prince's own hand, and concludes it by alluding to an account of the process, which he is 'preparing to be reserved in the archives of the Royal Society;' and, as we have already seen, Prince Rupert's most capital performance actually bears date four years earlier: so that there is no pretence for giving the invention to Sir Christopher Wren on the ground of anything which he produced, or any communication which he may have made in 1662.

But while we have thus shown that the pretensions of Prince Rupert completely supersede those of Sir Christopher Wren, it remains for us to prove that those of Prince Rupert himself are invalid, and that he was guilty of an act of meanness in imposing upon John Evelyn, and this to the extent of allowing a man of his high character to impose in turn, however unconsciously, upon the world, by claiming for Prince Rupert the honour of an invention to which the prince well knew all the while that he had no title.

The real inventor of this art was Louis von Siegen, a lieutenant-colonel in the service of the Landgrave of Hesse Cassel, from whom Prince Rupert learned the secret when in Holland, and brought it with him to England, when he came over a second time in the suite of Charles II. Some curious and very rare prints recently purchased on the Continent, and now deposited in the British Museum, will enable us to place the claims of Von Siegen beyond doubt.

It is true that the Baron Heneiken long since ascribed the invention to its true author; and in his 'Idée Générale d'une Collection Complète d'Estampes,' printed at Leipzig in 1771, he distinctly asserts that Prince Rupert learnt the art from Von Siegen, whose first specimen made public was a portrait of the Princess Amelia-Elizabeth of Hesse. But although Baron Heneiken is an author of acknowledged credit, we must have continued to speak with caution on the subject, because we believe Baron Heneiken does not give the date of this engraving, nor profess to have seen an impression of it. In the collection however lately purchased for the British Museum there is an impression of this identical portrait, and it bears date 1643, which is *fifteen years anterior* to the earliest of Prince Rupert's dates. In the same collection there is another curious work by Von Siegen, a portrait of the queen of Bohemia, the date of which is also 1643, which we think places the question beyond all dispute. But there is among them one specimen which we regard as more curious than any of the others; for although without a date, it bears, we think, the most conclusive internal evidence of having been produced in the very infancy of the art, since it exhibits a total misconception or misapplication of its peculiar local powers, which, as we have said, are especially calculated for large masses of shadow of an indefinite character, such as a plain background to a portrait. Now the work to which we allude, which is a portrait of the princess of Orange the eldest daughter of Charles I., is a mixture of line-engraving and mezzotinto, and in it the background (which, if the mixed style be used, would be best effected by the mezzotint ground) is performed wholly in cross-hatches by the old process; while the flesh and even the hair, in which line-engraving might have been applied with advantage, are produced wholly by the new process of mezzotinto. There are works by Theodore Caspar Fürstenburg, who also probably learnt the art from Von Siegen, which bear date 1656, being earlier than anything by Prince Rupert; but the works both of Fürstenburg and Prince Rupert are engraved entirely by the newly discovered process of mezzotinto, and evince a more matured knowledge of its powers than those of its inventor Von Siegen.

We will only further add the remarkable fact that Von Siegen frequently attached the word 'inventor' to his works, of which we subjoin an instance in the inscription to a 'Holy Family,' engraved by him after Carracci, and one of his latest performances: 'Eminentissimo Principi Domino D. Julio Mazzarini, S.R.E., Cardinali, &c., novi hujus Sculpturæ modi *primus inventor* Ludovicus à Siegen humilissime offert, dicat et consecrat. A° 1657.'

It is not improbable, notwithstanding what we have said, that Prince Rupert, by himself or with the assistance of Wallerant Vaillaint, an artist whom he retained in his suite, may have improved the mechanical mode of laying the mezzotinto ground; and it should also be stated that there is by Sir Christopher Wren a head of a blackamoor which is thought to have been done by a process differing from that of Prince Rupert. But these observations relate not to the principle of the art, but merely to the tool with which the *ground* is produced. The more perfect instrument at present used (i.e. the *cradle*) is said by Bartch to have been invented by Blooteling, a very skilful engraver in mezzotinto, who produced many of his works about A.D. 1672.

It is in our own country that mezzotinto engraving has been carried to the greatest perfection. The principal artists previous to the present century were James M'Ardell, Richard Houston, Valentine Green, Dixon, the two Watsons (Thomas and James), and one who contributed more perhaps to the improvement of this art than any one else, Richard Earlom, whose works, embracing almost every class of subject (history, portrait, still life, &c.), are well known, and are in almost every collection of importance in the country.

MHEYSIR. [Hindustan, vol. xii., p. 211.]

MIAMI. [Ohio.]

MIASMA is a Greek word (μίασμα) signifying pollution or corruption generally; and is employed to designate a certain volatile deleterious principle, arising either from the bodies of the sick, from animal or vegetable substances, or from the earth, and capable of exerting a morbid influence on those exposed to its action. To the terrestrial emanations the Italians have given the name of Malaria (from *mala* and *aria*, bad air), and this word has been generally adopted into other languages: to those emanations arising from the bodies of the sick, the term contagion is more properly applied. In common parlance then, miasma is seldom employed to designate the contagious effluvium of disease; but, with the adjunct marsh, is restricted to the sense in which malaria is used; hence we speak of marsh miasma and malaria as one and the same thing. Though marshes, whether salt or fresh, are prolific sources of malaria, they are by no means the only sources; the mud which is left by the drying of extensive ponds and lakes, the half-wet ditches of fortifications, and neglected sewers and drains, are capable of furnishing this poison. The decomposition of vegetable matter, in other circumstances than in connection with soil, is likewise capable of producing it; this has been exemplified in the sickliness of ships from the leakage of sugar into a damp hold. The fever which made such fearful ravages among the crew of the Priamus frigate, arose from the action of bilge-water on chips and shavings left in the hold. Having enumerated some of the sources of miasma, the question naturally suggests itself,—what are the conditions essential to its development? The mere name of marsh miasma suggests the idea of stagnant water, and if the preceding enumeration of circumstances under which the production of malaria takes place be examined, it will be found that vegetable matter and moisture are present in all the examples, and that animal matter is so occasionally. But how great soever may be the share which moisture has in its production, it is certain that only a very small proportion is necessary: a marsh, the whole surface of which is thoroughly wet, is comparatively innocuous; but if partially or entirely dried by the summer's heat, it becomes extremely pestilential in autumn; indeed malaria, in its most intense degree, has been met with in low lands which had become as dry as a brick ground, with the vegetation utterly burnt up, and hence a high temperature seems to be another agent necessary, or at least favourable to its development. According to Dr. Ferguson, the only condition indispensable to the production of marsh miasma on all surfaces capable of absorption, is the paucity of water where it had previously recently abounded, a rule to which he assures us there is no exception in climates of high temperature. Of the chemical and physical properties of malaria nothing is known, even the very obvious question whether it is always the same kind of poison, or whether a multiplicity of these may not exist, is one which the present state of our knowledge does not enable us to answer. The occasional existence of putrefaction in conjunction with malaria is an accidental concomitant, but by no means essential to its activity as a poison. With regard to the effects of malaria, these manifest themselves in a longer or shorter period after exposure to its influence, and consist chiefly in the production of intermittent, remittent, and yellow fevers, dysentery, and typhus. The long-continued application of the same poison in a diluted form gives rise to various disorders of minor import, gradually undermines the constitution, and produces premature old age; even the inferior animals and vegetables partake of the general depravation which characterises malarious districts. The most efficient means of preventing the generation of the malarious poison, and, by consequence, the diseases to which it gives rise, are, the draining of swampy lands, and preventing the accumulation of putrid or putrescible vegetable or animal matter.

MIAZZI, GIOVANNI, an Italian architect of the eighteenth century, born at Bergamo, in 1699, was originally brought up to his father's trade of carpenter. He was almost entirely self-educated in the profession which he afterwards followed; for it was not till he was forty that he availed himself of the instructions of Preti, who was his junior by two years. He had however previously built a small theatre in his native town, and the church of La Trinità in the Borgo of Angarano. One of his later and best works is the church of S. Giambattista at Bassano, in which he successfully overcame the numerous obstacles arising out of the site and the conditions he was obliged to comply with. He also built the collegiate church at Schio, that at Valdagno, another at San Vito, and a fourth at Simonzo, besides that at the convent of Monte Gargano, in Puglia. The Spineda palace, at Venegazza, in the Trevegiano, excited much admiration for the elegance of its design, which has since been greatly impaired by the demolition of the chapel and corresponding wing, and the arcades uniting them to the central edifice. The beautiful theatre at Treviso is another of his works; for although the original design proceeded from Bibbiena, he greatly improved it; and the façade, the vestibule, and many of the internal arrangements are entirely his own. Miazzi died about 1780, and, notwithstanding his age, continued vigorous and active almost to the last.

MICA. [LEPIDOLITE; MARGARITE; ODERIT.]

MICA SCHIST, one of the earliest groups of stratified rocks known to geologists, and very extensively distributed throughout the mountain regions of the globe, often in contact with granite, but more frequently superposed on gneiss. It is frequently interstratified with gneiss, primary limestone, quartz rock, chloritic schist, and clay slate, and is deficient in organic remains. There are however certain more recent assemblages of strata more or less allied to mica schist in composition, of very limited area, adjacent to granitic elevations, in Dauphiné, &c., which do contain organic remains of the secondary periods.

To the British geologist the southern Highlands of Scotland and the mountains of Donegal offer abundant and striking examples of mica schist, with its associated limestones, quartz rocks, &c., while round the granites of the Isle of Man, Cumbria, Devon, and Cornwall, hardly a trace of gneiss or mica schist has been observed.

Composition. Mica schist, in its most typical state, differs from gneiss by the absence of felspar, but among the early stratified rocks the gradations and permutations of ingredients are so frequent as to confound all merely mineral distinctions, from hand specimens. The mica is usually spread through the rocks of this series in continuous surfaces overspreading the quartz portions, whereas in gneiss this seldom happens. In respect of the magnitude, relative abundance, and crystalline aspect of the ingredients of mica schist, there is every possible variation, so that some specimens approach obscurely to granite, others to well defined gneiss, and others to clay slate.

Dr. M'Culloch, a good authority on subjects of this nature, proposed the following synopsis of micaceous schist.

Division I. Consisting of mica and quartz.
  Subdiv. 1. Simply laminar or foliated.
    a. Composed principally of continuously laminar mica
    b. Composed principally of continuously laminar quartz.
    c. The mica discontinuous, the quartz granular.
    d. The mica greenish, approaching to chloritic schist.
    e. Mica grey, approaching to talcose schist.
    f. Approaching to clay slate.

The rocks of this subdivision are frequently and remarkably contorted.

  Subdiv. 2. Granularly laminar.
    a. Granular quartz, with scales of laminar mica.
    b. Laminar quartz, with mica in scattered spots.
    c. Laminar quartz, with distinct scales of mica.
    d Laminar quartz, with mica in parallel lines, so as to appear fibrous on splitting. (Avanturine seems to be of this nature.)
    e. The mica bent and contorted round the grains of quartz.

Division II. Compounded of three or more ingredients.
    a. With hornblende.
    b. With felspar (passing to gneiss).
    c. With chlorite or talc (passing to talcose or chlorite schist).
    d. With more than one of these ingredients.
    e. With carbonate of lime.

Division III. Conglomerated, or containing superadded fragments of granite, gneiss, limestone, &c. (In Isla, Garveloch, Rannoch, &c.)

Besides the minerals above noticed, many others occur in mica schist, so as universally to modify its aspect. This is particularly the case with garnet, which is often perfectly crystallized amidst the mass of fragmentary mica and quartz, and is so frequently met with in mica schist, that it seems to mark a particular condition through which the rock has passed since its first deposition.

The circumstance which perhaps more than any other deserves attention in studying these rocks, is the character of their stratification. Where limestones or clay-slates alternate with the mica schist, its strata are easily traced; but in cases where entire mountains are formed of laminated mica and quartz, the contortions to which the whole is subject render it very difficult to determine the prevalent dip of the beds.

It is difficult to avoid the belief that the smaller contortions of gneiss and mica schist are due to causes quite distinct from violent movement; they are characteristic of a peculiar mode of deposition, or marks of a subsequent modifying process; whether the great contortions may be thus explained, or require the supposition of great disturbances of position, is not easy to determine. [GEOLOGY; ROCKS.]

MICAH (מִיכָה); one of the twelve minor Hebrew prophets, is called in the title to his prophecy the Morasthite, and thus he is distinguished from Micaiah, the son of Imlah, who prophesied the death of Ahab, about B.C. 897. (1 *Kings*, xxii. 8-28.) This appellation was probably derived from his birthplace, Moresheth-Gath (*Micah*, i. 14), or Mareshah, a city of the tribe of Judah. (*Micah*, i. 15; *Josh.*, xi. 44; 2 *Chron.*, xi. 8; xiv. 9-10.)

From the title to the book of Micah we learn that he prophesied in the days of Jotham, Ahaz, and Hezekiah, kings of Judah, or from 759 to 699 B.C. The kings of Israel during this period were Pekah and Hoshea. Thus Micah was contemporary with the latter part of Hosea's prophetical ministry, and with Isaiah. This date is confirmed by a reference made to the prophet by Jeremiah (xxvi. 18, 19), who quotes his prophecy respecting the destruction of Jerusalem (*Micah*, iii. 12), and says that it was uttered by Micah in the days of Hezekiah. He must have delivered his prophecy before the sixth year of Hezekiah (B.C. 722), in which the kingdom of Israel was destroyed, for he speaks of that calamity as a future event. (*Micah*, i. 6, &c.)

Hartmann contends that Micah prophesied after the fourteenth year of Hezekiah, and that the book which bears his name is a collection of different prophecies made during the Babylonish captivity, some of which are Micah's, and others not. (*Micah, neu übersetzt und erläutert*, Lemgo, 1800.) This hypothesis, which is totally at variance with all the testimony we have on the subject, and is not sustained by internal evidence, on which it professes to be founded, has been amply refuted by Jahn (*Einleitung*, vol. ii., p. 430) and Rosenmüller (*Scholia in Vet. Test.*, *Proœm. in Mic.*).

Micah prophesied both to Israel and Judah (i. 1). He begins by predicting the overthrow of both nations, upbraids them with their cruelty, injustice, and impiety, and concludes this part of the book with the striking prophecy of the destruction of Jerusalem, which Jeremiah quotes, and which some suppose to refer to the taking of the city and the razing of the temple by the Romans. (chaps. i., ii., iii.) He next prophesies the restoration of the people to Jerusalem (iv. 1-8), after they shall have been carried captive to Babylon (iv. 9, 10), and the destruction of their enemies (iv. 11, 13). He foretels the birth of the Messiah at Bethlehem, after great calamities (v. 1-3), his ministry, and final triumph (v. 4-15). In chap. vi. he again reproves the people for their ingratitude, irreligion, and injustice. In chap. vii. Jerusalem is represented as complaining of the corruption and faithlessness of her sons, but patiently waiting for deliverance from God (ver. 1-10). The prophet consoles her with the promise of her restoration (ver. 11-13), and concludes his book with a sublime prayer to God for the fulfilment of that promise (ver. 14-20).

'The style of Micah,' says Bishop Lowth, 'is for the most part close, forcible, pointed, and concise, sometimes approaching the obscurity of Hosea, in many parts animated and sublime, and in general truly poetical.' (*Prælect.*, xxi.)

The canonical authority of this book is undisputed. One of the most remarkable predictions in it (v. 2) is quoted in the New Testament as being understood by the Jewish priests and scribes to refer to the birth of the Messiah. (*Matt.*, ii. 6.)

(Rosenmüller's *Scholia in Vet. Test.*; the Introductions of Eichhorn, Bertholdt, Jahn, De Wette, and Horne; *The Minor Prophets*, by Newcome and Horsley; *Micah, übersetzt und erläutert*, von K. W. Justi, Leipz., 1820.)

MICHAEL'S MOUNT. [CORNWALL.]

MICHAEL, SAINT. [AZORES.]

MICHAËLIS, JOHN DAVID, was born at Halle on the 27th of February, 1717. His father, Christian Benedict Michaëlis, was professor of theology in the university of Halle, and a distinguished Hebrew scholar. After receiving instruction for some time from private tutors, Michaëlis spent four years in the orphan school at Halle, where his attention was particularly directed to languages and philosophy. In 1733 he began to attend the lectures at the university, and it was here that he obtained from the chancellor Ludwig's lectures on German history the foundation of that knowledge of general law and of the constitution of society which was afterwards displayed in his 'Mosaisches Recht.' After taking his degree in 1740, he visited England, where he made the acquaintance of several eminent scholars both in London and in Oxford. During part of his residence in England he preached at the German chapel in St. James's Palace. On his return to Germany he devoted himself to the study of history, Oriental languages, and biblical criticism. At the death of the chancellor Ludwig, Michaëlis was commissioned to arrange and catalogue his immense library. The catalogue was published in 1745, and is considered a model for such works.

In 1745 he went to the university of Göttingen at the invitation of Münchhausen; and there he spent the rest of his life, although he was invited by Frederick the Great, in 1763, to return to Prussia. To the university of Göttingen Michaëlis rendered the most important services, as professor of theology and Oriental literature from 1745 to 1791; as secretary and director of the Royal Society of Sciences, from 1751 to 1770, when he left it on account of some differences with the members; as editor of the journal entitled 'Gelehrte Anzeigen' from 1753 to 1770, and as librarian and director of the philological seminary, which would have been abandoned after the death of Gesner in 1761, if Michaëlis had not consented to direct it gratuitously.

In order to throw new light upon biblical science, Michaëlis planned the expedition to Arabia and India which was conducted by Carsten Niebuhr. The first project of this enterprise was submitted in the year 1756 to the Baron von Bernstorff, then minister of Frederick V., king of Denmark. The choice of the travellers was entrusted chiefly to Michaëlis, who drew up a series of questions for their guidance.

In 1775 Michaëlis was made a knight of the Polar Star by the king of Sweden; in 1786 he was appointed an Aulic counsellor of Hanover, and in 1789 he was elected a Fellow of the Royal Society of London. He died on the 22nd of August, 1791. He was twice married; by his first wife he had only one son, Christian Frederic; by his second he had nine children, of whom one son and three daughters survived him.

The mind of Michaëlis was strongly characterized by independence. He always acted in the spirit of his motto 'libera veritas.' But his love of independence often led him to undervalue the labours of other learned men, and to do injustice to some of his most distinguished contemporaries. He often appeared to delight in discovering difficulties solely that he might have the pleasure of removing them. In the examination of the Old Testament he treated the Masoretic traditions with a contempt hardly less extravagant than the reverence entertained for them by the school of Buxtorf; and in every department of criticism he was apt to hazard ingenious conjectures in opposition to all real evidence. Though a good Hebrew scholar, he never possessed an accurate knowledge of the classical languages, and his acquantaince with Arabic was superficial. Notwithstanding these defects, his contributions to biblical and Oriental learning are invaluable, especially when he treats of subjects capable of illustration from history and philosophy. His religious opinions were never firmly fixed, but he invariably expressed the greatest reverence for the Scriptures.

The works of Michaëlis are very numerous; the following are some of the most important. In Oriental literature, grammars of Hebrew, Chaldee, Syriac, and Arabic, and treatises on various subjects connected with these languages; 'Oriental and Exegetical Library,' 24 vols., New do. 8 vols.; 'Supplementa in Lexica Hebraica,' 6 vols. In philosophy, an essay 'On the Influence of Opinions on Language and of Language on Opinions,' which obtained a prize from the Prussian Academy of Sciences in 1759; a treatise on moral philosophy, and other works. In history, geography, and chronology, 'Spicilegium Geographiæ Hebræorum exteræ post Bochartum;' other treatises on geography and chronology; several separate dissertations on the laws and antiquities of the Jews, the substance of most of which is embodied in his 'Mosaisches Recht,' in 6 vols., 1770-75; a second edition of the first 5 vols. of this work was published in the years 1775-80. This work, which is considered the masterpiece of Michaëlis, was translated into English by Dr. Alexander Smith, in 4 vols. 8vo., 1814, under the title of 'Commentaries on the Laws of Moses.' 'The great object of Michaëlis in this work is to investigate and illustrate the philosophy of the Mosaic laws, to show their wonderful adaptation in every respect to the very peculiar circumstances in which the people to whom they were given had been placed by providence; and, while he takes every opportunity of establishing the claims of Moses to the character of an ambassador from heaven, to inculcate upon human legislators the important lesson of studying those particulars respecting the nature and political situation, the ideas and prejudices, the manners and customs of their countrymen, by attention to which alone they can ever hope to make them virtuous, prosperous, and happy.' (Dr. Smith's *Preface*, p. xvii.) In biblical criticism Michaëlis's *Introduction to the New Testament* is well known in England by the translation of the late Bishop Marsh; he also published part of an 'Introduction to the Old Testament;' a 'Translation of the Bible, with Notes, for the Unlearned,' and several other critical works. (Professor Hassencamp's *Collection of Memoirs relating to the Life and Writings of Michaëlis*; and *Biog. Univ.*, vol. 28.)

MICHAELIS, JOHN BENJAMIN, one of the minor classic poets of Germany, was born at Zittau on the last day of the year 1746. Though he had no other instruction than what the gymnasium of his native place afforded (for his father, who was a clothmaker, had suffered so much in his circumstances by the war, as to be unable to send him elsewhere), his natural abilities, seconded by a happy memory, stood him greatly in lieu of a regular classical education. Having made himself a complete master of Latin, he went to Leipzig with the intention of applying himself to the study of physic, but soon desisted from it as one for which he had no relish, and applied himself to poetry. At the recommendation of some of his friends, but far more out of necessity, he published a volume of poems in 1766. These first proofs of his poetical talent obtained for him the encouraging notice of Gellert, Weisse, and Oeser; the last-mentioned of whom interested himself warmly in his success, and earnestly recommended him to Gleim, who was afterwards his truest patron. In 1770 he was invited to undertake the editorship of the 'Hamburg Correspondent;' but he soon relinquished the office, which, alluring as it appeared at first, soon proved too irksome for him. While at Hamburg however he became acquainted with Lessing, who exerted himself to serve him, and obtained for him the situation of stage-poet in Seyler's company; but his nervousness and ill state of health soon compelled him to give it up. He now determined to avail himself of the generous proposal which Gleim had previously made him, to take up his residence with him, and make his house a permanent home. By Gleim he was welcomed as if rather conferring an obligation than receiving one; and thus suddenly placed in ease and comfort, and in the society of such men as Jacobi and Lichtwer, nothing further was left him to wish for, except that he might continue to enjoy his happiness. Unfortunately he became subject to a spitting of blood, which carried him off, September 30th, 1772, in the twenty-fifth year of his age.

In the favourable circumstances in which he was latterly placed, there is no doubt but that, had longer life been granted him, he would have distinguished himself among the writers at the close of the eighteenth century. The productions he left are to be considered merely as the blossoms of poetical talent. The principal ones among them are his satires, fables, and tales, and poetical epistles; and they afford proof not only of literary talent, but of the excellence of his moral character.

MICHAELMAS, the feast of St. Michael the archangel, 29th of September. Brady says it was first established in 487. Michaelmas-day is one of the regular periods, in this country, for settling rents; and an old custom is still in use of having a roast goose to dinner on that day, probably because geese are at this time most plentiful and in the highest perfection. Beckwith, in the last edition of the 'Jocular Tenures,' p. 223, says, 'Among other services, John de la Hay was bound to render to William Barnaby, lord of Lastres in the county of Hereford, for a parcel of the demesne lands, one goose fit for the lord's dinner on the feast of St. Michael the archangel. And this as early as the tenth year of king Edward the Fourth.' ('Lastres,' *Rot. Cur.*, 10 Edw. IV.)

Martin, in his 'Description of the Western Islands of Scotland,' p. 213, speaking of the Protestant inhabitants of Skie, says, 'They observe the festivals of Christmas, Easter, Good Friday, and that of St. Michael's. Upon the latter they have a cavalcade in each parish, and several families bake the cake called St. Michael's bannock.'

(Brady's *Clavis Calendaria*, vol. ii., p. 175-180; Brand's *Popular Antiquities*, 4to. ed., vol. i., p. 291-298.)

MICHAUX, ANDRE', was a French botanist, who visited Syria, Persia, and North America, at the latter part of the last century, in all which countries he made considerable collections of dried plants. He is chiefly known as the author of a valuable account of the oaks of North America, published in folio, at Paris, in 1801, and of the 'Flora Boreali-Americana,' which appeared in 1803, in two volumes 8vo. Of the latter work he is said to have been less the author than the late Professor Louis Claude Richard.

MICHAUX, FRANÇOIS ANDRE', son of André, was employed by the French government to explore the forests of North America, with a view to the introduction into Europe of the valuable timber-trees of that country. For this purpose he made three voyages to the United States, during which he succeeded in sending to France large quantities of seeds. His principal work is the 'Histoire des Arbres forestiers de l'Amerique Septentrionale,' in 3 vols. large 8vo., Paris, 1810-1813; this is an excellent account of the principal North American forest trees, abounding in valuable information as to their geographical distribution and botanical distinctions, and the uses and qualities of their timber. Besides these, he published a treatise 'On the Naturalization of Forest Trees in France,' 8vo., Paris, 1805; 'Journey to the West of the Alleghany Mountains,' 8vo., Paris, 1804; and 'A Notice of the Bermudas,' 4to., Paris, 1806.

MICHELOZZI, MICHELOZZO, an eminent Florentine sculptor and architect of the sixteenth century, was a pupil of Donatello, and was patronised by Cosmo de' Medici, to whom he was so attached, that on the latter being banished, in 1433, he chose to follow him. It was for Cosmo that he erected the edifice since denominated the Palazzo Riccardi at Florence, a noble monument of the older Florentine style, simple even to severity, yet possessing an air not only of grandeur, but of magnificence. The façade consists of a lofty rusticated basement, with comparatively small apertures, above which are two ranges of large arched windows, seventeen on a floor, and each divided into two lesser arches resting on a central column. The whole is crowned by a very rich cornicione. The interior court has upper and lower porticos or galleries, with arches resting upon columns, and with an enriched frieze between the first and second arcades. He also greatly improved the court of the Palazzo Vecchio, originally built by Arnolfo, and which is in a rich though somewhat fanciful style inclining to Gothic. Among his other works at Florence is the Palazzo Tornabuoni, now Corsi; and in the neighbourhood of that city the villas Cafaggiuolo and Carregi; also a palace at Fiesole, for Giovanni de' Medici, son of Cosmo I. During the time of his residence at Venice he made designs for many public and private buildings in that city, and erected there the celebrated library in the convent of San Giorgio. He was likewise employed by his patron Cosmo in enlarging and embellishing a palace at Milan, bestowed on him by Ludovico Sforza. His last work was designing and superintending the execution of the monumental chapel of the Annunciation, erected by Piero de' Medici in honour of Cosmo, in the Chiesa dei Servi, at Florence.

Michelozzo died at the age of sixty-eight, but the precise time of his decease is not known—probably it was about 1470.

MICHIGAN, a portion of the United States, which hitherto has been governed as a territory. The peninsular part of it will soon form a member of the Union, if it has not already been constituted an independent state; and the western part will remain a territorial government. The peninsula lies between 41° 35′ and 45° 50′ N. lat., and between 82° 35′ and 86° 50′ W. long. This part, which will form the state, is about 280 miles long, and on an average 150 miles wide, and is stated to have an area of 34,000 square miles, or about 5000 square miles more than the area of Scotland. Michigan is a peninsula, the western side of which is washed by Lake Michigan in all its length, or about 280 miles. The strait of Michilimackinac, which unites Lake Michigan with Lake Huron, and the north-western portion of the last-mentioned lake, surround the peninsula on the north. On the east extends Lake Huron, as far south as 43° N. lat. where it forms a deep bay, called Saginaw Bay, and constitutes, from the Strait of Michilimackinac to the outlet of the river St. Clair, a coast line of more than 260 miles. South of 43° N. lat. the boundary is formed by the river St. Clair for about 30 miles, and by the lake of St. Clair for about the same length. The river Detroit then becomes the boundary to its embouchure in Lake Erie, a distance of about 30 miles. Lake Erie washes the eastern shores of Michigan for about 40 miles. In the south the peninsula is divided by an imaginary line from the states of Ohio and Indiana. The boundary-line of Ohio runs along 41° 35′ N. lat. for about 80 miles, and that of Indiana along 41° 45′ N. lat. for about 110 miles.

Surface and Soil.—The interior of the peninsula forms a plain which has generally a level surface, but in some districts is undulating or intersected with low hills. This tract is probably about 200 feet above the lakes, and the surface of the lakes is nearly 600 feet above the sea-level, so that the greatest part of Michigan is probably about 800 feet above it. The highest land seems to traverse the peninsula towards its southern extremity in a south-west and north-east direction, and to terminate on the east of Saginaw Bay with the smaller peninsula of Sanilac. The surface of this part is more undulating than other parts, and intersected by a great number of small lakes. The soil is said to be rather fertile. The slope of this high land towards the lakes Erie and St. Clair, and the straits of Detroit and St. Clair, is long and hardly perceptible. This is probably the most fertile district of the country; it contains little prairie land, except on the alluvial tracts near the mouths of the rivers and along the lakes, which are in some parts marshy but fertile. Nearly the whole of the remainder of the country is covered with trees of a heavy growth. The slope towards Saginaw Bay along Saginaw river and its numerous branches is of a similar character: but the peninsula of Salinac has a poor soil and is mostly sandy. The larger peninsula, between Lake Huron and Lake Michigan, is less known. It is however certain that it contains no mountains, nor even high hills. A great portion of it is prairie-land, intersected with numerous swamps, at least in the southern districts which have been explored. The shores of both the great lakes are poor and sandy; and along the shore of Lake Michigan there are sandy eminences, formed near the mouths of the numerous small rivers which join the lake, by the action of their current against the swell of the lake: the adjacent tracts are of very inferior fertility.

Rivers.—As the rivers of the peninsula descend from the table-land to the great lakes, they have a short course. On the table-land they run slowly, but on the declivity their course is accelerated and interrupted by rapids. The most important are St. Joseph's river and Saginaw. St. Joseph's river falls into Lake Michigan, not far from its southern extremity, after a winding course of about 200 miles. Though rather rapid, it is said to be navigable for boats through nearly the whole of its winding course. The Saginaw river is formed by a great number of branches, which descend from the table-land lying to the east, south, and west of the depression in which it flows, and which may be considered as a prolongation of Saginaw Bay. Some of these branches flow fifty miles before they unite. After their union, the river takes the name of Saginaw, and is navigable for boats to its mouth, a distance of twenty-five miles. The rivers St. Clair and Detroit, as well as the lakes of Michigan, Huron, St. Clair, and Erie, are noticed under CANADA (p. 208, 209).

Climate.—The climate of this country is severe. The winter generally begins in the middle of November and lasts to the middle of March. The ice on the rivers and borders of the lake is strong enough to admit travelling on sledges. Though situated on both sides of 45° N. lat., its climate resembles that of southern Sweden (57° N. lat.). This circumstance is mainly to be attributed to the elevation of the surface, and also to its not being sheltered by any range of mountains against the cold northern and north-western winds which blow over the immense plains that stretch northward to the shores of the Polar Sea. The surrounding lakes, though large, are still too small to moderate in any sensible degree the coldness of these winds. Lake St. Clair is frozen over every year from December to February. The summers are never hot, but subject to considerable changes. In the hottest days the thermometer rises to 70°, but in the evening and morning it is as low as 46°. The climate is rather dry, and the quantity of snow which falls not considerable.

Productions.—Wheat, maize, and potatoes are grown to a great extent; oats and buckwheat are not so extensively cultivated. Other vegetables thrive very well. The country along the Strait of Detroit is famous for its orchards, which the French settlers have planted, and which are extensive and well managed. A great quantity of cider is exported. The most common trees are ash, beech, cedar, cherry-trees, elm, hickory, maple, oak, pine, poplar, aspen, and walnut. Around the lakes of the table-land and near the mouth of some rivers large tracts are covered with the wild rice (*Zizania aquatica*), on which immense flocks of water-fowl of different species feed. Of domestic animals cows are most numerous. The wild animals are the elk or moose-deer, deer, wolves, foxes, wild cats, otters, martens, racoons, opossums, squirrels of different kinds, and musk-rats. Beavers are only found on the rivers which fall into Lake Michigan. Fish abound in the lakes and rivers, but not in Lake Michigan. Wild turkeys and pigeons are abundant.

Inhabitants.—There are few settlements of the whites north-west of a line drawn from the mouth of St. Joseph's river to that of the Saginaw. The whole tract lying north of it is chiefly in possession of the aboriginal tribes of the Ottawas and Miamis, who, with some Pottowatamis and Chippewas, have in some places villages within the range of the country inhabited by the descendants of Europeans. These Indians generally cultivate maize, and some of them wheat and vegetables; they also raise horses, cattle, hogs, and poultry. The population of these tribes may amount to about 9000. That of the whites was estimated in 1810 at 4700, in 1820 at 10,000, and in 1830 it amounted to 31,670 souls, and according to an enumeration presented to Congress in 1834, it amounted to upwards of 90,000 within the limits of the proposed state, which is a greater relative increase than any other state or territory in the Union has had in the same time. There are a few coloured individuals.

Political Division and Towns.—The country settled by the whites is divided into 35 counties. The only place of importance is Detroit, built not far from the efflux of the river of the same name from Lake St. Clair. It is the seat of government, and contains above 3000 inhabitants, mostly of French origin: it is also the principal deposit for the cider, grain, and furs, which are sent from this place mostly to Cleveland in Ohio, and to Maldon in Upper Canada. It also carries on a considerable trade with the Indians. Mackinac, or Mackinaw, on the island of Michilimackinac (about nine miles in circuit), contains about 100 houses, and has a good harbour. It is the great place of resort for the Indians both for the sale of their furs and for receiving the annuities paid them by the United States. There is daily communication by steam-boats between Detroit and Buffalo in New York, a distance of above 300 miles. Many of the oldest inhabitants are of French extraction, but the largest part of the population consists of emigrants from New England.

History.—Early in the seventeenth century the French penetrated into this country from Quebec. In 1670 they founded Detroit. In 1783 Michigan was included in the limits of the United States, but not actually given up by the British until 1796. In 1805 it was formed into a territory. (Darby's *View of the United States;* &c.)

MICHIGAN, Lake. [CANADA.]

MICIPPA. [MAIIDÆ, vol. xiv., p. 300.]

MICKLE, WILLIAM,[*] was born in the year 1734, at Langholm in Dumfriesshire, where his father was a Presbyterian minister. At the age of sixteen he was sent to the counting-house of a relation, who was a brewer, and remained there five years. He afterwards set up business on his own account, but failed, it is said, because he devoted those hours to his poetical studies, which should have been dedicated to business. He subsequently became corrector of the Clarendon Press in Oxford, and though several of his juvenile poems had been printed, his name remained unknown to the public till the publication of an elegiac ode called 'Pollio,' in 1765. This was followed in 1767 by a poem in imitation of Spenser, called 'The Concubine,' published with many corrections and additions ten years afterwards under the title of 'Sir Martyn.' He also wrote, besides several other poems, a 'Letter to Dr. Harwood,' against the Arian views; an attack on Deism, called 'Voltaire in the Shades;' and a tragedy entitled the 'Siege of Marseilles,' which was refused by Garrick, Harris, and Sheridan in succession, and never produced. In 1775 came out his translation of Camoens's 'Lusiad,' which had occupied him five years. Governor Johnstone, his patron, having been appointed commander of the Romney man-of-war, took him out to Lisbon, where he was appointed joint-agent for the prizes that might be taken in an expected cruise. His translation procured him much respect among the Portuguese, and he was admitted a member of the royal academy, of which Prince Don John of Braganza was president. A poem called 'Almada Hill' was a result of his residence at Lisbon. After Mickle's return to London with Governor Johnstone, he wrote several pieces both in prose and verse, the last of which was 'Eskdale Braes,' a ballad. He died at Wheatly in Oxfordshire, in 1789

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[*] Sometimes called William Julius Mickle, but the second name was merely assumed by the author himself.

His translation of the 'Lusiad' has been severely censured on account of the liberties taken with the original, and the unwarranted diffuseness of the translation. Mickle's poems as a whole are worth little, indeed so little, that we may wonder how they acquired the small celebrity which they have attained. A ballad by Mickle entitled 'Cumnor-Hall' is not without merit; it furnished the idea of Sir W. Scott's 'Kenilworth,' and is printed in the introduction to that work in the late complete edition of Scott's novels.

MICO, or Fair Monkey, one of the common names for that species of *Ouistiti* (*Hapale* of Illiger) known to zoologists as the *Jacchus argentatus*, Geoff., *Simia argentata*, Linn. It is a very pretty little species, perhaps the prettiest of the genus. [JACCHUS.] The head is small and round, the face and hands of a deep flesh-colour; indeed the face and ears are of so lively a vermillion, that the animal, when in full health, looks almost as if it had been painted with that colour. The body is covered with long silvery-white hair, and the tail is of a shining dark chestnut, sometimes almost black.

MICROCE'BUS, M. Geoffroy's name for a form among the *Lemuridæ*; *Lemur* (Galago) *Guineensis*. *Locality*.—The river Amazon; Para.

MICRODA'CTYLUS. [ÇARIAMA.]

MICROGLOSSUS. [PSITTACIDÆ.]

MICROMETER, the term generally applied to contrivances for measuring small spaces or angles with great accuracy or convenience.

The word is not applied to some artifices for subdividing the graduations of an astronomical instrument (for these see VERNIER), nor when a magnified portion of a subsidiary arc is used, which may be best considered under the head of SECTOR, ZENITH SECTOR, though they come properly under the definition. We shall follow the usual meaning of the term.

1. *Wire Micrometer*.—When the rays from any bright object fall upon a convex lens, an inverted image of the object is formed, which may be viewed by the eye-piece as if it were a material body. If a fine wire or spider's web be stretched across the telescope tube at the place where the image is formed, this too will be seen distinctly through the eye-piece. Instead of fixing the wire to the telescope tube, it is stretched across a sliding-piece, which is moved by a screw perpendicularly to the length of the telescope, and can thus be made to measure the image in terms of the revolutions and parts of the screw. The head of the screw is divided, and there is an index by which the parts are read off. A little tongue passing over the notches of a plate notes the whole number of revolutions.

An English gentleman named Gascoigne seems first to have applied this principle to practice, but he unfortunately lost his life in the great civil war; and though his telescope fell into Townley's hands, and was used by him, the construction does not seem to have been generally known until it was re-invented by Auzout. Different improvements were gradually made nearly up to the present time. The plate carrying the wire is drawn by the screw, and held back by springs, which prevent any lost time. A micrometer of this kind is now generally applied to circles, transits, and theodolets, in addition to the fixed wires, which of course are always necessary. There are two verifications: first, the ascertaining the value of a revolution of the screw; and secondly, determining the reading of the screw-head when the moveable wire coincides with the fixed wire. In a circle or theodolet the micrometer wire is placed upon a sharp distant object, and the divided limb read off. The screw is turned through several revolutions, and the object is again bisected by moving the whole instrument by its tangent screw, and the divided limb read off a second time. We have then the same angle measured in revolutions of the screw and in the divisions of the instrument, and by a simple proportion have the value of a revolution and of a part. With a transit, the passage of Polaris over the micrometer wire is observed after successive revolutions of the screw. The angular motion of Polaris for the intervals is computed from the polar distance, and thus the value in arc obtained for a revolution of the screw. To determine the zero position of the micrometer wire, the moveable wire is brought to touch the fixed wire, first on one side, and then on the other, and the screw-head read off each time. The mean of the two readings will be that when the two wires are exactly superimposed.

The *position wire micrometer* has lately come very much into use for observations of double stars, and is the wire micrometer proper for equatorials. In this construction there are two wires parallel to each other, each moveable by its own screw: the whole apparatus can also be turned round in the plane of the wires, so as to place the wires in any direction, the angle round which it is turned being read off by two verniers upon a small circle called the position circle. In measuring a double star the wires are brought near each other, and the apparatus turned round until the two stars are either threaded on one of the wires, or, being placed between them, are judged to lie in the same direction. The division of the micrometer circle is then read off, and the observation in position is made. Now, by the divided circle of the micrometer turn the apparatus round 90°, and the wires will be at right angles to the line joining the two stars. By moving the equatorial, place one wire A on one of the stars, and place the other wire B by its screw, on the second star. Read off the screw-head of B, and then place A on the second star by moving the equatorial, and B on the first by moving its screw, and read off the revolutions and parts of B. The difference of the two readings of B will give, in revolutions and parts of the screw, twice the angle between the two stars. The process may be repeated, keeping B fixed and moving A. Before or after a series of observations the zero or index error of the position circle should be ascertained. Place the instrument nearly in the meridian, and make a star run along one of the wires from end to end. Read and note the position circle, which should mark 90° and 270°, and the difference from this is the correction to be applied to all the angles of position observed during the evening. The value of a revolution of the screw may be determined by separating the two wires a given number of revolutions, and observing a series of transits of known stars over them. As large equatorials are always carried by a clock movement, we should recommend fixing the *position micrometer* upon a *slipping*-piece, by which a small motion up or down or to the right or left can be given to the wires without meddling with the clock or the equatorial. With this apparatus the measurement of double stars is perfectly easy. The wire micrometer requires illumination for seeing the wires, and the light thus admitted often obliterates faint and ill-defined objects. For a description of the position micrometer and its application to the measurement of double stars, see De Morgan's *Companion to Maps of the Stars, Appendix*.

The micrometer microscope, for reading off the divisions of graduated circles, depends upon the same principle as the wire micrometer. An enlarged image of the divisions of the limb of the circle is formed, and this image is measured by the revolutions and parts of a screw. [CIRCLE.]

2. The *divided object-glass micrometer* and *heliometer*. If an object-glass be cut across so as to form two semicircles, and the semilenses be separated by sliding one beyond the other, each portion will form its proper image, and these will retreat from each other as the semilenses are moved. The semilenses are mounted on slides, and the quantity of separation read off upon a scale. In Bessel's heliometer, the most magnificent and most perfect instrument of this class, the focal length of the object-glass is eight French feet, and the aperture nearly six French inches. A description and plate will be found in the *Astronomische Nachrichten*, No. 189. The only objection which can be made to this species of micrometer, besides the extreme difficulty of constructing it, is, that stars are not seen so round and well defined as in an entire object-glass. Bessel's measures of double stars are however, so far as we can judge, the most accurate that have yet been made. Suppose a double star is to be measured with the heliometer: the whole of the object end is turned round, until four stars appear in a right line, and the semilenses are separated until the stars appear to be exactly at the same distance from each other, when

the scale is read off. The semilenses are then shifted in a contrary direction, sliding the two images over each other, until they again appear to be at equal distances, and the scale is again read off. The separation of the scale is four times the angular distance between the stars. There is a position circle, on which the direction of the stars is read off. In measuring the diameters of the sun, planets, &c., the two images are made to touch on opposite sides; and in observations of Halley's comet it was made to coincide with the neighbouring stars. The divided object-glass micrometer is on the same principle as the heliometer; a cap containing the divided lenses is placed over the object-glass of the telescope. A similar micrometer may be obtained by dividing one of the lenses of an eye-piece; and it seems probable that, with large telescopes, this micrometer may be of considerable use in measuring small angles. There is a good deal of colour in the images, but not at the point of contact. Micrometers of this class require no illumination.

3. *Reticules* and *circular micrometer*. The micrometers hitherto described are applied to the *accurate* measures of small angles; the present class, though very useful in certain cases, are of much lower pretensions. The reticule, or diaphragm, as it is sometimes called, is any fixed arrangement of wires or bars which can be applied to a telescope for the purpose of measurement. They are chiefly used when an object will not admit of illumination, or where the astronomer has no accurately divided instrument at his disposal, or, as in the case La Caille at the Cape of Good Hope, when the object is to fix approximately a greater number of stars than could be done in the same time with ordinary instruments. Suppose a cross like an X or V to be cut out of brass-plate and inserted in the principal focus of a telescope with the axis of the letter in a meridian. A star in passing through the field is occulted at its passage behind each of the bars, and the time noted. The *interval* will show, by an easy calculation, how far it passes from the vertex; and the *mean* of the times, the moment when it passes the axis of the diaphragm. If the true position of any one star so passing is known from any other source, all the other stars can be thus determined differentially with respect to it. The method is not very accurate, but may often be applied advantageously and with very small instrumental means. If a fine wire be drawn perpendicular to the axis, and a bright star, observed with illumination, made to run along the wire, the axis of the diaphragm can be set in a meridian, and that is the only verification necessary. The computation in declination will be least if the angle between the bars is such that the base of the triangle is equal to its altitude. This reticule is very convenient for mapping, if placed in the meridian, or for cometary observation, if the telescope is mounted as an equatorial, however rudely.

The circular micrometer was introduced, we believe, by Olbers, and perfected by Frauenhofer (*Astron. Nachricht.*, iv. 22), and is much less known and used in this country than it deserves. A metal ring is set in the centre of a perforated glass-plate, and the outer and inner edge of the ring is turned true. The plate is fixed in the focus of a telescope, and the appearance is that of a ring suspended in the heavens. The telescope is pointed, and the observer notes the time when a star disappears at the outer ring, re-appears on the inner ring, disappears again, and finally re-appears. If two stars be thus observed, it is clear that when a mean is taken of the disappearances and re-appearances of each, that the difference between the two means will be the difference of right ascension between the two stars, and therefore that if one be known, the other is determined. Again, if the diameter of the ring has been determined, and the declination of the stars nearly known, the time of describing the chord of the ring will give, by an easy computation, the distance of the chord from the centre, and that the more accurately the smaller the chord described. The sum or difference of these two distances is the difference of the stars in declination. The computation of the second star with its approximate declination may be repeated if the stars are near the pole. It will be seen that nothing is required for the circular micrometer, but the power of fixing the telescope for a few minutes until a known star passes the field, and that no illumination is required. It is especially the apparatus for determining the place of a faint comet or planet, and in the hands of Olbers, Harding, and many other German astronomers, has been of infinite use in cometary astronomy and in the discovery and observation of the small planets. When the comet has a large motion, or when the position of the star is so low as to require attention to the difference of refraction, the computation is a little more complicated, but generally scarcely any computation is required, and the results, in right ascension at least, are good. The observations at the inner edge of the ring are to be preferred. When however the object will bear illumination and the astronomer possesses a telescope so mounted that he can apply a wire micrometer to it, the results from this are incomparably more accurate, and the reticule above mentioned is certainly better for determining declination. Frauenhofer afterwards (*Astronom. Nach.*, iv. 43) proposed another ring and reticule micrometer. He cut a series of rings or lines upon a piece of plane glass which he placed in the principal focus of the object-glass, and then by a side lamp illuminated the rings, leaving the rest of the field dark. It is evident that for certain observations this micrometer would have great advantages.

There are many other micrometers, but they are not in such general use as to demand any notice here. The reader will find them very fully and elaborately described in Pearson's *Astronomy*, vol. ii., p. 126 to 272 inclusive.

MICROPO'GON, M. Temminck's name for a genus of Scansorial Birds which has the general structure of *Bucco*. The gape however is smooth. The three first quills only are graduated. Mr. Swainson arranges it under the '*Buccoinæ*,' or '*Barbuts*,' a subfamily of his *Picidæ*.

MICRO'PTERUS, a name assigned by MM. Quoy and Gaimard to a genus of *Anatidæ*, remarkable for the shortness of their wings.

Two species are recorded, viz. *Micropterus brachypterus* (Quoy and Gaim., *Oidemia Patachonica*, King, *Anas brachyptera*, Lath., *Racehorse* of Cook and Byron, and *Steamer-duck* of King), and *Micropterus Patachonicus*, King, which is smaller in the body than the first, and is able to fly.

Description of the first-named Species.—Above lead-colour, inclining to grey; abdomen whitish; the beauty-spot on the wings white, at the bend a blunt spur; bill yellow, the nail black; legs fuscous yellow. Length from tip of the bill to end of tail, 40 inches; of bill, 3; of wing, from carpal joint to apex of second quill feather, 11; of tail, 5; of tarsi, 2¾. (King.)

Habits, Food, &c.—Captain Phillip Parker King, R.N., who has described both species, one in the *Zool. Journal*, and the second in the *Zool. Proceedings*, first fell in with the larger species at Eagle Bay, beyond Cape San Isidro (Point Shut-up of Byron), in the Strait of Magalhaens. 'Here,' writes Captain King, 'we saw, for the first time, that most remarkable bird the Steamer-duck. Before steam-boats were in general use, this bird was denominated, from its swiftness in skimming over the surface of the water, the 'racehorse,' a name which occurs frequently in Cook's, Byron's, and other voyages. It is a gigantic duck, the largest I have met with. It has the lobated hind toe, legs placed far backwards, and other characteristics of the oceanic ducks. The principal peculiarity of this bird is the shortness and remarkably small size of the wings, which, not having sufficient power to raise the body, serve only to propel it along, rather than through the water, and are used like the paddles of a steam-vessel. Aided by these and its strong broad-webbed feet, it moves with astonishing velocity. It would not be an exaggeration to state its speed at from twelve to fifteen miles an hour. The peculiar form of the wing and the short rigid feathers which cover it, together with the power this bird possesses of remaining a considerable time under water, constitute it a striking link between the genera *Anas* and *Aptenodytes*. It has been noticed by many former navigators. The largest we found measured forty inches from the extremity of the bill to that of the tail, and weighed thirteen pounds; but Captain Cook mentions, in his second voyage, that the weight of one was twenty-nine pounds. It is very difficult to kill them, on account of their wariness and thick coat of feathers, which is impenetrable by anything smaller than swan-shot. The flavour of their flesh is so strong and fishy, that at first we killed them solely for specimens. Five or six months however on salt provisions taught many to think such food palatable, and the seamen never lost an opportunity of eating them. I have preferred these ducks to salt beef, but more as a preventive against scurvy than from liking their taste. I am averse to altering names, particularly in natural history, without very good reason; but in this case I do think the name of "steamer" much more appropriate and descriptive of the swift paddling motion of these birds than that of "race-horse." I believe, too, the name of "steamer" is now generally given to it by those who have visited these regions.'

The same author informs us that *Pecten vitreus*, whose shell is found attached to the leaves of *Fucus giganteus*, together with other *Mollusca*, is the food of the steamer-ducks *M. brachypterus* and *M. Patachonicus*.

(*Narrative of the Surveying Voyages of H. M. S. Adventure and Beagle*, **vol. i.**)

Race-horse, or Steamer-duck (Micropterus brachypterus).

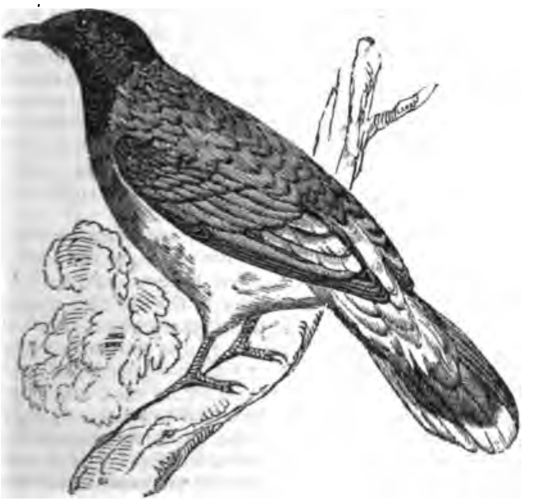
Micropterus comes very near to *Microptera*, Gravenhorst's name for a genus of coleopterous insects, and to *Microptère* of Lacépède, who uses the term to designate a genus of Acanthopterygious fishes.

MI'CROPUS, Mr. Swainson's name for the first genus of his Brachypodinæ, the first subfamily of the *Merulidæ*, according to his arrangement. [Merulidæ.]

Example, *Micropus chalcocephalus*; *Ixos chalcocephalus*, Temm.

Description.—Male.—The whole head covered with a sort of hood of metallic black with violet reflections; the neck, the shoulders, the back, and wings dull gray or lead colour; breast deep gray, which becomes brighter on the other lower parts of the body; wings black, but the secondaries gray, bordered with whitish on the exterior barbs; tail gray, with a transverse black band, and terminated with a broad white border. Length six inches four lines. *Female:* less lively in colour.

Locality, Java, where Van Hasselt found it in the wild and woody district of Bantam.



Micropus chalcocephalus (male).

MICROSCOPE, the name of an instrument for enabling the eye to see distinctly objects which are placed at a very short distance from it, or to see magnified images of small objects, and therefore to see smaller objects than would otherwise be visible. The name is derived from the two Greek words, expressing this property, *μικρός*, *small*, and *σκοπέω*, *to see.*

So little is known of the early history of the microscope, and so certain is it that the magnifying power of lenses must have been discovered as soon as lenses were made, that there is no reason for hazarding any doubtful speculations on the question of discovery. We shall proceed therefore at once to describe the simplest forms of microscopes, to explain their later and more important improvements, and finally to exhibit the instrument in its present perfect state.

In doing this we shall assume that the reader is familiar with the information contained in the articles Light, Lens, Achromatic, Aberration, and the other subdivisions of the science of Optics which are treated of in this work.

The use of the term *magnifying* has led many into a misconception of the nature of the effect produced by convex lenses. It is not always understood that the so-called magnifying power of a lens applied to the eye, as in a microscope, is derived from its enabling the eye to approach more nearly to its object than would otherwise be compatible with distinct vision. The common occurrence of walking across the street to read a bill is in fact magnifying the bill by approach; and the observer, at every step he takes, makes a change in the optical arrangement of his eye, to adapt it to the lessening distance between himself and the object of his inquiry. This power of spontaneous adjustment is so unconsciously exerted, that unless the attention be called to it by circumstances, we are totally unaware of its exercise.

In the case just mentioned the bill would be read with eyes in a very different state of adjustment from that in which it was discovered on the opposite side of the street, but no conviction of this fact would be impressed upon the mind. If however the supposed individual should perceive on some part of the paper a small speck, which he suspects to be a minute insect, and if he should attempt a very close approach of his eye for the purpose of verifying his suspicion, he would presently find that the power of natural adjustment has a limit; for when his eye has arrived within about ten inches, he will discover that a further approach produces only confusion. But if, as he continues to approach, he were to place before his eye a series of properly arranged convex lenses he would see the object gradually and distinctly increase in apparent size by the mere continuance of the operation of approaching. Yet the glasses applied to the eye during the approach from ten inches to one inch, would have done nothing more than had been previously done by the eye itself during the approach from fifty feet to one foot. In both cases the magnifying is effected really by the approach, the lenses merely rendering the latter periods of the approach compatible with distinct vision.

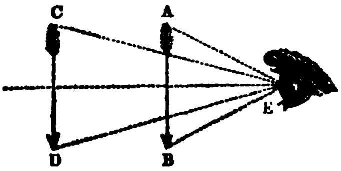
A very striking proof of this statement may be obtained by the following simple and instructive experiment. Take any minute object, a very small insect for instance, held on a pin or gummed to a slip of glass; then present it to a strong light, and look at it through the finest needle-hole in a blackened card placed about an inch before it. The insect will appear quite distinct, and about ten times larger than its usual size. Then suddenly withdraw the card without disturbing the object, which will instantly become indistinct and nearly invisible. The reason is, that the naked eye cannot see at so small a distance as one inch. But the card with the hole having enabled the eye to approach within an inch, and to see distinctly at that distance, is thus proved to be as decidedly a magnifying instrument as any lens or combination of lenses.

This description of magnifying power does not apply to such instruments as the solar or gas microscope, by which we look not at the object itself, but at its shadow or picture on the wall; and the description will require some modification in treating of the compound microscope, where, as in the telescope, an image or picture is formed by one lens, that image or picture being viewed as an original object by another lens.

It is nevertheless so important to obtain a clear notion of the real nature of the effect produced by a lens applied to the eye, that we will adduce the instance of spectacles to render the point more familiar. If the person who has been supposed to cross the street for the purpose of reading a bill had been aged, the limit to the power of adjustment would have been discovered at a greater distance, and without so severe a test as the supposed insect. The eyes of the very aged generally lose the power of adjustment at a distance of thirty or forty inches instead of ten, and the spectacles worn in consequence are as much magnifying glasses to them as the lenses employed by younger eyes to examine the most minute objects. Spectacles are magnifying glasses to the aged because they enable such persons to see as closely to their objects as the young, and therefore to see the objects larger than they could themselves otherwise see them, but not larger than they are seen by the unassisted younger eye.

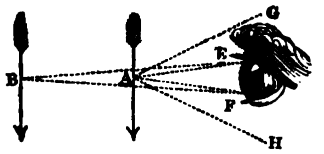
In saying that an object appears larger at one time, or to one person, than another, it is necessary to guard against misconception. By the apparent size of an object we mean the angle it subtends at the eye, or the angle formed by two lines drawn from the centre of the eye to the extremities of the object. In *figure* 1, the lines A E and B E drawn from the arrow to the eye form the angle A E B, which, when the angle is small, is nearly twice as great as the angle C E D formed by lines drawn from a similar arrow at twice the distance. The arrow A B will therefore appear nearly twice as long as C D, being seen under twice the angle, and in the same proportion for any greater or lesser difference in distance. The angle in question is called the angle of vision, or the visual angle.

Fig. 1.



The angle of vision must however not be confounded with the angle of the pencil of light by which an object is seen, and which is explained in *figure* 2. Here we have drawn two arrows placed in relation to the eye as before, and from the centre of each have drawn lines exhibiting the quantity of light which each point will send into the eye at the respective distances.

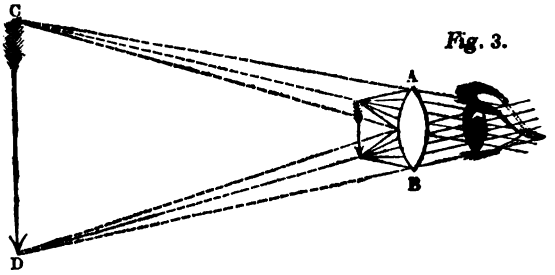
Fig. 2.



Now if E F represent the diameter of the pupil, the angle E A F shows the size of the cone or pencil of light which enters the eye from the point A, and in like manner the angle E B F is that of the pencil emanating from B, and entering the eye. Then, since E A F is double E B F, it is evident that A is seen by four times the quantity of light which could be received from an equally illuminated point at B; so that the nearer body would appear brighter if it did not appear larger; but as its apparent area is increased four times, as well as its light, no difference in this respect is discovered. But if we could find means to send into the eye a larger pencil of light, as for instance that shown by the lines G A H, without increasing the apparent size in the same proportion, it is evident that we should obtain a benefit totally distinct from that of increased magnitude, and one which is in some cases of even more importance than size in developing the structure of what we wish to examine. This, it will be hereafter shown, is sometimes done; for the present, we wish merely to explain clearly the distinction between apparent magnitude, or the angle under which the object is seen, and apparent brightness, or the angle of the pencil of light by which each of its points is seen, and with these explanations we shall continue to employ the common expressions magnifying glass and magnifying power.

The magnifying power of a single lens depends upon its focal length, the object being in fact placed nearly in its principal focus, or so that the light which diverges from each point may, after refraction by the lens, proceed in parallel lines to the eye, or as nearly so as is requisite for distinct vision. In *fig.* 3, A B is a double convex lens, near which is a small arrow to represent the object under examination, and the cones drawn from its extremities are portions of the rays of light diverging from those points and falling upon the lens. These rays, if suffered to fall at once upon the pupil, would be too divergent to permit their being brought to a focus upon the retina by the optical arrangements of the eye. But being first passed through the lens, they are bent into nearly parallel lines, or into lines diverging from some points within the limits of distinct vision, as from C and D. Thus altered, the eye receives them precisely as if they emanated from a larger arrow placed at C D, which we may suppose to be ten inches from the eye, and then the difference between the real and the imaginary arrow is called the magnifying power of the lens in question.

Fig. 3.



From what has been said it will be evident that two persons whose eyes differed as to the distance at which they obtained distinct vision, would give different results as to the magnifying power of a lens. To one who can see distinctly with the naked eye at a distance of five inches, the magnifying power would seem and would indeed be only half what we have assumed. Such instances are however rare; the focal length of the eye usually ranges from six to twelve or fourteen inches, so that the distance we first assumed of ten inches is very near the true average, and is a convenient number, inasmuch as a cipher added to the denominator of the fraction which expresses the focal length of a lens gives its magnifying power. Thus a lens whose focal length is one-sixteenth of an inch is said to magnify 160 times.

When the focal length of a lens is very small it is difficult to measure accurately the distance between its centre and its object. In such cases the best way to obtain the focal length for parallel or nearly parallel rays is to view the image of some distant object formed by the lens in question through another lens of one inch solar focal length, keeping both eyes open and comparing the image presented through the two lenses with that of the naked eye. The proportion between the two images so seen will be the focal length required. Thus if the image seen by the naked eye is ten times as large as that shown by the lenses, the focal length of the lens in question is one-tenth of an inch. The panes of glass in a window, or courses of bricks in a wall, are convenient objects for this purpose.

In whichever way the focal length of the lens is ascertained, the rules given for deducing its magnifying power are not rigorously correct, though they are sufficiently so for all practical purposes, particularly as the whole rests on an assumption in regard to the focal length of the eye, and as it does not in any way affect the actual measurement of the object. To calculate with great precision the magnifying power of a lens with a given focal length of eye, it is necessary that the thickness of the lens be taken into the account, and also the focal length of the eye itself.

We have hitherto considered a magnifying lens only in reference to its enlargement of the object, or the increase of the angle under which the object is seen. A further and equally important consideration is that of the number of rays or quantity of light by which every point of the object is rendered visible. The naked eye, as shown in *fig.* 2, admits from each point of every visible object a cone of light having the diameter of the pupil for its base, and most persons are familiar with that beautiful provision by which in cases of excessive brilliancy the pupil spontaneously contracts to reduce the cone of admitted light within bearable limits. This effect is still further produced in the experiment already described, of looking at an object through a needle-hole in a card, which is equivalent to reducing the pupil to the size of a needle-hole. Seen in this way the object becomes comparatively dark or obscure; because each point is seen by means of a very small cone of light, and a little consideration will suffice to explain the different effects produced by the needle-hole and the lens. Both change the angular value of the cone of light presented to the eye, but the lens changes the angle by bending the extreme rays within the limits suited to distinct vision, while the needle-hole effects the same purpose by cutting off the rays which exceed those limits.

It has been shown that removing a brilliant object to a greater distance will reduce the quantity of light which each point sends into the eye, as effectually as viewing it through a needle-hole; and magnifying an object by a lens has been shown to be the same thing in some respects as removing it to a greater distance. We have to see the magnified picture by the light emanating from the small object, and it becomes a matter of difficulty to obtain from each point a sufficient quantity of light to bear the diffusion of a great magnifying power. We want to perform an operation just the reverse of applying the card with the needle-hole to the eye—we want in some cases to bring into the eye the largest possible pencil of light from each point of the object.

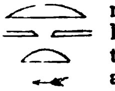
Referring to *fig.* 3, it will be observed that if the eye could see the small arrow at the distance there shown without the intervention of the lens, only a very small portion of the cones of light drawn from its extremities would enter the pupil; whereas we have supposed that after being bent by the lens the whole of this light enters the eye as part of the cones of smaller angle whose summits are at C and D. These cones will further explain the difference between large and small pencils of light; those from the small arrow are large pencils; the dotted cones from the large arrow are small pencils.

In assuming that the whole of this light could have been suffered to enter the eye through the lens A B, we did so for the sake of not perplexing the reader with too many considerations at once. He must now learn that so large a pencil of light passing through a single lens would be so distorted by the spherical figure of the lens, and by the chromatic dispersion of the glass, as to produce a very confused and imperfect image. This confusion may be greatly diminished by reducing the pencil; for instance, by applying a stop, as it is called, to the lens, which is neither more nor less than the needle-hole applied to the eye. A small pencil of light may be thus transmitted through a single lens without suffering from spherical aberration or chromatic dispersion any amount of distortion which will materially affect the figure of the object; but this quantity of light is insufficient to bear diffusion over the magnified picture, which is therefore too obscure to exhibit what we most desire to see,—those beautiful and delicate markings by which one kind of organic matter is distinguished from another. With a small aperture these markings are not seen at all; with a large aperture and a single lens they exhibit a faint nebulous appearance enveloped in a chromatic mist, a state which is of course utterly valueless to the naturalist, and not even amusing to the amateur.

It becomes therefore a most important problem to reconcile a large aperture with distinctness, or, as it is called, *definition;* and this has been done in a considerable degree by effecting the required amount of refraction through two or more lenses instead of one, thus reducing the angles of incidence and refraction, and producing other effects which will be shortly noticed. This was first accomplished in a satisfactory manner by—

Dr. Wollaston's Doublet,

Fig. 4.



invented by the celebrated philosopher whose name it bears; it consists of two plano-convex lenses (*fig.* 4) having their focal lengths in the proportion of 1 to 3, or nearly so, and placed at a distance which can be ascertained best by actual experiment. Their plane sides are placed towards the object, and the lens of shortest focal length next the object.

It appears that Dr. Wollaston was led to this invention by considering that the Achromatic Huyghenean Eye-piece, which will be hereafter described, would, if reversed, possess similar good properties as a simple microscope. But it will be evident when the eye-piece is understood, that the circumstances which render it achromatic are very imperfectly applicable to the simple microscope, and that the doublet, without a nice adjustment of the stop, would be valueless. Dr. Wollaston makes no allusion to a stop, nor is it certain that he contemplated its introduction, although his illness, which terminated fatally soon after the presentation of his paper, may account for the omission.

The nature of the corrections which take place in the doublet is explained in the annexed diagram (*fig.* 5), where L O L′ is the object, P a portion of the pupil, and D D the stop, or limiting aperture.

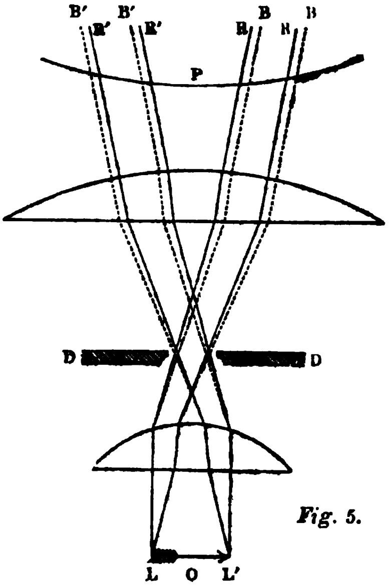


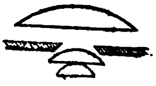
Fig. 5.

Now, it will be observed that each of the pencils of light from the extremities L L′ of the object is rendered excentrical by the stop, and of consequence each passes through the two lenses on opposite sides of their common axis O P; thus each becomes affected by opposite errors, which to some extent balance and correct each other. To take the pencil L, for instance, which enters the eye at R B R B, it is bent to the right at the first lens, and to the left at the second; and as each bending alters the direction of the blue rays more than the red, and moreover as the blue rays fall nearer the margin of the second lens, where the refraction, being more powerful than near the centre, compensates in some degree for the greater focal length of the second lens, the blue and red rays will emerge very nearly parallel, and of consequence colourless to the eye. At the same time the spherical aberration has been diminished by the circumstance that the side of the pencil which passes one lens nearest the axis passes the other nearest the margin.

This explanation applies only to the pencils near the extremities of the object. The central pencil, it is obvious, would pass both lenses symmetrically; the same portions of light occupying nearly the same relative places on both lenses. The blue light would enter the second lens nearer to its axis than the red, and being thus less refracted than the red by the second lens, a small amount of compensation would take place, quite different in principle and inferior in degree to that which is produced in the excentrical pencils. In the intermediate spaces the corrections are still more imperfect and uncertain; and this explains the cause of the aberrations which must of necessity exist even in the best-made doublet. It is however infinitely superior to a single lens, and will transmit a pencil of an angle of from 35° to 50° without any very sensible errors. It exhibits therefore many of the usual test-objects in a very beautiful manner.

The next step in the improvement of the simple microscope bears more analogy to the eye-piece. This improvement was made by Mr. Holland, and it consists (as shown in *fig.* 6) in substituting two lenses for the first in the doublet, and retaining the stop between them and the third. The first bending, being thus effected by two lenses instead of one, is accompanied by smaller aberrations, which are therefore more completely balanced or corrected at the second bend-

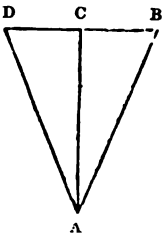
Fig. 6.



ing, in the opposite direction, by the third lens. This combination, though called a triplet, is essentially a doublet, in which the anterior lens is divided into two. For it must be recollected that the first pair of lenses merely accomplishes what might have been done, though with less precision, by one; but the two lenses of the doublet are opposed to each other; the second diminishing the magnifying power of the first. The first pair of lenses in the triplet concur in producing a certain amount of magnifying power, which is diminished in quantity and corrected as to aberration at the third lens by the change in relation to the position of the axis which takes place in the pencil between what is virtually the first and second lens. In this combination the errors are still further reduced by the close approximation to the object which causes the refractions to take place near the axis. Thus the transmission of a still larger angular pencil, namely 65°, is rendered compatible with distinctness, and a more intense image is presented to the eye.

Every increase in the number of lenses is attended with one drawback, from the circumstance that a certain portion of light is lost by reflection and absorption each time that the ray enters a new medium. This loss bears no sensible proportion to the gain arising from the increased aperture, which, being as the square of the diameter, multiplies rapidly; or if we estimate by the angle of the admitted pencil, which is more easily ascertained, the intensity will be as the square of twice the tangent of half the angle. To explain this, let D B (*fig.* 7) represent the diameter of the lens, or of that part of it which is really employed; C A the perpendicular drawn from its centre, and A B, A D, the extreme rays of the incident pencil of light D A B. Then the diameter being 2 C B, the area to which the intensity of vision is proportional will be $(2\,C\,B)^2$, and C B is evidently the tangent of the angle C A B, which is half the angle of the admitted pencil D A B. Or, if a be used to denote the angular aperture, the expression for the intensity is $(2 \tan. \frac{1}{2} a)^2$, which increases so rapidly with the increase of a, as to make the loss of light by reflection and absorption of little consequence.

Fig. 7.

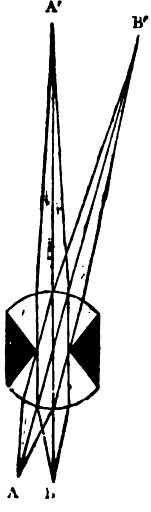


The combination of three lenses approaches, as has been stated, very close to the object; so close, indeed, as to prevent the use of more than three; and this constitutes a limit to the improvement of the simple microscope, for it is called a simple microscope, although consisting of three lenses, and although a compound microscope may be made of only three or even two lenses; but the different arrangement which gives rise to the term compound will be better understood when that instrument is explained.

Before we proceed to describe the simple microscope and its appendages, it will be well to explain such other points in reference to the form and materials of lenses as are most likely to be interesting.

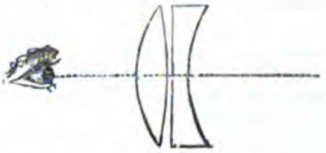
A very useful form of lens was proposed by Dr. Wollaston, and called by him the Periscopic lens. It consisted of two hemispherical lenses, cemented together by their plane faces, having a stop between them to limit the aperture. A similar proposal was made by Mr. Coddington, who however executed the project in a better manner, by cutting a groove in a whole sphere, and filling the groove with opaque matter. His lens, which is the well-known Coddington lens, is shown in *fig.* 8. It gives a large field of view, which is equally good in all directions, as it is evident that the pencils A A′ and B B′ pass through under precisely the same circumstances. Its spherical form has the further advantage of rendering the position in which it is held of comparatively little consequence. It is therefore very convenient as a hand-lens, but its definition is of course not so good as that of a well-made doublet or achromatic lens.

Fig. 8.



Another very useful form of doublet was proposed by Sir John Herschel, chiefly like the Coddington lens, for the sake of a wide field, and chiefly to be used in the hand. It is shown in *fig.* 9: it consists of a double convex or crossed lens, having the radii of curvature as 1 to 6, and of a plane concave lens whose focal length is to that of the convex lens as 13 to 5.

Fig. 9.



Various, indeed innumerable, other forms and combinations of lenses have been projected, some displaying much ingenuity, but few of any practical use. In the Catadioptric lenses the light emerges at right angles from its entering direction, being reflected from a surface cut at an angle of 45 degrees to the axes of the curved surfaces.

It was at one time hoped, as the precious stones are more refractive than glass, and as the increased refractive power is unaccompanied by a correspondent increase in chromatic dispersion, that they would furnish valuable materials for lenses, inasmuch as the refractions would be accomplished by shallower curves, and consequently with diminished spherical aberration. But these hopes were disappointed: everything that ingenuity and perseverance could accomplish was tried by Mr. Varley and Mr. Pritchard, under the patronage of Dr. Goring. It appeared however that the great reflective power, the doubly-refracting property, the colour, and the heterogeneous structure of the jewels which were tried, much more than counterbalanced the benefits arising from their greater refractive power, and left no doubt of the superiority of skilfully made glass doublets and triplets. The idea is now, in fact, abandoned; and the same remark is applicable to the attempts at constructing fluid lenses, and to the projects for giving to glass other than spherical surfaces,—none of which have come into extensive use.

By the term *simple* microscope is meant one in which the object is viewed directly through a lens or combination of lenses, just as we have supposed an arrow or an insect to be viewed through a glass held in the hand. When however the magnifying power of the glass is considerable, in other words, when its focal length is very short, and its proper distance from its object of consequence equally short, it requires to be placed at that proper distance with great precision: it cannot therefore be held with sufficient accuracy and steadiness by the unassisted hand, but must be mounted in a frame having a rack or screw to move it towards or from another frame or stage which holds the object. It is then called a microscope, and it is furnished, according to circumstances, with lenses and mirrors to collect and reflect the light upon the object, and with other conveniences which will now be described.

One of the best forms of a stand for a simple microscope is shown in *fig.* 10, where A is a brass pillar screwed to a tripod base; B is a broad stage for the objects, secured to

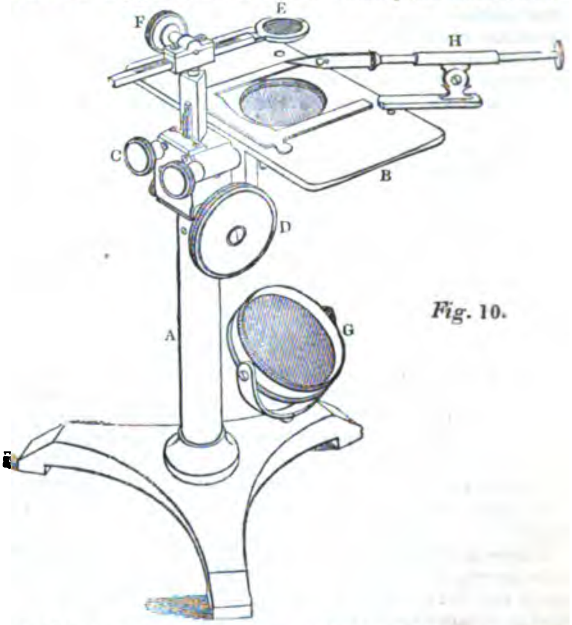


Fig. 10.

the stem by screws, whose milled heads are at C. By means of the large milled head D, a triangular bar, having a rack, is elevated out of the stem A, carrying the lens-holder E, which has a horizontal movement in one direction, by means of a rack worked by the milled head F, and in the other direction by turning on a circular pin. A concave mirror G reflects the light upwards through the hole in the stage, and a lens may be attached to the stage for the purpose of throwing light on an opaque object, in the same way that the forceps H for holding such objects is attached. This microscope is peculiarly adapted, by its broad stage and its general steadiness, for dissecting; and it is rendered more convenient for this purpose by placing it between two inclined planes of mahogany, which support the arms and elevate the wrists to the level of the stage. This apparatus is called the dissecting rest. When dissecting is not a primary object, a joint may be made at the lower end of the stem A, to allow the whole to take an inclined position; and then the spring clips shown upon the stage are useful to retain the object in its place. Numerous convenient appendages may be made to accompany such microscopes, which it will be impossible to mention in detail: the most useful are Mr. Varley's capillary cages for containing animalculæ in water, and parts of aquatic plants; also his tubes for obtaining and separating such objects, and his phial and phial-holder for preserving and exhibiting small living specimens of the Chara, Nitella, and other similar plants, and observing their circulation. The phial-microscope affords facilities for observing the operations of minute vegetable and animal life, which will probably lead to the most interesting discoveries. The recent volumes of the Transactions of the Society of Arts contain an immense mass of information of this sort, and to these we refer the reader.

The mode of illuminating objects is one on which we must give some further information, for the manner in which an object is lighted is second in importance only to the excellence of the glass through which it is seen. In investigating any new or unknown specimen, it should be viewed in turns by every description of light, direct and oblique, as a transparent object and as an opaque object, with strong and with faint light, with large angular pencils and with small angular pencils thrown in all possible directions. Every change will probably develop some new fact in reference to the structure of the object, which should itself be varied in the mode of mounting in every possible way. It should be seen both wet and dry, and immersed in fluids of various qualities and densities, such as water, alcohol, oil, and Canada balsam, for instance, which last has a refractive power nearly equal to that of glass. If the object be delicate vegetable tissue, it will be in some respects rendered more visible by gentle heating or scorching by a clear fire placed between two plates of glass. In this way the spiral vessels of asparagus and other similar vegetables may be beautifully displayed. Dyeing the objects in tincture of iodine will in some cases answer this purpose better.

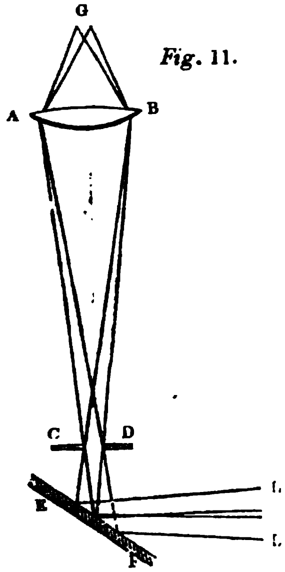
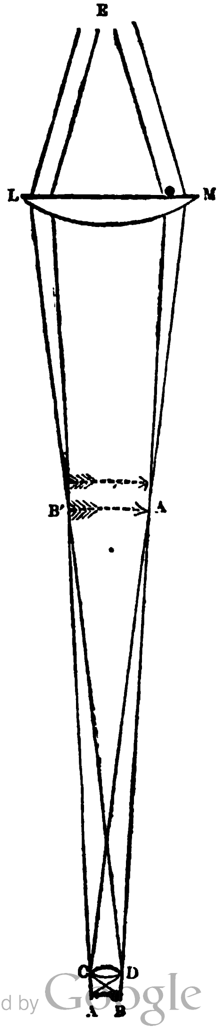


Fig. 11.

But the principal question in regard to illumination is the magnitude of the illuminating pencil, particularly in reference to transparent objects. Generally speaking the illuminating pencil should be as large as can be received by the lens, and no larger. Any light beyond this produces indistinctness and glare. The superfluous light from the mirror may be cut off by a screen having various-sized apertures placed below the stage; but the best mode of illumination is that proposed by Dr. Wollaston, and called the Wollaston condenser. A tube is placed below the stage of the instrument containing a lens A B (*fig.* 11), which can be elevated or depressed within certain limits at pleasure; and at the lower end is a stop with a limited aperture CD. A plane mirror E F receives the rays of light L L from the sky or a white cloud, which last is the best source of light, and reflects them upwards through the aperture in C D, so that they are refracted, and form an image of the aperture at G, which is supposed to be nearly the place of the object. The object is sometimes best seen when the image of the aperture is also best seen; and sometimes it is best to elevate the summit G of the cone A B G above the object, and at others to depress it below: all which is done at pleasure by the power of moving the lens A B. If artificial light (as a lamp or candle) be employed, the flame must be placed in the principal focus of a large detached lens on a stand, so that the rays L L may fall in parallel lines on the mirror, or as they would fall from the cloud. This will be found an advantage, not only when the Wollaston condenser is employed, but also when the mirror and diaphragm are used. A good mode of imitating artificially the light of a white cloud opposite the sun has been proposed by Mr. Varley: he covers the surface of the mirror under the stage with carbonate of soda or any similar material, and then concentrates the sun's light upon its surface by a large condensing lens. The intense white light diffused from the surface of the soda forms an excellent substitute for the white cloud, which, when opposite the sun and of considerable size, is the best day-light, as the pure sky opposite to the sun is the worst.

The Compound Microscope may, as before stated, consist of only two lenses, while a simple microscope has been shown to contain sometimes three. In the triplet for the simple microscope however it was explained that the effect of the two first lenses was to do what might have been accomplished, though not so well, by one; and the third merely effected certain modifications in the light before it entered the eye. But in the compound microscope the two lenses have totally different functions; the first receives the rays from the object, and, bringing them to new foci, forms an image, which the second lens treats as an original object, and magnifies it just as the single microscope magnified the object itself.

Fig. 12.



The annexed figure (12) shows the course of the rays through a compound microscope of two lenses. The rays proceeding from the object A B are so acted upon by the lens C D, near it, and thence called the object-glass, that they are converged to foci in A′ B′, where they form an enlarged image of the object, as would be evident if a piece of oiled paper or ground glass were placed there to receive them. They are not so intercepted, and therefore the image is not rendered visible at that place; but their further progress is similar to what it would have been had they really proceeded from an object at A′ B′. They are at length received by the eye-lens L M, which acts upon them as the simple microscope has been described to act on the light proceeding from its objects. They are bent so that they may enter the eye at E in parallel lines, or as nearly so as is requisite for distinct vision. When we say that the rays enter the eye in nearly parallel lines, we mean only those which proceed from one point of the original object. Thus the two parallel rays M E have proceeded from and are part of the cone of rays C A D, emanating from the point A of the arrow; but they do not form two pictures in the eye, because any number of parallel rays which the pupil can receive will be converged to a point by the eye, and will convey the impression of one point to the mind. In like manner the rays L E are part of the cone of rays emanating from B, and the angle L E M is that under which the eye will see the magnified image of the arrow, which is evidently many times greater than the arrow could be made to occupy in the naked eye at any distance within the limits of distinct vision. The magnifying power depends on two circumstances: first, on the ratio between the anterior distance A C or B D and the posterior focal length C B′ or D A′; and secondly, on the power of the eye-lens L M. The first ratio is the same as that between the object A B and the image A′ B′; this and the focal length or power of the eye-lens are both easily obtained, and their product is the power of the compound instrument.

Since the power depends on the ratio between the anterior and posterior foci of the object-glass, it is evident that by increasing that ratio any power may be obtained, the same eye-glass being used; or having determined the first, any further power may be obtained by increasing that of the eye-glass; and thus, by a pre-arrangement of the relative proportions in which the magnifying power shall be divided between the object-glass and the eye glass, almost any given distance (within certain limits) between the first and its object may be secured. This is one valuable peculiarity of the compound instrument; and another is the large field, or large angle of view, which may be obtained, every part of which will be nearly equally good; whereas with the best simple microscopes the field is small, and is good only in the centre. The field of the compound instrument is further increased by using two glasses at the eye-end; the first being called, from its purpose, the field-glass, and the two constituting what is called the eye-piece. This will be more particularly explained in the figure of the achromatic compound microscope presently given.

For upwards of a century the compound microscope, notwithstanding the advantages above mentioned, was a comparatively feeble and inefficient instrument, owing to the distance which the light had to traverse, and the consequent increase of the chromatic and spherical aberrations. To explain this we have drawn in *fig.* 12 a second image near A′ B′, the fact being that the object-glass would not form one image, as has been supposed, but an infinite number of variously-coloured and various-sized images, occupying the space between the two dotted arrows. Those nearest the object-glass would be red, and those nearest the eye-glass would be blue. The effect of this is to produce so much confusion, that the instrument was reduced to a mere toy, although these errors were diminished to the utmost possible extent by limiting the aperture of the object-glass, and thus restricting the angle of the pencil of light from each point of the object. But this involved the defects, already explained, of making the picture obscure, so that on the whole the best compound instruments were inferior to the simple microscopes of a single lens, with which indeed all the important observations of the last century were made.

Even after the improvement of the simple microscope by the use of doublets and triplets, the long course of the rays and the large angular pencil required in the compound instrument deterred the most sanguine from anticipating the period when they should be conducted through such a path free both from spherical and chromatic errors. Within twenty years of the present period, philosophers of no less eminence than M. Biot and Dr. Wollaston predicted that the compound would never rival the simple microscope, and that the idea of achromatising its object-glass was hopeless. Nor can these opinions be wondered at when we consider how many years the achromatic telescope had existed without an attempt to apply its principles to the compound microscope. When we consider the smallness of the pencil required by the telescope, and the enormous increase of difficulty attending every enlargement of the pencil—when we consider further that these difficulties had to be contended with and removed by operations on portions of glass so small that they are themselves almost microscopic objects, we shall not be surprised that even a cautious philosopher and most able manipulator like Dr. Wollaston should prescribe limits to improvement.

Fortunately for science, and especially for the departments of animal and vegetable physiology, these predictions have been shown to be unfounded. The last fifteen years have sufficed to elevate the compound microscope from the condition we have described to that of being the most important instrument ever bestowed by art upon the investigator of nature. It now holds a very high rank among philosophical implements, while the transcendent beauties of form, colour, and organization which it reveals to us in the minute works of nature, render it subservient to the most delightful and instructive pursuits. To these claims on our attention it appears likely to add a third of still higher importance. The microscopic examination of the blood and other human organic matter will in all probability afford more satisfactory and conclusive evidence regarding the nature and seat of disease than any hitherto appealed to, and will of consequence lead to similar certainty in the choice and application of remedies.

We have thought it necessary to state thus at large the claims of the modern achromatic microscope upon the attention of the reader, as a justification of the length at which we shall give its recent history and explain its construction; and we are further induced to this course by the consideration that the subject is entirely new ground, and that there are at this time not more than two or three makers of achromatic microscopes in England.

Soon after the year 1820 a series of experiments was begun in France by M. Selligues, which were followed up by Frauenhofer at Münich, by Amici at Modena, by M. Chevalier at Paris, and by the late Mr. Tulley in London. In 1824 the last-named excellent artist, without knowing what had been done on the Continent, made the attempt to construct an achromatic object-glass for a compound microscope, and produced one of nine-tenths of an inch focal length, composed of three lenses, and transmitting a pencil of eighteen degrees. This was the first that had been made in England; and it is due to Mr. Tulley to say, that as regards accurate correction throughout the field, that glass has not been excelled by any subsequent combination of three lenses. Such an angular pencil, and such a focal length, would bear an eye-piece adapted to produce a gross magnifying power of one hundred and twenty. Mr. Tulley afterwards made a combination to be placed in front of the first mentioned, which increased the angle of the transmitted pencil to thirty-eight degrees, and bore a power of three hundred.

While these practical investigations were in progress, the subject of achromatism engaged the attention of some of the most profound mathematicians in England. Sir John Herschel, Professor Airy, Professor Barlow, Mr. Coddington, and others, contributed largely to the theoretical examination of the subject; and though the results of their labours were not immediately applicable to the microscope, they essentially promoted its improvement.

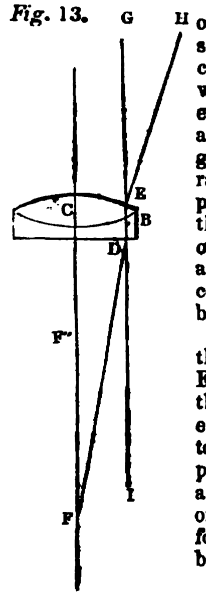
For some time prior to 1829 the subject had occupied the mind of a gentleman, who, not entirely practical, like the first, nor purely mathematical, like the last-mentioned class of inquirers, was led to the discovery of certain properties in achromatic combinations which had been before unobserved. These were afterwards experimentally verified; and in the year 1829 a paper on the subject, by the discoverer, Mr. Joseph Jackson Lister, was read and published by the Royal Society. The principles and results thus obtained enabled Mr. Lister to form a combination of lenses which transmitted a pencil of fifty degrees, with a large field correct in every part: as this paper was the foundation of the recent improvements in achromatic microscopes, and as its results are indispensable to all who would make or understand the instrument, we shall give the more important parts of it in detail, and in Mr. Lister's own words.

'I would premise that the plano-concave form for the correcting flint lens has in that quality a strong recommendation, particularly as it obviates the danger of error which otherwise exists in centring the two curves, and thereby admits of correct workmanship for a shorter focus. To cement together also the two surfaces of the glass diminishes by very nearly half the loss of light from reflexion, which is considerable at the numerous surfaces of a combination. I have thought the clearness of the field and brightness of the picture evidently increased by doing this; it prevents any dewiness or vegetation from forming on the inner surfaces; and I see no disadvantage to be anticipated from it if they are of identical curves, and pressed closely together, and the cementing medium permanently homogeneous.

'These two conditions then, that the flint lens shall be plano-concave, and that it shall be joined by some cement to the convex, seem desirable to be taken as a basis for the microscopic object-glass, provided they can be reconciled with the destruction of the spherical and chromatic aberrations of a large pencil.

'Now in every such glass that has been tried by me which has had its correcting lens of either Swiss or English glass, with a double convex of plate, and has been made achromatic by the form given to the outer curve of the convex, the proportion has been such between the refractive and dispersive powers of its lenses, that its figure has been correct for rays issuing from some point in its axis not far from its principal focus on its plane side, and either tending to a conjugate focus within the tube of a microscope, or emerging nearly parallel.

Fig. 13.



'Let A B (*fig.* 13) be supposed such an object-glass, and let it be roughly considered as a plano-convex lens, with a curve A B C running through it, at which the spherical and chromatic errors are corrected which are generated at the two outer surfaces; and let the glass be thus free from aberration for rays F D E G issuing from the radiant point F, H E being a perpendicular to the convex surface, and I D to the plane one. Under these circumstances, the angle of emergence G E H much exceeds that of incidence F D I, being probably nearly three times as great.

If the radiant is now made to approach the glass, so that the course of the ray F D E G shall be more divergent from the axis, as the angles of incidence and emergence become more nearly equal to each other, the spherical aberration produced by the two will be found to bear a less proportion to the opposing error of the single correcting curve A C B; for such a focus therefore the rays will be over-corrected.

'But if F still approaches the glass, the angle of incidence continues to increase with the increasing divergence of the ray, till it will exceed that of emergence, which has in the meanwhile been diminishing, and at length the spherical error produced by them will recover its original proportion to the opposite error of the curve of correction. When F has reached this point F'' (at which the angle of incidence does not exceed that of emergence so much as it had at first come short of it), the rays again pass the glass free from spherical aberration.

'If F be carried from hence towards the glass, or outwards from its original place, the angle of incidence in the former case, or of emergence in the latter, becomes disproportionately effective, and either way the aberration exceeds the correction.

'These facts have been established by careful experiment: they accord with every appearance in such combinations of the plano-convex glasses as have come under my notice, and may, I believe, be extended to this rule, that in general an achromatic object-glass, of which the inner surfaces are in contact, or nearly so, will have on one side of it two foci in its axis, for the rays proceeding from which it will be truly corrected at a moderate aperture; that for the space between these two points its spherical aberration will be over-corrected, and beyond them either way under-corrected.

'The longer aplanatic focus may be found, when one of the plano-convex object-glasses is placed in a microscope, by shortening the tube, if the glass shows over-correction; if under-correction, by lengthening it, or by bringing the rays together, should they be parallel or divergent, by a very small good telescope. The shorter focus is got at by sliding the glass before another of sufficient length and large aperture that is finely corrected, and bringing it forwards till it gives the reflexion of a bright point from a globule of quicksilver, sharp and free from mist, when the distance can be taken between the glass and the object.

'The longer focus is the place at which to ascertain the utmost aperture that may be given to the glass, and where, in the absence of spherical error, its exact state of correction as to colour is seen most distinctly.

'The correction of the chromatic aberration, like that of the spherical, tends to excess in the marginal rays; so that if a glass which is achromatic, with a moderate aperture, has its cell opened wider, the circle of rays thus added to the pencil will be rather over-corrected as to colour.

'The same tendency to over-correction is produced, if, without varying the aperture, the divergence of the incident rays is much augmented, as in an object-glass placed in front of another; but generally in this position a part only of its aperture comes into use; so that the two properties mentioned neutralize each other, and its chromatic state remains unaltered. If for example the outstanding colours were observed at the longer focus to be green and claret, which show that the nearest practicable approach is made to the union of the spectrum, they usually continue nearly the same for the whole space between the foci, and for some distance beyond them either way.

'The places of these two foci and their proportions to each other depend on a variety of circumstances. In several object-glasses that I have had made for trial, plano-convex, with their inner surfaces cemented, their diameters the radius of the flint lens, and their colour pretty well corrected, those composed of dense flint and light plate have had the rays from the longer focus emerging nearly parallel; and this focus has been not quite three times the distance of the shorter from the glass: with English flint the rays have had more convergence, and the shorter focus has borne a rather less proportion to the longer.

'If the surfaces are not cemented, a striking effect is produced by minute differences in their curves. It may give some idea of this, that in a glass of which nearly the whole disk was covered with colour from contact of the lenses, the addition of a film of varnish, so thin that this colour was not destroyed by it, caused a sensible change in the spherical correction.

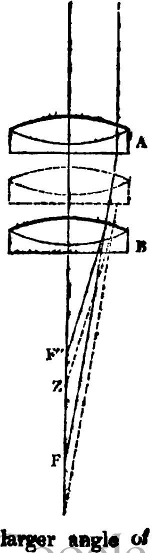
'I have found that whatever extended the longer aplanatic focus, and increased the convergence of its rays, diminished the relative length of the shorter. Thus by turning to the concave lens the flatter instead of the deeper side of a convex lens, whose radii were to each other as 31 to 35, the pencil of the longer aplanatic focus, from being greatly divergent, was brought to converge at a very small distance behind the glass; and the length of the shorter focus, which had been one-half that of the longer, became but one-sixth of it.

'The direction of the aplanatic pencils appears to be scarcely affected by the differences in the thickness of glasses, if their state as to colour is the same.

'One other property of the double object-glass remains to be mentioned, which is, that when the longer aplanatic focus is used, the marginal rays of a pencil not coincident with the axis of the glass are distorted, so that a coma is thrown outwards; while the contrary effect of a coma directed towards the centre of the field is produced by the rays from the shorter focus. These peculiarities of the coma seem inseparable attendants on the two foci, and are as conspicuous in the achromatic meniscus as in the plano-convex object-glass.

'Of several purposes to which the particulars just given seem applicable, I must at present confine myself to the most obvious one. They furnish the means of destroying with the utmost ease both aberrations in a large focal pencil, and of thus surmounting what has hitherto been the chief obstacle to the perfection of the microscope. And when it is considered that the curves of its diminutive object-glasses have required to be at least as exactly proportioned as those of a large telescope to give the image of a bright point equally sharp and colourless, and that any change made to correct one aberration was liable to disturb the other, some idea may be formed of what the amount of that obstacle must have been. It will however be evident that if any object-glass is but made achromatic, with its lenses truly worked and cemented, so that their axes coincide, it may with certainty be connected with another possessing the same requisites and of suitable focus, so that the combination shall be free from spherical error also in the centre of its field. For this the rays have only to be received by the front glass B (*fig.* 14) from its shorter aplanatic focus F'', and transmitted in the direction of the longer correct pencil F A of the other glass A. It is desirable that the latter pencil should neither converge to a very short focus nor be more than very slightly if at all divergent; and a little attention at first to the kind of glass used will keep it within this range, the denser flint being suited to the glasses of shorter focus and larger angle of aperture.

Fig. 14.



'The adjustment of the microscope is then perfected, if necessary, by slightly varying the distance between the object-glasses; and after that is done, the length of the tube which carries the eye-pieces may be altered greatly without disturbing the correction, opposite errors which balance each other being produced by the change.

'If the two glasses which in the diagram are drawn at some distance apart are brought nearer together (if the place of A for instance is carried to the dotted figure), the rays transmitted by B in the direction of the longer aplanatic pencil of A will plainly be derived from some point Z more distant than F″, and lying between the aplanatic foci of B; therefore (according to what has been stated) this glass, and consequently the combination, will then be spherically over-corrected. If on the other hand the distance between A and B is increased, the opposite effects are of course produced.

'In combining several glasses together it is often convenient to transmit an under-corrected pencil from the front glass, and to counteract its error by over-correction in the middle one.

'Slight errors in colour may in the same manner be destroyed by opposite ones; and on the principles described we not only acquire fine correction for the central ray, but, by the opposite effects at the two foci on the transverse pencil, all coma can be destroyed, and the whole field rendered beautifully flat and distinct.'

Mr. Lister's paper enters into further particulars, which are not essential to the comprehension of the subject. It is sufficient to say that his investigations and results proved to be of the highest value to the practical optician, and the progress of improvement was in consequence extremely rapid. The new principles were applied and exhibited by Mr. Hugh Powell and Mr. Andrew Ross with a degree of success which had never been anticipated; so perfect indeed were the corrections given to the achromatic object-glass—so completely were the errors of sphericity and dispersion balanced or destroyed—that the circumstance of covering the object with a plate of the thinnest glass or talc disturbed the corrections, if they had been adapted to an uncovered object, and rendered an object-glass which was perfect under one condition sensibly defective under the other.

This defect, if that should be called a defect which arose out of improvement, was first discovered by Mr. Ross, who immediately suggested the means of correcting it, and presented to the Society of Arts, in 1837, a paper on the subject, which was published in the 51st volume of their Transactions, and which, as it is, like Mr. Lister's, essential to a full understanding of the ultimate refinements of the instrument, we shall extract nearly in full.

'In the course of a practical investigation (says Mr. Ross) with the view of constructing a combination of lenses for the object-glass of a compound microscope, which should be free from the effects of aberration, both for central and oblique pencils of great angle, I combined the condition of the greatest possible distance between the object and object-glass; for in object-glasses of short focal length their closeness to the object has been an obstacle in many cases to the use of high magnifying powers, and is a constant source of inconvenience.

'In the improved combination, the diameter is only sufficient to admit the proper pencil; the convex lenses are wrought to an edge, and the concave have only sufficient thickness to support their figure; consequently, the combination is the thinnest possible, and it follows that there will be the greatest distance between the object and the object-glass. The focal length is $\frac{1}{8}$ of an inch, having an angular aperture of 60°, with a distance of $\frac{1}{25}$ of an inch, and a magnifying power of 970 times linear with perfect definition on the most difficult Podura scales. I have made object-glasses $\frac{1}{16}$ of an inch focal length; but as the angular aperture cannot be advantageously increased, if the greatest distance between the object and object-glass is preserved, their use will be very limited.

'The quality of the definition produced by an achromatic compound microscope will depend upon the accuracy with which the aberrations, both chromatic and spherical, are balanced, together with the general perfection of the workmanship. Now, in Wollaston's doublets, and Holland's triplets, there are no means of producing a balance of the aberrations, as they are composed of convex lenses only; therefore the best that can be done is to make the aberrations a minimum: the remaining positive aberration in these forms produces its peculiar effect upon objects (particularly the detail of the thin transparent class), which may lead to misapprehension of their true structure; but with the achromatic object-glass, where the aberrations are correctly balanced, the most minute parts of an object are accurately displayed, so that a satisfactory judgment of their character may be formed.

Fig. 15.

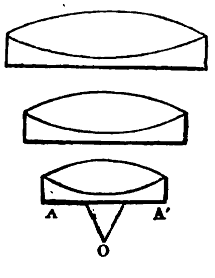
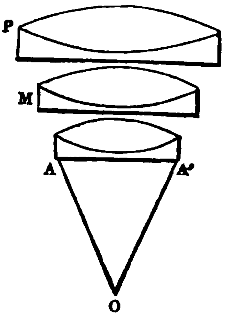


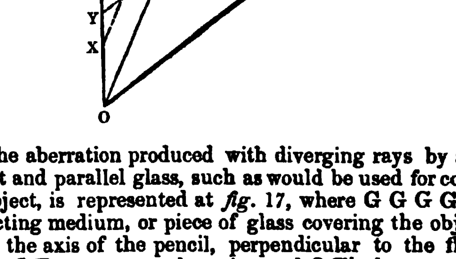
Fig. 16.



'It will be seen by *fig.* 15, that when a certain angular pencil A O A′ proceeds from the object O, and is incident on the plane side of the first lens, if the combination is removed from the object, as in *fig.* 16, the extreme rays of the pencil impinge on the more marginal parts of the glass, and as the refractions are greater here, the aberrations will be greater also. Now, if two compound object-glasses have their aberrations balanced, one being situated as in *fig.* 15, and the other as in *fig.* 16, and the same disturbing power applied to both, that in which the angles of incidence and the aberrations are small will not be so much disturbed as where the angles are great, and where consequently the aberrations increase rapidly.

'When an object-glass has its aberrations balanced for viewing an opaque object, and it is required to examine that object by transmitted light, the correction will remain; but if it is necessary to immerse the object in a fluid, or to cover it with glass or talc, an aberration will arise from these circumstances, which will disturb the previous correction, and consequently deteriorate the definition; and this effect will be more obvious with the increase of the distance between the object and the object-glass.

Fig. 17.



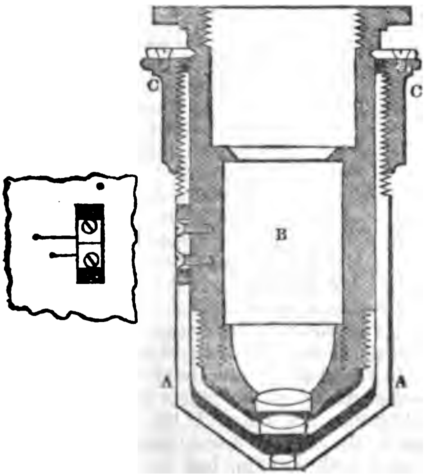
'The aberration produced with diverging rays by a piece of flat and parallel glass, such as would be used for covering an object, is represented at *fig.* 17, where G G G G is the refracting medium, or piece of glass covering the object O; O P, the axis of the pencil, perpendicular to the flat surfaces; O T, a ray near the axis; and O T′, the extreme ray of the pencil incident on the under surface of the glass: then T R, T′ R′, will be the directions of the rays in the medium, and R E, R′ E′, those of the emergent rays. Now if the course of these rays is continued, as by the dotted lines, they will be found to intersect the axis at different distances, X and Y, from the surface of the glass; and the distance X Y is the aberration produced by the medium which, as before stated, interferes with the previously balanced aberrations of the several lenses composing the object-glass. There are many cases of this, but the one here selected serves best to illustrate the principle. I need not encumber the description with the theoretical determination of this quantity, as it varies with exceedingly minute circumstances which we cannot accurately control; such as the distance of the object from the under side of the glass, and the slightest difference in the thickness of the glass itself; and if these data could be readily obtained, the knowledge would be of no utility in making the correction, that being wholly of a practical nature.

'If an object-glass is constructed as represented in *fig.* 16, where the posterior combination P and the middle M have together an excess of negative aberration, and if this be corrected by the anterior combination A, having an excess of positive aberration, then this latter combination can be made to act more or less powerfully upon P and M, by making it approach to or recede from them; for when the three are in close contact, the distance of the object from the object-glass is greatest; and consequently the rays from the object are diverging from a point at a greater distance than when the combinations are separated; and as a lens bends the rays more, or acts with greater effect, the more distant the object is from which the rays diverge, the effect of the anterior combination A upon the other two, P and M, will vary with its distance from thence. When therefore the correction of the whole is effected for an opaque object with a certain distance between the anterior and middle combination, if they are then put in contact, the distance between the object and object-glass will be increased; consequently the anterior combination will act more powerfully, and the whole will have an excess of positive aberration. Now the effect of the aberration produced by a piece of flat and parallel glass being of the negative character, it is obvious that the above considerations suggest the means of correction by moving the lenses nearer together, till the positive aberration thereby produced balances the negative aberration caused by the medium.

'The preceding refers only to the spherical aberration, but the effect of the chromatic is also seen when an object is covered with a piece of glass; for, in the course of my experiments, I observed that it produced a chromatic thickening of the outline of the Podura and other delicate scales; and if diverging rays near the axis and at the margin are projected through a piece of flat parallel glass, with the various indices of refraction for the different colours, it will be seen that each ray will emerge separated into a beam consisting of the component colours of the ray, and that each beam is widely different in form. This difference, being magnified by the power of the microscope, readily accounts for the chromatic thickening of the outline just mentioned. Therefore to obtain the finest definition of extremely delicate and minute objects, they should be viewed without a covering; if it be desirable to immerse them in a fluid, they should be covered with the thinnest possible film of talc, as, from the character of the chromatic aberration, it will be seen that varying the distances of the combinations will not sensibly affect the correction; though object-lenses may be made to include a given fluid or solid medium in their correction for colour.

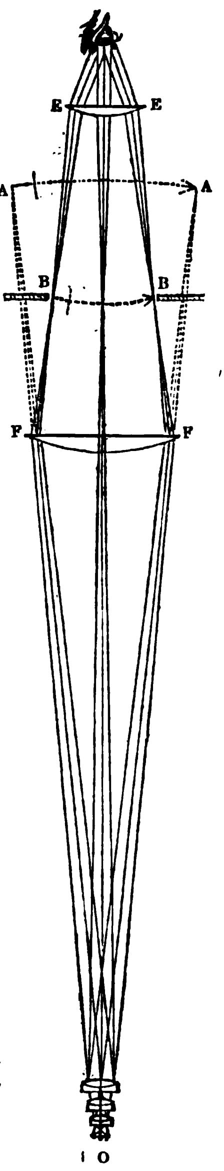
'The mechanism for applying these principles to the correction of an object-glass under the various circumstances, is represented in *fig.* 18, where the anterior lens is set in the end of a tube A A, which slides on the cylinder B containing the remainder of the combination; the tube A A, holding the lens nearest the object, may then be moved upon the cylinder B, for the purpose of varying the distance according to the thickness of the glass covering the object, by turning the screwed ring C C, or more simply by sliding the one on the other, and clamping them together when adjusted. An aperture is made in the tube A, within which is seen a mark engraved on the cylinder, and on the edge of which are two marks, a longer and a shorter, engraved upon the tube. When the mark on the cylinder coincides with the longer mark on the tube, the adjustment is perfect for an uncovered object; and when the coincidence is with the short mark, the proper distance is obtained to balance the aberrations produced by glass $\frac{1}{100}$th of an inch thick, and such glass can be readily supplied.

Fig. 18.



'It is hardly necessary to observe, that the necessity for this correction is wholly independent of any particular construction of the object-glass; as in all cases where the object-glass is corrected for an object uncovered, any covering of glass will create a different value of aberration to the first lens, which previously balanced the aberration resulting from the rest of the lenses; and, as this disturbance is effected at the first refraction, it is independent of the other part of the combination. The visibility of the effect depends on the distance of the object from the object-glass, the angle of the pencil transmitted, the focal length of the combination, the thickness of the glass covering the object, and the general perfection of the corrections for chromatism and the oblique pencils.

Fig. 19.

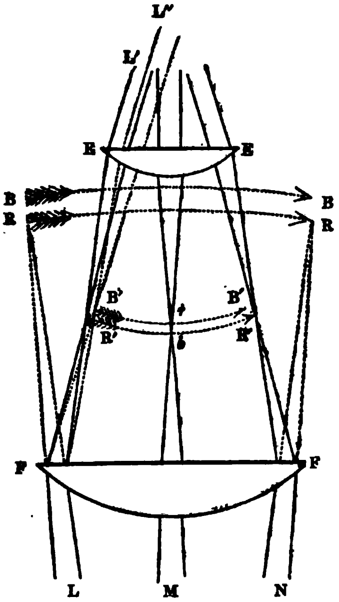


'With this adjusting object-glass, therefore, we can have the requisites of the greatest possible distance between the object and object-glass, an intense and sharply defined image throughout the field from the large pencil transmitted, and the accurate correction of the aberrations; also, by the adjustment, the means of preserving that correction under all the varied circumstances in which it may be necessary to place an object for the purpose of observation.'

In the annexed engraving, *fig.* 19, we have shown the triple achromatic object-glass in connection with the eye-piece consisting of the field-glass F F and the eye-glass E E, forming together the modern achromatic microscope. The course of the light is shown by drawing three rays from the centre and three from each end of the object O. These rays would, if left to themselves, form an image of the object at A A, but being bent and converged by the field-glass F F, they form the image at B B, where a stop is placed to intercept all light except what is required for the formation of the image. From B B therefore the rays proceed to the eye-glass exactly as has been described in reference to the simple microscope and to the compound of two glasses.

If we stopped here we should convey a very imperfect idea of the beautiful series of corrections effected by the eye-piece, and which were first pointed out in detail in a paper on the subject published by Mr. Varley in the 51st volume of the Transactions of the Society of Arts. The eye-piece in question was invented by Huyghens for telescopes, with no other view than that of diminishing the spherical aberration by producing the refractions at two glasses instead of one, and of increasing the field of view. It was reserved for Boscovich to point out that Huyghens had by this arrangement accidentally corrected a great part of the chromatic aberration, and this subject is further investigated with much skill in two papers by Professor Airy in the *Cambridge Philosophical Transactions*, to which we refer the mathematical reader. These investigations apply chiefly to the telescope, where the small pencils of light and great distance of the object exclude considerations which become important in the microscope, and which are well pointed out in Mr. Varley's paper before mentioned.

Fig. 20.

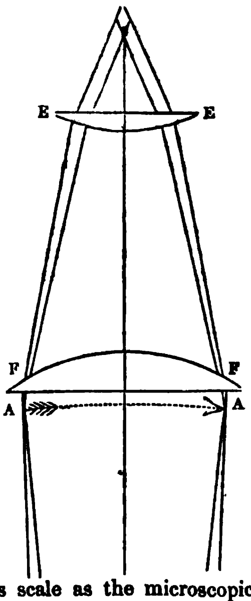


Let *fig.* 20 represent the Huyghenean eye-piece of a microscope; F F and E E being the field-glass and eye-glass, and L M N the two extreme rays of each of the three pencils, emanating from the centre and ends of the object, of which, but for the field-glass, a series of coloured images would be formed from R R to B B; those near R R being red, those near B B blue, and the intermediate ones green, yellow, and so on, corresponding with the colours of the prismatic spectrum. This order of colours, it will be observed, is the reverse of that described in treating of the common compound microscope (*fig.* 12), in which the single object-glass projected the red image beyond the blue. The effect just described, of projecting the blue image beyond the red, is purposely produced for reasons presently to be given, and is called over-correcting the object-glass as to colour. It is to be observed also that the images B B and R R are curved in the wrong direction to be distinctly seen by a convex eye-lens, and this is a further defect of the compound microscope of two lenses. But the field-glass, at the same time that it bends the rays and converges them to foci at B′B′ and R′R′, also reverses the curvature of the images as there shown, and gives them the form best adapted for distinct vision by the eye-glass E E. The field-glass has at the same time brought the blue and red images closer together, so that they are adapted to pass uncoloured through the eye-glass. To render this important point more intelligible, let it be supposed that the object-glass had not been over-corrected, that it had been perfectly achromatic; the rays would then have become coloured as soon as they had passed the field-glass; the blue rays, to take the central pencil for example, would converge at *b* and the red rays at *r*, which is just the reverse of what the eye-lens requires; for as its blue focus is also shorter than its red, it would demand rather that the blue image should be at *r* and the red at *b*. This effect we have shown to be produced by the over-correction of the object-glass, which protrudes the blue foci B B as much beyond the red foci R R as the sum of the distances between the red and blue foci of the field-lens and eye-lens; so that the separation B R is exactly taken up in passing through those two lenses, and the whole of the colours coincide as to focal distance as soon as the rays have passed the eye-lens. But while they coincide as to distance, they differ in another respect; the blue images are rendered smaller than the red by the superior refractive power of the field-glass upon the blue rays. In tracing the pencil L for instance, it will be noticed that after passing the field-glass, two sets of lines are drawn, one whole, and one dotted, the former representing the red, and the latter the blue rays. This is the accidental effect in the Huyghenean eye-piece pointed out by Boscovich. This separation into colours at the field-glass is like the over-correction of the object-glass; it leads to a subsequent complete correction. For if the differently coloured rays were kept together till they reached the eye-glass, they would then become coloured, and present coloured images to the eye; but fortunately, and most beautifully, the separation effected by the field-glass causes the blue rays to fall so much nearer the centre of the eye-glass, where, owing to the spherical figure, the refractive power is less than at the margin, that the spherical error of the eye-lens constitutes a nearly perfect balance to the chromatic dispersion of the field-lens, and the red and blue rays L′ and L″ emerge sensibly parallel, presenting, in consequence, the perfect definition of a single point to the eye. The same reasoning is true of the intermediate colours and of the other pencils.

From what has been stated it is obvious that we mean by an achromatic object-glass one in which the usual order of dispersion is so far reversed, that the light, after undergoing the singularly beautiful series of changes effected by the eye-piece, shall come uncoloured to the eye. We can give no specific rules for producing these results. Close study of the formulæ for achromatism given by the celebrated mathematicians we have quoted will do much, but the principles must be brought to the test of repeated experiment. Nor will the experiments be worth anything, unless the curves be most accurately measured and worked, and the lenses centred and adjusted with a degree of precision which, to those who are familiar only with telescopes, will be quite unprecedented.

The Huyghenean eye-piece which we have described is the best for merely optical purposes, but when it is required to measure the magnified image, we use the eye-piece invented by Mr. Ramsden, and called, from its purpose, the micrometer eye-piece. When it is stated that we sometimes require to measure portions of animal or vegetable matter a hundred times smaller than any divisions that can be artificially made on any measuring instrument, the advantage of applying the scale to the magnified image will be obvious, as compared with the application of engraved or mechanical micrometers to the stage of the instrument.

Fig. 21.



The arrangement is shown in *fig.* 21, where E E and F F are the eye and field glass, the latter having now its plane face towards the object. The rays from the object are here made to converge at A A, immediately in front of the field-glass, and here also is placed a plane glass on which are engraved divisions of $\frac{1}{100}$th of an inch or less. The markings of these divisions come into focus therefore at the same time as the image of the object, and both are distinctly seen together. Thus the measure of the magnified image is given by mere inspection, and the value of such measures in reference to the real object may be obtained thus, which, when once obtained, is constant for the same object-glass. Place on the stage of the instrument a divided scale the value of which is known, and viewing this scale as the microscopic object, observe how many of the divisions on the scale attached to the eye-piece correspond with one of those in the magnified image. If, for instance, ten of those in the eye-piece correspond with one of those in the image, and if the divisions are known to be equal, then the image is ten times larger than the object, and the dimensions of the object are ten times less than indicated by the micrometer. If the divisions on the micrometer and on the magnified scale were not equal, it becomes a mere rule-of-three sum, but in general this trouble is taken by the maker of the instrument, who furnishes a table showing the value of each division of the micrometer for every object-glass with which it may be used.

While on the subject of measuring it may be well to explain the mode of ascertaining the magnifying power of the compound microscope, which is generally taken on the assumption before mentioned, that the naked eye sees most distinctly at the distance of ten inches.

Place on the stage of the instrument, as before, a known divided scale, and when it is distinctly seen, hold a rule at ten inches distance from the disengaged eye, so that it may be seen by that eye, overlapping or lying by side of the magnified picture of the other scale. Then move the rule till one or more of its known divisions correspond with a number of those in the magnified scale, and a comparison of the two gives the magnifying power.

Having now explained the optical principles of the achromatic compound microscope, it remains only to describe the mechanical arrangements for giving those principles their full effect. The mechanism of a microscope is of much more importance than might be imagined by those who have not studied the subject. In the first place, steadiness, or freedom from vibration, and most particularly freedom from any vibrations which are not equally communicated to the object under examination, and to the lenses by which it is viewed, is a point of the utmost consequence. When, for instance, the body containing the lenses is screwed by its lower extremity to a horizontal arm, we have one of the most vibratory forms conceivable; it is precisely the form of the inverted pendulum, which is expressly contrived to indicate otherwise insensible vibrations. The tremor necessarily attendant on such an arrangement is magnified by the whole power of the instrument; and as the object on the stage partakes of this tremor in a comparatively insensible degree, the image is seen to oscillate so rapidly, as in some cases to be wholly undistinguishable. Such microscopes cannot possibly be used with high powers in ordinary houses abutting on any paved streets through which carriages are passing, nor indeed are they adapted to be used in houses in which the ordinary internal sources of shaking exist.

One of the best modes of mounting a compound microscope is shown in the annexed view (*fig.* 22), which, though too minute to exhibit all the details, will serve to explain the chief features of the arrangement.

A massy pillar A is screwed into a solid tripod B, and is surmounted by a strong joint at C, on which the whole instrument turns, so as to enable it to take a perfectly horizontal or vertical position, or any intermediate angle, such, for instance, as that shown in the engraving.

This moveable portion of the instrument consists of one solid casting D E F G; from F to G being a thick pierced plate carrying the stage and its appendages. The compound body H is attached to the bar D E, and moves up and down upon it by a rack and pinion worked by either of the milled heads K. The piece D E F G is attached to the pillar by the joint C, which being the source of the required movement in the instrument, is obviously its weakest part, and about which no doubt considerable vibration takes place. But inasmuch as the piece D E F G of necessity transmits such vibrations equally to the body of the microscope and to the objects on the stage, they hold always the same relative position, and no *visible* vibration is caused, how much soever may really exist. To the under side of the stage is attached a circular stem L, on which slides the mirror M, plane on one side and concave on the other, to reflect the light through the aperture in the stage. Beneath the stage is a circular revolving plate containing three apertures of various sizes, to limit the angle of the pencil of light which shall be allowed to fall on the object under examination. Besides these conveniences the stage has a double movement produced by two racks at right angles to each other, and worked by milled heads beneath. It has also the usual appendages of forceps to hold minute objects, and a lens to condense the light upon them, all of which are well understood, and if not, will be rendered more intelligible by a few minutes' examination of a microscope than by the most lengthened description. One other point remains to be noticed. The movement produced by the milled head K is not sufficiently delicate to adjust the focus of very powerful lenses, nor indeed is any rack movement. Only the finest screws are adapted to this purpose; and even these are improved by means for reducing the rapidity of the screw's movement. For this purpose the lower end of the compound body H, which carries the object-glass, consists of a piece of smaller tube sliding in parallel guides in the main body, and kept constantly pressed upwards by a spiral spring, but it can be drawn downward by a lever crossing the body, and acted on by an extremely fine screw whose milled head is seen at N, and the fineness of which is tripled by means of the lever through which it acts on the object-glass. The instrument is of course roughly adjusted by the rack movement, and finished by the screw, or by such other means as are chosen for the purpose. One very ingenious contrivance, but applied to the stage instead of the body of the microscope, invented by Mr. Powell, will be found described in the 50th volume of the Transactions of the Society of Arts.

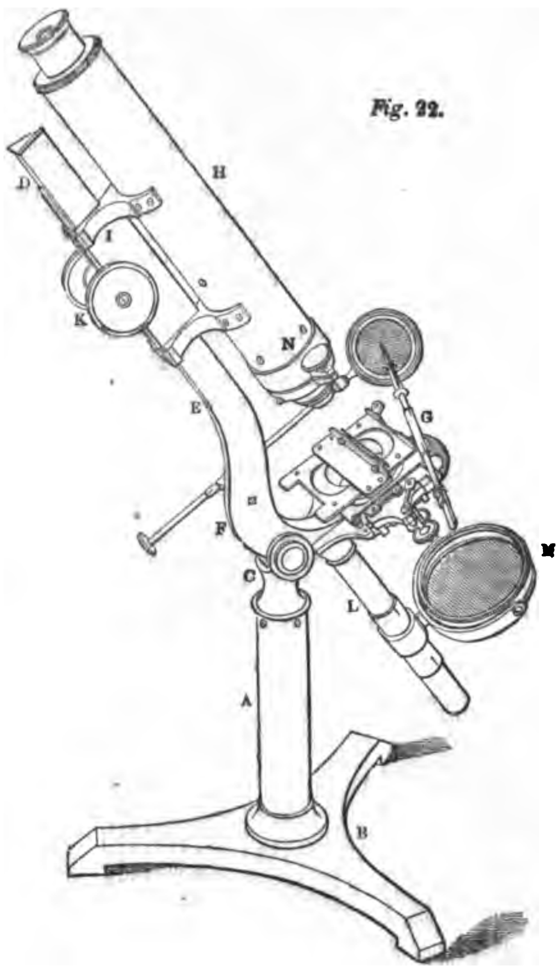


Fig. 22.

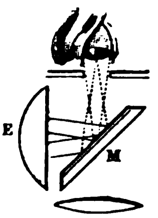
The greater part of the directions for viewing and illuminating objects given in reference to the simple microscope are applicable to the compound. An argand lamp placed in the focus of a large detached lens so as to throw parallel rays upon the mirror, is the best artificial light; and for opaque objects the light so thrown up may be reflected by metallic specula (called, from their inventor, Lieberkhuns) attached to the object-glasses.

It has been recently proposed by Sir David Brewster and by M. Dujardin to render the Wollaston condenser achromatic, and they have accordingly been made with three pairs of achromatic lenses instead of the single lens before described, with very excellent effect. The last-mentioned gentleman has also projected an ingenious apparatus, called the Hyptioscope, attached to the eye-piece for the purpose of erecting the magnified picture.

The erector commonly applied to the compound microscope consists of a pair of lenses acting like the erecting eye-piece of the telescope. But this, though it is convenient for the purpose of dissection, very much impairs the optical performance of the instrument.

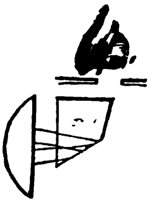
For drawing the images presented by the microscope the best apparatus consists of a mirror M (*fig.* 23), composed of a thin piece of rather dark-coloured glass cemented on to a piece of plate-glass inclined at an angle of 45° in front of the eye-glass E. The light escaping from the eye-glass is assisted in its reflection upwards to the eye by the dark glass, which effects the further useful purpose of rendering the paper less brilliant, and thus enabling the eye better to see the reflected image. The lens L below the reflector is to cause the light from the paper and pencil to diverge from the same distance as that received from the eye-glass; in other words, to cause it to reach the eye in parallel lines.

Fig. 23.



Dr. Wollaston's Camera Lucida, as shown in *fig.* 24, is sometimes attached to the eye-piece of the microscope for the same purpose. In this instrument the rays suffer two internal reflexions within the glass prism, as will be seen explained in the article CAMERA LUCIDA. In this minute figure we have omitted to trace the reflected rays, merely to avoid confusion.

Fig. 24



Annexed are four engravings of microscopic objects, the true character of which it is however impossible to give in wood, and is difficult indeed to accomplish by any description of engraving.

Fig. 25.

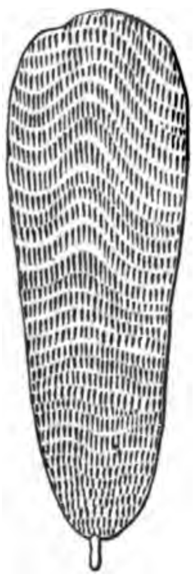


Fig. 26.

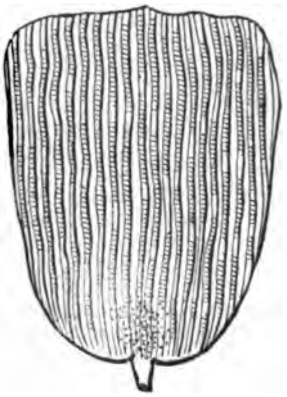
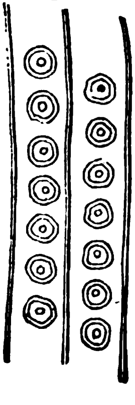


Fig. 27.

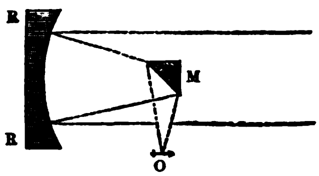
Fig. 25 shows a scale of the small insect called Podura Plumbea, the common Skiptail, magnified about five hundred times. To define the markings on this scale clearly is the highest test of a deep achromatic object-glass; and this drawing is given rather to explain what the observer should look for, than as a very correct representation. *Fig.* 26 is a scale or feather of the Menelaus Butterfly; *Fig.* 27 is the hair of a singular insect, the Dermestes; and *Fig.* 28 is a longitudinal cutting of fir, showing the circular glands on the vessels which distinguish coniferous woods. These latter objects may be seen by half-inch or quarter-inch achromatic glasses. Opaque objects are generally better exhibited by inch and two-inch glasses when a general view of them is required, and by higher powers when we wish to examine their minute structure. In the latter case the light must be obtained by condensing lenses instead of the metallic specula.

Fig. 28.



Although the reflecting microscope is now very little used, it may be expected that we should mention it. In this instrument, at *Fig.* 29, the object O is reflected by the inclined face of the mirror M, and the rays are again reflected and converged by the ellipsoidal reflector R R, which effects the same purpose as the object glass of the compound microscope. It forms an image which is not susceptible of the over-correction as to colour before described, and which therefore becomes coloured in passing through the eye-piece. This fact, and the loss of light by reflection, will probably always render the reflecting microscope inferior to the achromatic refracting.

Fig. 29.



The solar microscope has been so nearly superseded by the oxy-hydrogen, that a brief description of the latter must suffice, particularly as their optical principles are similar.

The primary object in both is to throw an intense light upon the object, which is sometimes done by mirrors, and sometimes by lenses. In *fig.* 30, L represents the cylinder of burning lime, R R the reflector, which concentrates the light upon the object O O; the rays from which, passing through the two plano-convex lenses, are brought to foci upon a screen placed at a great distance, and upon which is formed the magnified image.

Fig 30.

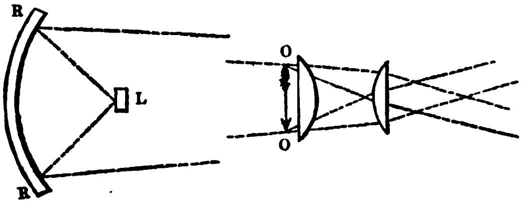
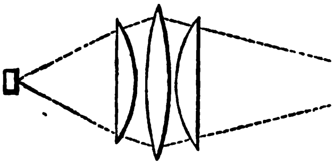


Fig. 31 shows a combination of lenses to condense the light upon the object. In either case the optical arrangements by which the image is formed admit of the same perfection as those which have been described for the compound microscopes. A few achromatic glasses for oxy-hydrogen microscopes have been made, and they will ultimately become valuable instruments for illustrating lectures on natural history and physiology. One made by Mr. Ross was exhibited a few months since at the Society of Arts to illustrate a lecture on the physiology of woods. It should be observed however that the oxy-hydrogen or solar microscope requires either a spherical screen, or that the objects should be mounted between spherical glasses, in order to bring the whole into focus at one time. This latter plan was adopted on the occasion just mentioned with perfect success.

Fig. 31.



MICROSCO'PIUM (the Microscope), a constellation of Lacaille, situated above Grus and Indus at the junction of Capricornus and Sagittarius. The only star in it worth notice is *α*, of the 4½ magnitude, (307) in the catalogue of Piazzi, and 2454 in that of the Astronomical Society.

MICRO'TUS, Schrank's name for a genus of Murine Rodents, embracing our English Water-rat, *Mus amphibius*, Linn., &c. [MURIDÆ.]

MICROZOA'RIA (literally, 'little animals'). This is the title employed by M. de Blainville for the Animalcula infusoria of earlier writers, who commonly classed these singular objects of microscopic research among the Zoophyta. Baker, Needham, Buffon, and Spallanzani, occupied with the singular facts and hypotheses regarding the origin and vitality of these animated points, gave little attention to their zoological relations; the works of Linnæus contain almost no notice of more than the larger Vorticellæ, Brachioni, and Volvoces, which are ranked among the Vermes Zoophyta. The great founder of all the classifications of the minute Infusoria, the first careful observer of their permanent characters of form, surface, movements, and internal structure, is the accurate O. F. Müller, author of the 'Zoologia Danica.' Considering that in 1786 (the date of his work) the microscope had been scarcely at all improved since the days of Hooke, the numerous figures which Müller presented were highly creditable to his eye and hand. They have been frequently copied (as in the 'Encyclopédie Méthodique'), and yet retain a high value.

Müller's classification, founded upon the figure and surface of the animal, is convenient to the observer who desires to name the active molecules which pass under his microscope, but unsatisfactory to the zoological student.

The genera are arranged in some degree according to their apparent simplicity.

A. Without external organs.

* Substance thick.

Monas. A mere point.
Proteus. Of variable figure.
Volvox. Spherical.
Enchelis. Cylindrical.
Vibrio. Round, elongated. (Several of the animals included in this group should have been ranked among the Vermes.)

* Membranaceous.

Cyclidium. Oval, complanate (generate by division).
Paramecium. Of an oblong figure (generate by division).
Kolpoda. Sinuate, complanate (generate by division).
Gonium. An angular mass.
Bursaria. Hollow like a purse.

B. With external organs.

* Naked.

Cercaria. With an extension like a tail. Some are said to have eyes.
Trichoda. Named for its hairiness (generate by division).
Kerona. With little horny protuberances.
Himantopus. With slender extensions or cirri.
Leucophra. Ciliated over all the surface (generate by division).
Vorticella. Ciliated about the mouth, contractile. The ciliæ have a whirling motion.

** Covered with a shell.

Brachionus. Ciliated nearly as Vorticella.

On this classification Lamarck (*Anim. sans Vertèbres*) has made few alterations; he preserves the same genera nearly in the same order in all the naked Infusoria, but rejects from those with external organs (Infusoires appendiculés) Vorticella and Brachionus (which he places among his Polypi), and re-arranges the others thus:

Infusoires appendiculés.

No tail { *Trichoda* (including Leucophra of Müller).
Kerona (including Himantopus of Müller).
A tail { *Cercaria.*
Furcocercaria.

The remaining groups are thus classed among the Polypi:

Polypi ciliati.

Section 1. Vibratiles with oral ciliæ, having vibratory movement.

Rattulus. (Trichoda rattus and T. clavus of Müller.)
Trichocerca. (Cercaria forcipata, &c., Müller.)
Vaginicola. Trichoda inquilina, &c., Müller.)

Section II. Rotiferæ, with oval ciliæ having rotatory movement.

Folliculina. (Vorticella ampulla, vaginata, &c., Müller.)
Brachionus. (Divided into sections, with or without a tail.)
Furcularia. (Includes the Vorticella rotatoria, or wheel-animal and others allied to it.)
Urceolaria. (Vorticella viridis, bursaria, &c., Müller.)
Vorticella. (The pedunculated species of Müller, both simple and compound.)
Tubicolaria.

Cuvier constitutes for the Infusoria his fifth and last class of zoophyta, observing however, what always struck the least informed zoologist, who contemplated the various forms and habits of these animals, that among them were several grades of organization, and some forms which could not be reconciled to zoophytic structure. Bory de St. Vincent had adopted (*Encyclop. Méthod.*, 1826) eighty-two genera, but Cuvier even reduces the number of Lamarckian genera.

Blainville (*Actinologie*, p. 162) gives the following arrangement of the Microzoaria.

Division I. Microzoaria Heteropoda.

Section 1. Rotiferæ. Body distinguished in parts anterior, medial, posterior (sometimes really showing head, thorax, abdomen), with anterior bundles of ciliæ, which in their rapid movement resemble wheels. Posterior appendices simple, terminal.

The genera are as in Lamarck, with indications of the subgenera adopted by Bory de St. Vincent.

Section 2. Ciliiferæ, with lateral ciliiform appendices. The genera are taken from Müller, viz. Kerona, Himantopus, Paramæcium, Trichoda, Leucophra, Volvox, Cyclidium, Monas, with indications of the subdivisions adopted by Bory de St. Vincent, &c.

Division II. Microzoaria apoda, with no external appendices, including Bursaria, Kolpoda, Trachelina (Vibrio, Müller), Proteus, Cercaria, Enchelis, Gonium. Many of these are thought by Blainville to be young Planariæ or Hirudines.

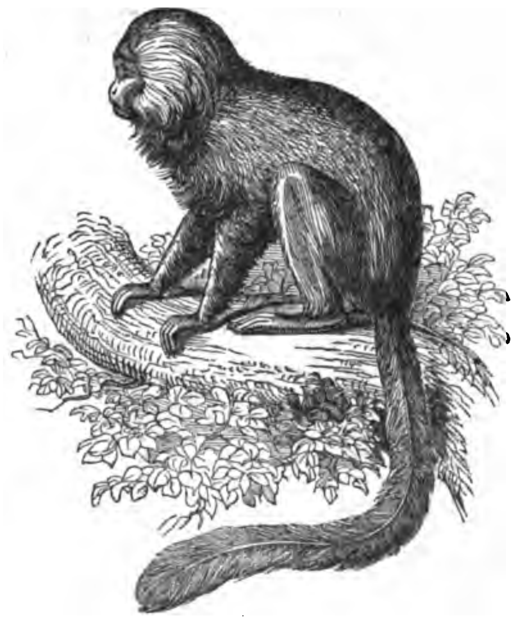
Nearly all the real information which accompanied these slight transformations of Müller's system of classification was derived from the numerous and acute observations of that eminent naturalist, whose figures and descriptions we have often compared with the indications of the microscope before this instrument received the marvellous improvements of Amici, Chevalier, Pritchard, Plösl, and Schiek. By their inventions, and the able use made of them since 1828, a new mine of knowledge has been opened on the history, structure, and zoological relations of the Infusoria. Professor Ehrenberg of Berlin has been highly successful in detecting unexpected points of structure even in the minutest animalculæ, and has in consequence proposed a new and remarkable classification, depending on a great variety of organizations, which he has discovered and already in a considerable degree made known. (*Organization der Infusionthierchen*, Berlin, 1830; *Ann. des Sciences Naturelles*, 1834; Taylor's *Scientific Memoirs*, 1837.)

The fundamental division proposed by Ehrenberg gives two distinct classes of Infusoria, viz. those which appear to have in their body a complicated digestive cavity, consisting of a great number of cells [POLYGASTRICA], and those which have a simple digestive sac, and wheel-organs about the mouth. [ROTATORIA.] To these articles the reader is referred for a full statement of Ehrenberg's latest classification.

MICRU'RA. [VIPERIDÆ.]

MI'CTYRIS. [PINNOTHERIANS.]

MIDAS (Zoology), M. Geoffroy's name for a subgenus of the small South American monkeys called *Ouistitis*. [JACCHUS.] The common name for the species of this subgenus is *Tamarin*.



Midas Rosalia.

Subgeneric Character.—Muzzle short, facial angle 60°, forehead with an appearance of prominence, arising from the great angle of the upper edge of the orbits. Upper incisors contiguous, under incisors same size as the upper. Nails like claws, excepting those on the thumbs behind; tail as in *Jacchus*. General dental formula as in *Jacchus*.

There are seven species, of which we select as the example *Midas Rosalia*, the *Marakina*, or *Silky Tamarin*.

Description.—This pretty little monkey is entirely of a golden yellow, varying to a redder tint, and palest on the back and thighs. The hair, which is fine and silky, is so long about the head and neck as to form a ruff or mane, whence it has been called the Lion-monkey. Its beauty and gentleness render it a very interesting pet; but great care is required to keep it from damp, which is destructive to it. It is supposed to live almost entirely on trees, and to be squirrel-like in its habits.

Locality.—Guyana, and the south of Brazil from Rio Janeiro to Cape Frio.

Desmarest notices a red and black variety (Guyana), and one of a bright shining red from Brazil.

N.B. This must not be confounded with *Midas Leonina*, *Simia leonina*, Humb., the *Leoncito*, or *Leonine Tamarin*, which is probably the smallest monkey known. The last is brownish, and has a very well developed mane of that colour, which it bristles up when angry, so as to look like a little lion. The face is black, the mouth white, and the tail black above and white below. It inhabits the plains bordering the eastern slope of the Cordillera, and is rare.

MIDAS'S EAR. [Auricula.]

MIDDELBURG. [Zeeland.]

MIDDLE LATITUDE (Navigation), the mean of two latitudes. It is the distinctive name of a method called in navigation middle latitude sailing, which means, that in estimating the difference of longitude by means of the differences of latitude and the intermediate departure, this departure is supposed to be an arc of a parallel of longitude at the intermediate or middle latitude. (Riddle's *Navigation*, in which a table may be found corrective of the results.)

MIDDLE VOICE is a term employed in Greek grammar to indicate a class of verbs which are called reflective in some other languages. The reflective meaning is supposed to be the original and main signification of the middle voice, but it is difficult in many of the middle verbs in Greek to trace the reflective notion. Although a separate voice, that is, a distinct mode of conjugation has been assigned to verbs with a middle signification, there are only two tenses in the Greek verb which have a form peculiar to the middle notion, namely, the first and second aorists in *σαμην* and *ομην*; which, in the model verb, are *ἐτυψάμην* and *ἐτυπόμην*. There are four tenses peculiar to the passive signification, namely, the two futures in *θησομαι* and *ησομαι*, and the two aorists in *θην* and *ην* (*τυφ-θήσομαι*, *τυπ-ήσομαι*, *ἐτύφ-θην*, *ἐτύπ-ην*). The future in *σομαι* (*τύπ-σομαι*, *λέγ-σομαι*), which is called in most grammars the future middle, has a passive signification, as well as a middle. (Monk on Eurip., *Hippol.*, l.1458; *Quarterly Journal of Education*, vol. iv., p. 158.) The following table will make the matter clearer:—

Tenses common to the passive and middle significations.

Present	*τύπτομαι.*	Perfect	*τέτυμμαι.*
Imperfect	*ἐτυπτόμην.*	Past Perfect	*ἐτετύμμην.*
Future	*τύψομαι.*	Future Perfect	*τετύψομαι.*

Tenses peculiar to the middle signification.

1st Aorist	*ἐτυψάμην.*	2nd Aorist	*ἐτυπόμην.*

Tenses peculiar to the passive signification.

1st Aorist	*ἐτύφθην.*	2nd Aorist	*ἐτύπην.*
1st Future	*τυφθήσομαι.*	2nd Future	*τυπήσομαι.*

Since then so many tenses in the Greek verb have the same form both for the middle and passive signification, it becomes an interesting object of inquiry, whether we should assign the priority to the passive or middle notion? This question has usually been answered by grammarians in favour of the passive; but the comparison of other languages etymologically connected with the Greek, would lead us to a contrary supposition. Very few of the Indo-Germanic languages have a form peculiar to the passive signification; even in Sanskrit the passive verb is not considered by Hindu grammarians as a distinct voice, but is classed among the derivative verbs. There are however two voices in the Sanskrit verb, answering to the Greek active and middle, which are called respectively *parasmaipadum* and *atmanêpadum*; the former answering to the active in Greek, and the latter having generally a reflective or medial but never a passive signification. The tenses of the passive verb are formed by prefixing the syllable *ya* to the person endings of the *atmanêpadum* conjugation. These person endings are evidently the same as those of the middle voice in Greek, as the following table of the present tense will show:—

	Sanskrit.	Greek.
Singular.	kship-ê	*τύπτ-ο, μαι.*
	kship-a, sê	*τύπτ-ε, σαι* (afterwards *τύπτ-εαι* = *τύπτ-ῃ*).
	kship-a, tê	*τύπτ-ε, ται.*
Dual.	kship-â, vahê	*τυπτ-ό, μεθον*
	kship-ê thê	*τύπτ-ε, σθον.*
	kship-êtê	*τύπτ-ε, σθον.*
Plural.	kship-â, mahê	*τυπτ-ό, μεθα.*
	kship-a, dhê	*τύπτ-ε, σθε.*
	kship-a, ntê	*τύπτ-ο, νται.*

That the passive signification should in course of time have taken the place of the middle, will not appear surprising, when it is recollected that a reflective verb is actually used in many languages, where a passive is used in others to express the same thing. An instance occurs in such a phrase as *les bas se vendent ici*, stockings sell themselves here; and in the same manner in Italian we have such phrases as *si dicono molte cose*, many thing say themselves, or are said; *si loda l'uomo modesto*, a modest man praises himself, that is, is praised; *mi si domanda uno scudo*, a dollar demands itself of me, that is, is demanded of me. The same idiom occurs both in Spanish and Portuguese.

It has been the practice to deny to the Latin language the possession of a middle, except in the case of deponent verbs. But in such a phrase as *Rhenus Oceano miscetur*, the verb is rather of the middle than the passive character, and this certainly must be allowed when it is said of a soldier *induitur galeam*, or when a general *milites armari jubet*; or as in the line of Virgil (*Georg.*, iii. 219)—

Pascitur in magna sylva formosa juvenca.

The above explanation of the middle form or voice is one which has been proposed; still the matter may require further discussion. The truth is, that the classification of verbs into active and passive, or into active, passive, and middle, is a very imperfect one, and for the purposes of a philosophical exhibition of grammar a new classification is wanting. The expressions 'I walk,' 'I eat,' &c., are in signification allied to the middle voice, though the form of these words does not differ from the form 'I kill,' 'I cut,' &c. In order to express the notion of the person 'I' being 'killed,' some modification of the primitive form 'kill' must be made, and another modification may be necessary to express the act of 'self-killing.' Thus in French we have *il tue*, *il fut tué*, and *il s'est tué*. In the last instance the act of 'self-killing' is distinguished from the act of 'being killed' by the addition of a word. In the Greek language the present tense of the passive form may be used to express either the act of the person being killed, or killing himself. In the first and second aorist tenses a peculiar form is used to express the act of self-killing; but as this peculiar form has the characteristic termination of what is called a passive verb, and not of an active, it might be classed under the passive voice as a peculiar tense, and the term middle voice might be got rid of altogether.

MIDDLESEX, the metropolitan county of England, is bounded on the north by Hertfordshire; on the east by Essex, from which it is separated by the river Lea; on the south-east by Kent, and on the south by Surrey, from both of which it is separated by the river Thames; and on the west by Buckinghamshire, from which it is separated by the river Colne. Its greatest length is, from north-east to south-west, from the Lea near Waltham Abbey to the Thames opposite Chertsey, 28 miles; its greatest breadth, at right angles to the length, is, from near South Mimms on the great north road to Limehouse, 17 miles. Its area is estimated at 282 square miles. The number of inhabitants in 1821 was 1,144,531; in 1831, 1,358,330; showing an increase in ten years of 213,799, or about 19 per cent., and giving 4817 inhabitants to a square mile. It is the smallest of all the English counties, except Rutland; in amount of population it is exceeded, and that only in a small degree, by Yorkshire alone; in density of population it very far exceeds any other English county. The courts of civil and criminal jurisdiction are held in London or Westminster, or at Clerkenwell, in the suburbs of London; but for parliamentary purposes Brentford, seven miles from Hyde-park Corner on the great western road, is the county town.

Surface; Geological Character.—The surface of the county consists for the most part of gentle undulations, affording a sufficient slope for the purposes of drainage. A range of hills extends along the northern or Hertfordshire border by Barnet, Elstree, Stanmore, and Pinner, averaging 400 feet in height above the level of the Thames. Another range of hills skirts the northern side of the metropolis by Hornsey, Highgate, and Hampstead; Harrow occupies an insulated eminence between these two ranges. That portion of the county which lies south-west of a line drawn from Brentford to Uxbridge is an almost unbroken flat, scarcely rising more than from 10 to 20 feet above the level of the Thames.

The county is chiefly occupied by the London clay. Enfield Chace, the most northern portion, and a strip along the western boundary by Harefield and Uxbridge, are occupied by the plastic clay, which here crops out. The high ground about Hampstead, Highgate, and Hornsey consists of Bagshot sand, a marine formation of unascertained depth covering the London clay. The thickness of the London clay is very variable. At Bromley near the Lea, in the south-east corner of the county, it was found to be only 44 feet (covered with 18 feet of alluvium), while at White's Club-house, St. James's, London, it was 235 feet. The thickness of the plastic clay in this county appears to be from 100 to 120 feet.

The county belongs entirely to the basin of the Thames, which forms its southern boundary. The Thames first touches the border just above Staines, at the junction of one of the arms of the Colne, and flows about six or seven miles to the southernmost point of the county near Shepperton, where (on the Surrey side) it receives the Wey. From the junction of the Wey it flows in a circuitous channel eastward 8 miles to Thames Ditton, above Kingston, and from thence 9 miles in a winding channel northward to Kew Bridge, just below Brentford. From Kew Bridge the Thames flows eastward 20 miles, with many bends, to the junction of the Lea, just above which it makes a circuit, nearly encompassing a marshy peninsula at the south-eastern angle of the county, called the Isle of Dogs. This river is crossed by several bridges: at Staines and Chertsey (both of stone), Walton (brick and stone), Hampton Court (wood), Kingston, Richmond, and Kew (all of stone), Hammersmith (a suspension bridge), and Putney and Chelsea (wood). There are six bridges in the metropolis: Vauxhall (an iron bridge), Westminster, Waterloo, and Blackfriars (all of stone), Southwark (an iron bridge), and London, the lowest on the river, a stone bridge. Between Rotherhithe and Wapping, about a mile and a half below London Bridge, a tunnel is in progress under the bed of the river. It has a double-arched roadway, with footpaths. The entrance at each end is to be by an inclined plane for carriages and horses, and a flight of steps for foot passengers. The river is navigable throughout for laden barges; but locks are required in the upper part to keep up the water. The lowest of these locks is at Teddington, between Kingston and Richmond bridges. Up to London Bridge the Thames is navigable for sea-borne vessels, and the space between that bridge and the junction of the Lea forms the port of London. [LONDON.] The banks of the Thames are for the most part low and flat, and in some places marshy. The Isle of Dogs would be overflowed every tide, if it were not protected by embankments.

The Lea forms the eastern boundary of the county, which it touches below Waltham Abbey. Its waters are, at the point of junction, divided between two or three channels, which reunite very soon after. Its course is southward through a belt of low marsh-land, 8 miles to the foot of Stamford Hill. In this part there is a navigable cut, distinct from the natural bed of the river, extending from Stewardstone below Waltham Abbey to the neighbourhood of Tottenham. The natural channel is in several parts divided so as to insulate portions of the marsh. From Stamford Hill the Lea flows south-east 6 miles by Lea Bridge, Old Ford, Bow, and Bromley, into the Thames. Below Lea Bridge it is divided into several channels, which reunite a little above the outfal. In one part (namely, between Lea Bridge and Old Ford) the navigation is carried on by an artificial channel. A navigable cut opens a communication between the Lea at Bromley and the Thames at Limehouse, avoiding the tedious circumnavigation of the Isle of Dogs. There are several mills on those channels of the Lea which are not used for navigation.

The Colne forms the western boundary of the county. It first touches the border below Rickmansworth, and its waters, like those of the Lea, frequently flow in several channels, which enclose a number of islands. It flows southward past or near Uxbridge, West Drayton, Harmondsworth, and Colnbrook (Bucks), to its junction with the Thames above Staines. Its whole length on the border of this county is about 18 miles: it is not navigable, but is useful in turning a number of mills. Two channels from this river near Colnbrook communicate, one with the Thames at Hampton Court, the other with the Cran near the powder-mills at Hounslow; a third stream from a little above Staines flows into the Thames between Shepperton and Sunbury.

The Brent rises just within the northern border of the county, and, after crossing a corner of Hertfordshire north of Totteridge, flows by Finchley, Brent-street in Hendon, Kingsbury, Twyford, Hanwell, and Brentford, into the Thames. Its course, which is very circuitous, is about 18 or 20 miles: it is not navigable, except in some part of its lower course, where it forms part of the line of the Grand Junction Canal. The Cran rises between Harrow and Pinner, and after a very circuitous course of 19 or 20 miles past or near Ickenham, Cranford, and the powder-mills at Hounslow, joins the Thames at Isleworth.

The principal canal is the Grand Junction, which enters the county near Harefield, in the north-west corner, and runs southward along the valley of the Colne by Uxbridge to West Drayton; from this place it runs eastward across the Cran to the Brent near Hanwell: it then follows the valley of the Brent, and for the most part coincides with the channel of that river, till it joins the Thames near Brentford. About 18 miles of its course are in this county. A branch from this canal near Cranford runs north-east to Northolt, and from thence east-south-east by Twyford to Paddington, a distance of 12 or 14 miles. The main line and the Paddington branch have an average width of 43 feet, and a depth of 5 feet. There is only one lock between the wharf at Paddington and Uxbridge.

The Regent's Canal commences in the Paddington branch of the Grand Junction Canal, and passes along the north and east sides of the metropolis by the Regent's Park, Camden Town, Islington, Kingsland, Hackney, Mile End, and the Commercial Road, into the Thames near Limehouse. Its length is 8¼ miles, with a fall of 90 feet: it has twelve locks exclusive of the tide-lock. It passes under Islington and the New River by a tunnel, and has one or two short branch cuts or basins in its course, one of which (Sir Geo. Duckett's canal) communicates with the Lea near Old Ford.

The New River, an artificial cut designed to supply the metropolis with water, enters the county on the north side between Enfield and Cheshunt, and is conveyed in a very winding channel to a reservoir at Pentonville, on the north side of London. [MIDDLETON, SIR HUGH.]

The south-western road (to Salisbury, Exeter, &c.) leaves London by Hyde-park Corner, and runs by Hammersmith, Brentford, Hounslow, and Bedfont, to Staines, where it crosses the Thames into Surrey. The Portsmouth road, branching from this near Hyde-park Corner, crosses the Thames at Putney Bridge; and the western (Bath and Bristol) road, branching from it at Hounslow, crosses the Colne at Colnbrook. The Oxford and Birmingham road leaves the metropolis at Tyburn turnpike, and passes through Shepherds' Bush, Acton, Hanwell, Southall, and Uxbridge, beyond which it crosses the Colne into Buckinghamshire. The great north road (to Derby, Leeds, Manchester, &c.) leaves London by Islington, and passes through Highgate, Fryern and Chipping Barnet, to South Mimms, where it branches off, one branch passing by St. Alban's, the other (the York road) passing by Hatfield. Another York road leaves London by Shoreditch church, and passes through Kingsland, Tottenham, Edmonton, and Enfield. Of the Norfolk and Suffolk roads, one leaves London by Shoreditch church, passing through Hackney, and crossing the Lea at Lea Bridge into Essex; another leaves by Whitechapel church, and crosses by Bow Bridge into Essex. These are the most important roads; but there are others well frequented. One (the Edgware road) leads from Tyburn turnpike by Paddington and Edgware into

Hertfordshire, joining the north road at St. Albans; another passes by Harrow and Pinner to Rickmansworth; and a third, called 'the Green Lanes,' leads by Stoke Newington and Winchmore Hill to Enfield.

The Birmingham Railway has its London terminus at Euston Grove, on the north side of the metropolis, and runs past Harrow to Watford in Hertfordshire; and the Great Western Railway has its London terminus at Paddington, and runs by Acton, Ealing, Hanwell, and Southall, to Maidenhead. The Eastern Counties Railroad commences at Mile End and runs by Bow and Stratford across the Lea into Essex: it is to communicate with Norwich and Yarmouth. There is another railway in progress, called the Northern and Eastern Railway, which also commences at Whitechapel, and is intended to communicate with Cambridge. Acts have been obtained for the Commercial Railway, to run from the eastern side of London to Blackwall; and for the Bristol, Birmingham, and Thames Junction Railway.

Agriculture.—The soil of this county is of three distinct qualities: poor sand and gravel on the tops of some of the hills and in various spots in the plain; a heavy poor clay in the north and north-west portion, which is chiefly covered with permanent grass, enriched by repeated application of manure; and a good fertile loam over a bed of gravel, and sometimes of peat, along the plain in which the Thames flows. To these must be added some rich deposits from the Thames, of a lighter and more muddy nature, which are admirably adapted for garden ground, and have been almost entirely converted into a rich black vegetable mould, by an abundant application of dung, from time immemorial.

The surface, with the exception of a few hills on the northern side of London, none of which rise more than 400 feet above the Thames, may be described as a plain, almost perfectly level as it approaches the Thames, but with a sufficient fall for the waters to prevent any of it being marshy. The Thames has been long kept within its present channel by artificial embankments, wherever these were necessary. But it is evident that, in times beyond memory, it frequently changed its bed, which accounts for the irregular deposition of gravel in various places, and the uniform covering of loam which is found above it.

Nearly the whole of the county lies over the blue clay, which is known by the name of the London clay: and the hills which rise above it are formed of a basis of clay covered by a poor ferruginous sand and gravel. In various places the clay appears near the surface at a level considerably above the loamy deposit mentioned above.

The stiff clay is altogether unfit for arable cultivation, until its nature is altered and corrected by the addition of chalk, lime, and ashes; most of it therefore remains undisturbed by the plough. When the commons, which are now mostly enclosed, remained open, the grass was poor and of little value; but that part which has been long enclosed has a coat of rich mould over it, caused by the annual application of dung to produce a sufficient crop of grass to make hay of, and its fertility is so much increased as to afford two good crops every year. Hay-making is nowhere better understood than in Middlesex. The value of hay so near the metropolis, and the abundant supply of labourers, enable the occupiers of grass-land to take advantage of a few days of fine weather to secure their hay. The mode of proceeding, as it is given in the Report of the Agriculture of Middlesex, by Middleton, has generally been held out as a pattern to all farmers. It is no doubt excellent where labourers are plentiful, but would be attended with some risk where the number is limited, and the extent of grass to be mown is considerable. The principle is, to expose the grass as much as possible to the sun and wind by keeping it constantly shaken up and moved, which is much facilitated by the use of the hay-making machine. It may thus be carried in a very few days, and stacked in a dry state; and when it is cut out, it appears of a fine green colour, not much changed by heating. The hay-ricks are generally large and neatly finished, the sides being pulled and trimmed smooth, and the top well thatched with straw. When the old hay is carried to market, it is tied up in neat trusses weighing 56 lbs. each, and 36 such trusses make a load. The trusses of new hay are made of 60 lbs. weight. It is called old when it has been in the rick three months. Some enclosures of pasture-land are made profitable by taking in horses to graze when they require rest and green food after having been overworked; but for this purpose the marsh pastures bordering on Essex along the Thames are preferred. There the soil is naturally rich, and requires little manure to recruit it.

The arable portion of the county lies chiefly towards Buckinghamshire, and between the Great Western Railway and the Thames. Some extremely good loams of considerable depth on a bed of flinty gravel, well adapted to every kind of agricultural produce, occur in several places. The lighter portions are mostly laid out in orchards, market-gardens, and nursery-grounds. Almost the whole of the land in the parishes of Chelsea, Hammersmith, Chiswick, Isleworth, and Brentford is taken up by such gardens. Here the spade is the principal instrument of cultivation. [GARDEN HUSBANDRY.]

Beyond Hounslow, including what was formerly Hounslow Heath, the land is cultivated more extensively, by farmers properly so called; and some of these occupy from 200 to 1500 acres. Here every improvement in the management of the soil is readily adopted; the best implements are in use: and it only requires a view of the fields along the two great branches of the western road to perceive that the land is kept clean and that the crops are good. The system is greatly modified by the short distance from an inexhaustible source of manure. It is not necessary to keep many head of cattle or great flocks of sheep to produce manure for the land. A smaller portion of the farm is devoted to raise food for cattle. Roots are disposed of to cowkeepers in London; but the expense of carriage is a great drawback to the profit. The produce is generally conveyed in waggons with four horses, or in tumbrils with two or three. A man and a boy are required in either case. Light single-horse carts, such as are used in Scotland, would be more economical, if one man could take charge of several carts, as is usually done there, and also in France; but the great traffic on the roads near London renders this very dangerous, and the law prohibits it. Every waggon with four horses, a man, and a boy, costs the proprietor from 1*l.* to 1*l.* 5*s.* for every working day. If half of this be placed to the account of the load taken to London, and the other half to that of the manure brought back, it will appear that, however convenient it may be to be able to procure manure at any time, and in any quantity, it is not so cheaply obtained as might appear at first sight. The number of horses required for a Middlesex farmer is much greater than where the land lies at a greater distance from any large town. The stable-dung is brought in a very fresh and loose state; it is put together in large heaps, where it heats very soon, and is then turned over, and sometimes covered with earth or sods. By the time it is carried upon the land it will have cost the farmer not much less than 1*l.* per waggon-load of three tons. Upon the lighter loams, which are improved by the treading of sheep, it is probably more advantageous to raise turnips, and fold the sheep on them, than to sell the turnips and buy town manure.

The course of crops on the farms in Middlesex is not so regular as in many other counties; but the alternation of white and green crops is very generally adopted. Naked fallows are almost entirely disused, even on the heavier soils. The land is kept clean by tares cut green, peas gathered in the pod, beans, and similar crops, which allow of ploughing and cleansing the land in summer, and sowing roots afterwards. The crops are usually drilled and well hoed: the principal are barley, clover, wheat, beans, oats—often in this order. Turnips and mangel-wurzel are not so extensively cultivated as they are where manure must be made on the farm. A succession of tares, to cut green for the horses, is indispensable; some of these are occasionally taken to London early in the season, and sell well in small quantities, tied up in bundles. Potatoes are not planted to so great an extent as might be supposed, considering the great consumption of this root in London: the reason is, that the market is fully supplied by cargoes which come by sea from Scotland, Yorkshire, Devonshire, and Jersey, where labour is cheaper and the land does not pay so high a rent. Potatoes consume much manure, whatever may have been pretended by some; and the corn which comes after them is generally weaker and less productive. When the rent of good land in Middlesex is taken into consideration, the carriage of manure, and the bulk of the crop to be carried to market by land, it will be found that, however valuable may be the produce of an acre of potatoes well cultivated, the expense is so great that the net return is little more than that of wheat, beans, or clover. It is very seldom that potatoes are planted as a substitute for the old fallow. Beans or peas in wide rows, and carefully hoed, are much preferable. Cole or rape is frequently sown on stiff loams, instead of turnips, and fed off with sheep. If the rape is drilled and hoed, it will clean the land, and forms an excellent preparation for wheat. It should have plenty of manure, which will be decomposed and well mixed with the soil when the wheat is sown. Thus the latter crop cannot fail to be good.

The grass-land is everywhere well managed. The surface is kept intersected with water-furrows wherever the soil is impervious to water, so that it never stagnates in winter. The grass is generally cut twice in the season, and made into hay; but the land is well manured, generally after the first mowing, about the middle of June. The Midsummer rains wash it in, and the aftermath is much increased by it. Two tons of hay at the first mowing, and one ton at the second, may be considered as the average produce of a statute acre. The rent of grass-land about ten miles from London, including rates and tithe, averages from 4*l.* to 6*l.* per acre. Nearer London grass-land lets very high for milch cows, and likewise for pleasure horses to graze in. But the rapid increase of buildings has converted so many fields into streets, or broken up the surface for the sake of the brick-earth, that the green meadows are every year farther from the centre of the metropolis.

Every breed of animal is to be met with in Middlesex. Horses and milch cows are the most common, as the most useful. The cart-horses are generally fine and strong. Some large horses, a little too heavy for a carriage and too slow for stage-coaches, but which make excellent cart-horses, are brought to London in large quantities by dealers, who collect them in the northern and midland counties. The dairy cows are chiefly of the large Holderness breed or the short-horn. Ayrshire cows have been tried, and, as far as milk goes, they are fully equal to the other breeds, taking the quantity of food consumed by each into consideration; but they do not yield such heavy carcasses to the butcher when fatted off. The most approved system of London dairymen is to let a cow be milked till she goes dry, and never allow her to go to the bull. By very high feeding she will increase in flesh while she gives milk, and by the time she is dry will be very fat. Private families in the neighbourhood of London, who have grass-land, have a predilection for the small Alderney cows, which give a small quantity of extremely rich milk. They are very quiet animals, and may be tethered or led about to graze in a halter. On good pasture they are very profitable. Alderney dairies have been established; but most of them have no title to that name, the large cows having soon superseded the smaller.

The price of labour in Middlesex is not so high, when compared with that of the adjoining counties, as might be expected. Very near London market-gardeners pay their labourers from 15*s.* to 1*l.* per week for day-labour; but as much as possible is done by the task. Digging and trenching are done by the square perch, the price varying according to the soil and the depth of the work. A good workman will earn 3*s.* 6*d.* or more in a day, but for this he must work hard. A mower has from 3*s.* to 6*s.* per acre for mowing grass, 2*s.* 6*d.* to 3*s.* 6*d.* for clover, and the same for oats or barley; tares and peas are hooked at from 3*s.* to 5*s.* per acre; wheat and rye are *fagged*, that is, cut close to the ground with a large reaping-hook, for 10*s.* to 18*s.* per acre, as the crop may be more or less heavy; beans for 6*s.* to 9*s.*; thrashing wheat costs 4*s.* to 5*s.* per quarter, and 1*s.* per load for tying up the straw; oats are thrashed for 2*s.* or 2*s.* 6*d.*; beans and pease, 1*s.* 6*d.* to 2*s.*; hay is cut, trussed, and every truss weighed, for 2*s.* 6*d.* to 3*s.* the load of thirty-six trusses; turnips hoed, first time, 6*s.* or 7*s.*; second time, 5*s.* Women making hay, and gathering peas or fruit, earn about 1*s.* per day.

These were the prices about thirty years ago; they had increased with the price of corn and meat, but have again fallen. At this moment they are rather on the increase; yet the above prices may be relied upon as fair averages in a circle of twenty-five miles round London. The principal weekly markets in Middlesex, out of London, are Barnet, every Monday; Southall and Finchley, on Wednesday; Uxbridge, Brentford, Hounslow, and Edgware, on Thursday; Staines, on Friday; and Enfield, on Saturday. Uxbridge is a great corn-market; Southall chiefly for cattle and sheep: those which remain unsold are sent to Smithfield on the Friday. Staines is also a good corn-market.

There are fairs at Brentford, May 17, 18, 19, and Sept. 12, 13, 14; Enfield, Sept. 23, Nov. 30; Hounslow, Trinity Monday, and Monday after Sept. 29; Staines, May 11. Uxbridge, July 31, Sept. 29, Oct. 19; Barnet fairs, April 8, and September 4, are noted for young cattle of every description.

Divisions, Towns, &c.—Middlesex is divided into six hundreds, as follows:—

	Acres.	Pop. in 1831.
Edmonton, N.E. .	31,410	26,930
Gore, N. .	28,660	11,315
Elthorne, N.W. .	35,690	20,091
Isleworth, S.W. .	9,280	13,568
Spelthorne, S.W. .	23,500	15,212
Ossulston, S.E., including		
Finsbury division .	11,934	151,409
Holborn „ .	7,808	346,255
Kensington „ .	19,220	87,961
Tower „ .	8,988	359,864
London city . .	600	123,683
Westminster city .	2,500	201,842
Militia . . .		200
	179,590	1,358,330

The cities of London and Westminster are locally in Ossulston hundred. The suburbs of London form the newly constituted parliamentary boroughs of Marylebone, Finsbury, and the Tower Hamlets.

There are four market-towns, Barnet, Brentford, Staines, and Uxbridge; besides Edgware, Enfield, and Hounslow, the markets of which have been discontinued; and a number of other places, which, though not ranking higher than villages, derive, from their proximity to the metropolis, sufficient interest and importance to require notice. [Barnet; Brentford; Chelsea; London.]

Staines is in Spelthorne hundred, 16¼ miles from Hyde-park Corner, on the road to Salisbury and Exeter. The parish contains an area of 1710 acres, with a population of 2486. The principal street extends half a mile along the road, and leads to the Thames. Many of the houses in the main street are good. A new stone bridge has been built over the river. The church is a neat modern structure, with a square embattled tower, and there are some dissenting places of worship. The market-house is a small building near the bridge. The market is on Friday, and there are two yearly fairs. There are several flour-mills near the town. The living is a vicarage united with the chapelries of Laleham and Ashford, of the joint annual value of 425*l.*, with a glebe-house. There were, in 1833, one infant-school, with 90 children; a school of industry for 26 girls, a Lancasterian school with 80 boys, and a national school with 40; one other day-school with 30 boys, three boarding-schools with 86 children, and three Sunday-schools, with 193 children of both sexes. There is also a Literary and Scientific Institution.

Uxbridge is in the parish of Hillingdon, in Elthorne hundred, about fifteen miles from Tyburn turnpike, on the Oxford road. It was formerly a place of strength, and a corporate town, and in the civil war of Charles I. was the scene of an unavailing negotiation for peace between the commissioners of the king and those of the parliament. The mansion in which the conferences were held is still standing. The area of Hillingdon parish is 4720 acres; the inhabitants, in 1831, amounted to 6885, of whom 3043 were in the chapelry of Uxbridge. The town consists of one principal street, about a mile in length, along the Oxford road, and two or three smaller ones. There are in the principal street two bridges over the arms of the river Colne, and one over the Grand Junction Canal. There are a commodious market-house of brick, supported on wooden columns; a chapel behind the market-house, built of flint and brick, and destitute of architectural beauty, capable of holding 800 persons; and several dissenting meeting-houses. The market, which is on Thursday, is one of the most important corn-markets in the kingdom. A second market, for provisions, is held on Saturday, and there are several yearly fairs. There are warehouses and wharfs on the Grand Junction Canal, and there are many flour-mills. Considerable business is done in the town, and brick-making is largely carried on in the neighbourhood.

The perpetual curacy of Uxbridge is of the clear yearly value of 111*l.*, with a glebe-house. There were, in 1833, a Lancasterian school, with 187 boys; a school of industry, with 107 girls; three other day-schools, with 114 children, three boarding and day schools, with 87 children; and three Sunday-schools, with 515 children.

Edgware is in Gore hundred, 8 miles from Tyburn turnpike, on the road to Watford and Aylesbury. The parish has an area of 1990 acres, with a population, in 1831, of 591. The place has one long straggling street, but contains some respectable houses. The church is of brick, and was built about the middle of the last century; the tower, more antient, is of flint and stone. The market, which was formerly held on Thursday, has been discontinued for many years. The west side of the main street is in the parish of Stanmore Parva, or Whitchurch. Near this place is Canons, a neat villa, erected on the site and from the materials of a stately mansion built by the duke of Chandos, whose tasteless vanity, as displayed in this establishment, was bitterly satirised by Pope in his 'Moral Essays' (Ep. iv). The church of Stanmore Parva, close to the park of Canons, was decorated by the duke. Little Stanmore has an area of 1420 acres, with a population, in 1831, of 876. The living of Edgware is a vicarage, of the clear yearly value of 493*l.*, with a glebe-house; that of Stanmore Parva is a perpetual curacy, of the clear yearly value of 267*l.*, with a glebe-house. The two parishes had, in 1833, one infant or dame school, with 41 children; eight day-schools (one endowed), with 152 children; and two Sunday-schools, with 91 children.

Enfield is in Edmonton hundred; that part which is called Enfield Highway is 9¼ miles from Shoreditch Church, on the York and Edinburgh road. Enfield manor-house was the residence of Elizabeth (afterwards queen) for a short time, during the reign of her brother Edward VI.; and she resided at Enfield, at the manor-house or at Elsynge-hall, at several periods during her reign. Of the manor-house one room on the ground-floor remains as in the queen's time. Elsynge-hall has disappeared, and its exact site is not known. The parish of Enfield has an area of 12,460 acres, with a population, in 1831, of 8812, about one-third agricultural. The houses constitute two principal groups; and many of them are well built. The church is an antient structure, comprehending chancel, nave, and two aisles, with a low embattled tower. There are a chapel-of-ease, lately erected, and several dissenting places of worship. Edward I. granted a charter for a market on Monday, and James I. for one on Saturday; but they have long fallen into disuse. There are two yearly fairs. There are in the parish a royal manufactory for fire-arms (partly carried on here and partly at Waltham Abbey), a manufactory for finishing crape, and two or three other trading establishments. The Lea navigation and the New River pass by or through this parish. Petty sessions and a Court of Requests are held here. The living of Enfield is a vicarage, of the clear yearly value of 1174*l.*, with a glebe-house. There were in the parish, in 1833, two infant schools, with 145 children; a school of industry, with 45 girls; seven other day-schools, with 181 children; five boarding and day schools, with 152 children; and four Sunday-schools, with 635 children.

Enfield Chase, formerly a large chase or park north-west of the town, extending into several parishes, is now entirely enclosed.

Hounslow is in the two parishes of Isleworth and Heston, in Isleworth hundred, but chiefly in Heston. The area of the two parishes is 6840 acres; the population, in 1831, was 8997. The town, which is 10 miles from Hyde-park Corner, is at the point where the Bath and Bristol road branches off from that to Exeter and Salisbury, and consists of a long street on the Exeter road, irregularly paved, and lighted with gas. Hounslow had an antient priory of the order of the Holy Trinity, which at its suppression, A.D. 1530, had a revenue of 80*l.* 15*s.* gross, or 74*l.* 8*s.* clear. The conventual chapel, long used as a chapel-of-ease, was taken down a few years since, and has been replaced by a new church, capable of seating above 1000 persons. The market, formerly held on Thursday, has been discontinued for some years. The chief business of the town has of late years arisen from its situation on a great thoroughfare, but this business is nearly destroyed since the opening of the Great Western Railway. There are some powder-mills and a flax-dressing-mill near the town. Adjoining to the town, on the west, was formerly an extensive heath, notorious for highway robberies. On this heath the army of James II. encamped before the Revolution. There are large cavalry barracks and an exercise-ground on what was formerly the heath. The remainder is now enclosed. The living of Hounslow is a perpetual curacy, of the clear yearly value of 125*l.* There were in Heston parish, in 1833, two infant schools, with about 321 children; three day-schools, with about 108 children; one boarding-school, with 19 boys; and one Sunday-school, with 70 children.

Tottenham is in Edmonton hundred, about 4 miles from Shoreditch church, on the York road. The parish, which is divided into four wards, has an area of 4680 acres, with a population, in 1831, of 6937. The main street is formed of good houses irregularly ranged along the road. In this street is a brick cross, erected A.D. 1600, in place of a former wooden one. The church is on a small eminence a short distance west of the village, and is an antient building, with a square embattled tower covered with ivy. The font is of great antiquity, and there are many monuments. A new church of considerable size has been built on Tottenham Green, and there are several dissenting meeting-houses. Bruce Castle (now occupied as a school) is a brick mansion, rebuilt in the latter part of the seventeenth century. A detached brick tower, which covers a deep well, is the only remain of the previous edifice, which was built by the Comptons early in the sixteenth century. The edifice takes its name from a castellated mansion, the residence of Robert Bruce the elder, father of the king of Scotland of that name, which antiently occupied the site. The river Lea forms the eastern boundary of the parish. There are extensive flour and oil mills. The living of Tottenham is a vicarage, of the clear yearly value of 978*l.*, with a glebe-house. The chapelry attached to the new church is of the clear yearly value of 309*l.*, and is in the gift of the vicar. There were, in 1833, two infant schools, with 85 children; an endowed free grammar-school with 80 boys; a 'blue-coat' school, with 60 girls, and a 'green-coat' school, with 40; two Lancasterian schools, with 283 children; a Catholic school, with 65 children; and several private day and boarding schools. There were also four Sunday-schools, with about 450 or 460 children.

Edmonton is on the York road, 7 miles from Shoreditch church, between Tottenham and Enfield. The parish has an area of 7480 acres, and is divided into four wards or 'streets,' beside an allotment of Enfield Chase assigned to this parish. The population, in 1831, was 8192. The village of Edmonton consists of two principal groups of houses, called Fore Street, or Upper Edmonton, and Church Street, or Lower Edmonton, extending along the north road for more than a mile, and consisting of some respectable ranges of houses, with detached mansions and villas. Southgate, a detached village west of Edmonton, is in 'South Street,' one of the four wards, and contains many residences of a superior description: among them is Minchenden House, belonging to the duke of Buckingham.

The parish church is for the most part of modern date, but the tower and some other portions are of greater antiquity; there are some antient monuments. There are chapels at Southgate and on Winchmore Hill, and several dissenting places of worship. The living of Edmonton is a vicarage, of the clear yearly value of 1550*l.*, with a glebe-house. The chapelries of Southgate and St. Paul, Winchmore Hill, are of the clear yearly value of 180*l.* and 100*l.* respectively, and are in the gift of the vicar of Edmonton. There were in the parish, in 1833, an endowed day-school, with 106 children, 60 of whom were clothed; another endowed day-school, with 72 girls; three day-schools, partly or wholly supported by charitable contributions, containing 233 children; eight other day-schools, with 117 children; ten boarding-schools, with 460 children; two day and Sunday schools, with 253 children; and one Sunday-school, with 184 children. Wyer House, in the parish of Edmonton, about a mile north-west of the village, is a fine old mansion-house built in the early part of the seventeenth century.

Harrow-on-the-Hill is in Gore hundred, 10 miles from Tyburn turnpike, on the road to Rickmansworth. The parish (including the hamlet of Harrow Weald and Green Hill) has an area of 9870 acres, with a population, in 1831, of 3861. The village is irregularly laid out. It derives its celebrity and chief support from its grammar-school, which was founded, under letters-patent of queen Elizabeth, by John Lyon, a wealthy yeoman of this parish, A.D. 1571. There are considerable estates which were left by J. Lyon for the support of the school and other charitable purposes. The school contained, in 1833, about 250 scholars ·

it is free to all boys of the parish of Harrow, but there are very few who take advantage of this opportunity; the scholars are chiefly the sons of the nobility and gentry. Many eminent men have been educated at Harrow: as Bruce, the Abyssinian traveller, Sir William Jones, Richard Brinsley Sheridan, the late Lord Byron, Dr. Parr, and many others. The parish church is a spacious structure on the summit of the hill: there are some small portions in the Norman style; and at the west end is a lofty tower, with a spire. The grammar-school is near the church. There are some dissenting meeting-houses; there are two chapels-of-ease, one at Pinner (which is considered as a distinct parish), and the other at Harrow Weald, a group of houses about two miles north of the village. The living of Harrow is a vicarage, of the clear yearly value of 627*l.*, with a glebe-house. The vicar has the right of presentation to the perpetual curacy of Pinner, which is ecclesiastically dependent on Harrow, and is of the yearly value of 100*l.* Harrow and Pinner are in the peculiar jurisdiction of the archbishop of Canterbury. There were in the parish, in 1833, three infant or dame schools, with 93 children; four day-schools, supported by subscription, with 197 children; two boarding-schools, with 76 children; and four Sunday-schools, with 409 children.

Twickenham is in Isleworth hundred, on the bank of the Thames, 10 miles from Hyde-park Corner. It has derived celebrity from its being the residence of Alexander Pope and several other eminent persons. The parish has an area of 2440 acres, with a population in 1831 of 4571. The village is irregularly laid out, but contains a number of genteel residences. The church is near the river, and is a plain brick structure, built in the early part of the last century, with an antient embattled tower. It contains monuments erected by Pope to the memory of his parents, and by bishop Warburton to Pope himself. There is a chapel-of-ease, erected A.D. 1720 or 1721, between Twickenham and Richmond, and one or two dissenting meeting-houses. Among the private residences are Strawberry Hill, and the house of Sir Wathen Waller, popularly termed 'Pope's Villa,' because it occupies the site of the poet's residence. Strawberry Hill was in great part erected by Horace Walpole, lord Orford, and is a medley of castellated and ecclesiastical Gothic architecture. There are powder and oil mills. The village is much frequented by visitors from London. The steam-boats which ply between London and Richmond frequently proceed up to 'Twickenham ait,' a small island in the river Thames, comprising a few acres chiefly laid out in pleasure-grounds. There is much garden-ground in the parish, the produce of which is sent up to the London market. The living is a vicarage of the clear yearly value of 717*l.*, with a glebe-house. There were in the parish, in 1833, an infant or dame school of 20 children; an endowed day-school with 166 children; three day-schools, partly supported by charitable contributions, containing 104 children; five other day-schools, with 154 children; and five boarding-schools, with 110 children.

Isleworth, adjoining Twickenham on the north side, is in Isleworth hundred, 8¼ miles from Hyde-park Corner. The parish has an area of 3120 acres, with a population of 5590. At Sion or Syon, in this parish, was formerly a monastery of Bridgetine priests and nuns, founded A.D. 1414 by Henry V., and originally settled at Twickenham. The yearly revenues of this house at the dissolution were 1944*l.* 11*s.* 8*d.* gross, or 1731*l.* 8*s.* 4*d.* clear. In the walls of this monastery after its desecration, Catherine Howard, queen of Henry VIII., was confined shortly before her execution. The site was granted by Edward VI. to the Protector Somerset, who commenced the present mansion of Sion House, which has received great additions and alterations from the dukes of Northumberland, the subsequent proprietors. This noble residence contains some valuable portraits. The village of Isleworth is on the bank of the Thames opposite to Kew Gardens, and consists of several substantial villas and residences, with others of less pretension. The church, on the bank of the Thames, is of brick, and was rebuilt A.D. 1705 or 1706; the tower, more antient, is of stone. There are some dissenting places of worship. The chief business of the parish is gardening; great quantities of raspberries and strawberries are grown for the London market. There are two flour-mills and a brewery. There are three ranges of almshouses in the parish. The living is a vicarage of the clear yearly value of 681*l.*, with a glebe-house. There were, in 1833, one infant-school, with from 50 to 70 children; an endowed school, with 150 children; a day and Sunday school, with 30 girls; and a Sunday-school, with 126 children; besides a large day-school in Hounslow (which is partly in this parish), supported partly by subscription.

Hampton is in Spelthorne hundred, about 15 miles from Hyde-park Corner. The parish, including the hamlet of Hampton Wick, has an area of 3190 acres, with a population in 1831 of 3992, of whom 1463 were in Hampton Wick. In this parish is the royal palace of Hampton Court, the site of which was once the possession of the Knights Hospitallers. On the suppression of the Order the fee of the manor was retained by the crown. Cardinal Wolsey took a lease of the manor from the prior of St. John's before the dissolution, which lease he surrendered to the king Henry VIII., who formed a royal park or chace, comprehending Hampton and several other parishes, which he enclosed and stocked with deer. This chace was in the succeeding reign broken up on the remonstrance of the aggrieved parishes, but the crown has since retained paramount authority over all game within its limits. While Wolsey held the lease of the manor he pulled down a mansion which stood here, and erected in its place a sumptuous palace, which Henry VIII. subsequently enlarged. Here Edward VI. was born, and his mother queen Jane Seymour died. This palace was the scene of the celebrated conference of 1603-4 between the Presbyterian clergy and the bishops and other Episcopal clergy, at which the king James I. was moderator, and the lords of the council were auditors. Charles I. resided here during part of his confinement, and Cromwell, Charles II., and James II. made it their occasional residence. William III. rebuilt a considerable part of the palace, and laid out the gardens and park in their present form. Since the time of George II. it has not been the abode of royalty, and is now occupied by private families who have grants of residence from the lord-chamberlain. The number of residents, including servants, is stated to be 700. The palace consists of three principal quadrangles, with some smaller courts. The chapel, the great hall, and some of the subordinate chambers and domestic offices are part of the building erected by Wolsey and enlarged by Henry VIII. The great eastern and southern fronts are the most modern parts of the building; the eastern front has an extent of about 330 feet, the southern of 328 feet. These portions were erected by Sir Christopher Wren, but are neither in keeping with the more antient portions of the structure, nor distinguished by any great beauty. The palace contains a number of pictures by the old masters, but the Cartoons of Raffaelle constitute its chief treasure. The gardens are laid out in very formal taste. The park has several avenues and fine clumps of trees. Bushey Park and lodge are an appendage of Hampton Court Palace; the lodge was the residence of William IV. when duke of Clarence, and now belongs to the queen-dowager for her life.

The village of Hampton has some substantial houses and handsome villas; among the latter is that which belonged to Garrick. Hampton races are held on Moulsey Hurst, on the opposite side of the Thames. The living of Hampton is a vicarage of the clear yearly value of 356*l.*, with a glebe-house. Hampton Wick is a chapelry of the clear yearly value of 87*l.*, in the gift of the vicar of Hampton. There were, in 1833, in the whole parish, nine day-schools (one endowed and one school of industry), with about 350 children: seven boarding-schools, with 94 children; and three Sunday-schools, with 76 children.

Hammersmith is in Kensington division of Ossulston hundred, 4 miles from Hyde-park Corner. The chapelry of Hammersmith, a dependency of Fulham parish, has an area of 2140 acres, with a population, in 1831, of 10,222. The principal street extends nearly two miles along the western road, and consists of several ranges of good modern houses. An elegant suspension-bridge crosses the Thames at this place. There are two churches: one erected in 1631, a spacious brick building; the other a Doric edifice, built within the last few years. The Dissenters have several places of worship, and the Catholics have a chapel and a convent of Benedictine nuns. Brandenburgh House, a villa erected by Sir Nicholas Crispe in the seventeenth century, and improved by subsequent occupants, was the residence of the late queen Caroline during her last abode in England. She died here, and after her death the house was pulled down. There are large nursery-grounds in the parish, and brick-making is extensively carried on. The living of Hammersmith is of the clear yearly value of 310*l*. There were in the chapelry, in 1833, an endowed school called 'Latymer's school,' with 80 boys; a charity school for 50 girls, a school of industry with 57 girls, three other charity schools (one of them supported by Catholics), with 90 children; twenty-nine other day-schools, with 532 children; eighteen boarding-schools, with 466 children; and eight Sunday-schools, with 572 children.

Fulham, 4 miles from Hyde-park Corner, is in the same hundred and division as Hammersmith. The parish, exclusive of the chapelry of Hammersmith, has an area of 1820 acres, with a population, in 1831, of 7317. It was the scene of some military movements in the war between Charles I. and the parliament, A.D. 1642; and in 1647 the council of officers and agitators sat at Fulham and Putney (a village in Surrey on the opposite bank of the Thames), to overawe the parliament and watch the king, who was then in confinement at Hampton Court. The village contains many good houses and villas; the manor-house is the residence of the bishop of London. The church is of stone, and has a stone tower in the decorated English style. There is a proprietary chapel, built by Richard Hunt, Esq., A.D. 1813, between Fulham and Hammersmith.

The bridge over the Thames at this place is of wood. There are extensive market-gardens in the parish, which are noted for the growth of asparagus. The living is a vicarage of the clear yearly value of 1135*l*., in the gift of the bishop of London. There were in the parish, in 1833, two infant schools, with 159 children; two national schools, with 249 children; three charity-schools, with 72 children; eleven other day-schools, with 213 children; ten boarding-schools, with about 207 children; and one Sunday-school with 60 to 80 children.

Kensington, in the same division and hundred as the preceding parishes, is now a suburb of London. The parish, with the extra-parochial chapelry of Twyford, has an area of 2980 acres, with a population, in 1831, of 20,945. Part of the chapelry of Knightsbridge is in Kensington parish. The principal street of Kensington consists of ranges of well-built houses extending along the great western road; and there are other streets. Brompton and Little Chelsea, on the south, and Kensington gravel-pits, on the north, are in the parish. There is at Kensington a royal palace, built on the site of a residence belonging to the family of Finch, earls of Winchelsea and Nottingham, from whom it was purchased by William III. That prince converted the dwelling-house into a palace, rebuilding the principal parts, and making many additions to it, which succeeding princes have augmented. The palace is of red brick, ornamented with columns and coignes of stone, and consists of three principal quadrangles. The suites of apartments are noble and extensive, and are adorned with many fine paintings by Flemish and English artists. The gardens and grounds, which are agreeably laid out, are three miles in circuit. There are barracks for detachments of the guards. Several members of the Royal family have apartments within the palace. Holland House, an antient mansion, chiefly in the Elizabethan style, was the residence of Addison, who died here; and much of the early life of Charles James Fox was passed here. It is now the residence of Lord Holland. it contains some interesting portraits. Campden House is another antient residence in the same style. Kensington Church, a large modern brick building, is near the principal street: new churches have been erected in Addison Road and at Brompton, and there is a chapel-of-ease at Brompton, erected about seventy years ago. There are dissenting and Catholic chapels. The living is a vicarage, of the clear yearly value of 1242*l*., with a glebe-house. To the new churches in Addison Road (St. Barnabas) and Brompton (Trinity Church) are annexed curacies, of the respective value of 405*l*. and 639*l*., in the gift of the vicar of Kensington. There were, in 1833, five infant or dame schools, with 44 children; a national school, with 290 children; a school for 17 girls, supported out of the parish rates; two schools, partly or wholly supported by charitable contributions, with 104 children; twenty-three other day-schools, with 489 children; forty-nine boarding-schools, with 827 children; and three Sunday-schools, with 265 children. There were also two proprietary grammar-schools, with about 180 children.

The parishes of St. Marylebone (pop., in 1831, 122,206), St. Pancras (pop. 103,548), and Paddington (14,540), in the Holborn division of Ossulston hundred, constitute the parliamentary borough of Marylebone. They are for the most part united to London. [LONDON.] The hamlets of Camden Town and Kentish Town, and part of the village of Highgate, are in St. Pancras parish. Camden Town consists of some streets of good houses; and Kentish Town of some rows of houses and detached villas. Camden Town is now rapidly increasing, and has greatly improved of late years, especially since the completion of the London and Birmingham Railroad. There is an Episcopal chapel at Camden Town, and one in Kentish Town, beside several dissenting meeting-houses. There is a veterinary college at Camden Town. The Regent's Canal passes between these two hamlets.

Hampstead is on high ground, 4 miles from Holborn Bars, in Holborn division of Ossulston hundred. The parish, which contains 2070 acres, with a population, in 1831, of 8588, was separated from that of Hendon in 1598. It contains the village of Hampstead and the hamlet of Kilburn. The village of Hampstead contains mineral springs, once in considerable repute. The salubrity of the air, and the pleasantness of the prospect which, from its elevated situation, it enjoys, have made it a favourite place of residence: on the hill, north-east of the village, is an extensive heath, on which are some large ponds, or reservoirs of water, used for supplying Camden Town and the adjacent parts with water. The church, which is of brick, was built about the middle of the last century. There are two proprietary Episcopal chapels, and several dissenting places of worship. The living is a perpetual curacy, of the clear yearly value of 887*l*. There were, in 1833, two infant-schools, with 159 children; three charity-schools (two attached to the Established Church, and one supported by Roman Catholics), with 287 children; nine other day-schools, with 155 children; seventeen boarding-schools, with 384 children; one day and Sunday school (at Kilburn), with 85 children; and five Sunday-schools, with 585 children.

Islington, one mile north of Hicks's Hall, on the great north road, is in the Finsbury division of Ossulston hundred, and included in the metropolitan parliamentary borough of Finsbury. The parish has an area of 3050 acres, with a population, in 1831, of 37,316. The principal street, under the designations of High Street, Upper Street, and Holloway, runs for several miles along the north road to the foot of Highgate Hill. Lower Street branches off from High Street, and runs towards Newington Green and Stoke Newington. The Liverpool Road forms a back road to Holloway: the new north road, and the new road from King's Cross to Holloway, have been laid out within the last twenty years. Highbury, Canonbury, Ball's Pond, and Holloway, are portions of the village, which comprehends a number of ranges of good houses. The New River passes through the parish, and the Regent's Canal is carried by a tunnel under the High Street, which is on an eminence, and under the New River. A considerable part of the parish is occupied as pasture-land by cow-keepers, who supply the metropolis with milk. There are some nursery grounds, and one or two manufactories, together with lime and coal wharfs, in the part adjacent to the Regent's Canal. The church is situated between Upper and Lower streets, and is of brick, with a tower of the same materials, surmounted by a stone spire of good design. There is a chapel-of-ease at Lower Holloway, a plain and rather heavy brick building, built A.D. 1814; and there are district churches at Upper Holloway (St. John's, a neat building, with a square embattled tower, crowned with pinnacles), Ball's Pond (St. Paul's, a structure of similar character to St. John's), in Cloudesley Square, near the back road (Trinity Church), and St. Peter's, the last erected. There are also several dissenting places of worship. At Islington is a college, belonging to the Church Missionary Society, for the education of young men designed for foreign missions; and at Highbury an academy for the education of young men for the ministry among the Independents The Caledonian Asylum is a handsome building, on the road leading from King's Cross, St. Pancras, to Holloway. Canonbury Tower, a heavy square brick building, is a relic of Canonbury House, the former mansion of the priors of St. Bartholomew's Monastery in Smithfield, and has been the residence of Dr. Goldsmith, Chambers, author of the Cyclopædia, and other persons of literary note. The living of Islington is a vicarage, of the clear yearly value of 1155*l*., the perpetual curacies are of the following clear yearly value:—Lower Holloway Chapel, 351*l.*; St. John's, Upper Holloway, 250*l.*; St. Paul's, Ball's Bond, 335*l.*; and Trinity, Cloudesley Square, 485*l.* Of the chapelry of St. Peter's there is no return. There were, in 1833, four infant-schools, with 578 children; thirty-eight boarding-schools, and sixty-one day-schools, among which were included three national schools, with 204 children; three other charity schools, connected with the Established Church, with 582 children; a Lancasterian school, with 160 girls; a school of industry for 35 girls, and three other charity schools, with 260 children. There are a proprietary school for 160 boys, and nine Sunday-schools, with 1648 children. In the British Orphan Asylum 43 children are maintained and educated, and in the Caledonian Asylum about 100. There is a Literary and Scientific Institution.

Hornsey is in the same hundred and division, north of Islington. The area of the parish is 2960 acres; the population, in 1831, was 4856. It contains the village of Hornsey, and the hamlets of Crouch End, Muswell Hill, and Stroud Green. Few villages near London have retained a more rural character than Hornsey. It lies in a valley out of the great thoroughfares; the New River passes close to it. The church, which is of stone, has been recently restored or rebuilt all but the tower, which is more antient. There were, in 1833, two national schools at Hornsey, with 115 children. The living is a rectory, of the clear yearly value of 493*l.*, with a glebe-house.

Highgate is on high ground on the great north road, 4 miles from London. Part of the village is in the parish of St. Pancras, and part in Hornsey parish. The village, which comprises some good villas and other houses, is on the top of a hill. A new church has been lately built, and a new school-room for the endowed grammar-school, which was founded by Chief-Justice Cholmeley in the reign of Queen Elizabeth. The master has a good salary and a house. There are some almshouses at Highgate, and one or two dissenting places of worship. Some ponds at Highgate contribute to supply part of the northern suburbs of the metropolis with water.

In order to avoid the steep declivity at Highgate, a project was formed in 1809 for carrying the north road through a spacious arched tunnel. The work was commenced; but in 1812 the earth over the tunnel fell in, the plan of a tunnel was given up, and a road was cut through the hill. A road which crosses the north road is carried over it by means of an archway of brick and stone. An extensive cemetery has lately been formed at Highgate, on the slope of the hill just below the church: the grounds are well laid out, and the entrance gateway contains a chapel and other apartments. There are numerous catacombs in this cemetery. There were in Cholmeley's grammar-school, in 1833, 33 boys; in another endowed school were 26 girls; and in a national school, 98 boys. A room for a national school for 100 girls was building at the same time.

Hackney is 2 miles from Shoreditch church, on one of the branches of the Norfolk and Suffolk roads. The parish has an area of 3300 acres, with a population, in 1831, of 31,047. It contains the several villages or hamlets of Hackney, Homerton, Upper and Lower Clapton, Stamford Hill, Dalston, Shacklewell, the greater part of Kingsland, and a part of Stoke Newington. Hackney, properly so called, has one principal street, known as Mare Street and Church Street, and some other streets, containing many good houses, some of them of old date, for this was one of the earliest places of rural retirement to the wealthy merchants and traders of London. The church was rebuilt near the close of the last century; it is a large brick building devoid of external beauty, but its interior construction and arrangements have been the subject of much commendation. It has a stone tower of modern erection, but as this was insufficient to bear the bells, the tower of the former church has been allowed to remain in the churchyard, which is spacious and pleasantly laid out. South Hackney church, originally built as a chapel-of-ease, but since made a district church, has little architectural beauty. Homerton adjoins Hackney on the north-east, and consists of one street, half a mile long, leading down to the marshes of the Lea. It has a proprietary Episcopal chapel, and a college rebuilt a few years since for the education of Congregational ministers. Clapton lies north of Homerton, and Stamford Hill north of Clapton. There are at Clapton a neat iron bridge, called Lea Bridge, over the Lea, and a handsome building erected for the London Orphan Asylum. At Stamford Hill is an Episcopal chapel, originally a proprietary chapel, but since purchased by subscription of the inhabitants and enlarged. Those parts of Kingsland and Newington which are in this parish are on the York road. On this road is the district church of West Hackney, a Doric edifice of good design. It has a large churchyard and a parsonage house. There is a small antient chapel at Kingsland, partly in this parish, partly in Islington. Dalston and Shacklewell lie between Hackney proper, Kingsland, and Newington. There are several dissenting meeting-houses; and several ranges of almshouses in the parish; among the latter is 'the Retreat' for the Widows of twelve Independent or Baptist Ministers. Dyeing, calico printing, and some other manufacturing processes are carried on in the parish; and there are considerable brick fields. The Regent's Canal and the Lea navigation pass through the parish.

Hackney parish originally constituted one benefice; but it has lately been divided into four districts, which, with the clear yearly value of their benefices, are as follows:—Hackney Rectory (the mother church), 1082*l.*, with a glebe-house; South Hackney Rectory, 399*l.*; West Hackney Rectory, 464*l.*, with a glebe-house; Stamford Hill Chapelry, 165*l.* There were in the parish, in 1833, sixty-three day and boarding schools of all kinds, four day and Sunday schools, and ten Sunday-schools. Of these schools four were infant schools, supported chiefly by endowment or subscription, with 470 to 490 children; fifteen others were charity schools, including two national and two Lancasterian schools, the Cumberland Benevolent Institution, the London Orphan Asylum, and the boys' establishment of the Children's Friend Society, which is at Hackney Wick. There are two proprietary grammar-schools; one connected with the Church of England, the other open to all sects. The school-house of the former is a brick building at Clapton, with a Doric front and portico finished with cement in imitation of stone; that of the latter is near Hackney churchyard, and is of Gothic architecture.

Bow is on the other and main branch of the Norfolk and Suffolk roads, 2½ miles from Whitechapel church. The name of the parish is Stratford-le-Bow, but we have given the colloquial abbreviation in order to distinguish it from Stratford Langthorn, or colloquially Stratford, which is just across the Lea in Essex. Between Bow and Stratford is an antient bridge over the Lea. Bow church is an antient structure, chiefly in the early English style, but there are some portions of Norman architecture. A yearly fair, much resorted to by the Londoners, has been of late years suppressed. The parish, which has an area of 630 acres, with a population, in 1831, of 3371, was separated from that of Stepney in 1730. At the hamlet of Oldford, in the parish, are the East London waterworks. The living is a rectory, of the clear yearly value of 319*l.*, with a glebe-house. There were, in 1833, three dame-schools, with 48 children; three boarding-schools, with 88 children; five day-schools, two of them endowed, with 109 children, and three unendowed, with 42 children; and two Sunday-schools, with 244 children.

Bromley is adjacent to Bow. Distilling and calico printing are carried on, and many of the inhabitants are much engaged in the East and West India Docks, and in the adjacent dockyards in Limehouse and Stepney parishes. The church has some traces of Norman architecture: it was probably the chapel of a Benedictine nunnery once existing here, whose revenue at the suppression was 121*l.* 16*s.* 0*d.* gross, or 108*l.* 1*s.* 11*d.* clear. The parish has an area of 620 acres, with a population, in 1831, of 4846. The living of Bromley is a donative, of the clear yearly value of 190*l.* The parish had, in 1833, one infant school, with 20 children; an endowed day-school, with 17 boys; two national schools, with 195 children; one other day-school, with 12 children; and one Sunday-school, with 180 children.

Stepney and Limehouse are immediately adjacent to London on the east side. The parish of Stepney comprehends an area of 2130 acres, and is divided into the four hamlets of Mile-End Old Town, Mile-End New Town, Poplar Chapel (with Blackwall), and Ratcliffe, having a population in all of 67,872. Limehouse parish is immediately adjacent to Stepney, and comprises 280 acres, with a population of 15,695. These two parishes comprehend the Isle of Dogs, and the adjacent districts extending northward to the road to Bow, on which road the hamlets of Mile-End are situated. Along this road, and along the Commercial Road, extending from London to Limehouse, as well as in the immediate streets and squares, are several ranges of good houses. Stepney church is a spacious building of stone and flint, probably erected in the 14th century. A new church was erected in the parish in the year 1822. There is at Stepney a college or academy for the education of ministers among the Calvinistic or Particular Baptists. Along the Mile-End Road are several hospitals or almshouses; of which the principal are the Jews' hospital, Bancroft's almshouses, and those belonging to the Trinity House. Limehouse church is one of the fifty erected in the reign of Queen Anne. Poplar chapel is a neat structure, almost entirely rebuilt in the latter part of the last century. The East India Hospital, in connection with this chapel, contains a dwelling for a chaplain, and for the widows of officers and seamen in the Company's service.

These two parishes are chiefly inhabited by seafaring people, or by those engaged in the building or fitting out of vessels. They contain the East India Docks and the West India Docks, and the basin at the junction of the Regent's Canal with the Thames. There are ship-building yards and ropewalks, also manufactories for anchors and chain cables, sail-cloth, ships' blocks, &c. The Regent's Canal and a cut from the river Lea to the Thames cross this parish. A tramroad leads along the south side of the Commercial Road from the West India Docks to Whitechapel: and a railroad is to run from London to Blackwall.

The living of Stepney is a rectory, of the clear yearly value of 1190*l.*, with a glebe-house. There is a chapelry attached to the new church, of the clear yearly value of 218*l.* Poplar is a rectory, of the clear yearly value of 632*l.*, with a glebe-house. Limehouse is a rectory, of the clear yearly value of 714*l.*

The parish of Stepney was once much more extensive than at present: those of St. Paul, Shadwell; St. Mary, Whitechapel; St. John, Wapping; St. Mary, Stratford-le-Bow; Christchurch, Spitalfields; St. George's in the East; St. Ann's, Limehouse; and St. Matthew, Bethnal Green, have been formed by separation from it. Had the parish retained its former extent, the population in 1831 would have been 250,000.

Stepney and Limehouse parishes contained, in 1833, three infant schools, seventy-three day-schools, and sixteen Sunday-schools. Of the day-schools, the principal are, Bancroft's school, in which 100 boys are boarded, clothed, and instructed; the Jew's hospital, for the employment and education of youth, with 58 children; Stepney proprietary school, with 120 boys; an endowed free-school under the management of the Cooper's company, with 35 boys; and several national or other charity schools. There are several dissenting congregations.

The parishes described above, from Hackney inclusive, are in the Tower division of Ossulston hundred, which is comprehended in the new metropolitan parliamentary borough of the Tower Hamlets.

Divisions for Ecclesiastical and Legal Purposes.—This county is included in the diocese of London, and is divided between the archdeacons of London and Middlesex. The City of London within and without the walls (with the exception of thirteen parishes which are peculiars of the archbishopric of Canterbury, one parish which is a peculiar of the bishopric of London, and four parishes which are in the peculiar jurisdiction of the dean and chapter of St. Paul's), the parishes of St. James, Clerkenwell, St. Leonard, Shoreditch, and St. Mary, Islington, and the precincts of Portpool, Hoxton, Norton Folgate, and Goswell-street, constitute the archdeaconry of London. The rest of the county (with the exception of twelve parishes which are in the peculiar jurisdiction of the bishop of London, seven which are in the peculiar jurisdiction of the dean and chapter of St. Paul's, and two which are peculiars of the archbishop of Canterbury) is included in the archdeaconry of Middlesex. The number of parishes and chapelries in the county, when Newcourt drew up his account of the diocese, was as follows:—

In London:	
Under the archdeacon of London	92
Peculiars	18
In the rest of Middlesex.	
Under the archdeacon of London	3
Under the archdeacon of Middlesex	52
Peculiars	21
Total	186

Since Newcourt's time the number of ecclesiastical divisions and benefices has considerably increased, through the subdivision of the larger parishes near London, such as Stepney, Hackney, Islington, St. Pancras, and St. Marylebone.

The county is, in civil suits, within the immediate jurisdiction of the superior courts sitting in the metropolis. In criminal cases of the more important class it is within the jurisdiction of the Central Criminal Court, held in the Old Bailey in London. Sessions, at which lighter criminal offences are tried, are held at the Sessions-house, Clerkenwell, twelve times in the year, and at Guildhall, for the city of London, eight times in the year. Sessions are also held for the city of Westminster. The city is under the police jurisdiction of its own aldermen; other parts immediately round London have police-offices, with stipendiary magistrates. The parts more distant from London are under the county magistrates.

The shrievalty of Middlesex is united with that of London. Two sheriffs are annually chosen by the Livery of London in common hall. London has a body of police of its own: the suburbs are watched by the metropolitan police, a numerous body of men under the direction of two commissioners.

Fourteen members of parliament are returned from Middlesex, namely, two for the county, four for the city of London, two for the city of Westminster, and two each for the new metropolitan boroughs of Marylebone, Finsbury, and the Tower Hamlets. The borough of Marylebone comprehends the three parishes of St. Marylebone, St. Pancras, and Paddington; that of Finsbury, various parishes and liberties in the Finsbury division of Ossulston hundred; and that of the Tower Hamlets, the liberties of the Tower and the Tower division of Ossulston hundred.

History and Antiquities.—In the earliest period of authentic history this part of our island was comprehended in the domains of the Trinobantes, who occupied Essex. It was traversed by Cæsar in his second expedition into Britain (B.C. 54), after his successful attempt to cross the Thames at Coway Stakes near Chertsey. [BRITANNIA.] It fell under the Roman dominion in the time of Claudius, but was overrun by the Britons in the general revolt under Boadicea. [BOADICEA.] Londinium (London) was already a place of considerable trade, and the residence of many Romans. In the Roman division of the island the county was included in the province of Flavia Cæsariensis, and contained the stations of Londinium, Pontes (according to some), and Sulloniacæ. Of Londinium [LONDON] nothing need here be said. Pontes has been variously fixed, at Colnbrook and at Old Windsor in Berks, and at Longford and Staines in Middlesex. Sulloniacæ was at Brockley Hill, between Edgware and Elstree. There are, or were till lately, traces of Roman camps at Stanmore, in the fields near Islington, and at Shepperton, near the place where Cæsar crossed the Thames. The Roman Watling Street from Londinium ran through Sulloniacæ to Verulamium (near St. Alban's). Ermine Street ran from Londinium northward by Stoke Newington to Enfield, and other roads led from Londinium by Pontes and across the Thames to the south-west parts of England, and across the Lea into Essex. Of this last the fragment of a stone causeway in the marshes of the Lea, between Hackney Wick and Old Ford, may be regarded as a remain. The Thames was known to the Romans by the names Tamesis and Jamissa. The Roman names of the Lea, the Colne, and the Brent, are not known.

Beside various Roman antiquities found in London, others have been discovered in various parts of the county. At Bentley near Stanmore fifty gold coins and several of silver and copper were found, together with two rings and a bracelet, all of gold. Coins, urns, or other Roman antiquities have been dug up at Hampstead, Shepperton, and Turnham Green near Brentford.

In the Saxon division of the island this county is generally considered to have been a part of the kingdom of the East Saxons; but we think this may be questioned. Sir F. Palgrave has shown that among the Saxon states there were more than seven or eight which were properly distinct from each other, although the weaker were commonly held in subjection by their more powerful neighbours. (*History of England* (*Anglo-Saxon Period*), in the *Family Library*.) Of these petty kingdoms or states we consider Middlesex (the territory of the Middle-Saxons) to have been one; for we do not think the name would have been given had Middlesex been, according to the common opinion, only a frontier district of the East-Saxon kingdom. It may have been governed occasionally by the kings of Essex,—it is known that these at least possessed many extensive rights in the city of London; but Essex was itself little more than a dependency of Kent, and never enjoyed a period of political independence. It favours our supposition that Middlesex was not a mere province or county of the East Saxons, to find that in the division of England under Alfred, while the county of Essex and part of Hertfordshire were included in the Danelagh, or Danish territory, London and the rest of Middlesex were placed under the alderman of Mercia. (Sir F. Palgrave, *Rise and Progress of the English Commonwealth*, vol. i., pt. i., pp. 116, 402; pt. ii., pp. cclxxxiii., cccv.) It is however to be observed that some early authorities make Middlesex a part of the Danelagh. (Sir F. Palgrave, *Ibid.*, pt. i., pp. 48, 572.)

In the wars which the West Saxon princes sustained with the Danes, London was repeatedly taken by that people. In the great struggle between Alfred and the Danish chieftain Hastings the citizens bore a distinguished part. In the reign of Athelstan, London became the occasional residence of the king. In A.D. 1013 London submitted to the Danes under Svein or Sweyne, Ethelred II., whom they had endeavoured to support, having fled. In the following year the citizens threw off the Danish yoke, and recalled Ethelred. In the reign of Edmund II. Ironside, London was besieged by the Danish king Canute, but the siege was raised, after continuing some time, on the approach of Edmund. A battle between the rival princes was fought the same year at Brentford, the issue of which enabled Canute to resume the siege of London, but with no better success. The subsequent death of Edmund however brought the whole island under the sway of Canute.

London, having become, under the later Saxon princes or under the Norman dynasty, the seat of government, was the scene of many events which belong not to the provincial but to the general history of the country. In A.D. 1189, at the coronation of Richard I., there was a dreadful massacre of the Jews by the populace at Westminster. In A.D. 1196 a great tumult arose in London, headed by William Fitz-Osborn, surnamed Longbeard. In A.D. 1212 London was much damaged by a great fire. In the civil wars of John the citizens took the side of freedom. The Great Charter was signed by that king close upon the border of the county, between Staines and Windsor. In the subsequent war against the king, the citizens supported the cause of the dauphin Louis, who was however ultimately shut up in London, and compelled to relinquish his attempt on the kingdom. In A.D. 1222 another tumult of the Londoners arose: it was however quelled, the ringleaders executed or otherwise severely punished, and the city severely mulcted. In A.D. 1232 another great fire happened. In the following years many struggles were maintained against the injustice and oppression of Henry III. by the citizens, who, on the breaking out of the civil war, A.D. 1264, eagerly joined the insurgent barons. They burned the palace of the King of the Romans at Isleworth, and a summer-house belonging to the king at Westminster. On the suppression of this insurrection, after the battle of Evesham (A.D. 1265), the citizens were compelled to purchase exemption from the loss of their privileges by heavy payments. Just before the breaking out of this insurrection there was a great massacre of the Jews in London. In the year 1267 the city was occupied by the earl of Gloucester, who repelled for a time the king's army. He was however obliged to submit.

In the civil wars of Edward II. the city was first threatened and then occupied by the insurgent barons, A.D. 1320. At a subsequent stage of the troubles, A.D. 1322, several of the supporters of the king, and his favourites, the two Despencers, were put to death by the populace. In the subsequent reign of Edward III. a considerable tumult was excited on occasion of Wicliffe being cited before a synod at St. Paul's. The duke of Lancaster and Lord Percy, earl-marshal, afterwards well known as the earl of Northumberland, supported Wicliffe, while the citizens supported the bishop of London, whom they supposed to be threatened by those nobles. This tumult had almost cost the city its municipal privileges, and led to the removal of the lord-mayor and aldermen, on the plea that they had not properly exerted themselves to put the citizens down.

The rising of the Commons under Wat Tyler, A.D. 1381, belongs to the history of England. In 1387 the earls of Warwick and Arundel and the duke of Gloucester assembled a considerable force at Hornsey Wood, to oblige the king to put away his followers. In A.D. 1388 the same lords with their followers assembled a force and marched to London, into which, after some hesitation, they were admitted. In A.D. 1390 the citizens of London, having offended the king, were obliged to appease him by a gift of 10,000*l.* to prevent much heavier consequences. The alienation produced by the king's oppressive conduct induced the citizens early to declare for his rival Henry of Bolingbroke, afterwards Henry IV.

In the reign of Henry V., early in the year 1413, several Wicliffites were seized in St. Giles's Fields by the king in person, who came upon them with an armed force. Treasonable purposes were imputed to them, and a great number were put to death. In the reign of Henry VI., A.D. 1450, London was seized by the insurgents under Cade, who committed great excesses, but after a sharp struggle was driven out by the citizens. At the commencement of the war of the Roses, a meeting of the leaders on both sides was held at London, with a view to a reconciliation, and a compromise effected; but some tumults arising between their retinues, suspicions arose again, and each party prepared for war. In A.D. 1460 the Yorkists were admitted into the city, while the king's troops occupied the Tower, from which they fired on the city. The citizens however obliged the garrison to surrender. In the same year the king was brought captive to London, and a peace was effected, which was very soon broken. The queen was about to re-enter London, when the approach of the earl of March obliged her to retire. The earl was declared king by his army, the citizens, and the nobles of his party, first in St. John's Fields, Clerkenwell, and afterwards at Baynard's Castle, in London, A.D. 1461. He assumed the title of Edward IV. In the year 1465 Henry VI., who had been again taken, was brought prisoner to London, and confined in the Tower. In 1470 he was released by the earl of Warwick. During the troubles of this period, a band of plunderers committed great excesses, but were put down by the earl of Warwick and duke of Clarence, and the leaders immediately hanged. In 1471 the Yorkists recovered the city, and Warwick was defeated and slain in the battle of Barnet. An obelisk erected on the spot records the event.

Edward, immediately after his victory at Barnet, marched to London, and, after parading the captive Henry through the streets, quitted the capital to engage Margaret, Henry's queen, at Tewkesbury. In his absence, London was attacked by the Bastard of Fauconbridge, who, after several repulses, retired. Henry died in the Tower very soon after, and Edward died at Westminster, A.D. 1483. The murder of Edward V. and the usurpation of Richard III., the coronation of Henry VII., his marriage, and the coronation of his queen, at Westminster (A.D. 1483-87), took place in London. In the reign of Henry VII. Perkin Warbeck was set in the stocks in London, and, about a year after, executed at Tyburn, for attempting to escape from the Tower, where he had been confined.

London was the scene of many of those acts of cruelty that have stained the memory of Henry VIII., and which need not be here enumerated. In Wyat's rebellion against Mary (A.D. 1554), the city was threatened by the rebels, who, after obtaining possession of Southwark, marched to Kingston, crossed the Thames, and marched through Brentford and Turnham Green to attack London. Wyat was however repulsed and obliged to surrender. The execution of Lady Jane Grey and her husband followed; fifty of Wyat's followers were hanged in different parts of the city, and Wyat himself was beheaded soon after. At the time of the Armada, London raised a body of 10,000 men, and the rest of the county 1000 more, with a few light horse and lancers. The city also furnished twenty-nine ships and barks, and above 2000 men; and the merchant adventurers ten ships of war. In A.D. 1601 the city was disturbed by the tumult excited by the earl of Essex, who was taken, and, with many of his supporters, beheaded. In A.D. 1605 the well-known gunpowder plot was formed and detected.

The commencement of the civil troubles of Charles I. was marked by some disturbances at London, which was devoted to the parliamentary cause; and on the breaking out of the war, the passages about the city were fortified, and the trained bands raised. After the battle of Edge Hill, the earl of Essex returned to London; and the king pursued him as far as Brentford, which, after a sharp action, he captured. On this, the trained bands and other forces under Essex marched to Turnham Green, but no battle was fought, and the king soon quitted the county. In A.D. 1643 the cities of London and Westminster with Southwark were surrounded by defensive works of great extent, which were demolished by order of parliament, about four years afterward. In 1645 the conferences for peace at Uxbridge were held. In 1648 a tumult arose in the city, and the rioters were not put down until after some bloodshed; and in 1649 Charles I. was beheaded.

In 1661, after the Restoration, London was again made the scene of tumult by the Fifth Monarchy-men under Venner. The great plague of London in 1665, and the great fire of 1666, are events well known; also the great agitation of the metropolis during the supposed discovery of the popish plot. The attempts upon the city charters and the severities inflicted upon some leading citizens in the closing years of Charles II. and in the reign of James II. are also well known.

In the year 1688 James II. formed a camp on Hounslow Heath; but his army, partaking of the national feeling, deserted him. In A.D. 1710 London was much agitated by the trial of Dr. Sacheverell. In the rebellion of 1745, a camp was formed on Finchley Common, and the city trained bands and county militia were kept in readiness to march. In 1780 London was the scene of destructive riots, occasioned by popular hatred to Catholicism. In 1815 there were some tumults on account of the corn-laws, and a few years afterwards on account of reform in parliament. Since then there has been no event in the history of the county of sufficient importance to be noticed here. (*Beauties of England and Wales; Ordnance Maps;* Conybeare and Phillip's *Outlines of the Geology of England and Wales; Parliamentary Papers.*)

STATISTICS.

Population.—Middlesex, as containing the great metropolis of the United Kingdom, of course cannot be compared with any other county of England, the population in proportion to its surface being vastly greater; the population of the other part of the county not included in the metropolis is not a fourteenth of the whole. As an agricultural county Middlesex therefore ranks very low, being the 42nd, or the very lowest in the scale. Of 358,521 males twenty years of age and upwards, living in 1831, only 12,516 were engaged in agricultural pursuits, and 11,064 in manufactures or in making manufacturing machinery. In this latter number is not included that numerous class of workmen of the best kind in all descriptions of manufactures, who are employed in London for combining, fitting, and finishing all the commodities requisite for the consumption and vast commerce of the metropolis. Workmen so employed are classed and specified in the detail of trades and handicrafts to the amount of four hundred different kinds. Independent of these, the manufactures of Middlesex are not of importance. More than 5000 males twenty years of age and upwards are employed in the manufacture of silk at Bethnal Green and its neighbourhood. At and near Whitechapel 440 men are employed in sugar-refinery. At Limehouse, sail-cloths and chain-cables are made; crape and oiled leather at Enfield; copper-works exist at Harefield, and mustard-mills at Staines.

The following table contains a summary of the population, &c. of every hundred, as taken in 1831:—

HUNDREDS, CITIES, OR BOROUGHS.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Edmonton hundred .	4,801	5,616	79	359	1585	1,620	2,411	12,969	13,961	26,930	6,242
Elthorne „ .	3,791	4,224	8	220	1248	1,505	1,471	9,998	10,093	20,091	5,143
Gore „ .	1,726	2,049	9	82	794	619	636	5,697	5,618	11,315	2,718
Isleworth „ .	2,454	2,871	43	151	976	736	1,159	6,515	7,053	13,568	3,209
Ossulston:											
Finsbury division .	20,516	34,569	558	2,049	827	21,865	11,877	70,641	80,768	151,409	38,153
Holborn „ .	36,554	83,467	1428	2,391	576	41,898	40,993	154,743	191,512	346,255	93,148
Kensington „ .	13,415	20,179	295	1,060	2062	9,458	8,659	39,217	48,744	87,961	20,827
Tower „ .	57,170	84,282	977	5,940	801	52,897	30,584	168,146	191,718	359,864	89,304
Spelthorne hundred .	2,715	3,175	29	166	864	954	1,357	7,325	7,887	15,212	3,798
London within the Walls } City .	8,002	11,719	32	705	1	7,077	4,641	27,327	28,451	55,778	16,869
London without the Walls } City .	8,733	15,884	49	426	29	11,101	4,754	33,413	34,492	67;905	19,147
Westminster city .	20,616	46,004	412	864	119	24,092	21,793	95,219	106,623	201,842	59,963
Militia under training .	—	—	—	—	—	—	—	200	—	200	—
Totals . .	180,493	314,039	3919	14,413	9882	173,822	130,335	631,410	726,920	1,358,330	358,521

The population of Middlesex, at each of the four following periods, was:—

	Males.	Females.	Total.	Increase per cent.
1801	373,655	444,474	818,129	..
1811	434,633	518,643	953,276	16·52
1821	533,573	610,958	1,144,531	20·06
1831	631,410	726,920	1,358,330	18·69

showing an increase between the first and last periods of 540,201, or about 67 per cent. on the whole population, being 10 per cent. more than the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the four dates of—

		£.		s.	d.	
1801	were	349,200,	being	8	6	for each inhabitant.
1811	..	502,967	„	10	6	„
1821	..	582,055	„	10	2	„
1831	..	681,567	„	10	0	„

The sum expended for the same purpose for the year ending March, 1838, was 383,076*l.*; and assuming that the population had increased at the same rate of progression as in the ten preceding years, the above sum gives an average of nearly 5*s.* for each inhabitant. This last average is below that for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending 25th March, 1833, was 968,724*l.* 19*s.*, and was levied upon the various descriptions of property as follows:—

	£	s.
On land . .	£69,833	13*s.*
Dwelling-houses .	823,248	15
Mills, factories, &c. .	57,352	2
Manorial profits, navigation, &c.	18,290	9
Total	£968,724	19

The amount expended was—

For the relief of the poor . .	£647,013	6s
In suits of law, removal of paupers, &c.	19,915	15
For other purposes . .	336,959	18
Total money expended	1,003,888	19

In the returns made up for subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 939,890*l.* 6*s.*, 754,660*l.* 17*s.*, 641,378*l.* 15*s.* (not stated in tables for 1837), and 573,106*l.* respectively; and the expenditure of each year was as follows:—

	1834.	1835.		1836.	1837.	1838.
	£.	£.	s.	£.	£.	£
For the relief of the poor	582,412	483,041	16	408,027	360,981	383,076
In suits of law, removal of paupers, &c. .	20,427	14,685	3	12,335	9,354	7,715
Payments towards the county-rate . .	313,678	64,588	10	66,154	not given.	71,580
For all other purposes		187,044	18	174,174	173,460	165,359
Total money expended	£916,517	749,360	7	660,690	543,795	627,730

The saving effected on the sum expended in 1838, as compared with that expended in 1834, was therefore 288,787*l.* 15*s.*, or about 31½ per cent.; and the saving effected on the sum expended for the relief of the poor was 199,336*l.*, or rather more than 34 per cent. as compared with the expenditure in 1834.

The number of turnpike trusts in Middlesex, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 7; the number of miles of road under their charge was 158. The annual income arising from tolls and parish compositions in lieu of statute duty was (in 1835) 96,744*l.* 14*s.*, and the annual expenditure in the same year was as follows:—

	£.	s.	d.
Manual labour . .	14,169	19	0
Team labour and carriage of materials	12,741	11	0
Materials for surface repairs .	36,207	13	0
Land purchased . .	50	10	0
Damages done in obtaining materials	47	14.	0
Tradesmen's bills . .	4,992	4	0
Salaries of treasurer, clerk, and surveyor	4,030	17	0
Law charges . . .	1,505	2	0
Interest of debt . . .	5,806	7	0
Improvements . . .	4,506	19	0
Debts paid off . . .	9,100	0	0
Incidental expenses . .	8,313	12	0
Estimated value of statute duty performed . . .	26	5	0
Total expenditure	£101,498	13	0

The county expenditure in 1834, exclusive of that for the relief of the poor, was 69,373*l.* 18*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building, repairs, &c.	2,831	17	0
Gaols, houses of correction, &c., and maintaining prisoners, &c.	22,819	7	0
Shire-halls and courts of justice, building, repairing, &c. .	1,943	4	0
Prosecutions . . .	6,674	4	0
Clerk of the peace . .	1,782	9	0
Lunatic Asylums . .	1,631	4	0
Vagrants, apprehending and conveying	1,105	19	0
Constables, high and special .	120	19	0
Coroner . . .	1,534	12	0
Debt, payment of, principal and interest	26,190	0	0
Miscellaneous . . .	2,740	3	0
Total expenditure	69,373	18	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were respectively 16,692, 19,883, and 24,965; making an average of 2387 annually in the first period, of 2840 in the second period, and of 3566 in the third period. The numbers of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect of whom any costs were paid out of the county rates, were 202, 224, and 1180 respectively. Among the persons charged with offences, there were committed for—

	1831.	1832.	1833.
Felonies . .	128	152	1094
Misdemeanors .	74	72	86

The total number of committals in each of the same years was 1707, 1701, and 2977 respectively.

	1831.	1832.	1833.
The number convicted was	293	342	1368
Acquitted . .	109	105	239
Discharged by proclamation	1305	1254	1370

In 1838 there were 3488 persons charged with crimes at the assizes and sessions in Middlesex. Of these 329 were charged with offences against the person, 204 of which were common assaults; 150 were charged with offences against property committed with violence, and 2740 with offences against property committed without violence. Of the remaining number 4 were charged with arson; 143 with forgery, and with uttering counterfeit coin; 11 with perjury, 27 for riot, and 84 for various other misdemeanors.

Of the whole number committed, 2578 were convicted, 625 were acquitted, 29 were not prosecuted, no bill was found against 246, and 10 were found insane. Of those convicted, 4 were sentenced to death, not one of whom was executed; the sentences against them being commuted to transportation for various periods: of the remaining offenders, 22 were transported for life, 2 for fifteen years, 86 for ten, and 707 for seven years. Sentence of imprisonment for 3 years, or above 2 years, was passed on 3; 70 were imprisoned for 2 years, or above 1 year; 193 for 1 year, or above 6 months; and 1365 for 6 months or under: 126 were fined. Of the whole number of offenders, 2663 were males and 825 females; 919 could neither read nor write, 1818 could read and write imperfectly, 682 could read and write well, 7 had received superior instruction, and the degree of instruction of the remaining 62 could not be ascertained.

The number of persons qualified to vote for the county members, and registered, in 1837, was 12,817. Of these, 9485 were freeholders, 1065 leaseholders, 975 copyholders, and 1292 occupying tenants, being one in 106 of the whole population, and one in 28 of the male population twenty years and upwards, as taken in 1831. The number of electors that voted at that election was 9214, viz. 6739 freeholders, 730 copyholders, 809 leaseholders, and 936 occupying tenants.

This county contains 27 savings' banks; the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	1832.	1833.	1834.	1835.
Number of depositors . .	50,827	56,709	62,543	68,237
Amount of deposits .	£1,393,360	£1,553,930	£1,705,308	£1,844,350

The various sums placed in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	43,134	£270,806	47,200	£288,362	52,742	£331,334
" 50	19,895	612,603	21,627	662,401	24,075	738,062
" 100	8,302	565,050	8,830	609,370	9,685	666,125
" 150	2,502	301,677	2,683	323,618	3,140	377,648
" 200	1,961	214,280	1,316	224,555	1,558	266,065
Above . 200	201	49,757	179	44,994	179	45,005
	75,195	2,014,173	81,841	2,153,300	91,379	2,424,239

Education.—The following is an abstract taken from the Education Returns laid before parliament in 1833:—

	Schools.	Scholars.	Total.
Infant schools . . .	109		
Number of infants at such schools; ages from 2 to 7 years:—			
Males . .		3,065	
Females . .		2,441	
Sex not specified .		3,226	
			8,732
Daily schools . . .	2,152		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		49,991	
Females . .		34,446	
Sex not specified .		8,051	
			92,488
Schools . .	2,261		
Total of children under daily instruction . . .			101,220

	Schools.	Scholars.	Total.
Sunday-schools . . .	329		
Number of children at such schools; ages from 5 to 15 years:—			
Males . .		23,440	
Females . .		23,225	
Sex not specified .		5,456	
			52,121

If we assume that the population between the ages of 2 and 15 years had increased in the same proportion as the whole population since 1821, and that the whole population had increased from 1831 to 1833 in the same ratio as during the ten years preceding 1831, we find that the number of children between the ages of 2 and 15 residing in Middlesex in 1833 was 469,563. Only two Sunday-schools are returned from places where no other schools exist, wherefore it may be said that all Sunday-school children in this county have opportunity of resorting to other schools also; but in what number or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Seventy-five schools, containing 11,529 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. At a few of the schools there are some scholars twenty years of age. Making allowance therefore for these two causes, for uncertainty, it appears that not more than one-quarter of the children between the ages of 2 and 15 are under instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	3	530	28	2,610	31	603	47	4,989
Daily Schools	107	9,266	184	23,927	1746	43,745	115	15,550
Sunday Schools	3	311	290	46,878	—	—	36	4,932
Total.....	113	10,107	502	73,415	1777	44,348	198	25,471

The schools established by Dissenters, included in the above statements, are—

			Scholars.
Infant schools . .	7, containing		577
Daily schools . .	103	.	9,170
Sunday-schools . .	150	.	27,689

The schools established since 1818 are—

			Scholars.
Infant and other daily schools	1,719, containing		67,158
Sunday-schools . .	219	.	37,484

Two hundred and thirty-eight boarding-schools are included in the number of daily schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by dissenters, with whom are here included Wesleyan Methodists, Roman Catholics, and Jews. Lending libraries of books are attached to 164 schools in Middlesex.

MIDDLETON, THOMAS, a celebrated dramatist in the reigns of Elizabeth, James I., and Charles I., the events of whose life are even less known than those of most of his contemporaries: indeed not a single circumstance is recorded respecting him by a writer of his own time; and excepting the fact that he was appointed chronologer to the city of London in 1620, mentioned by Oldys in his MS. notes to Langbaine, we are absolutely ignorant of his biography. He is supposed by Malone to have died in 1626.

The plays written by Middleton are very numerous. three of them, 'A Mad World, my Masters,' the 'Mayor of Queenborough,' and the 'Roaring Girl,' are in Dodsley's Collection, and the rest can only be procured separately. The 'Roaring Girl' is extremely valuable, as giving a picture of London manners in the author's time; it is interspersed with much of the slang which we find in Beaumont and Fletcher's 'Beggar's Bush,' and the heroine is a real character, the notorious Moll Cutpurse, who was introduced by Nat. Field, a contemporary dramatist, in his piece, 'Amends for Ladies.' A play of Middleton's, called 'The Witch,' has gained celebrity from the circumstance that Shakspere is supposed by some to have borrowed from it his incantations in 'Macbeth.' Besides the numerous pieces by himself alone, Middleton assisted Rowley in 'The Changeling,' 'The Spanish Gipsy,' and 'The Fair Quarrel,' and both him and Massinger in 'The Old Law;' he also joined with Fletcher and Jonson in the composition of 'The Widow,' which is printed in Dodsley.

Middleton does not hold the first rank among the dramatists of his day. His two best known plays, 'A Mad World, my Masters,' and the 'Roaring Girl,' are chiefly marked by a bustling variety of plot, a succession of incidents somewhat extravagant, and a familiarity with low life. He was however valued by his contemporaries, as is proved by his being chosen to assist such men as Jonson and Massinger.

MIDDLETON, SIR HUGH, was the sixth son of Richard Middleton, Esq., who was governor of Denbigh Castle, in Denbighshire, during the reigns of Edward VI., Mary, and Elizabeth. The name was variously spelt in those times, Mydelton, Myddleton, or Midleton. The date of Hugh Middleton's birth is unknown, and nothing has been recorded of the course of his life previous to his great undertaking of forming the New River and bringing it to London, except that he was a goldsmith in London, and had realised a very large property by the working of some copper-mines in Wales; and the decisive boldness with which he engaged in so vast and difficult an enterprise was probably the result of his having, in the conducting of his own mining speculations, acquired that practical knowledge of levelling, draining, embanking, and all the diversity of skill and fertility of resources necessary for the management of such a work. [MINING.]

Towards the latter end of the reign of Elizabeth, the metropolis of England being very inadequately supplied with water, the citizens of London obtained an act of parliament which gave them the legal authority to bring water from any part of Middlesex or Hertfordshire. For a considerable time however nothing was done, till, on the 28th of March, 1606, Hugh Middleton, 'citizen and goldsmith,' offered to bring to London a sufficient supply of pure water at his own cost. His offer was accepted; the citizens made over to him all the powers and privileges conferred by the act; and four years were allowed to complete the work. Having made the necessary surveys and preparations, and fixed on the Chadwell and Amwell springs, near Ware, in Hertfordshire, as the sources out of which his New River was to be formed, on the 20th of April, 1608, he commenced a work which, considering the imperfect mechanical resources of that age, may justly be regarded as stupendous. The distance from London by the road is about twenty miles, but the whole course of the river is thirty-seven miles. The ground through which it was to be brought presented much difficulty from its diversity of bottom as well as of level. In some places it was necessary to cut a channel thirty or forty feet deep; in others, to conduct the stream over valleys in troughs on wooden supports upwards of twenty feet high; and a vast number of bridges were to be constructed for the accommodation of those through whose grounds the stream was carried. These difficulties, together with others arising from the opposition of interested and influential persons, rendered it impossible to complete the work in the stipulated four years, and Middleton applied for an extension of the time, which was granted. Soon afterwards however he found that his large property was entirely exhausted. He applied to his fellow-citizens for assistance, but he applied in vain. He then solicited the king, James I., who, on the 2nd of May, 1612, entered into a covenant with Middleton, by which he engaged to pay half the expense, past and future, on condition of being entitled to half the property. The work was now pushed forward with increased vigour, and on the 29th of September, 1613, five years and five months from the commencement of the undertaking, and the day on which Sir Thomas Middleton, Hugh's brother, was elected lord-mayor for the ensuing year, the stream was admitted into the reservoir prepared for it at Sadler's Wells, near Pentonville. In the 'Biographia Britannica' an interesting account is given of the ceremony on this occasion, which was attended by the lord-mayor then in office, the aldermen, the recorder, and many of the principal citizens. The whole expense of the work was about 500,000*l.* Middleton was knighted soon afterwards, but for eighteen years after the completion of his undertaking no dividend was returned, and in the nineteenth year the first dividend only amounted to 11*l.* 19*s.* 1*d.* on each share.

Sir Hugh Middleton was compelled to sell his shares, and to support himself by the profession of what is now called a civil engineer. On the 19th of October, 1622, he was created a baronet for the following reasons (the king by special warrant kindly excusing him from the payment of the usual fine of 1095*l.*):—'1. For bringing to the city of London with excessive charge and greater difficulty a new cut or river of fresh water, to the great benefit and inestimable preservation thereof. 2. For gaining a very great and spacious quantity of land in Brading Haven in the Isle of Wight, out of the bowelles of the sea; and with banks and pyles and most strange defensible and chargeable mountains, fortifying the same against the violence and fury of the waves. 3. For finding out, with a fortunate and prosperous skill, exceeding industry, and no small charge, in the county of Cardigan, a royal and rich mine, from whence he hath extracted many silver plates, which have been coined in the Tower of London for current money of England. W. Camden, Clarenceux, November 1, 1622.' (*Harleian Misc.*) On the 18th of November, 1636, Charles I. regranted to Sir Hugh the whole of King James's shares for an annual rent of 500*l.* Middleton is supposed to have died soon afterwards, leaving a numerous family in very indifferent circumstances.

The springs near Ware are beautifully clear and very copious; but, a great many years ago, the supply having been found inadequate to the demands of the increased population, the New River Company entered into an agreement with the Commissioners of the Lea River to take a portion of the Lea at Ware, which was conveyed at first through pipes, but some years afterwards it was agreed that there should be an opening made of six feet by two, which is called the Marble Gauge. The Amwell spring now runs into the Lea River, and has done so for a great number of years; but an ample supply having been obtained from the Lea, it is presumed that the New River Company made no objection to the Amwell spring being turned from its original course; the time however when it was done is not certainly known.

The fall of the New River is three feet per mile, which gives a velocity of about two miles an hour. The average width is about 21 feet, and the average depth about four feet in the centre; so that, taking it at half the depth, there is a section of forty-two square feet flowing to London at the rate of two miles an hour. At the Sluice, near Highbury, the river is dammed back to the height of twenty inches, at Enfield to two feet four inches, and there are three or four more similar interruptions for the purpose of checking the current. This has been done because the Commissioners of the Lea complained that the New River Company, by enlarging the bridges and taking off the bends of the river to bring it more speedily to London, took more water than they were legally entitled to. They could take one-third more if they had the right; but not having enough, they have erected a steam-engine at Broken Wharf, which pumps up an additional supply from the Thames, pouring it directly into the main-pipe. To get rid of the engine at Broken Wharf the New River Company have tried, but hitherto, we believe, in vain, to get an act of parliament granting the right to take an additional supply from the Lea at Tottenham, and with that view have purchased Tottenham mill, together with fifty acres of ground, which they could convert into a reservoir.

The New River, especially in winter, is occasionally rendered dirty by drainage from the land and villages along its course, and the company have been at great expense to purify the water before it is delivered to the inhabitants of London. For this purpose two settling reservoirs were formed at Stoke Newington in 1832, under the direction of Mr. Mylne, the Company's engineer. The water covers an area of thirty-eight acres, more than twenty feet deep in some places, and twelve feet on the average. A part or the whole of the New River can be turned into the upper reservoir, where it settles, and is then drawn off by a steam-engine, and poured into the lower reservoir, where another settlement takes place, and the water is then turned again into the channel of the New River. Bathing in the New River is now entirely prohibited; and men called walksmen mow the bed of the river every week to keep down the growth of weeds, which are stopped by gratings seven miles from each other, where the weeds are taken out.

The capital of the Company has been stated by themselves to be 1,038,426*l.*, divided into 72 shares, or 14,426*l.* per share.

We subjoin a short table founded upon a 'Report on the Metropolis Water,' printed by order of the House of Commons, in August, 1834; by which it will be seen that the New River furnishes almost as much as the other seven companies united, supplying 70,145 houses (including large manufactories, breweries, &c.) with 16,905,000 gallons of water daily, at the average rate of 241 gallons per day to each house, at an average charge of less than 1*d.* per day.

	Houses.	Gallons daily to each house.	Total gallons per day.	Charge yearly to each house. £	*s.*	*d.*
New River .	70,145	241	16,905,000	1	6	6
Chelsea . .	13,892	168	2,334,000	1	13	3
Grand Junction	8,780	350	3,073,000	2	8	6
West Middlesex	16,000	185	2,960,000	2	16	10
East London .	46,421	120	5,571,000	1	2	9
South London	12,046	100	1,204,000	0	15	0
Lambeth . .	16,682	124	2,069,000	0	17	0
Southwark .	7,100	156	1,108,000	1	1	3
	191,066		35,224,000			

(Stow's *Survey of the City of London; Biographia Britannica;* Nelson's *History of Islington; Report on the Metropolis Water*, 1834.)

MIDDLETON, CONYERS, born August 2nd or December 27th, 1683, was the son of William Middleton, rector of Hinderwell, near Whitby in Yorkshire. At the age of seventeen he was sent to Trinity College, Cambridge, of which college he was two years afterwards chosen a scholar. He took his degree of B.A. in 1702, and was shortly after ordained deacon. In 1706 he was elected a fellow of Trinity College; and in 1708, joined with other fellows of his college in a petition to the bishop of Ely, as the visitor of the college, against Bentley the master. Middleton, who was then a young man, did not take a prominent part in this proceeding; but the feelings of hostility to the master originated by these disputes sank deep into his mind, and made him subsequently the most determined and dangerous of his enemies.

Middleton married soon afterwards, and resided for a short time in the Isle of Ely on a small living in the gift of his wife, but the unhealthiness of the situation induced him to return to Cambridge at the end of a year.

When George I. visited the university of Cambridge in 1717, Middleton, with several others, was created Doctor of Divinity; but Bentley, who was Regius Professor of Divinity, refused to confer the degree unless a fee of four guineas was given to him in addition to the broad piece which was the antient and customary compliment on this occasion. This demand was resisted by Middleton, who however at last consented to pay it, on condition that the money should be restored if it should be determined that it was an illegal demand. Middleton sued Bentley for it in the vice-chancellor's court; and Bentley, refusing to pay the money or to acknowledge the jurisdiction of the court, was deprived of all his degrees by a grace of the senate, October 17, 1718. [Bentley.] As Bentley was a firm supporter of the Whig ministry then in power, it was feared that a commission might be issued by the crown to inquire into the state of the university; and Middleton, to justify himself and his friends, accordingly published 'A full and impartial Account of all the late Proceedings in the University of Cambridge against Dr. Bentley,' which, says Dr. Monk, 'was the first published specimen of a style, which, for elegance, purity, and ease, yields to none in the whole compass of the English language. The acrimonious and resentful feeling which prompted every line is in some measure disguised by the pleasing language, the harmony of the periods, and the vein of scholarship, which enliven the whole tract.' (*Life of Bentley*, p. 388.)

A few months afterwards, Middleton published 'A Second Part of the full and impartial Account of all the late Proceedings, &c.,' and also 'A true Account of the present State of Trinity College, in Cambridge, under the oppressive Government of their Master, R. Bentley, late D.D.' In the latter pamphlet Middleton had declared 'that the fellows of Trinity College had not been able to find any proper court in England which would receive their complaints;' and Bentley perceiving that his adversary had been guilty of an expression which might be considered as a libel upon the whole administration of justice in the kingdom, brought an action against him in the Court of King's Bench, in which the jury returned a verdict of guilty. The court however was unwilling to pronounce sentence, and the matter eventually dropped by Middleton's begging pardon of Bentley and consenting to pay all the expenses of the action, which must have been considerable, since the share of the expenses of the prosecution not allowed by the master of the court, and paid by Trinity College, amounted to 150*l*.

While this matter was pending, Bentley published Proposals for a new edition of the Greek Testament, with a specimen of the intended work. The proposals and specimen were drawn up by candle-light one evening, according to Bentley's own confession; and the whole sheet bore marks of precipitation and haste. Middleton eagerly availed himself of the opportunity which the carelessness of his great enemy had afforded him, and accordingly published a severe critique upon it, in a pamphlet entitled 'Remarks, paragraph by paragraph, upon the Proposals lately published by R. Bentley for a new edition of the Greek Testament,' and followed up his attack by 'Some further Remarks' a few weeks afterwards. Although Middleton professed, in the commencement of the pamphlet, that 'his remarks were not drawn from him by personal spleen or envy to the author of the Proposals, but by a serious conviction that he had neither talents nor materials proper for the work he had undertaken, and that religion was much more likely to receive detriment than service from it,' he nevertheless condescended to the lowest abuse against his antagonist; but it must be allowed that in this respect he was hardly a match for the master of Trinity.

As Middleton had been put to great expense and trouble by his recent prosecution, his friends in the university, regarding him as a sufferer in a public cause, resolved to bestow some public mark of distinction upon him, and accordingly established a new office of principal librarian, to which Middleton was elected notwithstanding the violent opposition of the other party. Shortly after his election, he published a plan for arranging the university library, which was entitled 'Bibliothecæ Cantabrigiensis Ordinandæ Methodus quædam,' 1723; in the dedication of which to the vice-chancellor he expressed himself in a manner which appeared to call in question the jurisdiction of the Court of King's Bench; for which he was again prosecuted by Bentley, and condemned to pay a fine of 50*l*.

Having lost his wife shortly after this, he travelled on the Continent, and spent some months in Rome in 1724. On his return to England, he renewed his suit against Bentley for the recovery of the four guineas, who at length paid the money to Middleton in 1725. In 1726 he published a short treatise 'De Medicorum apud veteres Romanos degentium Conditione Dissertatio; qua &c. servilem atque ignobilem eam fuisse ostenditur;' which was considered an insult upon the whole medical profession. Several pamphlets were published in answer to it, to which Middleton replied in the following year.

In 1729 Middleton published his celebrated 'Letter from Rome,' in which he attempted to show that 'the religion of the present Romans was derived from that of their heathen ancestors,' and that in particular the rites, ceremonies, dresses of the priests, &c. in the Roman Catholic church were taken from the pagan religion. This work was received with the greatest favour by the learned, and went through four editions in the author's life-time; but the free manner in which he attacked the miracles of the Roman Catholic church gave offence to many divines of his own communion, who suspected and maintained that the author had as little respect for the miracles of the apostles as for those of the Roman Catholic saints. This suspicion was confirmed by his next publication in 1731, which was a letter to Dr. Waterland, containing some remarks on Waterland's reply to Tindal's attack upon revealed religion, in a work written by the latter, which was entitled 'Christianity as old as the Creation.' This letter, which was first published anonymously, but was soon known to be written by Middleton, gave the greatest offence to the clergy. Pearce, bishop of Rochester, replied to it; and so strong was the feeling against Middleton, that he was nearly deprived of his degrees, and nearly degraded from his office of public librarian. Finding it necessary to make an explicit avowal of his sentiments with regard to religion, Middleton published, in 1732, 'Some Remarks on a Reply to the Defence of the Letter to Dr. Waterland, wherein the Author's Sentiments as to all the principal points in dispute are fully and clearly explained,' in which he expressly asserted his belief in Christianity, and disclaimed all intention of attacking the evidences of revealed religion. It must however be admitted that Middleton had spoken of the Scriptures in a manner that was calculated to give just cause of offence; and there is abundance of evidence in his writings to prove that he regarded Christianity in scarcely any other light than a republication of the law of nature, and that he endeavoured, like a certain class of modern divines in Germany, to reduce as far as possible everything supernatural in the Bible to mere natural phenomena. He expressly maintained that there were contradictions in the four evangelists, which could not be reconciled (*Reflections on the Variations found in the four Evangelists*); he accused Matthew 'of wilfully suppressing or negligently omitting three successive descents from father to son in the first chapter of his Gospel' (*Works*, vol. ii., p. 24, 4to. ed.); he asserted that the apostles were sometimes mistaken in their applications of prophecies relating to Christ (*Works*, vol. ii., p. 59); he considered the 'story of the fall of man as a fable or allegory' (*Works*, vol. ii., p. 131); and with respect to the prophecy given at the fall, that the seed of the woman should bruise the serpent's head, he did not hesitate to declare, in another part of his works (vol. iii., p. 183), 'that men who inquire into things will meet with many absurdities which reason must wink at, and many incredibilities which faith must digest, before they can admit the authority of this prophecy upon the evidence of this historical narration.' Such being the opinions of Middleton (and passages of a similar nature might be multiplied to almost any extent from his works), it cannot excite surprise that he should have been regarded by his brethren with suspicion, and have been looked upon, notwithstanding his assertions to the contrary, as a disbeliever in the fundamental doctrines of Christianity.

While these discussions were going on, Middleton was appointed to the professorship of natural history, which had been recently founded by Dr. Woodward, which appointment he resigned in 1734, and soon after married again. In the following year he published 'A Dissertation concerning the Origin of Printing in England,' showing that it was first introduced and practised by our countryman William Caxton at Westminster, and not, as is commonly supposed, by a foreign printer at Oxford. In 1741 he published by subscription his most celebrated work, 'The History of the Life of M. Tullius Cicero,' Lond., 2 vols. 4to. There were 3000 subscribers to this work, and the profits arising from its sale were so considerable, as to enable Middleton to purchase a small estate at Hildersham, six miles from Cambridge, where he chiefly resided during the remainder of his life. Middleton's 'Life of Cicero' is written, like all his other works, in a pleasing and perspicuous style; but the strong bias of the author in favour of his hero has frequently led him to become the panegyrist of very questionable actions, and even to misrepresent, perhaps not intentionally, those events which did not reflect credit on the character of his favourite. [Cicero, p. 158.] Dr. Parr, in a preface to a republication of Bellendenus, entitled 'De Statu,' asserts that Middleton, in his 'Life of Cicero,' borrowed very largely from a work of Bellendenus on the character, literary merits, and philosophical opinions of Cicero, which is entitled 'De Tribus Luminibus Romanorum.'

Two years afterwards, Middleton published a translation of Cicero's letters to Brutus, and of Brutus's to Cicero, with the Latin text, and a prefatory dissertation, in which he defended the authenticity of the epistles against the objections of Tunstall, who maintained that they were the composition of some sophist. The arguments of Middleton were combated by Markland in his 'Remarks on the Epistles of Cicero to Brutus, and of Brutus to Cicero, in a letter to a friend.' [Markland.]

In 1745 he published 'Germana quædam Antiquitatis eruditæ Monumenta,' &c., in which he gave an account of the various specimens of antient art which he had collected during his residence at Rome. Two years afterwards he published his 'Treatise on the Roman Senate,' in which he maintained that all vacancies in the senate were filled up by the people; and in the same year he published 'An Introductory Discourse to a larger work, designed hereafter to be published, concerning the Miraculous Powers which are supposed to have subsisted in the Christian Church from the earliest ages,' which was followed in 1749 by 'A Free Inquiry into the Miraculous Powers,' &c. This work gave even more offence than his letter to Dr. Waterland: it was attacked by Dodwell, Church, and Chapman, and was generally condemned by the clergy as tending to destroy the authority of miracles in general. Middleton however disclaimed all such intention; and it must be allowed that whatever may have been his private opinions, he does not in this work advance anything which could fairly be construed into an attack upon revealed religion; perhaps the former controversy had made him more cautious. The object of the 'Free Inquiry' was to place the divines of his own church in the awkward predicament of either denying the authority of the fathers altogether, or else of admitting the truth of the leading doctrines of the Roman Catholic Church, which he maintains to be satisfactorily established by the testimony and miracles of the early fathers. Edward Gibbon, who was then a young man at Oxford, chose the latter alternative, and went over to the Roman Catholic Church, sooner than abandon the authority of the fathers. [GIBBON.]

In 1750 Middleton published 'An Examination of the Bishop of London's (Dr. Sherlock) Discourses concerning the Use and Intent of Prophecy,' in which he maintained that the use of prophecy, as it was taught and practised by Christ and his Apostles, was drawn entirely from single and separate predictions, gathered by them from the books of the law and the prophets, and applied, independently of each other to establish the Messiahship of Jesus, and that there was no foundation for Dr. Sherlock's argument that the prophecies of each age were intimately connected with each other and with those of the preceding age, and that the whole formed one connected series from the time of the antediluvians to the prophecies of Malachi.

Middleton died at Hildersham on the 28th of July, 1750. He accepted, shortly before his death, a small living from Sir John Frederick. His subscription to the thirty-nine articles and the canons of the church on that occasion was represented by his enemies, but whether justly or not it is difficult to say, as hypocritical and insincere.

The works of Middleton, with the exception of his 'Life of Cicero,' were collected and published after his death in four volumes, 4to. 1752, and subsequently in five volumes, 8vo. Several treatises appeared in this collection which had not been published before, of which the most important are:—'A Preface to an Intended Answer to all the Objections made against the Free Inquiry;' 'Some cursory Reflections on the Dispute or Dissension which happened at Antioch between Peter and Paul;' 'Reflections on the Variations or Inconsistencies which are found among the Four Evangelists;' 'An Essay on the Gift of Tongues;' 'Some Short Remarks on a Story told by the Antients concerning St. John the Evangelist and Cerinthus the Heretic;' and 'An Essay on the Allegorical and Litteral Interpretation of the Fall of Man.'

MIDDLETON, THOMAS FANSHAW, D.D., the first English bishop of Calcutta, was the only son of the Rev. Thomas Middleton, rector of Redleston, in Derbyshire, and was born at that village on the 26th of January, 1769. In 1779 he was admitted into Christ's Hospital, London, and from thence he proceeded to Pembroke Hall, Cambridge, where he took his degree of B.A., with honours, in Jan., 1792. In the following March he received ordination, and entered upon the curacy of Gainsborough, in Lincolnshire Here he edited a periodical work, entitled the 'Country Spectator,' which continued to appear for about seven months, and most of the papers in which were written by Mr. Middleton himself. In 1794 he became tutor to the two sons of Dr. John Pretyman, archdeacon of Lincoln, and brother of the bishop. In consequence of this appointment he removed, first to Lincoln, and afterwards to Norwich, where he became curate of St. Peter's Mancroft in 1799, having already, in 1795, been presented by Dr. Pretyman to the rectory of Tansor, in Northamptonshire. In 1797 he married Elizabeth, the eldest daughter of John Maddison, Esq., of Gainsborough. This lady not only brought him a great increase of domestic happiness, but also assisted him in his literary labours, by transcribing all his manuscripts for the press. In 1802 Dr. Pretyman presented him to the rectory of Bytham, in Lincolnshire. About this time he wrote his chief work, 'The Doctrine of the Greek Article, applied to the criticism and illustration of the New Testament,' which he published in 1808, with a dedication to Dr. Pretyman. In the same year he took his degree of D.D. at Cambridge, and removed to his living at Tansor, where he discharged his duties in such a manner as to gain the affection and esteem of his people. In 1809 he was appointed by Bishop Pretyman to a stall in the cathedral of Lincoln, and in 1812 to the archdeaconry of Huntingdon. In 1811 he resigned his two livings for the vicarage of St Pancras Middlesex, and the rectory of Rottenham, in Hertfordshire. He fixed his residence at St. Pancras, and made the acquaintance of several dignitaries of the church and other distinguished individuals.

About this time a provision was inserted in the Act for the renewal of the East India Company's Charter, enabling the crown to constitute a bishopric in India. Calcutta was forthwith made a bishop's see, and Dr. Middleton was appointed the first bishop, and consecrated by the archbishop of Canterbury on the 8th of May, 1814. After receiving an address from the Society for the Promotion of Christian Knowledge, of which he was a warm supporter, requesting his aid in promoting the objects of the Society in India, and after being elected a fellow of the Royal Society, Bishop Middleton sailed on the 8th of June, and arrived in Calcutta on the 28th of November, after a voyage which he had diligently employed in increasing his qualifications for his office, especially by the study of Hebrew and Persian. As bishop of Calcutta he made every effort to promote the interests of Christianity according to the tenets of the Church of England, and to aid the cause of education. He made three visitations of his immense diocese, in two of which he directed his particular attention to the state of the Syrian Christians in the neighbourhood of Cochin, on the coast of Malabar. By his efforts the Bishop's College at Calcutta was established for the education of clergymen and missionaries for the British possessions in Asia; and he laid the first stone of its buildings on the 15th of December, 1820. He instituted a consistory court at Calcutta, and would have done the same at Madras, but for the opinion of the advocate-general at Madras that such a measure would be illegal.

Bishop Middleton died of a fever on the 8th of July, 1822, in the fifty-fourth year of his age. He was buried at Calcutta, and the greatest respect was shown to his memory both in India and at home. He was of a tall and commanding person; animated in his manner; sanguine, generous, and amiable in his disposition; and, in his religious principles, firmly attached to the Church of England. As all his papers were destroyed by a direction in his will, none of his works have appeared besides the 'Doctrine of the Greek Article,' the periodical publication mentioned above, and some sermons, charges, and tracts, which have been collected into a volume, to which a memoir of Bishop Middleton is prefixed, by H. K. Bonney, D.D., archdeacon of Bedford (Lond., 1824).

The object of Bishop Middleton's work on the Greek article is, first, to establish the rules which govern the use of the article, and then to apply these rules to the interpretation of various passages in the New Testament, many of which are of such a nature that they furnish arguments for or against the divinity of Christ, according to the different views which are taken of the force of the article. Owing to this circumstance the doctrine of the Greek article has become the subject of warm discussion among theologians; and some Unitarian divines have strongly opposed the views of Middleton. His chief rules have however been received as sound by the great majority of biblical critics. A second and improved edition of Middleton's work was edited by Professor Scholefield in 1828, and a third edition by the Rev. Hugh James Rose, 1833. An abstract of the work is prefixed to Valpy's edition of the Greek Testament.

MIDDLEWICH. [CHESHIRE.]

MIDHEAVEN (Astronomy), a technical term for the point of the ecliptic which is on the meridian at any given moment.

MIDIANITES (מִדְיָנִים, *Μαδιανῖται, Μαδιηνᾶιοι*), the descendants of Midian, the son of Abraham by Keturah (*Gen.*, xxv. 2, 4), who, with the other sons of Abraham's concubines, migrated eastward from Canaan during Abraham's life (*Gen.* xxv. 6). In the time of Jacob their merchants had caravans from Gilead through Palestine to Egypt (*Gen.*, xxxvii. 28, 36). In the time of Moses we find them in Arabia Petræa, under the government of a high-priest (*Exod.*, ii. 15), and leading their flocks as far as Mount Sinai (*Exod.*, iii. 1); but they did not extend to the west of this mountain, for the Israelites did not come in contact with them in their march from Egypt, but, on the contrary, Jethro, their high-priest, came out of his country to visit Moses, when the Israelites were encamped at the foot of Sinai (*Exod.*, xviii. 1-5; *Numb.*, x. 29). They are next mentioned as living in the neighbourhood of the plains of Moab, to the east of the Dead Sea and the river Jordan.

where they suffered a defeat from the Edomites (*Gen.*, xxxvi. 35), and where they again appear as allies of the Moabites when the Israelites arrived the second time on the borders of Palestine (*Numb.*, xxii. 4). Here they corrupted the Israelites with the licentious worship of their god Baal-peor, and were punished by a dreadful massacre (*Numb.*, xxv. xxxi.; *Josh.*, xiii. 21). This calamity however fell only upon a part of the nation, for they afterwards, with the Amalekites and other eastern tribes, invaded the country of the Israelites, and destroyed the harvests, during seven successive years (*Judges*, vi. 1-3, 33). At last Gideon (*Judges*, vi. 11) defeated the Midianites and Amalekites in the plain of Jezreel, and pursued them beyond the Jordan (*Judges*, vi. 33; vii. viii.). In the time of Isaiah, the Midianites were still known as a commercial tribe (*Is.*, lx. 6), but their name afterwards merged in that of the Arabians.

The exact country of the Midianites is not determined with certainty. Some indeed suppose that those in Arabia Petræa, mentioned in *Exodus*, ii. 15, were quite a different nation from those on the east of Palestine, the former being related to the descendants of Cush (*Numb.*, xii. 1; *Hab.* iii. 7). But the more common and more probable opinion is, that the Midianites were an Arabian nomade tribe, whose possessions extended from Mount Sinai and the head of the Red Sea up towards the plains of Moab, while there may have been other bodies of them in the western part of Arabia (1 *Kings*, xi. 18). The Arabian geographers Abulfeda and Edrisi mention a town, Madian, on the eastern side of the Ælanitic gulf of the Red Sea, somewhat to the north of the modern Moilah, which is probably the Μήδιανα of Ptolemy (v. 17) and the Μαδιανή of Josephus (*Ant.*, xii. 11, 1), and of which the ruins were to be seen in the time of Eusebius and Jerome.

The Midianites were governed by their elders (*Numb.*, xxii. 4), and by chiefs or kings (*Numb.*, xxv. 15, 18; xxxi. 8, *Judges*, vii. 25; viii. 3, 5). When they invaded Palestine they were very numerous; they possessed many camels, and had acquired great wealth, probably by commerce (*Judges*, vi. 5; vii. 12; viii. 10, 24; *Is.*, lx. 6). Their religion was the worship of Baal-peor. [BAAL.]

They are twice called Ishmaelites (*Gen.*, xxxvii. 28; *Judges*, viii. 24), which is a proof of their close connection with the Arabians. (Relandi, *Palæstina*, 98; Winer's *Biblisches Realwörterbuch.*)

MIDSHIPMEN are young gentlemen ranking as the highest of the first class of petty officers on board a ship of war: their duty is to pass to the seamen the orders of the captain or other superior officer, and to superintend the performance of the duties so commanded. They are educated for their profession at the Royal Naval College, and are required to complete two years service at sea before they can be rated. Such as are appointed by the special authority of the Lords Commissioners of the Admiralty are denominated Admiralty midshipmen.

By the regulations of 1833, the whole number allowed to be entered on board a ship of war varies according to the rate of the latter; a sixth-rate ship may have eight, and a first-rate may have twenty-four midshipmen. And, on a ship being put in commission, the captain or commander may select them from the Royal Naval College, subject however to the approbation of the lords of the admiralty.

Should there be more Admiralty or College midshipmen than can be provided for, their lordships may give appointments, as extra-midshipmen, to two at most for any one ship; these must be in the places of an equal number of seamen, and they are included in the complement of midshipmen when vacancies occur.

The monthly pay of an officer of this class is 2*l.* 8*s.* for ships of all rates.

MIDSUMMER EVE. On the eve of the feast of the Nativity of St. John the Baptist, or Midsummer-day, it was long the custom to kindle fires at midnight, sometimes upon the hills, in honour of the summer solstice; a practice which Gebelin, in his 'Allegories Orientales,' says was followed among the antient nations. In later times these were sometimes called St. John's fires; and they are still lighted in Ireland. The 'Times' newspaper of June 29, 1833, contains an account of a riot at Cork in consequence of some soldiers refusing to subscribe money toward the fires which were to be lighted on St. John's Eve.

(Brand's *Popul. Antiq.*, 4to. ed., vol. i., p. 238; Milner's *Inquiry into certain Vulgar Opinions concerning the Catholic Inhabitants and the Antiquities of Ireland.* 8vo., Lond., 1808, p. 100; Vallancey, *Collect. de Rebus Hibern.*, No. I., p. 123.)

MIEL, JAN (called GIOVANNI DELLO VITE), one of the most eminent of the Flemish artists, was born in 1599. He studied under Gerard Segers, in whose school having highly distinguished himself, he went to Rome, where he especially studied and copied the works of the Caracci and Correggio. On being received into the academy of Andrea Sacchi, he gave such proofs of extraordinary genius, that Sacchi invited him to assist him in a grand design which he had already begun. But in consequence of some disgust, the cause of which does not appear, Miel abandoned the elevated subjects which had hitherto engaged his attention, declined the friendly proposal of Sacchi, and resolved to adopt the style of Bamboccio, to whom he is nowise inferior in force or brilliancy. His favourite subjects were holiday parties, carnivals, gipsies, beggars, and pastoral scenes and persons. We speak of his easel pictures, which are his finest performances; but he likewise painted historical pictures on a large scale, both in fresco and oil, which, though wanting in elevation of design and grace in the heads, are far superior to what might be expected from an artist whose subjects were in general of so much lower a class. His pictures of hunting-parties are particularly admired; the figures and animals of all kinds are designed with extraordinary spirit and truth to nature; the colouring is beautifully transparent, and the tints of his skies are extremely clear and delicate. His great merit procured him the favour of Charles Emanuel, duke of Savoy, who appointed him his principal painter, conferred on him the order of St. Mauritius, and presented him with a cross set with diamonds of great value. There are many capital pictures by this artist in the imperial gallery at Vienna; and in a grand saloon in the hunting seat at Turin there is a series of his noblest productions, representing the chace of various kinds of animals.

MIERIS, FRANCIS (called the Elder), was born at Leyden in 1635. This admirable artist was at first placed under the care of Abraham Toorne Vliet, one of the best designers in the Low Countries; and after having made considerable progress under him, he became a pupil of Gerard Douw. He soon so far surpassed all his fellow-students, that Gerard Douw called him the prince of his disciples. He excelled Douw in elegance, in correctness and brilliancy of colouring, and in the art of painting silk, velvet, satin, and other rich stuffs, and was nearly equal to him in finish. His works are rarely to be seen, and more rarely to be sold, and their prices are very high. Besides portraits, he painted conversations, persons performing on musical instruments, patients attended by their physician, &c. His own price for his pictures was calculated according to the time he spent upon them, at the rate of a ducat an hour. His finest portrait is that of the wife of M. Cornelius Plaats, in whose family it was carefully preserved, according to Pilkington, though very large sums had been offered for it. Some of his pictures are in the Florence Gallery. He died in 1681, aged forty-six.

MIERIS, WILLIAM (called the Younger), the son and disciple of Francis, was born at Leyden in 1662. He had made considerable progress during the life of his father; but having lost him when only nineteen years of age, he devoted himself to the study of nature. His first subjects were taken from private life, like those of his father, in which every part was copied minutely after nature. He afterwards attempted historical compositions, and his first performance of this kind was Rinaldo asleep on the lap of Armida, surrounded by the Loves and Graces, which was so highly admired, that he was prevailed upon to paint three repetitions of the same subject. He likewise painted landscapes and animals; and was so admirable a modeller in clay, that he might be ranked among the most eminent sculptors. He was inferior to his father in design, grouping, and effect; nor has he the same exquisite touch. His finishing is extremely delicate, and almost over-careful. He died in 1747, at the age of eighty-five, equally esteemed as a man and an artist. The above account is taken from Pilkington and others; but Dr. Waagen is much less favourable in his opinion: he says, 'The degeneracy of Dutch painting into mere mechanical industry, without spirit, was manifested, in all its dull sameness, in this master, most of whose works are extremely disagreeable to me.'

MIERIS, FRANCIS (called the Young Francis), was the son of William, but much inferior to him. He made numerous copies of the works of his father and grandfather, and it is probable that such copies are put off at public sales as their performances. He is more distinguished as an historian, by his 'Historie der Nederlandsche Vorsten,' 3 vols. fol., the Hague, 1732-5; and 'Groot Charterboek der Graven van Holland, Zeeland, en Vriesland,' 4 vols., Leipzig, 1753-6. The history of his native town Leyden was left unfinished, one volume only having been published. He died in 1763, aged seventy-six.

MIGNARD, PETER (called the Roman), was born at Troyes in 1610. His name was properly More; but his father, who was of English origin, took the name of Mignard. He was at first intended for the medical profession; but as he manifested a decided talent for painting, his father placed him in the school of Jean Boucher, at Bourges, and afterwards in that of the celebrated Vouet. Having seen some capital paintings of the Italian masters, he left Vouet and went to Rome, in 1636, to study after Raphael, Michael Angelo, and A. Caracci. He spent twenty-two years at Rome, during which time he painted many historical pictures and portraits, among which those of popes Urban VIII. and Alexander VII. were the finest. In 1658 he was invited to Paris at the suggestion of Colbert, and, on his way through Italy, had the honour of painting the portraits of several of the Italian princes and their families. In France he acquired the favour of Louis XIV., who sat to him for his portrait ten times, and gave him a patent of nobility; and after the death of Le Brun, appointed him principal painter, director of the Royal collections of the Academy of Painting, and of the Gobelin manufactory. Mignard executed one of the greatest works in fresco in France, the cupola of Val de Grace. He also adorned the great hall at St. Cloud with mythological subjects, undertook several works at Versailles, and painted numerous portraits. Though Mignard was far inferior to the great models that he studied at Rome, in invention, elevation, depth of feeling, and originality, his pictures, especially his Madonnas, have much delicacy and grace; his compositions are rich; his colouring, in general, is brilliant and harmonious; and he unquestionably is in the first rank of the painters of the French school. He died in 1695, at the age of eighty-five. Nicholas Mignard, Peter's brother, two years older, was a very respectable artist: he studied two years at Rome with Peter. He died at Paris in 1668, where he was director of the Royal Academy of Painting.

MIGUEL, SAN. [Mexican States.]

MIHIEL, ST. [Meuse.]

MILA'NO, THE PROVINCE OF, is bounded on the north by the province of Como, on the east by that of Bergamo (from which it is divided by the Adda), on the south by the provinces of Lodi and Pavia, and on the west by the Ticino, which separates it from the Sardinian territory. The province of Milan is entirely in the great plain of Lombardy, and is watered by the Lambro, the Olona, and other affluents of the Po. Numerous canals, some for irrigation and others for navigation, communicate with these various rivers. The soil is in most parts fertile, and the country is well cultivated, full of large villages, farm-houses, and country-houses; and the appearance of prosperity is general. The chief products are corn, rice, fruit, grass for cattle, and silk. The population of the province, exclusive of the city of Milan, in 1837, consisted of 377,324 inhabitants, and is increasing every year. The province is divided into fifteen districts: Milano, Bellate, Saronno, Barlassina, Monza, Verano, Vimercate, Gorgonzola, Gallarate, Cuggiono, Busto, Arsizio, Soma, Melzo, Melegnano. The only town, besides Milan, is Monza, ten miles north-east of Milan, with about 10,000 inhabitants, and a fine old cathedral founded by the Longobard queen Theodelinda: it contains several good paintings, and the portraits of all the sovereigns who have worn the iron crown of Lombardy, from Agilulphus, the husband of Theodelinda, to Charles V. The iron crown, so called because it contains an iron rim which is said to be made of one of the nails from the cross of Jesus Christ, is kept in the cathedral of Monza. The archives contain many valuable old documents, and some fine MSS. of the time of Pope Gregory I. Monza has also a handsome royal palace, with a vast park and gardens. The neighbourhood of Milan contains many other fine country residences belonging to the Milanese nobility and landed gentry: among others Omate, Leinate, Castellazzo, Gernietto, Villa Traversi near Desio, and Montebello. This last is memorable from having been the head-quarters of Bonaparte after the campaign of 1797, and during the negotiations which preceded the peace of Campoformio. It was at Montebello that he decreed the destruction of the republic of Venice. The roads in the province of Milan are numerous, wide, and kept in excellent repair.

MILA'NO, the capital of Lombardy, and the third city of Italy, being next to Naples and Rome in population and importance, stands in the midst of a vast plain, between the rivers Olona and Lambro, with which it communicates by a canal called Naviglio Grande, which flows all round the original old town, of which it marks the boundary. This Naviglio and another canal called Naviglio di Martesana put Milan in communication with the Lago Maggiore and the Lake of Como on one side, and with the Po on the other. The suburbs, which have been gradually built outside of this boundary, and which occupy more space than the original city, are enclosed and surrounded by a line of ramparts, which is planted with trees, and serves as a promenade. This external circuit of the town is nearly ten miles. Much of the space however between the Naviglio and the ramparts is not built upon, and is occupied by gardens and fields. The population of Milan, in 1837, was 145,387. (*Bollettino Statistico.*) In 1770, when the abbé Richard wrote his tour, it did not amount to 100,000. In 1810, under Napoleon, it was 132,000. In 1816, after the change of government, it fell to 129,000, since which time it has been increasing yearly. The widest and finest streets of Milan are in the external part of the town, or suburbs: those which lead to the principal gates are called Corso, and serve as fashionable promenades. The Corso di Porta Orientale, which leads to the Bergamo road, is the most frequented. The streets of the old town are mostly narrow and irregular. The duomo, or cathedral, stands nearly in the centre of the town, and its lofty spire, which is seen from almost every part of it, serves as a directing point to strangers. This magnificent building, all of white stone, and dedicated to the Virgin Mary, was begun by Giovanni Galeazzo Visconti, duke of Milan, in March, 1386, and is not yet quite finished. The exterior, with its hundred spires and its three thousand statues of various sizes, looks like a forest of marble. The style of architecture is a kind of florid or modern Gothic; the front is of a mixed style. The interior is vast and imposing, and not loaded with ornaments. There are 520 steps to ascend, in order to reach a gallery which runs round the principal spire, from which there is a most splendid view of the whole Lombard plain, and of the chain of Alps which borders it in the form of a crescent on the north side. The churches of Milan abound with fine paintings: the famous Lord's Supper, by Leonardo da Vinci, in the refectory of the former convent of Santa Maria delle Grazie, though sadly injured, is not yet quite obliterated.

Milan is a gay, thriving, modern city: its markets are abundantly supplied with every luxury, and the citizens are generally fond of good living. Numerous coffee-houses, splendid hotels, abundance of handsome carriages, elegantly dressed pedestrians, several theatres well supplied with actors and singers,—all attest the habits of a luxurious capital. Milan has been styled 'the little Paris;' and the appellation is appropriate, for it resembles that capital rather than the other Italian cities. But Milan is also a centre of learning: it is the place of residence of several of the best Italian writers, and more books are published yearly at Milan than in all the rest of Italy. Gioja, Romagnosi, and Monti made Milan their habitual residence; Manzoni, Grossi, Sacchi, and other living writers still reside in it. The fine arts are successfully cultivated at Milan, as the annual exhibition of the works of living artists proves. The engravers Longhi (lately dead), Anderloni, and others rank among the first in Italy. The museum of Brera contains several excellent paintings of the great masters; among others the Agar of Guercino, the Marriage of the Virgin by Raphael, and St. Peter and Paul by Guido. The Ambrosian library is well known for its numerous and valuable MSS., and especially for its palimpsests, derived from the monastery of Bobbio, and among which Mai discovered the treatise 'De Republica' of Cicero, fragments of several of his lost orations, the letters of Marcus Aurelius and Fronto, and other valuable remains of antient literature. The library of Brera contains 100,000 volumes, and is open to the public. Among the private libraries, that of the marquis Trivulzio contains 30,000 printed volumes and 2000 MSS.

Milan abounds with charitable institutions. The great hospital, one of the finest and largest in the world, has been richly endowed by numerous benefactors, whose portraits are preserved within it. A singular but harmless distinction has been observed in these portraits. Those benefactors who have contributed below a certain sum are represented standing, whilst those whose donations or legacies have been more considerable are painted sitting comfortably at their ease. Four houses of refuge for poor children are supported by public contributions. Two large workhouses for the unemployed poor have been established of late years, as well as a house of correction for criminals, who are employed in useful labour, and which is said to be admirably well regulated. (*Bollettino Statistico di Milano*, January, 1833.) Milan has a savings'-bank, the deposits in which are between five and six millions of livres, or above 200,000*l.* sterling, an insurance company, a military college, a veterinary school, a conservatorio or school of music, and a school of the fine arts. For general education, there are two royal colleges or Lycea, three gymnasia, a clerical seminary, and three colleges or houses for female education. The elementary schools are noticed in the article LOMBARDO-VENETIAN KINGDOM. The Society of Arts and Sciences bestows annual prizes for inventions relating to agriculture and manufactures.

The manufactures of Milan are of some importance: they consist chiefly of silks, printed cottons, plate-glass, jewellery, artificial flowers, braid, soap, and leather.

Milan is an archbishop's see, the residence of the Austrian viceroy and of the governor-general of the Lombard provinces. It has a court of appeal, a tribunal of prima istanza for civil and another for criminal matters, and a commercial tribunal, called 'Tribunale mercantile e di Cambio.'

The public gardens, the ramparts, the great parade, which occupies the site of the old citadel, and the several avenues planted with trees which lead from the gates in various directions, afford pleasant walks and rides. The climate of Milan is hot in summer, but occasionally cold and foggy in winter: it is however considered healthy.

The Circo, or modern amphitheatre, built in the time of the French dominion, for the exhibition of chariot and horse races, bull-fights, and other games, is of an oval form. The arena, which is about 800 feet in length, can be filled with water, and be transformed into a naumachia for boat-races.

The Duomo and La Scala theatre have so completely absorbed the attention of travellers, that few of them have done more than barely mention any of the other edifices, notwithstanding that Milan contains several which deserve examination on account of their architecture. Even Woods, in his 'Letters of an Architect,' speaks only of some of the older churches, scarcely naming any one building besides, or any work of the last or present century, the theatre of La Scala, and the Arco della Pace itself, not excepted. Notwithstanding the imposing grandeur of some of the older palazzi, or private mansions, and the elegance of some of the modern ones, neither the one nor the other have been described, or rather they have scarcely been named; and yet among the former are the Palazzo Arcivescovile, with its façade of simple grandeur, the Palazzo Visconti, remarkable for the series of large busts on the pediments of the principal floor windows; the Palazzo Annone, by Francesco Richini, in a rather peculiar yet majestic style; the Palazzo Marini, now the Palazzo di Finanza, the work of Galeazzo Alessio, which, although impure in taste, and too much crowded, is an exceedingly rich and picturesque as well as extensive pile of building, whose principal façade exhibits three orders, a Doric, an Ionic (in pilasters), and one consisting of fluted termini, surmounted by masks or busts for their capitals. Among the more recent structures of this class is the Palazzo Belgioioso, by Giuseppe Piermarini (who died 1798), the architect of the Teatro della Scala, the Monte or public bank, and various other edifices; the Villa Belgioioso, by the architect Leopoldo Pollak (died 1800); and the Palazzo Belloni, the work of the celebrated Cagnola, who likewise erected the magnificent marble triumphal arch called the Arco della Pace. Somewhat akin to this last-mentioned structure are several of the arches or gateways forming the entrances into the city. Among these the most remarkable in point of design is the Porta Ticinense, or di Marengo, a classical propylæum of the Ionic order, presenting a double distyle in antis, that is, one in each front, connected by lateral walls, each pierced by a single plain arch. This also was designed by Cagnola. The Porta Nuova, by the architect Zanoja, who died in 1817, and who is known also as a poet, is a very tasteful design, and one that shows considerable originality. The Porta Orientale again, with the adjoining buildings as completed a few years since by Vantini, makes a rich architectural display. Yet, with the exception of the Duomo, not one of these edifices, not even the gorgeously-picturesque façade of Santa Maria presso San Celso, the work of Galeazzo Alessio, nor the more refined elegance which stamps many of the buildings by Cagnola, Zanoja, Pollak, Gilardoni, and other modern architects, has been described by the pencil of any of our English artists, who seem to have visited Milan for no other purpose than that of delineating what is as familiar to us from prints as our own St. Paul's.

The Arco della Pace calls for more particular notice, as being one of the most splendid public embellishments of Milan, and, after the Arc de l'Etoile at Paris, the most important monument of the kind erected in modern times; likewise as being the principal work of its architect, the Marchese Luigi Cagnola, by whom it was commenced in 1807, and carried on until his death, August 10, 1833, after which it was continued by Carlo Londinio, and finally completed in 1837. It stands on the north-west side of the city, where it forms the entrance from the road of the Simplon into the spacious Piazza d'Armi, and is not only completely insulated, but so situated as to be seen to the utmost advantage from every point of view, particularly as regards its two principal fronts, one of which faces the noble avenue above mentioned, and the other, or that towards the city, is viewed between two elegant Doric marble buildings (serving as guard and toll houses), which are placed a little in advance of it, and are about three times the breadth of its front apart from each other. The arch, which is entirely faced with marble, and highly enriched in every part with reliefs and sculptures, besides statues both upon and in front of the attic, forms an architectural mass whose general dimensions are 72½ feet English, by 42½ in depth, and 74 in height, or including the sestiga and statue on its summit, the extreme height is 98 feet. Each of the principal fronts exhibits four fluted Corinthian columns, with half-columns behind them, and between them a centre arch (24 feet wide and 48 high) and a smaller one (10 feet 9 inches wide and 28 feet high) on each side of it. The entablature (the frieze of which is enriched throughout with figures of genii holding festoons) is not made to break over each of the columns, as in the triumphal arches of antiquity, neither is it continued unbroken throughout, as is the case in the arch in the Green Park, London, but it forms only a single projecting break on each side of the centre, whereby the inconvenience is avoided of such a mass of stone being suspended over the wider centre intercolumn. This disposition of the entablature has led to another novelty in the design, for instead of a statue being placed over each column, a single recumbent one, of larger dimensions than would else be suitable, is placed on these projecting entablatures. Those on the side towards the city represent the rivers Ticino and Po, on the other the Adige and Tagliamento; the two former of which were executed by Cacciatori, and the latter by Pompeo Marchesi.

There is some peculiarity in the plan of the Arco della Pace, there being no transverse passage through it from end to end, as in the Arc de l'Etoile, but merely an opening through the piers separating the larger arch from the one on each side of it, owing to which the external sides or ends of the structure have the expression of greater solidity. At each angle of the attic is a bronze equestrian statue of Victory, about thirteen feet high; and on the side towards the city the centre is crowned by a colossal figure of Peace (modelled by Sangiorgio, and cast in bronze by Luigi and Antonio Manfredini) in a car with six horses. Further than this neither description nor enumeration can be given of the various other sculptures and reliefs that so worthily adorn this magnificent work.

Milan, under the name of Mediolanum, was a town of the Cisalpine Gauls, and is mentioned by Livy (v. 34) and Polybius (b. xi.). It was taken by the consuls M. Marcellus and C. Cornelius Scipio, B.C. 221. Little is said in history of Milan afterwards until the end of the third century of our æra, when Maximianus, the colleague of Diocletian, fixed his residence at Milan, and surrounded it with walls.

which were two miles in circumference, and which continued to enclose the area of the town till the time of Frederic I., in the twelfth century. Valentinian II., Theodosius I., Honorius, and other emperors of the fourth and fifth centuries, resided occasionally at Milan. At the fall of the Western empire, Milan was twice devastated, once by Attila, and afterwards by the Goths under Vitiges, A.D. 539, and it did not recover from their ravages for several centuries after. The Longobard kings had their residence at Pavia, and Milan is little noticed in history during their dominion. It remained in obscurity till the latter part of the ninth century, when, under the reign of the emperor Charles the Fat, the archbishop Anspertus restored the walls built by Maximianus, and thus gave security to the inhabitants. From that time Milan recovered, and grew in population and wealth, and became gradually the principal city of Lombardy. The remainder of its history is given under LOMBARDY and LOMBARD CITIES. The present city of Milan has no claims to classical antiquity, the only solitary remains of Roman construction being sixteen handsome fluted pillars near the church of S. Lorenzo, which are supposed to have formed part of a temple dedicated to Hercules by Maximianus.

The history of Milan has been written by Corio, Ripamonti, Calco, Giulini, and lastly by Verri, who is the most critical and enlightened of the native historians, 'Storia di Milano,' with a continuation by Custodi, 4 vols. 8vo., 1825. Argelati has written the literary history of Milan, 'Bibliotheca Scriptorum Mediolanensium,' 4 vols. fol., 1745. Pirovano has published a description of Milan, 'Nuova Guida di Milano, coi suoi Stabilimenti di Scienze, di Pubblica Beneficenza ed Amministrazioni, Chiese, Palagi, Teatri,' &c., 1824. Numerous other authors have written upon particular buildings and other subjects relative to this important city. See also the *Plan of Milan*, published by the 'Society for the Diffusion of Useful Knowledge.'

MILDEW is a disease which attacks both living and dead vegetable matter, and is believed by the vulgar to be owing to fogs, dew, meteors, and noxious exhalations, but in reality is caused by the ravages of parasitical fungi. This malady is often of little importance to the subjects of its attack, as it appears towards the close of the year, when the most essential of the vital functions of plants are fulfilled, or in such a small degree as to produce no appreciable effect upon the general health of the plants infested. But it very often becomes a most serious evil, destroying the straw of corn, and so preventing the maturation of the grain, ravaging the fields of peas and beans, destroying the hopes of the gardener by seizing upon his peaches and nectarines, especially when forced, and not unfrequently extending its evil influence to the orchards and every description of kitchen-garden crop.

The species of fungi which produce these effects are always very minute, and often of microscopic smallness. Some are intestinal, attacking plants internally, and only becoming visible when they break through the surface of the plant for the purpose of shedding their spores; others are superficial, rooting and fructifying upon the outside of the epidermis. These two classes of mildew fungi require to be carefully distinguished.

Of the *intestinal* fungi the following are the more common, viz.:—

1. *Uredo fœtida*, called the Pepper-brand. This plant attacks wheat, filling the young seed with its jelly-like spawn, and producing myriads of fœtid deep brown spores, which end by occupying the whole interior of the ripe grain.

2. *Erineum griseum*, and other species of the same genus, which overrun the leaves of the mountain ash, the sycamore, &c., forming broad grey, orange, or brown blotches.

3. Various kinds of *Puccinia*. The mildew of wheat-straw is caused by *Puccinia graminum*, which is generated in cavities below the epidermis of the stem, and protrudes when ripe in the form of dull greyish-brown broken striæ. *Puccinia Heraclei* occasionally attacks crops of celery and endive, spreading over the field and producing the appearance of scorching.

4. *Æcidium cancellatum* occasionally does much harm to pear-trees in the orchards of Herefordshire. It appears at first like bright yellow spots upon the upper surface of the leaves; by degrees a liquid matter is exuded from them; at the same time small conical processes appear in clusters from the under side of the leaf; these processes enlarge, become fibrous, open at the sides by numerous slits, and thence discharge their spores. This fungus often produces the most destructive consequences, appearing upon the leaves, stems, and fruits, and generally destroying the tree. Another species, *Æcidium laceratum*, sometimes spreads over hawthorn hedges; and the common orange-red mildew of the Berberry is *Æcidium Berberidis*.

5. *Sclerotium*, a hard kernel-like fungus, is a less common but sometimes very troublesome visitor. *S. compactum* occasionally establishes itself in the rind of fruits, rendering them uneatable; *S. Cyparissiæ* and others attack the leaves of various plants, particularly of the pear-tree.

In all these cases it is usually found that the most vigorous individuals are the first affected by the mildew, especially in the case of Uredo and Puccinia; and it is probable that the spores from which these plants are propagated are drawn into the circulation from the soil, along with the fluid matter on which plants feed; that they are carried along into the stem, and begin to grow as soon as they find themselves in a suitable situation, disturbing and disorganising the tissue by the production of their spawn, and taking to themselves that nutriment which would otherwise have been applied to the general maintenance of the plant attacked. Mr. Bauer found that he could always cause wheat to produce the Uredo fœtida by rubbing its grains with the spores of that fungus previous to their being sown; and Mr. Knight ascertained that by sowing pear-seeds in soil infested with the Æcidium, the very youngest leaves of the seedling plants were attacked.

Of *superficial* fungi the following are the most remarkable:—

1. *Cylindrosporium concentricum*, a pulverulent species, which appears in dots arranged in a circular manner upon the leaves of the cabbage.

2. *Acrosporium monilioides.*—A frequent cause of the whiteness of leaves and stems in roses, &c. It consists of vast multitudes of filaments jointed like a necklace.

3. *Botrytis diffusa* and species of the genus *Aspergillus*, whose filaments bear tufts or branches, covered with spores. These form the white mealy appearance of the leaves of onions and similar soft-leaved plants.

4. *Erysiphe communis*, which forms the mildew of peas. It consists of white cobweb-like spawn, radiating from a solid grey spherical centre, filled with the spores of the species. Peach mildew is often caused by another of this genus, the *E. pannosa*.

The attacks of superficial fungi are generally brought on by the debility of the species attacked; and it is probable that unhealthy individuals only are suited to the growth of these parasites. This is like what occurs among animals, which, when healthy, are scarcely attacked by parasitical vermin, but as soon as they become sickly are overrun by them. Heavy rains occurring suddenly after long drought are mentioned as a cause of this kind of mildew; and it may be supposed that the plants are debilitated by the dry weather, at which time the fungi seize upon them, and that as soon as rain falls they grow with rapidity and quickly overrun the plants. It is said that deep-coloured roses and peaches are more liable to mildew than others; this may be referred to constitutional debility, for their colour is connected with a want of power to decompose carbonic acid, which is one of the most indispensable of vital functions in the vegetable kingdom. Transplanted onions, which are less vigorous than untransplanted ones, are the most subject to mildew.

These causes of mildew being rightly understood, the methods of preventing the evil are sufficiently obvious. To cure intestinal mildew the soil should be neither too rich nor too freely watered, and every precaution should be taken to prevent the spores of the mildew-plants from being communicated to the soil. Mr. Knight stopped the attacks of *Æcidium cancellatum* by taking up his mildewed pear-trees, washing their roots clean, pruning them closely, and removing them to a new situation; those removed became healthy, those left in the soil eventually perished. It would also appear that in some cases plants may be rendered incapable of taking the mildew. Mr. Bauer says that if corn attacked by pepper-brand is soaked in lime-water for at least 12 hours and then well dried in the air, before sowing, not only are all the fungi adhering to it destroyed, but the plants themselves are incapable of nourishing the fungus; at least he found that prepared grains could not be inoculated, although unprepared grains could be. With regard to destroying superficial mildew, a restoration of vigour or its preservation seems to offer the best chances of success. Mr. Knight prevented his peas from mildewing by watering them abundantly and constantly; in Scotland, where the climate is more equable than in England, and the night dews more abundant, pea mildew is unknown; the writer of this has seen a crop of onions, perishing under the attacks of Botrytis diffusa, gradually restored to health by a constant supply of water. As to the schemes of stopping superficial mildew by the application of sulphur, quick-lime, fresh wood-ashes, and similar substances, all of which have been recommended, it does not appear that any advantage follows their employment. When trees are attacked by superficial parasites, the best plan of removing the evil is by cutting off all the mildewed branches and destroying them, together with shreds, nails, or whatever else may have been made use of in training the plants. Mr. Hayward recommends in addition that peach-trees, which are very liable to mildew, should be subsequently washed with a fluid consisting of 4 gallons of rain-water, 2 lbs. of soft soap, 1 lb. of flower of sulphur, 1 lb. roll tobacco, 1 quart of fresh-slaked lime, and 1 pint of spirits of turpentine, the whole boiled together for half an hour.

MILE. This word is derived from *miliare*, the *mille passus*, or thousand paces, of the Romans. Each pace was five feet, and each foot certainly contained between 11·60 and 11·64 modern English inches. [STANDARDS OF LENGTH.] Taking the Roman foot at 11·62 English inches, the original Roman mile was therefore 1614 yards, or nine-tenths and one-sixtieth of an English statute mile, very nearly; while the English mile is a Roman mile and nine hundredths of a Roman mile.

The English statute mile is 8 furlongs, each of 220 yards, or 40 poles of 5½ yards or 16½ feet each. It is also 80 surveying chains of 22 yards each. It is therefore 1760 yards, or 5280 feet. The square mile is 6400 square chains, or 640 acres.

The remains of the Roman mile and the Gallic or Celtic league [LEAGUE] are found in the itinerary measures of most European countries. The following list (taken from Kelly's 'Cambist,' except the statement of the Roman mile) will show the itinerary measures of various countries, as they are usually reputed in English yards and statute miles. We have placed them in order of magnitude. The last column shows in round numbers how many of each make 1000 statute miles:—

Yards.		Stat. miles.	No. in 1000 St. miles.
1614	Antient Roman mile	·917	1091
1628	Modern Roman mile	·925	1081
1760	English statute mile	1·000	1000
1808	Tuscan mile	1·027	974
1984	Antient Scottish mile	1·127	887
2240	Irish mile	1·273	786
4263	French posting league	2·422	413
4635	Spanish judicial league	2·634	380
4860	French league of 25 to the degree	2·761	362
6760	Portugal league	3·841	260
6859	German short mile	3·897	257
6864	Flanders league	3·900	256
7416	Spanish common league	4·214	237
8237	Prussian mile	4·680	214
8244	Danish mile	4·684	213
8475	Dantzic mile	4·815	205
9113	Hungarian mile	5·178	193
9153	Swiss mile	5·201	192
10126	German long mile	5·753	174
11559	Hanoverian mile	6·568	152
11700	Swedish mile	6·648	150

The metrical mile of 1000 French metres, or one kilometre, or 1093 English yards, is put down among the measures of France, Italy, and the Netherlands; the geographical mile, or the sixtieth of a degree of latitude, or about 2025 yards, is used in England and Italy; the geographical league of three such miles, or 6075 yards, is used in England and France; the German geographical mile is four English geographical miles, or 8100 yards; the short mile used in Poland (which is also the league of Brabant) is the geographical league (6076 yds.), and the long mile of the same country is the German geographical mile (8101 yds.), which is also the length of the mile in Holland. The Arabian mile is 2148 yards; the Chinese li 632 yards; the Persian parasang 6086 yards; the Russian werst 1167 yards; and the Turkish berri 1826 yards. All the preceding statements relative to modern measures rest on the authority of the work cited.

This diversity of itinerary measures, particularly as observable in countries which were formerly under Roman sway, can only be conjecturally explained; partly by supposing that the mile (Roman) and the league (Celtic) were in process of time confounded with each other (as Ingulphus asserts to have been the case in England), partly by recurring to the well-known tendency to give the same name to measures which were multiples one of the other. [LEAGUE.] It would be much beyond us to attempt any derivation of the preceding anomalous measures, either from the mile or the league, and we shall in the present article confine ourselves to the history of the English mile.

It will be necessary to treat this subject at some length, on account of the manner in which our metrologists and antiquaries have passed it over. The legal history is simply this; that previously to the reign of Elizabeth the statutes on weights and measures confined themselves entirely to the regulation of the smaller standards; while in the 35th year of that queen an act was passed which (perhaps undesignedly on the part of its framers) has fixed the mile at its present length. This statute, though it is always appealed to as if made for the purpose of settling the question, yet in fact does nothing more than incidentally define a mile for a particular purpose. Persons are forbidden to build within three *miles* of London, and the *mile* is to be 8 furlongs of 40 perches of 16½ feet each. But whether this mile had become common, and only wanted the sanction of law, whether it was a new measure intended to be generally enforced, or whether it was meant as the measure for the particular purpose indicated, and for that purpose only, cannot be gathered, at least from the recital in the Statutes at large. It will however subsequently appear that we are not without something like a probable account of the derivation of the measure; and whatever doubt may rest upon the meaning of the statute, it was considered by an authority of the reign of James I. (Cowell) as a general declaration of the length of the mile. Previously however to the act of Elizabeth it may be doubted whether any uniform mile was in existence. Most unquestionably many, perhaps most, writers made use of a mile of 5000 feet, probably not being aware of the English foot having become longer than the Roman, and intending to use the Roman mile. (See the citations in LEAGUE.) Thus Roger Bacon, in his general description of the earth, follows (except as hereinafter mentioned) the Latin writers, and uses their mile as a matter of course, without the least warning of his being aware that he was using a measure different from the popular one of his time. In a writer then on any mathematical or cosmographical topic the mile may be presumed to have 5000 feet. If however the subject had any connection with astronomy, and if Arabian writers were referred to, it was not unusual to use the Arabian mile of 2000 yards (according to Roger Bacon's estimation, Jebb, p. 141).

If, as we believe we shall presently show, a longer mile was in popular use, it may be doubted whether the authors above alluded to were aware of the difference. They certainly did not perpetuate such knowledge; for Dr. Bernard, the most profound of English metrologists, found the mile of 5000 feet sufficiently common in old writings to induce him to give it a name, and call it the English *geometrical* mile, meaning, we suppose, that principally used in mathematical writings; but he does not give the least hint that any other mile, except this geometrical mile and the statute mile, was ever in existence. Nor does his predecessor Greaves, when he remarks that great differences have been observed between measured and statute miles, hint at such discordances being derived from the remains of an old and different measure, or at any acknowledged measure different from the statute mile. This mile of 5000 feet continued in use among seamen, whose measures depend more upon writers on navigation than on acts of parliament, until the earth's dimensions became better known. A very old notion as to the earth's magnitude gave 60, or at most 62½, Roman miles to the degree. The sea mile tallied with that of writers on shore, until the measures of Picard, &c. became well known; but the sixtieth part of a degree of latitude is so convenient a standard measure for the sailor, that under the name of a nautical or geographical mile it has lengthened with the common estimation of the degree of latitude. Thus in the time of Gunter we find the degree described as 60 miles of 5000 feet each; though he certainly says (*On the Cross-Staffe*, b. xi., cap. 6), that by comparison of observations,[*] he thinks 352,000 feet nearer the truth. Even almost as late as the Revolution common works written for landsmen describe the sea league as three Italian miles, which answers nearly to 15,000 feet. By the time of Dr. Bernard however we find the sea mile described as coinciding with the statute mile (*De Mens. et Pond.*, p. 202); but this is in a work of science and authority: and Oughtred (before the date of Bernard's book) says that it is 'taken' (or rather mistaken) that 60 statute miles make a degree. It is most likely that the sea league would in the first instance be taken from the common league; and certainly 15,000 feet, or 2·84 statute miles, is almost the same as the length which different deductions will give for the old land league.

We now proceed to the main question, the length of the old English mile: premising that the utmost we can attempt is a clear proof that the old popular mile differed considerably from the modern mile. The gradual changes of this old mile (which the general history of itinerary measures may lead us to suspect) must be traced out by closer investigation of antiquarian authorities than mathematicians have been went to make, and better estimation of their relative values in a mathematical point of view than antiquaries have hitherto been capable of making.

There is a *tradition* among antiquaries (Sir H. Ellis, *Preface to Domesday*) that this old mile was somewhere about a statute mile and a half. This tradition is not to be relied on; for though in all probability it agrees with the truth, yet it may have arisen from another circumstance. We have more than once heard it proved by the assertion that, even within the memory of man, distances were measured in the remote parts of the country by a longer than the statute mile; for instance, that York was said to be 150 miles from London, while it is really more than 199 statute miles. This is perfectly true; but the reason is perhaps different from that given, as the following account will show:—

The first actual measurement of the roads in England, in statute miles, was made by John Ogilby, cosmographer to Charles II., and was published by him in 1675, under the title of 'Britannia,' with copious descriptions, and 100 copper-plates of the roads, in a large folio volume: the instrument used was called by him a *wheel-dimensurator*, and answers entirely to the perambulator now in use. Various editions of this work were published, of which we have seen three, and D'Anville mentions a fourth. It is worth noting that this measurement, as compared with older ones, soon came into general use: thus in a little work for men of business, called 'The Complete Tradesman, or Exact Dealer's Daily Companion,' London, 1684, we find a list of Ogilby's distances from town to town, compared with those formerly adopted. The latter were called by Ogilby *computed* miles, and the meaning of this word might be doubted, but it is proved to mean miles in common use by previous publications. Thus in Samuel Morland's 'Description and Use of Two Arithmetic Instruments,' &c., 1673 (or two years before Ogilby's publication), we find the distances called 'computed' by Ogilby set down as the (supposed) real distances. D'Anville appears to have seen an edition of Ogilby (of which there is one at least) in which the word *computed* is always contracted into *com*. This he supposed to mean *common*, and the whole of his chapter on English itinerary measures (*Mésures Itinéraires*, cap. x.) must in consequence be read cautiously, as he assumes it to be indisputable that there was a common mile in use at the Revolution, which was about a quarter longer than the statute mile. But on the authority of the silence of Bernard and Greaves, above referred to, we must remain of a different opinion, and must suppose that the computed miles preserved by Ogilby had been intended to represent the number of statute miles, but erroneously given.

What then may these computed miles mean, which had served the common purpose in the estimation of distances? The word computed never meant reputed, but was always applied to a result of reckoning of some kind or other. Ogilby says, 'Whence these computations arose is altogether uncertain; the nearest conjecture is, that they seem to exclude the whole length of the towns, and to be the distance from the end of one town to the beginning of the next, not regarding the fractional parts of a mile, but taking the lesser integer.' The computed miles always give a smaller figure than the measured ones, or the same, never a greater; and a little examination will render it difficult to suppose that the preceding explanation can be the true one. For independently of its having been the known practice to measure the roads from a conspicuous part of every town, the preceding will not explain differences of four, five, and even seven miles in a stage of less than thirty; neither will it explain long stages being often of the same number of computed as of measured miles. Our own conviction is that the computed miles are nothing more than distances measured on a map in a straight line from town to town, which differ from those measured on the roads more or less, according to the deviations and curvatures of the roads. Should this opinion be correct, we might expect beforehand, first, that the roads in the neighbourhood of the metropolis would appear more direct than the general average; secondly, that the principal roads would show indications of being more straight than the average deduced from all classes, and from cross as well as direct roads. Both these things appear in the general results, and we can clear ourselves of the suspicion of bias in our selection of instances by throwing that task on others. In the first place the roads near London agree so much better in the computation, so called, and the measurement, that both Ogilby and D'Anville notice the circumstance, and conclude that a shorter mile was in use in the neighbourhood of the great city. We find on examination that such is the case with most of the twenty-mile distances about London, which yield about 120 measured miles for 100 computed miles; and this happens particularly with those routes which come earliest in Ogilby's work; but 120 would have been increased almost up to the general average by taking twenty miles on every road out of London.

Secondly, in the 'Exact Dealer's Daily Companion,' already quoted, there is a selection of the roads to which most importance was attached, upon the whole of which 3953 computed miles answer to 5020 measured miles, or 100 computed miles give 127 measured miles. According to D'Anville, Ogilby's whole work gives 7679½ measured miles of road, and 5765 computed, so that 100 computed miles make 133 measured miles. Hence the remaining 2659 measured miles give 1812 computed miles; or, off the principal roads, 100 computed miles give 147 measured miles. These results place, in such large numbers of miles, insuperable difficulties in the way of any explanation which should equally apply to the greater and lesser roads; and it seems to us that there remains only the hypothesis that the computed miles were map-measured[*] distances, and that the larger and more important roads were straighter than the rest.

It is believed that, since the time of Ogilby, the roads have been much shortened by the various acts of parliament. *Have the milestones been altered accordingly?* or has the increased speed of stage-coaches been in part the result of calling a shorter line of road by the same number of miles? To try this question, we shall compare a few distances from place to place, as given in Ogilby's 'Britannia,' with those in Mogg's edition of Paterson's 'Roads' (1824), altered so as to start from the same point, namely, the old standard in Cornhill:—

		Ogilby.	Mogg.
London to	Worcester . . .	112	114
,,	Berwick . . .	339	337
,,	Bristol	115	117
,,	Bridgnorth . .	142	142

The measures in Ogilby may of course be erroneous; but as they were certainly made with a sufficient instrument, and exhibit every appearance of care, and as in our country it is nobody's business to see that all succeeding milestones are altered when a mile of road is saved in the middle of a line, we suspect strongly that a remeasurement would show our present distances to be too long.

The credit of the antiquaries' tradition, which would otherwise be considerable, is destroyed by its probable origin, as above stated. We now come to another species of evidence, the testimony of foreign writers. The new measures of any country found their way abroad but slowly at the beginning of the seventeenth century, and we shall not therefore be surprised to find foreign writers of the middle and end of that century varying from then existing measures in their statements. We shall first take the geography of Varenius, first published in 1650, and edited in 1672 by no less a person than Newton, then Lucasian professor. The following sentence was allowed by the editor to pass without comment:—'Triplicia habent Angli milliaria: majora, quorum 27½ sequant gradum sive 19 Hollandica; mediocria quorum 50; minima quorum 60 vel 55.' Now the mile of Varenius is described by himself as containing 18,000 Rhineland feet, each of which, according to Dr. Bernard, is 1·033 English feet. Whence it may be deduced that the three miles described as English by Varenius severally contain 2·43, 1·33, and 1·11 statute miles (taking '60 vel 55' to be 60). We have no doubt that Varenius has here got hold of the leuca, the old mile or half the leuca, and the modern statute mile, which, being not sixty years old when he wrote, was not, though the contemporary legal measure, more accurately known than the others. Again, Ozanam, in his 'Mathematical Dictionary,' A.D. 1691, makes the English mile a quarter longer than the Italian mile, that is, considerably above the statute mile; but his accounts of itinerary measures are so evidently theorised into round hundreds and thousands of geometrical paces, that no dependence can be placed on any specific results drawn from them. If his geometrical pace be five French feet (Paucton, p. 179), this English mile (which he states at 1250 paces) is 6250 French feet, or 2219 English yards, that is, 1·26 statute miles. But this is hardly worth notice, for no value of the geometrical pace can be taken which will make Ozanam's account of measures consistent with itself. We shall take one more conjectural determination of the mile, derived from the sea league of the seventeenth century. Gunter states this at three miles of 5000 feet in a mile, the league being the twentieth of a reputed degree. The author of the 'Exact Dealer's Daily Companion,' above cited, calls it three Italian miles, or 4904 yards. Now if the original league were the land measure, then the mile (or half of the leuca) would have been 2452 yards, or 1·4 statute mile.

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[*] This of course refers to the measure of Snell, which gave 353,235 feet (A.D. 1616).

[*] If our hypothesis be correct, these computed miles should represent distances on an incorrect map, which in fact they do. We found them agree somewhat better with the county maps in old editions of Camden's 'Britannia' than with our modern maps.

D'Anville endeavours to make the old mile the same thing as the original French league, or the Roman mile and a half [LEAGUE], taking the *computed mile*, already discussed, as the old measure. But independently of the mile thus considered not being long enough (and we have no instance of an itinerary measure shortening by time), the distinction between the mile and the league seems to have been one of the most common notoriety from the time of the earliest manuscripts; and previous to this time the confusion which might have made D'Anville's supposition true had already lengthened the league by 500 paces.

The only way of detecting the length of any measure, a copy of which is not absolutely preserved, is by the knowledge of some quantity, which having been handed down in terms of the old measure, and being still in existence, can be re-estimated in terms of the new measures. Unfortunately we have no very exact measurements of well-known lengths; nevertheless by using such as we have, and taking the mean of a considerable number, the odds are much against any very serious error remaining in the result.

About 1478 William Botoner, commonly called William Wircestre, or William of Worcester, made a tour in various parts of England, and wrote, apparently for his own use, a large number of memoranda, which remained in the library of Corpus Christi College, Cambridge, and were published in 1778, by Dr. Nasmyth, with the title,* "Itinerarium Willelmi de Worcestre.' The date of the writer is well settled, for he asserts that in the year 1473 he presented to the bishop of Winchester his own translation *into English* of Cicero de Senectute. This William of Worcester was given to measurement: he records the dimensions of the churches which he visited, and the number of miles between the several towns. From the latter enumerations we have collected the most definite instances, which we have compared with our latest road-books, as follows (W is the number of miles in W. of W.'s account; R in the road-books):—

	W.	R.
From Oxford to Farringdon	12	17⅛
„ Farringdon to Wooton Basset	15	9
„ Gloucester to Tewkesbury	7	11
„ Shepton Mallet to Glastonbury	5	8¼
„ Glastonbury to Bridgewater	9	15¾
„ Bridgewater to Taunton	7	11⅛
„ Taunton to Wellington	5	7
„ Wellington to Collumpton	10	12¼
„ Collumpton to Exeter	10	11½
„ Ottery St. Mary to Exeter	10	13
„ Plymouth to Saltash	3	4½
Totals	93	131⅛

To give the best chance of a correct result which our present means afford, we must increase this 131⅛ modern road miles in such proportion as will make them correctly represent the same roads at the time when William of Worcester travelled. This we have no data for doing, and any supposition we may make must rest on its own intrinsic probability. To neglect this correction altogether would make the preceding give 100 old miles equal to 141 statute miles, and this is the lowest conclusion which can be formed. But if five per cent. of deviation has been corrected since the old account, that is, if what is now 100 miles would have been 105, then 100 old miles may be stated at 148 statute miles. This conclusion, and even a stronger one, may be reinforced from a totally distinct quarter. But first let it be observed, that since roads have no tendency to lengthen, but the contrary, it may be inferred that such of the preceding instances as make the old mile least are most probably those in which the distances have been shortened; and instead of being the cases of most weight, are precisely the reverse.

Though the preceding instances are quite sufficient, yet it may be satisfactory to name one or two short distances in which a very large mistake is impossible. The following, were they the only ones, would lead us to suspect that the old mile was even longer than a mile and a half statute. William of Worcester says that Wokey Hole is about half a mile from Wells, whereas, by the Ordnance Map, it is a mile and six-tenths in a straight line from the centre of the town. Again, Merkysberry (now Masberry) Castle is placed by him at two miles from Wells on the opposite side: it is now three miles and three-quarters in a straight line from the centre of the town. Lastly, Fenny Castle is said to be a mile and a half westward towards the marsh, whereas what is now called Castle Hill is two miles and three-quarters westward. These instances are more convincing than the preceding as to the mere use of a longer mile, though not so well adapted for its determination.

We must now remove the question to Palestine. In the description of the earth given by Roger Bacon (Jebb, pp. 180-236) he generally follows Pliny, and gives distances in Roman miles, except only when treating of those parts which the Crusaders visited, and other Eastern countries. In this part of his account Bacon relies much on the conversation and writings of a certain Willielmus, who went on a mission from the king of France to the Tartars in 1253, and on the oral accounts of other travellers. But the country on the distances of whose towns he is most precise in his information is Palestine itself. By taking fifteen well defined instances, and measuring the corresponding distances on Major Rennell's map in parts of inches, we have the following, the first column being the number of leucæ in Bacon, the second the number of inches in Rennell. (We omit sea-distances, as likely to err considerably.)

	B.	R.
From Gaza to Ascalon	9	·65
„ Ascalon to Joppa	12	1·12
„ Joppa to Aco	24	2·48
„ Aco to Cæsarea	12	1·10
„ Aco to Tyre	9	1·18
„ Tyre to Sarepta	4½	·49
„ Sarepta to Sidon	3½	·34
„ Sidon to Baruth	8½	1·10
„ Baruth to Gibeleth	9	·87
„ Gibeleth to Tripolis	9	1·21
„ Jerusalem to Joppa	12	1·50
„ Jerusalem to Jericho	9	·67
„ Samaria to Jerusalem	12	1·57
„ Samaria to Cæsarea	12	1·03
„ Aco to Nazareth	7	·72
Totals	152½	16·03

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* With it was published the 'Itinerary of the Holy Land,' by Simon Simeon, and whoever would consult the book at the Museum must look under the latter name in the Catalogue. With it was also published the tract on Leonine Verses referred to in the article on that subject.

The scale of Rennell's map is three inches to a degree of latitude; and the only remaining question is, how much must this 16·03 inches, which is a total of distances measured in the shortest lines from place to place, be increased to allow for the deviations of the roads? If we assume that the deviation was equal to that in England at the Revolution, we must* increase 16·03 in the proportion of 100 to 127, which gives 20·3581. It must be remembered that the more allowance is made for deviation, the longer is the leuca; and we think it is the least supposition which can be made, to suppose the deviation on routes in Palestine no greater than in England. Dr. Bernard states that it was the practice of the Oriental geographer Abu Rihan (Al Biruni or Birunius) to deduct one-fifth from distances measured on the roads, to obtain the true distances in a straight line. This amounts to increasing the number of miles measured on the map in the proportion of 100 to 125, and is practically accordant with the preceding rule in a question of which the data are as rough as in the present one. The testimony is valuable as referring to roads in the East, and at the period to which Bacon's account refers. The leuca is then, on these suppositions, ·1335 of an inch on Rennell's map, or ·0445 of a degree. The length of the degree in these latitudes being assumed at 363,500 feet, we deduce 3·064 statute miles as the length of a leuca, or 1·532 statute miles as the length of the old mile. If we were to reject the correction for deviation, the result would be 1·206 statute miles, which is unquestionably too small.

In 1422 Sir Gilbert de Lannoy was sent by Henry V. of England on a tour of military observation in Egypt and Syria. His account is published (from a manuscript in the Bodleian) in the 21st volume of the 'Archæologia.' He never mentions the league more than once or twice, and gives all his distances in miles. From his account of Egypt we soon found that no hypothesis would make his distances agree with modern travellers. He places the city of Cairo, for instance, three miles from its port Boolak, which distance is now called only *one* mile. [Kahira.] But on examining his distances in Palestine there appears almost a certainty that he used a smaller mile, of which two and a half (and not two) make the league of Roger Bacon. The following are all the comparisons which his work affords us the means of making:—

	Bacon. Leagues.	Lannoy. Miles.	League in Miles.
From Joppa to Aco .	24	60	2·5
„ Aco to Tyre .	9	25	2·78
„ Tyre to Sidon .	8	20	2·5
„ Sidon to Baruth .	8½	25	2·94
„ Jerusalem to Joppa .	12	30	2·5

But even Lannoy's mile must be longer than our statute mile; and it is difficult to explain the difference. One thing is certain, that Lannoy's mile in 1422 cannot be the same thing with that of William of Worcester in 1473, or that of Bacon in 1250, being shorter than either.

So far our conclusions proceed upon assumptions of the highest probability; and the result is, that from the English measurements we may infer that 100 antient miles certainly exceed 141 statute miles, while from those in Palestine they are most likely not much less than 153 such miles. It is highly probable that the result is nearer to 153 than to 141. If we were to take a mean of both results, giving them equal weights, the mile thus obtained would be probably too small, and this result is 1·47; so that (as mentioned in League) the ratio of 145 to 100 (misprinted 45 to 100) is the very least which is admissible, and perhaps too small even for a minimum. It seems to us that a more probable result would be obtained by taking 153 as a result of the measure in Palestine (for it is hard to believe that the correction for deviation could have been too much), and giving this number twice as much weight as 141 in forming a mean of the two. This gives 149 in place of 147; or, roughly speaking, we think it by no means improbable that 100 antient miles are as much as 150 statute miles, and tolerably certain that they exceeded 145 such miles. At the same time there is evidence enough that very different miles were in use among writers, and also that the most ignorant confusion between antient and modern measures frequently existed. Sir John Maundevile, for instance, says, 'Aftre the auctoures of astronomye, 700 furlonges of erthe answeren to a degree of the firmament: and tho ben 87 miles and 4 furlonges. Now be that here multiplyed by 360 sithes; and than thei ben 31,500 myles, every of 8 furlonges, aftre myles of oure contree.' The old astronomical authors use the stadium, which is here made to be the English furlong, a measure with which it had no connection.

There is certainly this difficulty in the way, that [League] the antient minimum distance between two market-towns must have been 19 modern statute miles, which seems a great distance. But it must be remembered that this appearance is a consequence of the notions derived from the modern interpretations of the courts, which make the leuca to be a statute mile; so that seven miles has long been the legal distance. This interpretation is so preposterous that it must be thrown aside; for even if the mile of Bracton and Fleta were the mile of the *books*, and not the mile of the *people*, the leuca would be 10,000 feet, or two statute miles all but the tenth of a mile. And the reason given by Bracton certainly requires some greater distance than seven miles. For he implies [League, vol. xiii., p. 376] that the third of a day's work should be half the distance of two markets; and gives a time for buying and selling not longer in duration than that allowed for going to the market. Reading this paragraph by the modern interpretation of the courts, the time of business would be that in which a laden horse or market-cart would go three miles and a half; and if, taking into account the badness of roads in the fifteenth century, we allow even as much as two hours for this, then the day's work would be only six hours. According to our reading the time of going nine miles and a half would be the time of business; or allowing three miles an hour, the day's work would be something more than nine hours. It may however be possible, and not improbable, that the mile of 5000 feet, or that of the books, was that of the courts of judicature, which would give about 12½ statute miles as the distance in question.

We conjecture that the length of the antient mile arose from that confusion between the mile and the leuca which is referred to by Ingulphus. [League.] The leuca of fifteen hundred paces would, when the foot attained its permanent length, be 1·42 modern statute miles, to which the term mile being applied, we have the probable beginning of the old mile, that is, we adopt D'Anville's conclusion on different grounds. If in the meanwhile the leuca of 2000 paces came into use (as, according to Ingulphus, it did), which would be called in the books two miles (as in fact it was two miles of the *writers*), it is by no means surprising that a new leuca of two long miles should be formed from the mile of the people. This would be but a poor conjecture for the establishment of a measure; but it has great force in reference to a mile, the existence of which is separately proved. And though Ingulphus states that the word leuca was introduced as meaning a mile, yet it is more likely that the new measure should have been introduced under the old name, than the new name for the old measure: it is moreover tolerably certain that the conquerors would attempt to introduce both their measure and its name, while the people would be able to resist the latter, but not the former.

The origin of the statute mile may perhaps be explained as follows:—The furlong, or quarantena, was not a part of the Roman itinerary system of measures. It grew out of the perch, or perticata, a measure originally of small lengths, as in buying or selling of land, 40 of which were made into one by the simple name of forty-long, or furlong. The great variations of the perch, in different parts of the country, induced the legislature, at a very early period, to fix it at five yards and a half. It did not harmonise with the book-system of measures, and we see [League] that when it was introduced there, the mile was awkwardly described as seven furlongs and a half, three perches, and two palms. The legislators of Elizabeth, who were well acquainted with the stadium, seeing the mile of the books (and perhaps of the courts) making upwards of seven furlongs and a half, might very naturally restore the nominal accordance of the old and modern systems, and at the same time avoid fractional quantities, by lengthening the mile into eight furlongs.

MILFORD HAVEN. [Pembrokeshire.]

MILHAU, a town in France, in the department of Aveyron; in 44° 5′ N. lat. and 3° 5′ E. long.; on the road from Paris to Narbonne, through Moulins, Clermont, and St. Flour: the distance is not given in the road-books.

Milhau is said to have been known to the Romans by the name of Æmilianum, a name which indicates a Roman origin. It is not however noticed by D'Anville. In the religious wars of the sixteenth and seventeenth centuries, it was one of the strongholds of the Calvinists. Louis XIII. possessed himself of it in A.D. 1629, and ordered the fortifications to be destroyed. The town is situated on the right bank of the Tarn, in a pleasant valley surrounded by hills covered with peach and almond trees. It is well laid out, but the streets are narrow. Many of the houses and the public fountains are handsome: there is a good 'place' or square and some agreeable promenades. There is a bridge over the Tarn, supposed to be of Roman erection.

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* We take this from some rough trials, out of Ogilby's book, but we rely more on the eastern geographer presently mentioned.

The population, in 1831, was 8847 for the town, or 9806 for the whole commune; in 1836 it was 10,450 for the commune. The inhabitants manufacture a considerable quantity of woollen cloth, serge, chamois and other leather, and gloves. Cheese, which resembles the 'Roquefort cheese,' and is sold under that name, is made in the neighbourhood in cellars hollowed out of the rock. Considerable trade in raw and spun wool, leather, timber for various uses, wine, and sweet and bitter almonds, is carried on. There are a subordinate court of justice, a commercial court, a board of trade, and some fiscal government offices; an agricultural society, a high school, a drawing-school, and an hospital. There is a Protestant church, under the direction of the consistory of St. Afrique.

The arrondissement of Milhau has an area of 772 square miles, and comprehends 39 communes: it is divided into 9 cantons or districts, each under a justice of the peace. The population, in 1831, was 63,603; in 1836, it was 65,800.

MI'LIOLA, a family of FORAMINIFERA, vol. x., p. 348.

MILITARY FRONTIER (Hungary). This is the name given to a tract of country which extends from the Adriatic Sea to the Bukowina, between the frontiers of Illyria, Croatia, Slavonia, Hungary, Transylvania, and those of Turkey. Its length is about 1000 miles, from Povile, on the Adriatic, in 16° 48′ E. long., to the defile of Ostocz, in 26° 35′ E. long., and it lies between 44° 7′ and 47° 36′ N. lat.; its breadth varies in different parts: the area is about 18,000 square miles. The whole of this tract is divided into—1, the Western or *Croatian* Military Frontier; 2, the *Slavonian* Military Frontier; 3, the *Hungarian* or *Banat* Military Frontier; 4, the *Transylvanian* Military Frontier.

This tract is distinguished from the rest of the Austrian monarchy by having its own purely military government. All the peasants are soldiers, of whom, in time of peace, 45,000 men are always under arms; but in 1815, before the peace, there were 62,000. This force was originally intended as a barrier against the inroads of the Turks. By this tenure the peasants hold from the state the hereditary usufruct of their lands. This singular institution secures to the state the services of a great military force (there being above 100,000 men capable of bearing arms), which in time of peace costs the state nothing. These well-trained and disciplined soldiers defend their own frontier both against hostile attacks and the plague without pay, and in time of war serve the state in the same manner as the rest of the army, and receive the usual pay. They are divided into seventeen regiments of infantry, one of hussars, and one battalion of sailors. Each regiment consists (in time of peace) of two battalions, or twelve companies, which serve in turn, has its own staff, and is commanded by a colonel, who exercises both the civil and military authority. Two regiments make a brigade. The military authority is divided among what are called four general commands, the seats of which are, at Agram for the Croatian frontier; at Peterwardein for the Slavonian; at Temesvar for the Hungarian; and at Hermann for the Transylvanian: the whole is under the supreme direction of the Aulic Council of War at Vienna. According to the military constitution, the generals superintend the civil affairs and the administration of justice. Under the general are the regimental commanders, who are in the place of district authorities; in short, all civil officers hold military rank.

Face of the Country; Soil; and Climate.—A great part of the country is mountainous, the western part being traversed by the Julian Alps, and the eastern by branches of the Carpathians. Many fine valleys, some of them rich in picturesque beauty, lie between the branches of the mountains; the remainder of the country is pretty flat. The western part of the Banat is a sandy plain covered with sandhills from 60 to 180 feet high. On the banks of the Danube, the Theiss, and the Temes, there are extensive marshes. In the mountainous parts the temperature is that of more northern countries; whereas the lower central parts enjoy a climate resembling that of Italy. The soil is on the whole very fruitful, especially in the plains, and in several valleys of the Banat. For the natural productions, see HUNGARY.

Manufactures.—There are no manufactures of any importance. The women, as well as the men, show great skill and ingenuity in manufacturing almost every article for their own consumption. There is a very great export trade in the productions of the country. The extensive forests supply great quantities of excellent timber. That of Jablanacz is much esteemed in England for ship-building.

Variety of Nations; Languages; Religion; and Education.—The population is at present (1839) at least 1,200,000, and is of many different races, two-thirds however being of Slavonian origin, namely, Croatians, in the Croatian Military Frontier, and the Slavonians and Servians (Illyrians or Russians), in Slavonia and the Banat. The three other principal nations are less numerous, namely, the Wallachians (perhaps above 150,000), in the Transylvanian and Banat Military Frontier, and the Hungarians and Szekler in Transylvania. Besides these there are Magyars, Germans, Greeks, Jews, and Gipsies. The Clementines are of Albanian origin, so called from their leader Clement. They are not above 2000; they inhabit two villages in the district of Peterwardein, and have retained their manners and language. The majority of the inhabitants are of the Greek not-united Church, in 450 parishes; next in number are the Roman Catholics, in 330 parishes. The united Greeks have 150 parishes; the Protestants (about 50,000 in all) are Calvinists, having 85 parishes, Unitarians 10, and Lutherans 4 parishes. 'All the inhabitants of the Military Frontier,' says Hassel, 'are endowed with admirable natural faculties, and, whether in the rude climate of the Carpathians, or the milder temperature of the plains, are distinguished for talent. But all these excellent gifts of nature are still buried, generally speaking, in profound slumber; and it is but lately that some efforts are perceived to call them into action. The government has done much to promote public instruction; but the number of schools is far too small, especially amongst the followers of the Greek Church; so that frequently there is not a single school in a tract of many leagues in extent.' This, it is true, was written twenty years ago; but it would seem that little progress has been made since that time, for the number of schools stated to exist in 1820 is quoted without alteration in the Austrian 'Encyclopædia' in 1838. The great variety of costume appears surprising to a stranger; for while persons in office and the ladies in the towns adopt the fashions of Vienna, each nation and tribe has its own costume, which in Croatia and some other parts has a striking resemblance to that of some countries of the East. Various and often unjust judgments have been passed on the character of these people: with some exceptions, of course, they may be described, according to Hassel, Blumenbach, and other writers, as a people of great natural talents, acute, docile, very patriotic, devotedly attached to the Imperial house, brave, frank, hospitable, fond of music and poetry, and possessing a great degree of national pride. Their domestic arrangements are founded on the patriarchal way of life, derived from remote ages, which the government has carefully maintained. All the branches of a family (called a house communion) live together, and several generations are found at the same time in one house. The head of the family, called the Gosspodar, exercises a kind of patriarchal authority, which all the members are bound to respect and obey. The males who are of age have however a vote in the discussion of all important family concerns. The mother, who is called Goszpodaricza, presides over the internal affairs, and superintends the female members of the family. The property of the family is in common, and no one is exempt from the duty of working. Each person who works has an equal share in the produce, but the Goszpodar and his wife have each a double portion. No member is allowed to have land or cattle of his own; but he may possess money and furniture. He who leaves the house without the consent of the elders and the regiment is reputed a deserter. Daughters who marry into another house have a smaller portion. Such a family often consists of 30, 40, and even 80 members. [PETERWARDEIN; SEMLIN.] (Von Hietzinger, *Statistik der Militärgrenze*, 1822; *Oesterreichische National Encyclopedie*, 1838; Hassel, vol. ii.; also Stein, Horschelmann, and other writers.)

MILITARY POSITIONS are the sites occupied by armies either for the purpose of covering and defending certain tracts of country or preparatory to the commencement of offensive operations against an enemy.

A position is considered as advantageously chosen when it is on elevated ground; when it is not commanded by eminences within the range of artillery; and when, from the existence of natural obstacles, as rivers or marshes, on the wings, it is incapable of being turned, that is, the enemy cannot without making an extensive movement get to the rear of the army by which the position is occupied. In the event of such points of support being wanting, the position, whether it be a plain or an eminence, should have its flanks protected by villages, or by redoubts raised for the purpose; for the flanks being the weakest points of the line, since the troops there are only defended by their own fire, they particularly require to be strengthened by the impediments of the ground or by fortifications, in order that the enemy, in any attempt to turn the position, may be retarded till reinforcements can be brought up to oppose him.

The advantages possessed by an army on commanding ground consist in the troops being able to see the manœuvres of the enemy while their own are concealed; the fire also, being directed downwards, is more effective than that of the enemy, which is made upwards from a lower level. The existence of woods or hollow ways in front of a position is considered as an unfavourable circumstance, since an enemy might there place divisions or parties for the purpose of attacking the line by surprise; but, on the other hand, a wood in the rear, if it should not be such as to create an impediment to the passage of the troops through it, might become advantageous in the event of a retreat, as it would afford a temporary cover for the retiring columns. A village or even a single building on the ground occupied by the army may become the key of the position; and as, frequently, on the preservation of this point depends the possession of the field of battle, such point should be well supported by troops and artillery. At the battle of Coruña, in 1809, the village of Elvina was twice contested by the opposing armies; and on the field of Waterloo, the Château de Goumont was the object about which the action raged with the greatest violence. The highest point of ground, particularly if near the lines of operation (the roads leading to the magazines), may also constitute the key, and it is usually strengthened by one or more redoubts. It would evidently be advantageous if such key were near the centre of the line, because, on any change in the disposition of the latter, the key might still be retained, and if the wings are separated from each other, it might prevent either of them from being cut off by the enemy; whereas if situated at one extremity, it might, on a wheel of the army taking place, become so remote as to be incapable of being supported.

The elevated ground which constitutes the position should be able to contain all the troops who are to occupy it, but it should not much exceed the extent necessary for this purpose, lest, not being able to defend the whole, the army should be deprived of the advantages arising from a superiority of command, in consequence of the enemy gaining some part of the height.

However favourable a position may be with respect to the elevation of the ground, that circumstance will be of small value if the troops and artillery cannot be conveniently placed on it. It is indispensable that the ground afford ample room for the manœuvres of that species of troops in which the strength of the army chiefly lies; and at the same time it may be observed that, in making choice of a position, the ground in front should be as much as possible disadvantageous in that respect for the enemy. The Spanish General Cuesta is blamed for having, previously to the battle of Rio Seco in 1808, placed his army in such a situation that the ground before it was in the highest degree favourable for the action of the French cavalry, which was particularly numerous. Artillery should always be placed where it can act with most effect; and when the ground occupied by an army presents alternately salient and retired points along the front of the line, the batteries should be placed at all such points. At the former, in order that the lines of fire may effectually command the approaches by which the enemy's columns may advance; and at the latter, that they may defend the descending ground immediately in front of the others. Infantry may occupy any kind of ground, but should, if possible, always form a close line: it is usually placed between the batteries; and, if exposed to a distant cannonade, the troops may be drawn up in a trench, the earth from which will serve to cover them without preventing them from marching out in line to meet the enemy. Cavalry must be posted on a level plain, over which it may advance with regularity when a charge is to be made; if compelled to act on broken ground, it is formed in small detachments behind the infantry, through whose intervals it may pass at proper opportunities. It may be observed that every disposition of an army for defence should correspond to that of the works which constitute a fortified place. The batteries at the advanced points of the line serve a purpose similar to that of the guns in the flanks of bastions; and the intermediate line of troops forms a sort of curtain.

In the choice of positions for offensive operations, such should be taken as have no rivers or broken ground in front; since these would impede the contemplated movements towards the enemy: small inequalities, behind which infantry or cavalry may be concealed, are however advantageous, as they afford the means of occasionally making attacks by surprise. On the other hand, when an army is on the defensive, the front as well as the wings should be protected by every obstacle to the progress of the enemy which nature may present or art can devise: among those afforded by the latter may be mentioned the blocking up of roads by abatis or traverses; preparing countermines, by which, on the enemy's advance, the roads may be destroyed; rendering fords impassable and even forming inundations by constructing dams across the streams. It should be observed however that when a defensive position is covered by a river, the line of troops should be at 800 or 1000 yards in rear of the latter, in order that sufficient space may be afforded for the troops to act against the enemy in the event of his forcing a passage across; and, in all cases, every obstacle in the way of a free communication within the position ought to be removed, that the troops may easily succour each other when attacked. Whatever be the nature of the obstacles opposed to the enemy, they should be within the range of the artillery of the line; and then the position may be considered as impregnable, since an enemy would find it scarcely possible either to form or deploy his columns of attack on broken ground and under a destructive cannonade. Good roads, on the other hand, should exist, or should be formed, in the rear, both to facilitate the arrival of supplies from the magazines or depôts, and to favour a retreat, should the latter step become necessary. An army always retires in disorder under the fire of the enemy, and its danger is greatly increased when the retrograde movement is embarrassed by walls, ravines, streams, or other impediments; the divisions then become separated from each other, and some of them are generally cut off by the enemy before they can be supported. It would be advantageous that the ground in rear should command that of the position itself; for then the army, in retreating, would obtain a superiority of elevation over the pursuing enemy; and it might even have an opportunity of renewing the action with a prospect of success.

A knowledge of the art of choosing military positions is an important qualification in the staff-officers of an army; and these officers should continually exercise themselves in forming correct judgments concerning the fitness of ground for such positions. They should be able to ascertain at once, by the eye, its extent and the stations it may afford for troops of the different arms, so that those of all kinds may act with the greatest effect and duly support each other; and, consequently, they should be able to determine the order of battle which is the most advantageous for the ground to be occupied. They are also to judge of the facilities which the roads may present for an advance or a retreat, or for the conveyance of supplies from the magazines; and, finally, of the obstacles which the ground in front may oppose to the movements of the enemy. The power of readily appreciating the character of ground in all these repects is what is called, by foreign writers, the military coup-d'œil; and this can only be acquired by a profound knowledge of the tactics of war joined to much experience in the practice of executing military surveys, and of contemplating the appearance of ground from all possible points of view. These points being the supposed stations of the enemy, the staff-officer should accustom himself to observe from thence how the latter might make his attack; for then only can he judge in what manner an attack ought to be opposed; that is, what disposition of troops and artillery would be the most favourable for resisting it when made. Continual meditation, from his youth, on the subjects above mentioned is stated by Livy to have distinguished the Achæan general Philopœmen, who was thus always prepared to avail himself of the advantages of ground in the disposition of troops for action.

MILITIA. The body of soldiers raised for the defence of a nation may be called the militia of that nation; but in Great Britain and Ireland the term is applied particularly to those men who are chosen by ballot to serve for a certain number of years within the limits of these realms. The regulations of the militia service differ widely from those of the conscription on the Continent; since under the latter the troops become members of the regular army, and may be marched beyond the frontiers of the state; whereas the militia is enrolled only for home service, and may be said to constitute a domestic guard. Nothing corresponding to a modern militia can be said to have existed among the antients. In the Grecian states every citizen was a soldier; and every person, between certain ages, in the city and in the provinces, was obliged to serve in the Roman armies wherever they might be employed.

The military force of this country in the time of the Saxons was formed by a species of militia, and every five hydes of land were charged with the equipment of a man for the service. The ceorles, or peasants, were enrolled in bodies and placed under the command of the Ealdermen or chiefs, who were elected by the people in the folkmotes. After the Norman conquest of the country the proprietors of land were compelled, by providing men and arms in proportion to their estates, to contribute to the defence of the realm in the event of a threatened invasion. The troops were raised under the authority of *commissions of array*, which were issued by the crown; and the command was sometimes vested in the persons to whom the commissions were granted; though frequently the high constables, or the sheriffs of the counties, commanded in their own districts. This militia seems, at first, to have been liable to be marched to any part of the kingdom at pleasure, but in the reign of Edward III. it was decreed by a statute that no man thus raised should be sent out of his county, except in times of public danger. From the reign of Philip and Mary the lords-lieutenants have had the charge, under the sovereign, of raising the militia in their respective counties.

Charles I. having, by the ‘Petition of Right, been deprived of the power of maintaining a disposable body of troops in the country, found himself, in 1641, unable to suppress the rebellion then raging in Ireland; and was in consequence induced to commit the charge of restoring peace to the care of the parliament. The latter immediately availed itself of the circumstance to get into its own hands all the military force of the nation; and in the following year the two houses passed a bill in which it was decreed that the power over the militia, and also the command of all forts, castles, and garrisons, should be vested in certain commissioners in whom they could confide. The king having refused his assent to the bill, the parliament made a declaration that it was necessary to put the nation in a posture of defence, and immediately issued orders to muster the militia; on the other hand, the king issued commissions of array for a like purpose to some of the nobility, and thus commenced that war which desolated the country for several years.

When Charles II. ascended the throne, the national militia was re-established on its former footing, and the chief command was vested in the king. The lords-lieutenants of counties were immediately subordinate to the sovereign, and granted commissions (subject however to the king's approbation) to the field and regimental officers who commanded under them. New regulations respecting the amount of property which rendered persons liable to the charge of providing men and arms were then established; and at that time no one who had less than 200*l.* yearly income or less than 2400*l.* in goods or money could be compelled to furnish a foot soldier; nor could one who did not possess 500*l.* per annum or an estate worth 6000*l.* be made to provide a man for the cavalry. Persons having less property were required, according to their means, to contribute towards finding a foot or a horse soldier. The militia was then mustered and trained, by regiments, once a year and during four days; but the men were mustered and trained, by companies, four times in the year, and during two days each time. At the periods of mustering, every man was obliged to provide himself with his own ammunition.

These regulations, being found to be expensive, at length ceased to be observed, and the trainings of the militia were discontinued in every part of the realm except the city of London. In 1756, under an apprehension that the country was about to be invaded by a French army, considerable bodies of Hanoverian and Hessian troops were brought over for its defence; the spirit of the nation revolted however at the disgrace of being indebted to foreign mercenaries for protection; and these troops being sent back to the Continent, a national militia was again raised and organised under the sanction of an act of parliament in the 30th year of George II. The measure was generally popular, though it did not meet with universal approbation; and there were many persons who maintained the opinion that, for want of military knowledge and habits, this species of force could not be relied on in the event of its being called into active service. Experience has however shown that such an opinion is quite destitute of foundation; and it was soon afterwards admitted that, when well disciplined, these constitutional battalions rivalled those of the regular troops in the performance of all military evolutions. It may be observed here, that the greater part of the 16,000 British troops who gained the battle of Talavera were men drafted from the militia regiments at home; and so recently had they joined the army in Spain, that in the action many of them bore on their accoutrements the numbers of their former corps. (Napier, vol. ii.)

The militia laws were repealed in the 2nd year of George III., when a new act regulating the service of this force was passed; and in the 26th George III. all the previously existing statutes relating to the force were formed into one law. New regulations however were made by acts passed in the 42nd, 51st, and 52nd years of the same reign. The militia of the kingdom is now embodied under general officers, and is subject to the provisions of the mutiny act, or articles of war. The king is empowered to employ it in any part of the United Kingdom, but not out of it. The militia of Great Britain may serve in Ireland, and that of Ireland in Great Britain: the period of service for each, out of the island to which it belongs, being at most two years. When called into active service the officers rank with those of an equal grade in the regular army, but as the juniors of each grade, and they may receive promotion for meritorious services during a rebellion or an invasion; but no officer of militia can serve on a court-martial at the trial of an officer or soldier of the regular troops.

All persons not labouring under bodily infirmity and not specially excepted, are liable to be chosen for private militia men and to serve either personally or by substitute. The persons excepted are—peers of the realm; commissioned and non-commissioned officers and privates serving in the regular forces; half-pay officers of the navy, army, and marines, and commissioned officers who have served four years in the militia; members of corps of yeomanry and volunteers, and privates serving in the local militia; seamen and persons doing duty in the royal docks, at the gun-wharfs, and powder magazines; also persons employed under the direction of the Board of Ordnance; resident members of the two universities; clergymen of the Established church; also Protestant dissenting preachers, provided they take the oaths of allegiance and supremacy, and exercise no other occupation, or only that of schoolmaster; constables or other peace-officers; articled clerks; apprentices; free watermen on the Thames; poor men having more than three legitimate children, and persons above 45 years of age. To alleviate the distress of a poor man, when drawn for the militia, and who has provided a substitute, the churchwardens of the parish are bound to return to him a sum not exceeding 5*l.*, or half the current price of a substitute. No one having served personally, or by substitute, during three years in the militia, can be obliged to serve again till it comes to his turn by rotation; but if a man has served as a substitute for another, this does not exonerate him from serving again if chosen by the ballot.

The militia is trained and exercised by battalions or regiments twice in a year, and during fourteen days each time, or once in a year for twenty-eight days, at the discretion of the lords-lieutenants or their deputies.

The supplementary militia is an additional body of men which was first raised in 1793, for the defence of the country at that juncture. It is still continued to be raised when the necessities of the state require it, and it is subject to the same regulations as the ordinary militia. The local militia was a body raised in 1809, for the purpose of replacing, in certain districts, the corps of volunteers. By the 52nd George III., this force may be marched to any part of Great Britain in the event of a rebellion or an invasion, and it may be kept embodied till six months after the former is terminated or the latter repelled. Persons enrolled in the local militia cannot be compelled to serve in the regular militia till one year after their period of service in the former has expired.

The whole amount of the several militia forces in England alone exceeds 200,000 men; and during the late war, when an invasion of the country was apprehended, the force which might have been assembled in arms amounted to more than twice that number of men.

In France a militia was first raised from the provinces during the reign of Louis XIV.; but the several corps were disbanded after the peace of Ryswick. In 1726 was organised a force of the like kind, consisting of men chosen by lot from the towns and villages, and held in readiness to be assembled when required: and in 1778 these provincial troops were formed into 106 battalions. Since the great Revolution, the National Guard may be said to constitute the militia of France.

In the United States of America, by an act passed in 1792, the principal provisions of which are still in force, all able-bodied white male citizens between the ages of eighteen and forty-five, with certain exceptions, are enrolled in the militia; and when drafts are to be made for active service, the individuals are selected by ballot as in this country. The persons excepted are the executive, judicial, and representative officers of the Union, those who are employed in the post-office department, &c.; and, in some of the states, persons are exempted who have scruples of conscience against bearing arms. The president has the power of calling out the militia of the states; and, when on active service, it is subject to the same rules and articles of war as the regular troops, but courts-martial for the trial of military offenders are composed of militia officers only.

A national militia is an institution of the highest utility to a state; the men being engaged in military occupations only so long as may be necessary for becoming qualified to serve as soldiers when called upon to take the field, and being at all other times employed in labours subservient to the practice of the useful arts. They thus possess the united characters of defenders of their country and of contributors to its prosperity, while they remain connected in social union with their fellow-citizens, and are interested, like them, in the support of the laws and in the preservation of good government. It is in some respects otherwise with the soldiers of a regular army, who, devoted exclusively to the profession of arms, and though their services are indispensable in the prosecution of foreign wars, have few feelings in common with the civil portion of the community; and who, except in a nation like Great Britain, where the military power is duly subordinated to the civil magistrate, might, under the influence of an ambitious chief, become dangerous to the liberty of their country.

MILI'ZIA, FRANCESCO. According to the autobiographical sketch which he has left us, Milizia was born at Oria, a small town of the province of Otranto, in the kingdom of Naples, in 1725, and was of a noble and wealthy family. When nine years old, he was placed under the charge of his maternal uncle, who practised medicine at Padua. With him he remained about seven years, when he ran away from him and joined his father, who was then at Rome, and who sent him to Naples, where he studied logic and metaphysics under the celebrated Genovesi, and physics and geometry under the Padre Orlandi. He was more anxious however to study the world, and set out from Naples with the intention of going to France, but his finances would carry him no farther than Leghorn. After this he was obliged to content himself with leading a half studious, half indolent life at Oria. At the age of twenty-five, he married a young lady of family at Gallipoli, and having obtained a handsome allowance from his father, went to Rome, where he ultimately settled with his wife, in 1761. It was here that he began to apply himself diligently to the study of architecture, and published his Lives of the Architects, or 'Vite degli Architetti piu celebri,' in 1768, which was followed by his treatise 'Del Teatro,' in 1772, a production that excited so much scandal on account of certain observations in it, that it was suppressed by withdrawing all the copies; yet was soon afterwards republished at Venice. His 'Principles of Civil Architecture,' first published in 3 vols. 8vo., in 1781, and considerably improved in the third edition at Bassano, 1785, greatly extended his literary reputation, being, at the time of its appearance, almost the first attempt to base the art on rational principles, and to expose the pedantry with which it had been taught. It is moreover written in an attractive style, and is seasoned with not a little mordacity and causticity in some of the remarks. On this latter account, while it was admired by young students, it was censured by many more advanced professors, who charged the author with speaking too freely of many eminent names, with attacking authorities, and propounding his own views without regard to the example of others. His 'Arte di vedere nelle Belle Arti,' in which he showed himself a strong partisan of Mengs, is another work written with great eloquence, and with equal freedom of opinion, impugning Michael Angelo, among others, with unsparing severity. He also published a work entitled 'Roma delle Belle Arti di Disegno,' and his 'Dizionnario delle Belle Arti,' which latter, first printed at Bassano, in 1797, 2 vols. 8vo., is chiefly a translation from the 'Encyclopédie Méthodique.' After this, disgusted at the attacks levelled against his 'Roma,' he not only desisted from publishing the second and third parts which he had proposed of that work, but abandoned the fine arts, and took up the study of natural history. He died at Rome, in March, 1798.

Milizia had for a short time held the appointment of superintendent of the buildings in the Ecclesiastical States belonging to the king of the Two Sicilies, but he resigned it in 1786, not caring to have any such responsibility or tie upon him. His 'Lettere inedite,' addressed to the Count Sangiovanni, and first published at Paris, in 1827, serve to portray his disposition, and, without the testimony of his other writings, to convince us that he abhorred pedantry and dogmatism, false enthusiasm, and quackery. They abound with very free remarks on persons, and are seasoned with much caustic humour. An English translation of his 'Lives of the Architects' appeared in 2 vols. 8vo. in 1826, but besides being badly executed and full of gross errors of the press, it does not supply those names which Milizia omitted, nor the numerous other names that ought now to find their place in such a work.

MILK is an opaque fluid, secreted by the mammary glands of the females of the animals belonging to the class Mammalia, and adapted to the nourishment of their young offspring. It is of a specific gravity somewhat greater than that of distilled water, and possesses a peculiar odour, which is due to several acids. It consists, in addition to the watery portion, serum, &c., of globular particles, which are not more than half the size of the globules of human blood, having a diameter of about one ten-thousandth of an inch. They are composed of a fatty matter (butter) and a coagulable substance, which in many points resembles albumen, termed *caseum*.

The globules are specifically lighter than the fluid in which they are suspended, and easily ascend to the top when the milk is allowed to stand. This constitutes the cream, and consists of the butter, with some caseum and a portion of serum. By agitation, such as is effected by the various modes of churning, the fatty globules unite into a mass (butter), leaving the buttermilk, which consists of caseum and serum.

Milk from which the supernatant fluid, or cream, has been removed is termed skim-milk, and still retains a considerable quantity of coagulable or caseous matter, which may be separated from the serum, or whey, by means of a rennet or any acid. This coagulated portion constitutes the curd, and is the basis of cheese. If a rennet be used, and all the portion coagulated by its means be separated, the addition of vinegar causes some of what remains to coagulate; and this has been termed *zieger* by Schubler, but it is not certain that it differs from caseum. What remains after both these coagulated principles have been removed is the whey, which contains sugar of milk, some azotized substance (perhaps osmazome), lactic acid, and various salts.

The different constituents of milk, and the differences in the relative proportions of them in some of the common domestic animals, will be best seen in the following tables drawn up by Mr. Pereira:—

- Milk
  - Cream
    - Butter
      - Fatty Matter, solid at ordinary temperatures . . . . *Stearine.*
      - Liquid Fatty Matter
        - By saponification, yielding Butyric, Caproic, Capric, Margaric, and Oleic Acids, and Glycerine . . . . *Butyrine.*
        - By saponification, yielding no Butyric, Caproic, nor Capric Acids . . . . . *Oleine.*
    - Buttermilk . . .
      - Caseum.
      - Serum.
  - Skim-Milk
    - Matters which are coagulable
      - by Rennet . . . . *Caseum or Curd.*
      - not by Rennet, but by Acetic Acid . . . . *Zieger.*
    - Serum or Whey . . .
      - Azotized Matter . . . . *Osmazome?*
      - Lactic Acid.
      - Salts
        - Soluble in Alcohol
          - Lactates of Potash, Soda, Ammonia, Lime, and Magnesia.
          - Chlorides of Potassium and Sodium.
        - Soluble in Water, not in Alcohol
          - Sulphate of Potash.
          - Phosphate of Potash and Soda.
        - Insoluble in Water
          - Phosphates of Lime, Magnesia, and Iron.

100 Parts of the Milk of the	Cream.	Butter or Fatty Matter.	Caseum.	Sugar of Milk.	Total Butter, Caseum, and Sugar of Milk.
Ewe (Stiprian Luiscius, and Bondt)	11·5	5·8	15·3	4·2	25·3
Goat (ditto) . .	7·5	4·56	9·12	4·38	18·06
Goat (Payen) . .	not stated	4·08	4·52 including insoluble salts.	5·86 including insoluble salts.	14·46
Cow (Stiprian Luiscius, and Bondt	4·6	2·68	8·95	3·60	15·23
Cow (Berzelius) .	not stated	4·5	6·10	3·5	14·10
Woman (Payen) 1st case .	not stated	5·16	0·180	7·62	12·96
Woman (Payen) 2nd case .	not stated	5·2	0·250	7·930	13·38
Woman (Payen) 3rd case .	not stated	5·18	0·240	7·66	13·08
Ass (Stiprian Luiscius, and Bondt)	2·9	..	2·3	4·5	6·8
Mare (ditto) . .	0·8	..	1·62	8·75 (only 3·7 according to Young.)	10·39

From these analyses it would appear that milk is a compound fluid, chiefly consisting of oleaginous and albuminous materials, with different salts.

According to Dr. Prout, 'albuminous and oleaginous principles may be considered already fitted for the purposes of the animal economy, without undergoing any essential change in their composition.' And thus, by the action of the organs of the parent, the food is brought into a state very favourable for its assimilation in the body of the young, without taxing severely the digestive organs of the latter. The salts present in the milk serve also important uses, especially the phosphate of lime by consolidating the bones which, at the time of birth, are soft and cartilaginous. The period when lactation in the human offspring should cease must vary with the vigour and progress of development of the infant; but in general nine months is the proper time for suckling, and its continuance beyond that period is injurious both to parent and child.

The milk of cows or other animals is extensively used as the food even of adults, and, though insufficient alone, is a most valuable ingredient of diet. It is often enjoined as the food of invalids, especially of persons who have a tendency to consumption.

Milk is also used as an antidote in cases of poisoning by some metallic salts, such as corrosive sublimate, perchloride of tin, sulphate of copper, &c.

Though cheese is in general difficult of digestion, fresh-pressed curd is often found to suit the stomach of persons affected with disease of that organ. (See Abercrombie, *On Diseases of the Stomach.*)

Milk may be brought to a dry state, and powdered, in which condition it keeps for a length of time; and by dissolving it in tepid water an artificial milk may be formed, capable of being used at sea, particularly for children during long voyages.

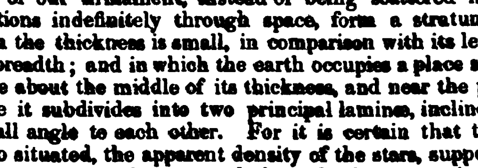
(See Mr. Pereira's 'Lectures' in the *Medical Gazette.*)

MILKY WAY. It is desirable, in describing astronomical objects, to keep as close as possible to the words of those who are accustomed* to the sight and description of such things. Two passages in Sir John Herschel's 'Astronomy' (pp. 163, 375, 376, Lardner's *Cyclopædia*, No. 43) will describe the Milky Way, and the theory of it, by Sir William Herschel, with excellent brevity and distinctness.

'There are not wanting *natural* districts in the heavens, which offer great peculiarities of character, and strike every observer: such is the Milky Way, that great luminous band which stretches, every evening, all across the sky, from horizon to horizon, and which, when traced with diligence, and mapped down, is found to form a zone, completely encircling the whole sphere, almost in a great circle, which is neither an hour circle nor coincident with any other of our astronomical *grammata*. It is divided in one part of its course, sending off a kind of branch, which unites again with the main body after remaining distinct for about 150°. This remarkable belt has maintained, from the earliest ages, the same relative situation among the stars; and when examined through powerful telescopes, is found (wonderful to relate!) *to consist entirely of stars scattered by millions*, like glittering dust on the black ground of the general heavens.

'If the comparison of the apparent magnitudes of the stars with their numbers leads to no general conclusion, it is otherwise when we view them in connection with their local distribution over the heavens. If indeed we confine ourselves to the three or four brightest classes, we shall find them distributed with tolerable impartiality over the sphere; but if we take in the whole amount visible to the naked eye, we shall perceive a great and rapid increase of number as we approach the borders of the Milky Way. And when we come to telescopic magnitudes,' or stars of so small a magnitude as to be invisible except through a telescope, 'we find them crowded, beyond imagination, along the extent of that circle, and of the branch which it sends off from it; so that in fact its whole light is composed of nothing but stars, whose average magnitude may be stated at about the tenth or eleventh.

'These phenomena agree with the supposition that the stars of our firmament, instead of being scattered in all directions indefinitely through space, form a stratum, of which the thickness is small, in comparison with its length and breadth; and in which the earth occupies a place somewhere about the middle of its thickness, and near the point where it subdivides into two principal laminæ, inclined at a small angle to each other. For it is certain that to an eye so situated, the apparent density of the stars, supposing them pretty equally scattered through the space they occupy, would be least in a direction of the visual ray (as S A) perpendicular to the lamina, and greatest in that of its breadth, as S B, S C, S D; increasing rapidly in passing from one to the other direction, just as we see a slight haze in the atmosphere thickening into a decided fog-bank near the horizon, by the rapid increase of the mere length of the visual ray. Accordingly, such is the view of the construction of the starry firmament taken by Sir William Herschel, whose powerful telescopes have effected a complete analysis of this wonderful zone, and demonstrated the fact of its consisting entirely of stars. So crowded are they in some parts of it, that by counting the stars in a single field of his telescope, he was led to conclude that 50,000 had passed under his review in a zone two degrees in breadth, during a single hour's observation. The immense distance at which the remoter regions must be situated, will sufficiently account for the vast predominance of small magnitudes which are observed in it.' [HERSCHEL; NEBULÆ.] But to the above it must be added, that the fifty thousand stars thus men-



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* Many popular works on astronomy contain nothing but descriptions of descriptions, in which want of absolute plagiarism is no merit, but the reverse. We recommend the work cited to those of our readers who are not already acquainted with it, as that of an actual observer whose felicity of description is very notorious among those who are in the habit of viewing the celestial bodies.

tioned as contained in a zone of 15° by 2° include only those which could be steadily seen and distinctly numbered; besides which, twice as many more were suspected, of which only occasional glimpses could be got for want of sufficient light.

The Milky Way may be described in general terms as extending three or four degrees on each side of a great circle inclined at an angle of about 60° to the ecliptic, which it cuts in the northern hemisphere between the horns of Taurus and the feet of Gemini, and in the southern hemisphere between Sagittarius and Scorpio. Beginning with the part nearest to the North Pole, it nearly covers Cassiopea and Perseus, and then, becoming thinner, passes through Auriga, between Taurus and Gemini, and near the back of Canis Major through Argo. It then narrows considerably, and passing under the hind feet of Centaurus, widens again near Ara. A little above the last constellation, and before it again meets the ecliptic, it divides into the two streams above mentioned, which contain between them a long thin strip passing through part of Scorpio, Serpens, Aquila, Vulpecula, and Cygnus. In Cygnus the streams reunite, but immediately separate again, finally reuniting higher up in the same constellation, from whence the main stream reaches Cassiopea, &c.

The Milky Way was called by the Greeks *γαλαξίας*, or *κύκλος γαλακτικός* (whence our word *Galaxy*), and by the Romans *Orbis lacteus*. The mythology of the former people on the subject is as edifying as usual: Hyginus fixes on Eratosthenes the most common story, namely, that the Galaxy arose from the milk of Juno, who pushed Hercules away from her breast (where he had been placed by Jupiter) on learning that he was the son of Maia. Nor does the above accurate writer forget to mention that others held the appearance to have arisen from young master Hercules having been a greedy child, and having filled his mouth too full. Others thought that the whole was not milk, but ears of corn which Isis dropped in her flight from Typhon. Another fable, mentioned by Plato, makes the Milky Way to be a broad causeway through the heavens for gods and heroes to walk upon; another, that it is the part of the heaven which was singed when the horses of the sun ran away with Phaeton. These stories are a proper prelude to the speculations of the philosophers which followed. Some of the Pythagoreans are reported to have supposed the Milky Way to be an old and disused path of the sun, out of which, some said, he was frightened by the banquet of Thyestes; others, a reflexion from the sun. Anaxagoras is said to have thought it was the shadow of the earth: Aristotle supposed it to be sublunary, and to consist of exhalations, of the same matter as comets. Posidonius took it for a band of fire; Theophrastus for a solid and luminous band, joining together the two hemispheres; while Diodorus thought it was celestial fire shining through the clefts of the solid heavens, Democritus hit the true explanation, namely, that it is a congeries of little stars too small to be separately seen—an opinion which both Plutarch (*De Placit. Philos.*, l. iii., c. 1) and Manilius mention. Shortly after the invention of the telescope, Galileo announced that he had resolved the whole of the Milky Way into stars. 'Est enim *Galaxia* nihil aliud quam *innumerarum stellarum coacervatim consitarum congeries:* in quamcunque enim regionem illius perspicillum dirigas, statim stellarum ingens frequentia sese in conspectum profert quarum complures satis magnæ et valde conspicuæ videntur, sed exiguarum multitudo prorsus inexplorabilis est.' (*Nuncius Sidereus.*) It is however not easy to suppose that Galileo's resolution of the Milky Way was complete; and we may here see how necessary is attention to minute description. When Sir J. Herschel, in the paragraph cited above, states the stars to appear 'like glittering dust *on the black ground of the general heavens*,' we know that, if the observer can be depended upon, he has completely resolved the continuous light in question: but if he only says, with Galileo, that he detected innumerable stars, we are only sure that he has distinguished the nearer stars, and may suppose that the more distant ones still formed a Milky Way behind them. That this must have been the case with Galileo (whose telescopes would never distinctly show Saturn's ring) may be confidently asserted. It must also be remembered that Galileo had completely resolved several nebulæ, and might easily have completed his assertion as to the Milky Way from analogy. Kepler ('Dioptr. Pref.') describes this resolution in a way which will be some guide as to its character: 'Nebulosa stella ostendit, ut in Via Lacteâ, duas, tres, vel quatuor clarissimas stellas in arctissimo spatio collocatas;' that is, two, three, or four stars were seen in the smallest space: this may very well correspond to Sir W. Herschel's estimate of 50,000 in the zone above mentioned, without the necessity of supposing that those stars were seen, which the forty-foot reflector would only show by glimpses. Sir W. Herschel counted seventy-nine stars, on the average, in a field of fifteen minutes in diameter, showing about as much of the heavens as is covered by one-fourth part of the moon. If, which may be suspected, the 'arctissimum spatium' of Kepler meant the field of his telescope, the resolution thus obtained would not quite justify the conclusion, except as a probable deduction; the real and necessary inference would only have been, that stars invisible to the naked eye exist in every part of the Milky Way in considerable numbers.

MILL, JOHN, was born at Shap, in Westmoreland, about 1645. In 1661 he entered as servitor at Queen's College, Oxford, took his degree of B.A. in 1666, of M.A. 1669, and was shortly afterwards chosen a fellow and tutor of his college. In 1676 he was made chaplain to Dr. Lamplugh, bishop of Exeter, and in 1681 obtained the rectory of Blechingdon, in Oxfordshire, and was appointed chaplain to Charles II. In 1685 he was appointed principal of St. Edmund's Hall, which office he held till his death, which happened June 23rd, 1707.

Mill is known by his valuable edition of the Greek Testament, which was published only fourteen days before his death, with the following title: 'Novum Testamentum Græcum, cum Lectionibus variantibus, MSS. Exemplarium, Versionum, Editionum, SS. Patrum et Scriptorum Ecclesiasticorum, et in easdem Notis.' This edition, which was the labour of thirty years, was originally begun by the advice of Dr. Fell, bishop of Oxford, and reflects the greatest credit on the diligence and critical acumen of its learned editor. He inserted the various readings that had been previously collected, procured extracts from several then uncollated MSS., and added many readings from the antient versions and the writings of the fathers. Mill however made no change in the text, which was merely a reprint of Robert Stephens's edition of 1550. These various readings, which amounted to more than 30,000, were attacked by Dr. Whitby, in 1710, in a work entitled 'Examen Variantium Lectionum Johannis Millii;' in which he maintained that a collection of so many various readings tended to unsettle the text of the New Testament, and to introduce doubt and uncertainty into the whole system of biblical interpretation. Dr. Whitby's arguments were applied by Antony Collins, in his 'Discourse on Free-thinking,' against the authority of the New Testament; whose work was answered by Bentley, a personal friend of Mill's, under the signature of Phileleutherus Lipsiensis.

The edition of the Chronicle of Malala, published at Oxford, in 1691, which is frequently said to have been edited by Mill [BENTLEY], was merely published under his superintendence, since the printing of the work was finished under the revision of Chilmead. [MALALA.]

MILL, JAMES, was born at Montrose, on the 6th of April, 1773. He is said to have received the early part of his education at the grammar-school of Montrose. However this may be, he was, subsequently at least, educated in the house of Sir John Stuart (originally Belcher), who was for a long time member of parliament for Kincardineshire. Mr. Mill was sent to the university of Edinburgh, where he was educated for the church and where he distinguished himself as a Greek scholar. Metaphysical and ethical philosophy also occupied a great part of his time at the university. He was a favourite of Dalzel, the then Greek professor in Edinburgh, who recommended him as a tutor to the Marquis of Tweedale. He was licensed to preach about 1798. By the advice of a friend he changed his views, and in 1800 accompanied Sir John Stuart to London, where he settled. He became editor of 'The Literary Journal,' a review, which supported him for some time, but was discontinued in consequence of the smallness of the sale. Mr. Macdiarmid, and Dr. T. Thomson, professor of chemistry in the university of Glasgow, were the chief contributors. He afterwards employed much of his time in writing for periodical publications; and for several years he was an occasional contributor to the 'Edinburgh Review.' He married soon after he had settled in London. His acquaintance with Mr. Bentham commenced at an early period of his residence in the metropolis.

His 'History of British India' was commenced about 1806, but being a work of great labour, and the author being obliged to devote a considerable portion of his time to other avocations, it was not published till the winter of 1817-18. It is perhaps no very high praise of this work to say that it is not only the best history of British India, but the only single work calculated to convey to the general reader any clear and connected view of India and Anglo-Indian affairs. But it possesses higher claims than these. It is admitted by some of the most eminent of those who have administered Indian affairs for the last ten years, that Mr. Mill's work was the beginning of sound thinking on the subject of India; and the measures of government in that country are stated by those who have the best means of knowing, to be now bearing every year more and more the impress of his views. The style of Mr. Mill's history has been represented by some as dry and unattractive. Mr. Mill certainly does not deal much in rhetorical ornament, at least in what is usually considered such by modern writers, for his style reminds us more of the nervous simplicity and terseness of some of the antient masters of the difficult art of writing, than that of any modern except Hobbes. The reader who is really in search of a meaning will find it in the writings of Mr. Mill with far less labour than where it is to be sought for in a crowd of unapt and unnecessary words. These remarks may be said to be applicable rather to Mr. Mill's philosophical than to his narrative style. But although not possessing narrative powers of the same kind as Sir Walter Scott or even David Hume, there are passages of Mr. Mill's history which will interest many readers as much as the most spirit-stirring romance; for instance, his account of some of the actions of Clive, and of Cornwallis's night attack upon the outworks of Seringapatam. His narrative of military operations is good; clearness, in which Mr. Mill excels, being the principal quality required. And some of his characters, that of Clive in particular, are drawn in a few bold and forcible lines, which engrave them on the mind of the reader.

In consequence of the ability and knowledge of the subject displayed in his history, and although he had in some parts of it freely censured the conduct of the East India Company, the Court of Directors, in the spring of 1819, introduced him into their home-establishment, and intrusted to him the chief conduct of their correspondence with India in the revenue branch of administration. He afterwards rose, in the course of promotion, to be head of the department in the India House of correspondence with India.

About three years before his appointment to his office in the India House, Mr. Mill became a contributor to the 'Supplement to the Encyclopædia Britannica,' his principal contributions to which were the articles on Government, Education, Jurisprudence, Law of Nations, Liberty of the Press, Colonies, and Prison Discipline. These essays were reprinted in a separate form, and are probably the best known of Mr. Mill's productions. They exhibit great powers both of analysis and ratiocination, and have produced, we believe, more marked effects than any other, not only of the works of Mr. Mill, but of any other writer of this age on such subjects, on the minds of his contemporaries.

His 'Elements of Political Economy,' whatever may be its merits or demerits, and it made no pretensions to originality, published in 1821-2, has at least the very great merit of being written with his usual clearness and precision of language.

In 1829 he published his 'Analysis of the Phenomena of the Human Mind,' a work on which he bestowed more of the labour of thought than on any other of his productions. In this work Mr. Mill has attempted to resolve all the powers of the human mind into a very small number of simple elements. From an examination of a number of the more complicated cases of consciousness, he arrives at the conclusion that they all resolve themselves into three simple elements—sensations, ideas, and the train of ideas. He thus explains what he means by the terms *sensations* and *ideas*. 'We have two classes of feeling: one, that which exists when the object of sense is present; another, that which exists after the object of sense has ceased to be present. The one class of feelings I call sensations; the other class of feelings I call ideas.' (*Analysis of the Phenomena of the Human Mind*, vol. i., p. 41.) Mr. Mill begins with the simpler, and thence proceeds to the exposition of the more complex phenomena. 'The feelings,' he says, 'which we have through the external senses are the most simple, at least the most familiar, of the mental phenomena. Hence the propriety of commencing with this class of our feelings.' (*Analysis*, vol. 1., p. 1.) Accordingly, he begins with sensation, under which head he ranges the feelings which we have by the five senses—smell, taste, hearing, touch, and sight. 6, Sensations of disorganization, of the approach to disorganization, in any part of the body. 7, Muscular sensations, or those feelings which accompany the action of the muscles. 8, Sensations in the alimentary canal. He next proceeds to ideas, or the copies or images of sensations. He then treats of ideas put together or associated in trains, and of the order of their association and the causes of that order. Before proceeding to the exposition of the more complex ideas or clusters of ideas, he finds it necessary to explain the process of naming, or language; that process by which the sensations and ideas of one man are communicated to another, and by which likewise a record is preserved of sensations and ideas after they are passed. He then treats of consciousness and conception, which philosophers, he says, have erroneously created into what they called powers of the mind: whereas, he says, consciousness is merely a name applied to sensations, and to ideas whether simple or complex; to all the feelings of our sentient nature. and conception a name applied only to ideas, and to ideas only in a state of combination. But consciousness may surely be said to be the power of having sensations and ideas; and conception the power of having ideas in a state of combination.—In this sense, which is not at variance with Mr. Mill's explanation of them, both consciousness and conception may be called powers of the mind.

Again, imagination, he says, is the name of a *train* of ideas. 'I am said to have an imagination, when I have a train of ideas; and when I am said to imagine, I have the same thing; nor is there any train of ideas to which the term imagination may not be applied.'

'There is great diversity of trains. Not only has the same individual an endless variety of trains, but a different character belongs to the whole series of trains which pass through the minds of different individuals or classes of individuals. The different pursuits in which the several classes of men are engaged render particular trains of ideas more common to them than other trains. One man is a merchant, and trains respecting the goods in which he buys and those in which he sells are habitual in his mind. Another man is a lawyer, and ideas of clients and fees, and judges and witnesses, and legal instruments and points of contestation, and the practice of his court, are habitually passing in his mind. Ideas of another kind occupy the mind of the physician; of another kind still the mind of the warrior. The statesman is occupied with a train different from that of any of the classes that have been mentioned, and one statesman with a very different train from another, according as his mind is running upon expedients which may serve the purpose of the day, or arrangement which may secure the happiness of the population from generation to generation. A peculiar character belongs to the train which habitually occupies the mind of the mathematician. The mind of the metaphysician is also occupied by a train distinguished from that of other classes. And there is one man yet to be mentioned, the poet, the peculiarity of whose trains has been a subject of particular observation. To such a degree indeed have the trains of the poet been singled out for distinction, that the word imagination, in a more restricted sense, is appropriated to them. We do not call the trains of the lawyer, or the trains of the merchant, imagination. We do not speak of them as imagining when they are revolving each the ideas which belong to his peculiar occupation; it is only to the poet that the epithet of imagining is applied. His train or trains analogous to his are those which receive the name of imagination.' (Vol. i., p. 179.)

In some parts of his book Mr. Mill has, we think, been led into error, in part probably by carrying his notion of association as an explanation of these phenomena too far. Thus in the chapter on classification, after very ably showing how long men had been led away by mere jargon from the real nature and object of classification, he says, 'Man first becomes acquainted with individuals. He first names individuals. But individuals are innumerable; and he cannot have innumerable names. He must make one name serve for many individuals.' After then alluding to the case of 'synchronous sensations so concreted by constant conjunction as to appear, though numerous, only one; o which the ideas of sensible objects, a rose, a plough, a house, a ship, are examples'—he thus proceeds: 'It is easy to see wherein the present case agrees with and wherein it differs from those familiar cases. The word man, we shall say, is first applied to an individual; it is first associated with the idea of that individual, and acquires the power of calling up the idea of him; it is next applied to another individual, and acquires the power of calling up the idea of him; so of another, and another, till it has become associated with an indefinite number, and has acquired the power of calling up an indefinite number of those ideas indifferently. What happens? It does call up an indefinite number of the ideas of individuals as often as it occurs; and calling them up in close connection, it forms them into a species of complex idea.' (Vol. i., p. 204.) Mr. Mill then says there can be no difficulty in admitting this, 'because it is an acknowledged fact.' Mr. Mill himself furnishes what he considers the reason, for he says, 'It is also a fact that when an idea becomes to a certain degree complex from the multiplicity of the ideas it comprehends, it is of necessity indistinct. Thus, when the word man calls up the ideas of an indefinite number of individuals, not only of all those to whom I have individually given the name, but of all those to whom I have in imagination given it, or imagine it will ever be given, and forms all those ideas into one, it is evidently a very complex idea, and therefore indistinct.' (*Ibid.*)

Mr. Mill having gone through an exposition of abstraction, memory, belief, ratiocination, evidence, and some of the more complicated cases of naming, devotes the latter half of the second volume of his Analysis to the phenomena in which the sensations and ideas are to be considered as not merely existing, but also as exciting to action. He treats of pleasurable and painful sensations, and of the causes of the pleasurable and painful sensations; then of ideas of the pleasurable and painful sensations, and of the causes of them. He treats of wealth, power, and dignity, and their contraries, of our fellow-creatures, and of the objects called sublime and beautiful, and their contraries, contemplated as causes of our pleasures and pains. Chapter 22 is devoted to the subject of motives; and Chapter 24 to that of the will. Chapter 25 (the last) to intention. Mr. Mill's exposition of all these phenomena is mainly grounded on the law of association, by which he means simply the fact that the order of occurrence amongst our ideas is the order of occurrence amongst our former sensations, of which those ideas are the copies.

Mr. Mill's last work was the 'Fragment on Mackintosh,' published anonymously in 1835. This is a very severe criticism upon the 'Dissertation on the History of Ethical Philosophy,' contributed by Sir James Mackintosh to the 'Encyclopædia Britannica.' This work contains some very valuable disquisitions on morals, legislation, and jurisprudence, with some very clear and just remarks on the distinctions between these subjects, which are often confounded. Mr. Mill wrote several of the principal articles in the early numbers of the 'Westminster Review.' Among the contributions which are considered his best, are the article on the Formation of Opinions,' in No. XI., and the article on the Ballot, in No. XXV.

Mr. Mill died at Kensington, June 23, 1836.

MILLAR (Professor), JOHN, son of the Rev. James Millar, minister of the parish of Shotts, was born in that parish on the 22nd June, 1735. Two years after, his father was translated to the parish of Hamilton in the same presbytery, and young Millar was about the same time placed under the charge of his uncle, Mr. John Millar of Milhaugh, in the neighbouring parish of Blantyre. At the age of seven he was put by his uncle to the school of Hamilton, and thence sent to Glasgow college, where he distinguished himself by his diligence and attention. He was at first designed for the church; but while at college he adopted the resolution of studying for the bar. On leaving college he became preceptor to the eldest son of Lord Kames, in whose family he spent two years, during which he formed an intimacy with David Hume and other eminent individuals. On the 9th of February, 1760, Millar passed advocate (*Faculty Record*); but having undertaken at this early period of his life the cares and burden of a family, he was soon obliged to abandon his prospects at the bar, and an opportune vacancy having occurred in the chair of civil law in Glasgow college, he applied for and obtained that situation the following year (1761). He now devoted himself entirely to the duties of his new sphere, and by his conduct in it raised the class from a very low and languid condition to be the most popular of the law chairs in the kingdom. 'His manner was familiar and animated, approaching more nearly to gaiety than enthusiasm; and the facts which he had to state, or the elementary positions he had to lay down, were given in the simple, clear, and unembarrassed diction in which a well-bred man would tell a story or deliver an opinion in society. All objections that occurred were stated in a forcible, clear, and lively manner; and the answers, which were often thrown into a kind of dramatic form, were delivered with all the simplicity, vivacity, and easy phraseology of good conversation. His illustrations were always familiar, and often amusing; and while nothing could be more forcible or conclusive than the reasonings which he employed, the tone and style in which they were delivered gave them an easy and attractive air, and imparted to a profound and learned discussion the charms of an animated and interesting conversation.' (*Edinburgh Review*, vol. iii.*) But this was not all. It was also in no small degree owing to his practice of *examining* his pupils, and prescribing essays on subjects previously discussed in his lectures, that Millar acquired the high reputation as a professor of law which still attaches to his name. Every day before he began his address from the chair he endeavoured to ascertain by examination of his pupils whether they had followed his reasoning on the preceding day; and when the lecture was over he remained some time in the class-room to converse with such as were desirous of farther information. By engaging with them in an easy dialogue he removed obscurities and corrected misapprehensions; and the students were accustomed to acknowledge that it was at these meetings they derived the full benefit of the lectures. (Jardine's *Outlines of a Philosophical Education*, p. 463.) Mr. Millar had also the good fortune, as we may call it, of long having scarce any rival chair to contend with; for from the time of Mr. Erskine's resignation in 1765 onwards to the end of the year 1786, when Dr. David Hume was appointed, the chair of Scots law at Edinburgh was filled by Professor Wallace, who had too many employments to allow of his attention being devoted to any. Such accordingly was the success which attended Mr. Millar's prelections, that his pupils rapidly increased in number, and the professor of civil law in the Edinburgh college, after seeing his students proportionally diminished, was obliged to abandon the practice, which had till then prevailed in his class, of lecturing in Latin, with the hope of retaining the remainder.

Although most of his lectures were attended with interest, yet remarking a more than ordinary degree of attention manifested to such of them as referred to the progress of society and government, Mr. Millar was induced from this circumstance to publish a short treatise on the subject. This he did in 1771, and the work was favourably received. Some years afterwards he began to turn his attention in a particular manner to the nature and origin of the English government; and in 1787 he published his 'Historical View of the English Government, from the settlement of the Saxons in Britain to the accession of the House of Stuart.' This work is described as 'remarkable for the sagacity of its conjectures, the ingenuity of its explanations, the boldness of its discussions, and the total freedom from prejudice; but it is deficient in accuracy and research, and will not bring conviction to a mind that has received its first impressions from the plausible but delusive representations of Hume.' (*Edinburgh Review*, xxx., 166-7.)

Mr. Millar was in stature about the middle size; his person was athletic, and his countenance very animated and expressive. He continued in good health till about the end of the year 1799, when he was seized with an inflammatory complaint, from which however he in a certain degree recovered; but having about a year and a half after exposed himself to cold, he was seized with a pleurisy, of which he died 30th May, 1801.

MILLE'NNIUM, a Latin word meaning a period of a thousand years, is applied by ecclesiastical writers to the period during which it is predicted in Scripture that the Church will be in a state of extraordinary prosperity, and which is to be preceded by the overthrow of her enemies, accompanied at its commencement by the first resurrection, or the resurrection of the saints, and followed by the destruction of Gog and Magog, and the general judgment. (*Rev.* xx).

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* The elaborate article of which the above quotation is a part has for its reputed author Francis Jeffrey, who is supposed to have been a pupil of Professor Millar's.

Respecting the state of the church during the Millennium two opinions are held, both of which can be traced up nearly to the earliest ages of Christianity. The one is that Christ will reign in person upon the earth at Jerusalem, that the saints will reign with him and enjoy corporeal pleasures, and that the Jews will be restored to Palestine and exalted to the first rank among the nations of the world. This doctrine was held by Irenæus and others of the earlier fathers, not merely as their own opinion, but as the faith of the church received from the Apostles. These tenets were also held by Lactantius, who expected the Millennium to commence very soon after the time at which he lived. On the other hand it was held by Jerome and other fathers, who warmly opposed the doctrines just mentioned, that the passages of scripture on which they are founded must be taken in an allegorical sense, and that the Millennium will only be distinguished by the universal diffusion of pure Christianity in the world, and a consequent decrease of physical and moral evil. This opinion was adopted as the belief of the orthodox church, and has been almost universally received in modern times. The followers of the late Rev. Edward Irving and some other small sects, as well as many individuals among other bodies of Christians, still hold the doctrine of the personal reign of Christ on earth. Such persons are commonly called Millennarians, the name applied in the early ages of the church, together with the corresponding Greek word Chiliasts, to those who held these opinions. (Lardner's *Credibility*; Middleton's *Free Enquiry*, page 46.)

MILLEPO'RIDÆ. In the Linnæan 'Systema Naturæ' the genus Millepora included fourteen species of solid corals perforated with conical non-lamelliferous pores. Several of these have been taken as types of new genera or subgenera, and, according to the general practice of modern zoology, the Linnæan genus is transformed into a great family. Lamarck (*Anim. sans Vertèbres*, 11) places many of the Millepores in his fourth section of Polyparia, the foraminated corals, with Catenipora and Tubipora, which belong to other groups. The Milleporidæ form a distinct order in the Foraminated Polypiaria of Lamouroux (*Expos. Méthod.*), and include no less than eighteen genera, viz.:—

Ovulites, Retepora, *Lunulites*, Orbulites, Ocellaria, Melobesia, Eudea, *Alveolites*, Theonea, Chrysaora, Millepora, *Terebellaria*, Spiropora, *Idmonea*. (Distichopora, Hornera, Krusensterna, and Tilesia are included among Milleporidæ in the table, but not in the body of the work.) The genera in Italics are fossil.

Lamouroux defines the Milleporidæ thus:—*Polyparia* stony, polymorphous, solid, internally compact; *cells* very small or poriform, scattered or in series, never lamelliferous, though the parietes are sometimes lightly striated.

Blainville collects the Milleporidæ into groups according to the form of the cells in the coral, and defines the family by characters drawn both from the animal and the stony support.

Animals in general very slender, and provided with a single circle of slender tentacula; *cells* sometimes of considerable size, but always *without lamellæ or striæ* within or without the tubes; *polyparium* fixed, varying in shape. Retrenching from the group the palmated kinds (to form the genus Palmipora among the Madrephylliœa), there remain, according to Blainville, 23 genera, which are thus arranged:—

1. *Cells polygonal, often rather large.*—Favosites (Eunomia), Alveolites, Apsendesia, Theonea, Pelagia, Terebellaria, Polytrema, Frondipora, Lichenopora.
2. *Cells round, very fine, poriform, immersed.*—Orbiculites, Marginopora, Stromatopora, Tilesia, Spinopora, Chrysaora, Ceriopora, Distichopora, Heteropora.
3. *Cells round, more or less tubular.*—Pustulopora, Hornera, Idmonea, Cricopora.

The following are the principal characters of these genera:—

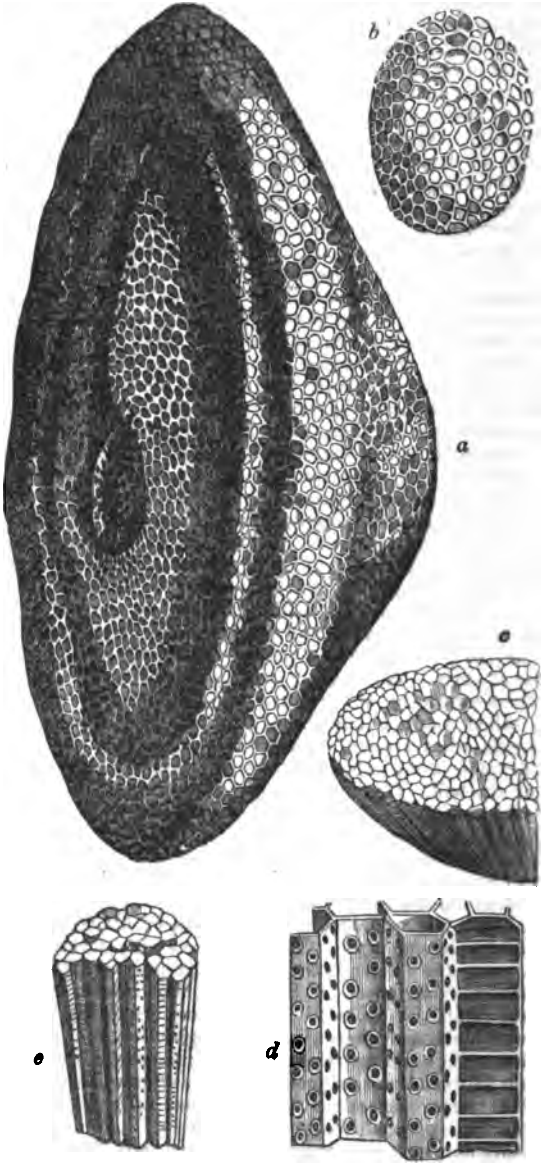
§ 1. Cells polygonal.

Favosites.—Animals unknown; *cells* prismatic, contiguous, vertical or diverging, the parietes pierced with pores, the cavity divided by transverse septa; *polyparium* branched or massive, sometimes basaltiform.

A genus of Lamarck; Goldfuss added to the knowledge of its structure, but changed its name to Calamopora. Blainville thinks Eunomia of Lamouroux may be included in it, but the descriptions are unlike. Ehrenberg places it near Astræa, in the family of Madrephylliœa, and we think with reason.

The Favosites are only known in a fossil state, and, we believe, only in strata of the 'Transition' and carboniferous eras, in the former of which they are specially abundant, in the Eifel, Siluria, at Dudley, &c.

Example, Favosites Gothlandica. (Goldfuss, t. 26, f. 3.)



Favosites Gothlandica.

a, *b*, two specimens; *c*, nuclei of the tubes; *d*, tubes magnified; *e*, portion of a vertical section.

Eunomia.—Animals unknown; *cells* tubular, long, parallel, internally sulcated longitudinally, and transversely annulated; the parietes thick and solid. (Lamouroux, *Expos. Méthod.*)

The only species, Eunomia radiata, is fossil in the oolitic series of Caen.

Alveolites.—Animals unknown; *cells* short, tubular, prismatic, alveoliform, the parietes thin; polyparium formed into reticulated layers, enveloping each other.

A genus of Lamarck, subsequently, but without sufficient reason, reunited by Goldfuss to Favosites, under the name of Calamopora.

Two living species and a few fossils, chiefly from the tertiary series of Dax. Blainville includes in the genus (not correctly) many of the Calamopora of Goldfuss which are to be ranked as Favosites.

Frondipora.—Animals unknown; *cells* unequal, subpolygonal, accumulated irregularly, prominent only on the external surface of a finely branched *polyparium*, which is fixed, arborescent, variously reticulated, and longitudinally striated on the non-celluliferous face.

One of the species is ranked as a Retepora by Lamarck.

Lamouroux (following Tilesius) calls it Krusensterna. The species are recent in the seas of Kamtchatka and the Mediterranean.

Example, Frondipora reticulata. (Blainv., pl. 69, f. 1.)

Lichenopora.—Animals unknown; *cells* rather large, poriform or subtubular, subpolygonal, accumulated and scattered on the interior surface of a fixed orbicular, cupuliform polyparium, which is quite smooth externally.

A genus of Defrance, including one recent and three fossil species from the cretaceous and tertiary strata.

Example, Lichenopora turbinata. (Blainv., pl. 68, f. 4.)

Theonea.—Animals unknown; *cells* rather large and deep, subpolygonal, accumulated irregularly, prominent on the tumid or angulated face of the polyparium, which is fixed, irregularly lobed, and more or less lacunose between the accumulations of pores,

Example, Theonea clathrata (Lamouroux, pl. 80, f. 17), from the oolite of Caen.

Apsendesia.—Animals unknown; *cells* subpolygonal, small, poriform, irregularly disposed, occupying the upper and external edge of sinuous ridges, smooth on one side, plaited on the other; *polyparium* globular or hemispherical, diverging from the base to the circumference.

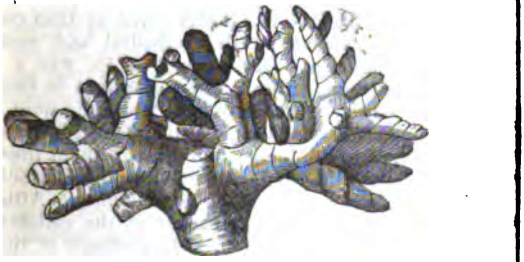
A genus of Lamouroux, from the oolite of Caen.

Example, A. dianthus. (Blainv., pl. 59, f. 2.)

Terebellaria.—Animals unknown; *cells* small, oval, subtrigonal, quincuncially arranged on the surface of the *polyparium*, which is composed of short conical apparently twisted branches.

This beautiful coral, thus characterised, is found in the oolite of Caen, and, it is believed, also abundantly near Bath. Perhaps only one species is known, which Lamouroux divides into two.

Example, Terebellaria ramosissima. (Lamour., pl. 82, f. 1, *a*.)



Terebellaria ramosissima.

Pelagia.—Animals unknown; *cells* subpolygonal, close irregular, occupying the convex edge of numerous vertical ridges, disposed in a radiating form, and either simple or dichotomous, on the upper surface of the coral; *polyparium* free, fungiform, excavated and lamelliferous above, convex, pedunculated, and circularly wrinkled below.

Example, Pelagia clypeata. (Lamour., pl. 79, f. 5, 6, 7.) From the oolite of Caen.

Polytrema.—Animals unknown; *cells* poriform, polygonal, irregular, unequal, numerous, occupying the knotty branches of a small fixed *polyparium*.

A genus of Risso.

Example, Polytrema miniaceum. (Blainv., pl. 69, f. 4.)

§ 2. Cells rounded, poriform.

Orbitolites.—Animals unknown; *polyparium* a regular, orbicular, discoid, cellular, cretaceous mass; *cells* in two layers, sometimes apparent externally, and especially at the margin, which is thickened.

A genus of Lamarck, apparently founded upon an *internal coral*. One recent European species, and several fossils from the chalk and tertiaries of Europe, are mentioned.

Example, Orbitolites complanata. (Blainv., pl. 72, fig. 2.)

Marginopora.—Animals unknown; *cells* poriform, excessively small, round, close, situated in the narrow tortuous folds of the circumference of the *polyparium*, which is free, irregular, discoid, thickened at the margin, and concentrically striated on both surfaces.

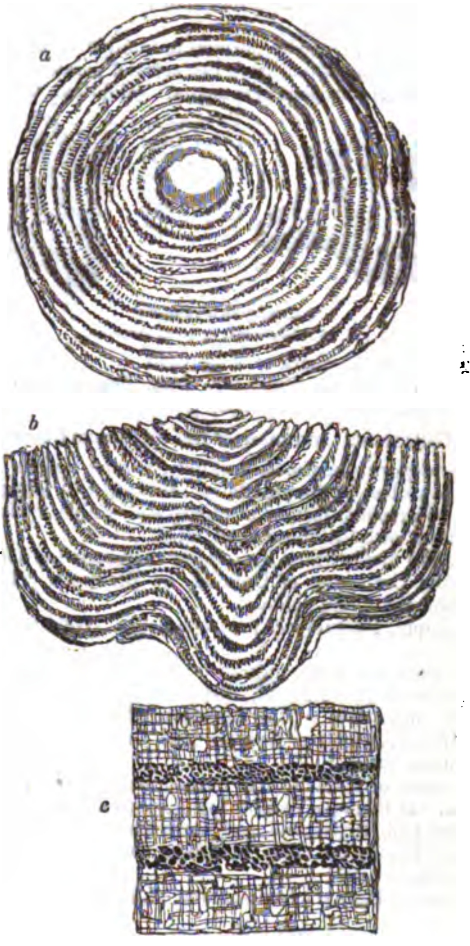
(Probably an internal coralline plate.)

Example, Marginopora vertebralis. (Blainv., pl. 69, f. 6.)

Stromatopora.—Animals unknown; *polyparium* hemispherical or subglobose, formed of alternately solid and porous adherent superposed layers.

The character is from Goldfuss, the author of the genus. The cells are very small, the external surface concentrically wrinkled. The species are fossil in the 'Transition' limestone, &c. of the Eifel, Siluria, Dudley, &c. Mr. Lonsdale has described a new species similar to a Nummulite in figure.

Example, Stromatopora concentrica. (Goldfuss, 'Petrifacta Europæ,' tab. 8.)



Stromatopora concentrica.

a, surface reduced; *b*, vertical section reduced; *c*, portion highly magnified.

Ceriopora.—Animals unknown; *cells* poriform, round, close, irregularly distributed in concentric layers; *polyparium* polymorphous, often globular or lamellar.

This genus was established by Goldfuss, but is curtailed by a stricter definition, by Blainville, to suit fossils which appear in the chalk of Maestricht and the 'Transition' rocks of Bamberg.

Example, Ceriopora micropora. (Goldfuss, t. 10, f. 4.)

Chrysaora.—Animals unknown; *cells* periform, very fine, with a round opening, accumulated on the intervals of ridges, which anastomose on the surface of the fixed irregularly ramose *polyparium*.

A genus of Lamouroux, to which Blainville refers many of the Cerioporæ of Goldfuss, which belong to the oolitic formations.

Example, Chrysaora spinosa. (Lamour., pl. 81, f. 6.)

Tilesia.—Animals unknown; the *polyparium* formed of tortuous, verrucose, cylindrical branches; *cells* small, accumulated in irregular patches which project above the general surface, and are separated by smooth intervals.

Example, Tilesia distorta. (Lamour., pl. 74, f. 5, 6.) From the oolite of Caen.

Spinopora.—Animals unknown; *polyparium* adherent by a concave concentrically striated face below; above reticulated, tuberculated, and bearing between the tubercles poriform *cells*.

Fossil from the chalk. Three species.

Example, Spinopora mitra. (Blainv., pl. 70, f. 3.)

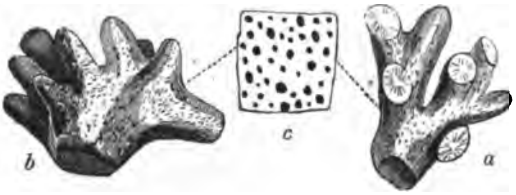
Distichopora.—Animals unknown; *cells* of two kinds, some stelliform, scattered, superficial, shallow; the others poriform, deep, unequal, forming three lateral rows on each side of the branches of an arborescent *polyparium*; these branches are compressed, obtuse, subflexuous, and tubulose within.

This Lamarckian genus contains the Millepora violacea of Linnæus. (Blainv., pl. 55, f. 2.)

Heteropora.—*Animals* unknown; *cells* round, poriform, completely immersed, of two sorts; some, larger than the others, are regularly dispersed on the whole surface of the *polyparium*, which is fixed, lobed, or branched, and formed of superposed laminæ.

A genus of Blainville, formed to include certain Cerioporæ of Goldfuss which have two sorts of pores.

Example, Heteropora cryptopora. (Goldfuss, t. 10, f. 3.)



Heteropora cryptopora:
a, b, two specimens; c, pores magnified.

Fossil from the chalk of Maastricht.

Mr. Lonsdale mentions one from the Silurian Rocks. (Murchison's *Silurian System*, p. 880.)

§ 3. Cells round, and more or less tubular and prominent.

Pustulopora.—*Animals* unknown; *cells* rather prominent, pustulose or mammellated, distant, with round openings; *polyparium* formed of superposed laminæ, cylindrical, digitiform, or a little branched, fixed.

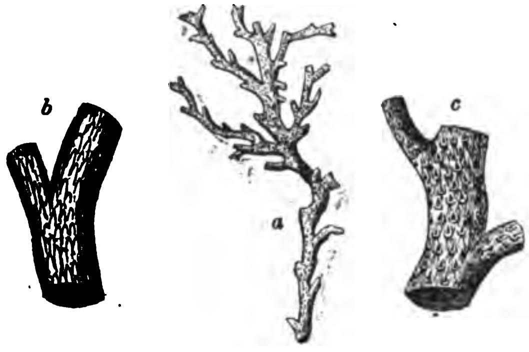
The few fossils which have these characters are separated from the Cerioporæ of Goldfuss by Blainville. They are from the chalk and oolite.

Example, Pustulopora madreporacea. (Goldfuss, pl. 10, f. 12.)

Hornera.—*Animals* unknown; *cells* with a circular opening, prominent, detached, dispersed almost quincuncially on the inner face of the branches of a fragile ramulose *polyparium*, which is fistulose and furrowed on the non-polypiferous face.

A genus of Lamouroux, formed from Retepora of Lamarck. It includes several living species, from the seas of Europe and Australasia, and more fossils, chiefly from the tertiary strata, but Mr. Lonsdale notices one from the Dudley limestone.

Example, Hornera frondiculata. (Lamour., t. 74, f. 7, 8, 9.)



Hornera frondiculata.
a, natural size; b, c, fragments of the upper and lower sides, magnified.

Idmonea.—*Animals* unknown; *cells* prominent, subconical, distinct, with a circular opening, arranged in half rings or short cross-lines, on two-thirds of the circumference of the branches of the *polyparium*, which is not porous, but slightly channelled on the non-celluliferous face; the branches are divergent and triquetral.

One living species belongs to this genus of Lamouroux, and several fossils from the oolite of Caen, and chalk and tertiaries of Maastricht and Paris. Goldfuss has included two of them among Reteporæ.

Example, Idmonea triquetra. (Lamour., pl. 79.) From the oolite of Caen.

Cricopora.—*Animals* unknown; *cells* tubular, rather prominent, with a circular opening, arranged in rings transversely or obliquely on the surface of a fragile *polyparium*, which branches into cylindrical parts obtuse at the extremity.

This genus was named Spiropora by Lamouroux, but it is only rarely that the cells take anything approaching to a spiral arrangement. The coral is *alveolar* through its mass. Some of the most characteristic species are fossils from Caen. C. Faujasii is from the chalk of Maastricht, and Blainville joins to the group two recent species, Seriatopora annulata and S. nuda (Lamarck). Ehrenberg calls the group Myriazoon, and Wiegmann Truncularia.

MILLER, SIR THOMAS, Baronet, second son of Mr. William Miller, writer to the signet, was admitted advocate at the Scottish bar in February, 1742, in the twenty-fifth year of his age. In 1748 he was constituted steward (or sheriff) of Kirkcudbright, and the same year elected joint principal clerk of the city of Glasgow. These offices he resigned in 1755, being then appointed solicitor to the excise in Scotland. In March, 1759, he was made king's solicitor-general: in April of next year, he was advanced to be lord advocate, soon after which he was returned to parliament. In November, 1762, he was chosen rector of Glasgow college. He continued in the post of lord advocate till April, 1766, when he was raised to the bench of the court of session, and succeeded Sir Gilbert Elliot, lord justice clerk, deceased; on which occasion he took his seat, by desire of the court, on the right hand of the lord president; and thence, on Dundas's death, he was, in January, 1788, elevated to the presidency of the court of Session, being the *first* lord justice clerk so promoted. The following month he was created a baronet. He died 27th September, 1789, leaving the present Sir William Miller, a judge in the court of session by the titular designation of Lord Glenlee, and other children.

It is to this distinguished person that the poet Burns alludes in these lines of his 'Vision:'—

> 'Through many a wild romantic grove,
> Near many a hermit-fancied cove,
> Fit haunts for friendship or for love,
> In musing mood,
> An aged judge I saw him rove,
> Dispensing good.'

MILLER, JOHN MARTIN, born at Ulm (where his father was preacher in the cathedral and professor of Oriental languages), December 2, 1750, was a novelist, whose productions made a great sensation in Germany in the last century. At Göttingen, where he went to study theology, in 1770, he became acquainted with Voss, Holty, Bürger, the two Stollbergs, and other eminent literary characters of the time, and afterwards with Klopstock, whom he accompanied on his return to Hamburg. After taking orders, he was appointed preacher at the cathedral of his native town in 1783, and in 1797 professor of theology at the Gymnasium. In 1810 the king of Wirtemberg bestowed the deanery of Ulm on him; but he did not live to enjoy it many years, for he died on the 21st June, 1814.

Although now almost forgotten, his romance of 'Siegwart' (first published in 2 vols., 1776, shortly afterwards greatly enlarged, and in many parts re-written) had astonishing success. It called forth a host of imitators, and had also the distinction of being parodied. It was translated into French, Polish, Dutch, Danish, and Italian. Like his 'Siegwart,' his 'Karl von Burgheim' and other novels have little action or interest of story, but are distinguished by pure morality and an amiable though exaggerated sensibility. This excess of sensibility and sentiment, which however was merely caricatured by his professed imitators, qualified him well for an elegiac and lyric poet; and his productions of that class are distinguished by the tenderness and religious feeling which they breathe. His sermons are likewise compositions of no ordinary merit, attractive in style, eloquent, and impressive.

In his personal character he is said to have been rather cold and reserved, and therefore disappointed many who expected to find in the author of 'Siegwart' an impassioned enthusiast. His romances may be forgotten, but his poems never can.

MILLES, JEREMIAH, dean of Exeter, was the son of Jeremiah Milles, and nephew to Dr. Thomas Milles, bishop of Waterford and Lismore. Bishop Milles left his fortune to his nephew Jeremiah, who was born in 1714, and educated at Eton. He afterwards went to Corpus Christi College, Oxford, where he took the degree of M.A. in 1735, and that of D.D. in 1747. His uncle collated him to a prebend in the cathedral of Waterford, and presented him to a living near that city, which he held but a short time, choosing to reside in England. Upon his return he married Edith, the daughter of archbishop Potter, through whose means he obtained the united rectories of St. Edmund the King and St. Nicholas Acon, in Lombard Street, with that of Merstham, in Surrey, and the sinecure rectory of West Terring, in Sussex. In 1762 Dr. Milles was nominated to the deanery of Exeter, on the advancement of Dr. Charles Lyttelton to the see of Carlisle, whom he also succeeded as president of the Society of Antiquaries in 1769. In the 'Archæologia' are several communications by him: particularly one entitled 'Observations on the Wardrobe Account of the Year 1483, wherein are contained the Deliveries made for the Coronation of King Richard the Third, and some other Particulars relating to that Monarch;' and another (*Archæol.*, vol. iv., p. 331-346), in which he joined the abbé Barthélemy in denying the genuineness of the Apamæan medal. Mr. Gough informs us that, while dean of Exeter, he formed a large collection of materials for the 'History of Devonshire.' His most unsuccessful literary attempt was to vindicate the authenticity of Rowley's Poems, in an edition which he printed, in 4to., in 1782. The dean died February 13, 1784.

(Nichols's *Literary Anecdotes*, vol. iv., pp. 471, 472; Chalmers's *Biogr. Dict.*, vol. xxii., pp. 168, 169.)

MILLET, a plant which botanists class among the grasses, though, in some species and in favourable situations, it attains the height of 18 or 20 feet. (Burckhardt's *Travels in Nubia*, p. 280.) The stalk of all the species of millet resembles a jointed reed, having at every joint a long broad leaf, which embraces the stalk with its base. The plants are all annuals, and grow quickly, yielding an abundance of small grains which are set round a compact spike at the top of the stalk. The stalk itself is filled with a saccharine juice.

Millet thrives best in a light sandy soil, and if sufficient space is allowed between the plants to weed and hoe them during their early growth, they will afterwards overtop and smother all weeds, and yield an abundant return with little labour and without much manure. The seeds however require a climate warmer and drier than that of England to ripen properly. Millet is cultivated largely in the southern parts of Europe—in Spain, Italy, the south of France, Switzerland, and Southern Germany; but it is grown most extensively in the East Indies, China, Arabia, Syria, Egypt, and Nubia. It has also been introduced into the West Indies, where it is called *Guinea corn*, and is used as food for the negroes.

In the East millet is used as food for men; but in Europe, though it is sometimes made into loaves and cakes, and frequently into puddings, it is mostly used for feeding poultry and domestic animals. The leaves and panicles are given, both green and dried, as fodder to cattle.

Millet has been described by botanists under the generic terms *Holcus* and *Sorghum*. The most general species, the common Indian millet (*Holcus Sorghum*, Linn.), known in Nubia by the name of *Durra*, is described under SORGHUM VULGARE. We briefly notice the most important of the other species:—

Black millet (*Holcus niger*, Arduino) is one of the largest species. Caffre millet (*Holcus Cafer*, Arduino) is a native of the Cape of Good Hope. Yellow-seeded millet (*Holcus saccharatus*, Linn.) is a native of the East Indies. Two-coloured millet (*Holcus bicolor*, Linn.) is said to be a native of Persia. Drooping millet (*Sorghum cernuum*) is cultivated in Arabia, Syria, and various parts of the Levant.

MILLIN, AUDIN LOUIS, born in 1758, was an eminent French antiquary, who succeeded Barthélemy as keeper of the antiquities and medals in the Royal Library at Paris. His 'Dictionnaire des Beaux Arts,' 'Dictionnaire de la Fable,' 'Monumens Antiques,' and 'Galérie Mythologique,' are all useful contributions towards archæology and the fine arts. Besides these works, his 'Magasin Encyclopédique,' which he carried on for twenty years without seeking any profit from it, was a highly valuable literary journal, and may now be regarded as a repository containing much important information. To the above may be added his 'Voyage dans les Départémens du Midi de la France,' 'Voyage dans la Savoie,' and 'Voyage dans le Milanais.' These works possess a permanent interest on account of the historical and antiquarian matter which they contain. He died August 14th, 1818.

MILLION. [NUMERATION.]

MILLSTONE-GRIT is the title of a remarkable group of strata which belong to the carboniferous system and separate the coal formation from the mountain limestone. It may be regarded as one of the many instances of 'transition' on a large scale, which reveal to the geologist local changes of level and position of the antient lands, whereby new currents were occasioned in the sea, and new depositions produced in its bed. Instead of the deposits of mountain limestone generated by processes almost purely marine, we have in the millstone-grit group evidence of streams from the interior of elevated lands and periodical currents which spread pebbles, sand, and clay, with land-plants, over surfaces where, previously, corals and shells were accumulated in the quiet sea. The character of this group varies according to a certain law of development, in passing from the south to the north of England. It is of little importance in the south-west of England, South Wales, or any of the midland coal-fields, but in Derbyshire it acquires great thickness, and appears in some of the most striking scenes of that romantic county. Here it is a series of thick arenaceous rocks, alternating with shales and flagstones below the coal and above the limestone. Perhaps no more remarkable feature in English geology can be noticed than the bold crags of millstone-grit which are crossed as the traveller proceeds from the coal of Sheffield to the limestone of Castleton.

Farther to the north, between the deep limestone dales of Yorkshire, the millstone-grit rocks appear on the summit of Ingleborough, Penyghent, and Wharnside, mixed with shales, limestones, ironstones, and beds of coal. At least three distinct bands of coarse pebbly millstone-grit here occur, though not in one hill, and a similar character belongs to the series in Durham and Northumberland. Through all the extreme north of England indeed the millstone-grit group passes by its coal, ironstone, &c. to the coal formation above, and by its limestones and peculiar shales to the mountain limestone below, by so easy a gradation that the whole appears one vast series of associated deposits.

The rock from which the group is named, the millstone-grit, is a very coarse-grained quartzose sandstone, with layers of pebbles, often defining the upper or under surfaces of beds, and sometimes (as near Keighley) containing remarkable masses of laminated mica, which is not common in the substance of the stone. The most coarse and quartzose parts of the stone have a vague resemblance to unmicaceous granites (as that of Ravenglass), and this is strengthened by the occasional abundance of felspar, in large masses crystallized within, but fragmented or worn to a pebbly aspect externally. This discloses probably the true history of the rock. It is a re-aggregated mass of the disintegrated materials of granite; and as almost every sandstone of the coal districts is liable to assume locally the coarseness of grain of the millstone-grit, and all appear to contain felspar grains and fragments (often decomposed to porcelain clay), the importance of a study of the millstone-grit becomes evident. The organic remains are a mixture of those belonging to the coal formation (plants) and those of the subjacent limestone (conchifera, mollusca).

MILNER, JOSEPH, was born in the neighbourhood of Leeds, on the 2nd of January, 1744. He was sent to the grammar-school at Leeds, where, by his industry and talents, among which a memory of most extraordinary power was conspicuous, he gained the warm regard of his instructor, the Rev. Mr. Moore, who resolved to have him sent to college. This plan was nearly frustrated by the death of Milner's father in very narrow circumstances; but by the assistance of some gentlemen in Leeds, whose children Milner had lately engaged in teaching, and by the offer of the office of chapel-clerk at Catherine Hall, Cambridge, he was enabled to enter that hall at the age of eighteen. In the year 1766 he took his degree of B.A., and gained the chancellor's second gold medal for classical knowledge. He now became assistant in the school, and afterwards the curate of the Rev. Mr. Atkinson, of Thorp Arch, near Tadcaster. Here he proceeded in the composition of an epic poem, entitled 'Davideis,' which he had commenced at Cambridge, and which he afterwards finished at Hull. It was submitted to Dr. (afterwards bishop) Hurd, who highly complimented the author on the talent it displayed, but advised him to defer its publication. Not long after he had obtained deacon's orders, Milner was elected head-master of the grammar-school, and afternoon-lecturer of the principal church of Hull. The school increased under his care. He not only introduced his younger brother to those literary pursuits in which he was afterwards distinguished [MILNER, ISAAC], but he also took his mother and two orphan children of his elder brother to live with him. About the year 1770 he embraced the sentiments of the evangelical party in the church of England. This change in his religious views brought upon him neglect, and in some cases open opposition from many among the upper classes who had once been his admirers and friends; but his church was soon crowded with others, chiefly from the lower orders of the people, in whose sentiments and manners his preaching produced a striking change; and at length he not only recovered the esteem of his fellow-townsmen, but lived to see his own religious sentiments become so popular in the town that many of the pulpits of the churches were filled by his friends and pupils, and he himself was chosen vicar of Hull by the mayor and corporation. His election took place only a few weeks before his death, which happened on the 15th of November, 1797, in the 54th year of his age. For seventeen years before his death he had been vicar of North Ferriby, near Hull. A monument, executed by Bacon, was erected to his memory in the high church of Hull by several gentlemen who had been his pupils.

The excellencies of Mr. Milner's personal character were of the highest order. He was deeply pious, upright in all his conduct, singularly open and sincere, and kind, cheerful, and amusing in social life. In his political principles he was strongly attached to the established order of things in church and state.

The work by which he is best known is the 'History of the Church of Christ,' which was commenced by himself and completed by his brother, the dean of Carlisle, and which extends from the rise of Christianity to the Reformation. The first edition of this work appeared in 5 vols. 8vo., 1794 to 1812, and a second edition in 1810. It has been more than once reprinted. The plan of the history is thus stated in the author's Introduction: after stating that in all ages of the church there have existed 'men who have been *real*, not merely *nominal* Christians,' he proceeds:—'It is the history of these men which I propose to write. It is of no consequence with respect to my plan, nor of much importance, I believe, in its own nature, to what *external* church they belonged. I intend not to enter with any nicety into an account of their rites and ceremonies, or forms of church-government, much less into their secular history. Even *religious controversies* shall be omitted, except those which seem to bear a relation to the essence of Christ's religion, and of which the history of his real church requires some account. Let not the reader expect that the actions of great men (great in a secular view, I mean) will be exhibited to his notice. Nothing but what appears to me to belong to Christ's kingdom shall be admitted: genuine piety is the only thing which I intend to celebrate.' It is manifest that on this plan no *complete* church history can be written. Such a work ought assuredly to record the religious opinions and practices which have at any time prevailed among any of those who profess the Christian faith; leaving the reader to conclude, from these materials, which parties have been right and which wrong. But on Milner's plan we have avowedly the history of only one class of opinions, and the choice of this class is determined solely by their agreement with the sentiments of the author. Now, to say nothing of the temptation to do violence to facts, to which an author is exposed who is determined to trace the existence of certain principles in all ages of the church (a temptation from which it is but just to add that Milner has escaped), it is clear that, writing on this plan, two ecclesiastical historians of opposite creeds would produce works containing very different sets of facts, but each professing to be a 'History of the Church of Christ.' Though, for these reasons, Milner's work cannot be called a *complete* church history, its value as a *contribution* to church history is very great. It is written in that spirit of piety, and of deep interest in what the author believes to be true religion, which is not always found in our celebrated church historians; and for the very reasons which prevent its being complete, it contains many important facts which had previously been little attended to. It surpasses most other church histories in the use made of the writings of the Fathers, though the reverence which the author professes for those venerable men has led him to trust them too much.

The other works of Mr. Milner are,—1, 'Gibbon's account of Christianity considered; together with some Strictures on Hume's Dialogues concerning Natural Religion.' 2, 'Some Passages in the Life of William Howard.' 3, 'Essays on the Influence of the Holy Spirit.' 4, 'Tracts and Essays, Theological and Historical.' 5, 'Practical Sermons; with an Account of his Life, by the Dean of Carlisle,' 2 vols. A complete collection of his works was edited by the dean of Carlisle, 8 vols., 1810.

MILNER, ISAAC, dean of Carlisle, and brother of the preceding, was born in 1751. At the age of six he began to accompany his brother to the grammar-school at Leeds; but at his father's death his studies were interrupted, and he was employed in learning the woollen manufactory at Leeds. When Joseph Milner was appointed head master of the grammar-school at Hull, he released his brother from his engagements at Leeds, and took him under his own tuition, employing him as his assistant in teaching the younger boys. In his life of his brother the dean expresses his sense of this act of kindness with an affectionate warmth which shows the attachment that existed between the brothers, and is equally creditable to the feelings of both. In 1770 Isaac Milner entered Queen's College, Cambridge, where he took his degree of B.A. in 1774, and was Senior Wrangler. In 1775 he was elected Fellow of Queen's College, and in 1783 Jacksonian Professor of Experimental Philosophy; in 1788 he took his degree of D.D., and was elected Master of Queen's College; and in 1798 he was appointed Lucasian Professor of Mathematics. In 1791 he was appointed Dean of Carlisle. He was twice Vice-Chancellor, in 1792 and 1809. At Cambridge he formed a close friendship with the late Mr. Wilberforce, by whom he was introduced to Mr. Pitt; and in company with those eminent men he made a tour on the Continent about the year 1787. He died at the house of Mr. Wilberforce, at Kensington Gore, on the 1st of April, 1820.

Dean Milner was possessed of very extensive and accurate learning, which he always had at his command. He had great talents for conversation, and a dignified simplicity of manner. His religious and political principles agreed pretty closely with his brother's. He wrote the following works, besides several scientific papers in the 'Philosophical Transactions,' and the continuation of his brother's 'Church History:'—'Animadversions on Dr. Haweis's History of the Church of Christ;' 'Strictures on some of the Publications of the Rev. Herbert Marsh, intended as a Reply to some of his Objections against the Bible Society.' The following were published after his death:—'Sermons,' 2 vols.; 'Essay on Human Liberty.'

('Memoir of Dean Milner,' in the *Christian Observer* for May, 1820, vol. xix., p. 289.)

MILO', MELOS, one of the larger Cyclades in the Ægean sea, about 70 miles north of the coast of Crete, and 65 east of the coast of the Peloponnesus. It is 14 miles long from east to west, and its breadth is about eight miles. Its northern coast is indented by a deep bay, which forms a natural harbour, one of the best and safest in the Levant. The surface of the island is mountainous, and of volcanic formation; it has hot mineral springs, and mines of sulphur and alum. The soil is fertile, and produces abundance of fruit, wine, oil, and pasture for cattle. The population, which was above 20,000 in the time of Tournefort, about a century ago, has greatly decreased; it is now stated vaguely at 7000 by Balbi, and at only 1500 by Thiersch, but this last estimate appears too low.

Besides the chief town, called also Milo, which is in the east part of the island, near the port, there are several villages, called Pollone, San Dimitri, Castro, &c. The lower grounds near the sea are marshy, and are said to render the air unwholesome in summer.

Melos is said to have been colonised first by the Phœnicians, and afterwards by the Lacedæmonians. During the Peloponnesian war the Athenians sent an armament to reduce it under the command of Nicias, the son of Niceratus, but the attempt failed. Some years later in the war a new expedition from Athens landed on the island, and after a siege of several months took the town of Melos, when the Athenians put to death all the adult males, and carried away the women and children as slaves, after which a colony of Athenians was sent to occupy the place. (Thucyd., iii. 91; v. 84, &c.) At a later period Melos, like the other Greek islands, became subject to Rome, and afterwards to the Byzantine emperors, the Venetians, and the Turks. It now forms part of the new kingdom of Greece.

There are extensive remains of the antient capital of the island, Melos, near the great harbour, consisting of part of an amphitheatre, cyclopean walls, a temple of Venus, and numerous subterranean galleries. A fine statue of Venus, found at Melos, is in the museum of the Louvre at Paris.

A number of vases and other antiquities have been discovered among the ruins.

Near the north-east extremity of Milo is the rocky island of Cimolos, called by the Italian sailors Argentiera; the channel between the two is very dangerous in stormy weather, and noted for shipwrecks. (Dapper, *Description des Isles de l'Archipel.*; Porcacchi; Tournefort.

MILONOV, MICHAEL, a Russian poet of considerable talent, and who, but for his premature death, would probably have risen to greater literary eminence, was born in 1792, and received his education at the university of Moscow, where he distinguished himself by his application and abilities. His poems, which were first published in a collective form in 1819, consist chiefly of satires, epistles, and various lyrical pieces, and display elevation of mind, acute thinking, and tender feeling. Among them are some translations and imitations from Horace, Schiller, and others. He died October 17-29, 1821.

MI'LTIADES (Μιλτιάδης) was the younger son of Cimon (who was sprung from a noble Athenian family), and nephew of the elder Miltiades, who, during the life of Pisistratus, had founded a tyranny, or arbitrary government, in the Chersonese. The elder Miltiades had been succeeded by Stesagoras, the elder son of Cimon, on whose death the young Miltiades succeeded to his place. The first important affair in which Miltiades appears is at that juncture, during the Scythian expedition of Darius, B.C. 513, when the Greek commanders who guarded the raft over the Danube debated whether they should not cut off the Persian king's retreat by breaking up the passage. Miltiades advised the destruction of the bridge, and although his opinion was overruled, it is not too much to suppose that his reason for advocating it was exactly that on which it was afterwards rejected. So shrewd a politician could hardly have failed to observe, that to annihilate the Persian power was, as Histiæus suggested, tantamount to giving all the tyrants of individual cities their dismissal.

Twenty years afterwards, Miltiades was called upon to act a more important part. Hipparchus, one of the sons of Pisistratus, had fallen by the hands of Harmodius and Aristogiton; and Hippias, the other son, who had been driven from Athens chiefly by the aid of the Spartans, had retired, as Greeks both then and subsequently often did under similar circumstances, to the Persian court. In Ionia, the burning of Sardis was followed by a war which lasted for six years, in which each party seemed to have learned a lesson: the Persians, that their enemy was not altogether despicable; and the Greeks, that without unity of plan there was no hope of success.

In B.C. 492, Mardonius led the first Persian armament, which was dispersed by a storm in doubling the peninsula of Athos. In B.C. 490, a second armament under Datis and Artaphernes was sent against Greece. This force crossed to Naxos, and thence to Delos and Eubœa. A few days sufficed to sweep through the island of Eubœa, and the whole armament made for the coast of Attica. Guided by Hippias, who knew the capabilities of every spot of ground in his country, the army landed at Marathon. [MARATHON.] The plain of Marathon extends inwards from the sea to the mountains, where it is contracted into a narrow glen by the spurs of two hills, but spreads out beyond the base of these spurs and between them and the sea. It is roughly in the form of a T, the top stroke representing that part which borders on the sea, and the leg of the letter corresponding to the glen, which is divided lengthwise by a mountain stream. Through this glen lay the road to Athens, and on the eastern side of the hill the Athenian army posted itself.

According to custom, the army was under the direction of ten generals, each of whom took the command for one day in turn. One of the ten was Miltiades, who had just been acquitted on a charge of tyranny, more perhaps owing to the politic way in which he had used his power in the Chersonesus, than to the real merits of his conduct. He had a powerful ally in the polemarch Callimachus, who, by virtue of his office, commanded the right wing, and had an equal vote with the ten generals. The votes of the generals being divided on the question of an engagement, Callimachus, by his vote, decided for fighting; and when the day of command came round to Miltiades, the battle took place.

The Persian army was much more numerous than that of the Greeks, who are generally reckoned at 10,000. In the centre of the Persian host were stationed their best soldiers, a precaution necessary in order to give some stability to an army composed of forty or fifty different tribes, but injurious inasmuch as it exposed them to the very manœuvre which Miltiades practised, and with a view to which he apparently arranged his forces, so that the centre might be weak and the wings strong. The Persian centre broke that of the Greeks, and pursued them toward the hills, but in each wing the Athenians, who had charged at double-quick time, dispersed those who were opposed to them, wheeled round and routed the victorious Persians. This decided the battle. The vanquished perished in thousands, by the sword, in the marshes, and in attempting to embark on board their ships; and the Athenians and their allies the Platæans were left completely masters of the field. Herodotus states 6400 as the number of the Persian dead, and 192 the number of the Athenians who fell. The tactics practised at this battle are worthy of remark, as being so completely opposed to the Dorian plan of preserving a close and impenetrable phalanx, and much more nearly allied to those of modern warfare. Perhaps no battle ever reflected more lustre on the successful commander than that of Marathon on Miltiades; though it should be observed, that he, whom all ages have regarded as the defender of liberty, began his career as an arbitrary ruler, and on only one occasion in his whole life was engaged on the side of freedom; but for the same man to be the liberator of his own country and a despot in another is no inconsistency, as the course of human events has often shown.

The battle of Marathon put an end to the expedition headed by Datis and Artaphernes, and the career of Miltiades closed soon after. He appears next at Paros, to which he laid siege with seventy Athenian ships. The Parians defended themselves bravely, and, if we may believe Herodotus, Miltiades had recourse to magic, in the practice of which he received a wound, which, with general ill success, compelled a retreat. On his return, while yet suffering from a gangrene in the wound, he was accused, tried, and condemned for deceiving the people. The punishment was commuted for a fine; but being unable to pay it, he died in prison.

The character of Miltiades is one on which, with the few materials which history has left, we should not judge too exactly. The outline which remains is one that, if filled up, would seem fittest to contain the very model of a successful statesman in an age when the prime minister of Athens was likewise the leader of her armies. Heeren has briefly noticed the transition which took place in the character of Athenian statesmen from the warrior like Themistocles and Miltiades to the warlike rhetorician like Pericles, and thence to the orator, who to his rhetorical skill united no military prowess. Miltiades with great generalship showed great power as a statesman, and some, but not much, as an orator. This is agreeable to his age. Whether he was a true patriot, governed by high principle, it is now impossible to determine. He achieved one great action, which for his country produced a most decisive result. The unfortunate close of his career may be considered by some as showing the ingratitude of democracies; but perhaps a judicious historian will draw no conclusion of the kind, especially with such imperfect materials before him as we possess for the life of this illustrious Athenian.

(See Herodotus, lib. v., vi.; Cornelius Nepos, whose biography of Miltiades is of no value; Plutarch; Thirlwall's *History of Greece;* and Clinton's *Fasti;* for the office of Strategus, Schömann and Meier's *Attische Process;* and for the topography of Marathon, Pausanias, Dodwell, and E. D. Clarke's *Travels.*)

MILTON. [KENT.]

MILTON, JOHN, son of John and Sarah Milton,* was born December 9, 1608, at his father's house in Bread-street, London. He was of a good family, his father having been educated at Christ Church, Oxford, but was disinherited for turning Protestant. He was a man of great musical acquirements, and specimens of his composition are preserved in Burney's 'History of Music.'

Milton's education appears to have been sedulously conducted; first under a person of Puritan opinions named Young, who was master of Jesus College, Cambridge, during the Protectorate, and afterwards at St. Paul's School under Alexander Gill. From St. Paul's he proceeded to Christ's College, Cambridge, where, as the College Register informs us, he was admitted, February 12, 1624.

At the University he was distinguished for the peculiar excellence of his Latin verses, and, according to his own expression, met with 'more than ordinary favour and respect' during the seven years of his stay there. It will be unnecessary here to go into the momentous question whether Milton was whipped at Cambridge. Dr. Johnson is 'ashamed to relate what he fears is true, that Milton was one of the last students in either university that suffered the public indignity of corporal correction,' and Warton, in an elaborate commentary on Milton's first elegy, draws from the words a meaning which would have startled the author: but there appears small reason to believe the fact.

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* The name is spelt Mylton in the baptismal register.

After having declined both the church and the bar, he retired to his father's house at Horton in Buckinghamshire, where, during a residence of five years, he read over all the Greek and Latin classics, and, as it is supposed, wrote his 'Arcades,' 'Comus,' 'L'Allegro,' 'Il Penseroso,' and 'Lycidas.' Attempts have been made to fix the precise place where some of Milton's minor poems were written, by a reference to the descriptions of scenery contained in them. It appears to us that these attempts depend on a mistaken principle; that, namely, of assuming the poet's mind to be influenced in such matters by the scenery with which he is at the time familiar. Now that localities must affect a person who is writing descriptive poetry, no one will deny; but in purely imaginative poetry, like 'L'Allegro' or 'Il Penseroso,' we cannot attach any great weight to such considerations, particularly when the descriptions are so general, and when the describer is Milton.

In 1637, on the death of his mother, Milton travelled into Italy, during which journey he was introduced to Grotius, to Galileo, and to Tasso's patron, Manso. While in Italy news reached him of the progress of the troubles in England. Relinquishing his original intention of prolonging his journey to Sicily and Greece, he returned, after an absence of fifteen months, and devoted himself to the education of his nephews, John and Edward Phillips, and to the politics of the day. Much has been said on his system: Dr. Johnson has sneered at it; and more modern authorities have caught at it in order to support a convenient theory, each perhaps without reflecting much on the subject. The tendency of his scheme was not to supply the then existing deficiency of instruction in the knowledge of nature, or to substitute some other treatise on such matters for the works of Aristotle, but to exchange, as quietly as possible, and at the same time as decidedly, the merely formal routine of classical teaching for one in which the books that were read might arouse thought as well as exercise memory. His list comprises almost all the technical treatises extant in Latin and Greek, but excludes history and almost all the better known books of poetry, probably because he only intended it for children, and postponed such subjects for the instruction or amusement of riper years. His aims were not those of a mathematician or the philosopher of nature; the state, not science, was in his view, and his object was to make, not good members of a university, but well-informed citizens. To this tend his eulogy of manly exercises and his plans for a common table, which could have had little importance in the eyes of a student.

In 1641 Milton began his political career by writing a treatise 'Of Reformation,' which was followed in the same year by those on 'Prelatical Episcopacy,' 'The Reason of Church Government urged against Prelacy,' and some animadversions on a tract of Bishop Hall's, and in the next by 'An Apology for Smectymnuus.'

In 1643 he married his first wife, who was the daughter of a country gentleman of Oxfordshire. Not long afterwards his conjugal troubles began, by the refusal of his wife to return to him from a visit to her father. He accordingly repudiated her, and in 1644 and 1645 published four treatises in justification of his conduct. The former year is also remarkable as that in which he produced his 'Tractate on Education,' and that most able of all appeals, the 'Areopagitica, or a Speech for the Liberty of Unlicensed Printing,' a work which contains in the same space more passages of surpassing eloquence than any other which proceeded from his own or from any other pen.

About this time Milton was reconciled to his wife, whose family had been reduced to distress by their devotion to the royal cause.[*] His pen was silent until after the execution of Charles, when he produced a tract on 'The Tenure of Kings and Magistrates; proving that it is lawfull to call to account a tyrant or wicked king,' &c. This was followed by 'Observations on the Articles of Peace, and Animadversions on the Scotch Presbytery at Belfast,' in the same year (1649). His next work, 'The History of England,' was interrupted by his appointment to the post of Latin secretary to the Council of State, which had determined that the Latin language should be used in all foreign negotiations, a custom which has not been dispensed with until lately as far as treaties are concerned. At present, treaties are written in French, in addition to the languages of the parties to it; and disputes on the text are settled by an appeal to the French version. The Council could not have chosen any man in England better qualified for the office by his sound scholarship and his ready command of the Latin language; but it is to be regretted that in his controversies with Salmasius he should have stooped to criticise style instead of weighing arguments. In his new capacity Milton was deputed to answer 'Eikon Basilike,' which he did in his 'Eikonoklastes;' and soon after to rebut Salmasius's vindication of monarchy, by his 'Defensio Populi Anglicani,' of which two books Hobbes declared himself unable to determine whose language was best or whose arguments worst.

After his appointment as Latin secretary he changed his abode to Westminster. Upon the death of his first wife he married a daughter of Captain Woodcock of Hackney, who died in childbed within a year of their marriage. In 1654, or perhaps before that time, he became totally blind, a misfortune which his enemies considered as a judgment from Heaven.[*]

The duties of his office, occasional pamphlets on politics, and his 'History of England,' which appeared in 1670, employed him till he began 'Paradise Lost.' At the Restoration he retired into obscurity; but he seems to have incurred no particular danger, although he was once in custody of the serjeant-at-arms. Some ascribe his safety to Sir W. Davenant.

Having obtained indemnity under an act passed in 1660, he married his third wife, Elizabeth Minshull; and in 1665, according to Elwood the Quaker (who acted in some measure as his secretary), he had completed 'Paradise Lost,' which was shown to Elwood in a finished state in that year, during a visit paid by Milton to some friends of Elwood's in Buckinghamshire. The poem was licensed and published in 1667. Five pounds were paid by Samuel Simmons, the bookseller, for the copy, with a promise of five pounds more when 1300 copies should have been sold, of the first, second, and third editions respectively. The 'Paradise Lost' first consisted of only ten books. The division into twelve was made in the second edition, published in 1674, three years before which time he had produced 'Paradise Regained' and 'Samson Agonistes.'

In 1673 he published a 'Summary of Logic;' in 1673 a treatise 'Of True Religion,' &c.; and in 1674 his Latin letters and exercises. His last work was a translation of the Polish declaration in favour of John III. He died on Sunday, November 8, 1674, and was buried in the chancel of St. Giles, Cripplegate.

For full information on Milton's life, his habits, appearance, &c., the reader is referred to the very copious Life by Todd, prefixed to his edition of Milton's Poetical Works.

Milton belonged to the Independents, a name in his time expressive both of religious and of political tenets. He seems to have been as bold in speech as in writing, and this boldness, so early as the date of his Italian journey, gave his friends some uneasiness for his safety. But Milton did not consider, as some have supposed, that in entering on controversy he was following the bent of his nature: he calls it expressly a 'manner of writing, wherein knowing myself inferior to myself, led by the genial power of nature to another task, I have the use, as I may account it, but of my left hand.' After the death of Charles he took a decided part against the Presbyterians, as is shown by his tract on the Tenure of Kings, and became the champion of republicanism against Salmasius. This was the period of his greatest celebrity. As Latin secretary he held an official residence for eight years, and divided the curiosity of foreigners with Cromwell himself. Yet, at the Restoration, he had no hardships to complain of, except the exorbitant fees charged by the serjeant-at-arms, and it is even said that he had the refusal of his original office.

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[*] The passage in 'Paradise Lost,' where the scene is supposed to be described is well known (b. x., v. 940).

[*] A curious account of his blindness is given in his own words, 'Latin Epistles,' No. xv.

It would be out of place here to do more than notice in a cursory manner Dr. Johnson's critique of Milton's poetry. To attempt by writing to impress the beauties of an imaginative work upon those acquainted with that work is a task more easy than useful; for those who do not appreciate poetic beauty without the guidance of another man's judgment will seldom form any opinions of their own worth possessing: and in like manner those who are not by their own taste directed to see the faultiness of a critique like that to which we have referred, will probably derive little benefit from being told that it has faults. But there is another class of readers to whom it may be well to direct a few observations; those, we mean, whose taste is accurate enough to enable them to trace faultiness as pervading the system, though they cannot discern its particular mistakes. In any criticism, on whatever subject, it is most important that the spirit in which the work subjected to criticism was written, should be kept in view by the critic. With this restriction and condition an imaginative work like 'Lycidas,' written in the style of a school of Greek poets, of which Theocritus is the model, would never be called 'easy, vulgar, and therefore disgusting;' and its rhymes and numbers would not have been stigmatised as uncertain and unpleasing by any one who reflected that Milton had Italian models in view when he wrote 'Lycidas' in verses of unequal length.

Let no one try to render a poem, even epic or dramatic, into an historical form. Charles Lamb has attempted it; a man perhaps more likely to succeed than any of his age; and his prose Shakspere would rather deter than provoke imitation. The absurdity of reducing a chapter of Hume's 'History of England' into a metrical shape, and then criticising it as a poem, is sufficiently manifest; but when we come to an imaginative work like 'Il Penseroso,' dissect it into elements, and make these elements purely narrative, persons are and have been deceived into supposing this dissection to be legitimate criticism.

'Paradise Lost,' perhaps the greatest continuous effort of human imagination, had originally the form of a drama, of which several plans remain. The epical form however at last asserted its superiority, although enough of the drama remains in the present poem to enable us to trace with some distinctness the shape which it probably assumed. In spite of all that has been said and written on 'Paradise Lost,' the truth of Dr. Johnson's observation must be to a considerable extent allowed, that it is 'one of the books which the reader admires and lays down, and forgets to take up again.'

Much of this inattention is no doubt owing to the character of this age. Learned poetry suits us not. We require either passionate and powerful description, like Byron's; imitations of antiquity so disguised that we are not all of us able to trace them, like Walter Scott's; or thoughtful poetry, either couched in sensuous imagery, like that of Shelley, or aspiring to be philosophical, like that of Wordsworth. But for allusions to classical authors, however beautiful, for an exhibition and exposition of the leading doctrines of Christianity, couched in language however sublime, and for a history of events so gigantic, we have no taste when conveyed in the form of a poem. In other words, 'Paradise Lost' is not and cannot be extensively popular; and even among its admirers we shall detect many who judge of it not as a poetical but as a theological production. Taken as a whole, a proper estimate cannot be formed of it by any one who has not learning enough to enable him at least to perceive the learning of the author; and the same may be said of the dramatic works of Milton, for the allusions to passages in the Greek tragedies which are contained in the first few pages of 'Samson Agonistes' are almost equal in number to the lines themselves.

Milton's poetry cannot be dismissed without a word or two on his versification. His matchless ear led him to choose blank verse—a measure till then almost unknown except in dramatic works—as the best metre for an epic poem. To the same quality is owing the harmony of his lyrical verses, in which, as in everything else, he seems to have been a century in advance of his own time. If we compare his liquid verses with the lilting jingle which characterises almost all the versifiers of the last century who attempted the octave stanza, the difference will be immediately discerned. It was not until Milton began to supersede the French school that English poets produced verses approaching his own in sweetness. Such are some of Coleridge's and Shelley's, not to mention Scott, who borrowed his measures from other sources.

Of all authors, antient and modern, respecting whom conflicting judgments have been pronounced, no one has had more to contend with, both from the unwise conduct of his friends and the malice of his enemies, than Milton. Living at a time when party spirit ran high, and identifying himself with one of the extremes, his character has been assailed by many enemies, and of his defenders not a few have made up by violence what they wanted in discretion. It is part of our national habits to regard every man who can be so regarded, not according to his eminence in art or science, so much as according to his station as a political partisan. This is no theory, but a positive fact, which fact has become more generally true during the last half century from the accident of that literature by which the opinions of a great portion of the reading public is guided—the periodical literature—having assumed a tone decidedly political. Thus Milton is often viewed, not as a poet, not as a writer of all writers most eloquent, but as a partisan. And yet, until we divest ourselves of this deep-engrafted habit, we shall never read Milton's prose works as they ought to be read; we shall never see in them the commentaries on his own poetry which they supply; never trace those models of eloquence which they contain; never reflect that in Milton's polemics we find the perfection of a reviewer's style, with all the acumen and not half the heaviness of Bentley, and with qualities more adapted to controversy than any which have been exhibited from his time until the beginning of the present century; that in his historical fragment exists a mythological narrative written not less poetically than Niebuhr's 'Lays' and 'Legends' of Roman History, although Niebuhr was the first who followed, however unconsciously, this great example; and that in his 'Speech for the Liberty of Unlicensed Printing' the sentiments are noble, and are more nobly expressed than in any English composition before the days of Burke. It is as rhetorical models that we must view Milton's prose works; his logic may fail, his facts and arguments may be insufficient, but his eloquence remains unrivalled.

A curious change took place even during Milton's lifetime in regard to public taste. The Shaksperian drama, that wonderful combination of active and reflective poetry, gave place to a bad imitation of an unnatural model, the French heroic play. Italian measures, those which Surrey, Shakspere, and Milton had all more or less practised, were supplanted by the ten-syllable rhyming couplet of Dryden, imitated also from the French. In fact the nation took their cue from the court in matters of taste, and the court was not less subservient to French influence in literature than in politics. Whenever a good history of the eighteenth century shall be written, the historian will do well to trace distinctly the way in which English literature has been gradually recovering from the taint which it contracted after Restoration, as affording a curious illustration of the manner in which opinions on taste and on politics go hand in hand. And no such history can be written without including a deliberate investigation of the influence which Milton has exercised, and the esteem in which he has been held, particularly among the nonconformists, a body of men whose power, because silently applied, has been often underrated or even overlooked.

The editions of Milton's poetical works are very numerous. His prose works have been much neglected, and we are not aware that a uniform edition including the tract on Christian Doctrine has yet appeared.

In the year 1823 a Latin manuscript, with the title 'De Doctrina Christiana, libri duo posthumi,' was discovered in the State-Paper Office, and, from internal and other evidence, was ascertained to be the work which Milton was known to have written on this subject, and which was supposed to be lost. It was edited by the present bishop of Winchester (Sumner), and a translation was also published. This work is characterised by the usual boldness and freedom of opinion which pervade all Milton's writings. As a theological work, it is perhaps almost unnecessary to remark that it would be considered of little value by any denomination of Christians.

(Todd's *Life of Milton*; Milton's *Works*.)

MILVUS. [FALCONIDÆ, vol. x., p. 187.]

MIME (from the Greek *mimus* (μῖμος), an imitator), a dramatic performance of irregular form among the Greeks, in which occurrences of real life were clothed in a poetical dress. It usually consisted of a single scene, mostly comic, sometimes with such dialogue added as the excitement of the moment prompted. Mimes appear to have been common entertainments at feasts. Sometimes they were acted on the stage. Sophron of Syracuse (born about B.C. 420), who wrote in the vulgar dialect of the Doric Greek of Sicily, is considered the inventor of this species of composition. His mimes were in rhythmical prose, and were highly esteemed by Plato, who is said to have carried to Athens the taste for this species of composition. With the exception of a few fragments, and the names of some of his mimi, the works of Sophron are lost. The fragments of Sophron are collected in the 'Museum Criticum,' No. VII. We have specimens of a mime in the fifteenth idyll of Theocritus. Philestion of Nicæa, another writer of mimes, was contemporary with the latter years of Socrates. Suidas (Φιλιστίων) calls his mimes *biologic*, or 'pictures of life.'

Among the Romans, mimes seem to have been nothing but irregular harlequinades, probably the lineal ancestors of our 'Punch.' In the time of Augustus, Bathyllus and Pylades divided the taste of the Roman capital as actors of mimi. Among the mimographers of Rome we find Mattius, Laberius, and Publius the Syrian, the second of whom died B.C. 43, when the third was in the height of his popularity. Laberius acted as well as composed mimes. In the reigns of the earlier emperors we meet with other mimographers of celebrity, but none came up to the reputation of Laberius and Publius.

(Macrob., *Sat.*, ii. 7; Suetonius, *Cæs.*, c. 39; Ziegler, *De Mimis Romanorum*, Göttingen, 1789, quoted in 'Conversations Lexikon.')

MIMNERMUS OF COLOPHON, a Greek elegiac poet, contemporary with Solon. Müller, quoting a fragment of Mimnermus's elegy 'Nanno,' says that he was one of the colonists of Smyrna who came from Colophon, and whose ancestors at a still earlier period came from the Nelean Pylos. To the reduction of Smyrna to Halyattes, he ascribes the melancholy character of his poems. (*History of the Literature of Antient Greece*, p. 115.) From Horace and Propertius we gather that his poems had reference for the most part to those appetites which are, in poetical language, expressed by the name of love. His mind however was of a melancholy turn, which gave to his writings a pensive cast not traceable in the writings of others who belonged to the same school. In the few fragments which we have remaining of Mimnermus, he complains of the briefness of human enjoyment, the shortness of the season of youth, and of the many miseries to which man is subject. Mimnermus was the first who adapted the elegiac verse to those subjects which, from this adaptation, are now usually considered as proper to it; Callinus, its inventor, having used it as a vehicle for warlike strains. The fragments of Mimnermus have been several times edited, in the collections of Stephens, Brunck, Gaisford, and Boissonade, to which may be added Bach's separate edition, published at Leipzig in 1826. They have been translated by Ch. von Stolberg, Herder, A. W. Schlegel, and others.

(Ulrici's *Geschichte der Hellenischen Dichtkunst*.)

MIMO'SEÆ are a division of the Leguminous order of plants, whose flowers are regular, the stamens long, usually indefinite in number, and hypogynous, and the flowers valvate in æstivation. They are in many cases polygamous, and their leaves are always more or less compound. The principal genus of the division is the Acacia. [ACACIA.] Mimosa itself consists of a considerable number of species, many of which are remarkable for the irritability of their leaves, a curious property which has always rendered them objects of interest. [SENSITIVE PLANTS.] The species commonly cultivated for the exhibition of this phenomenon is the Mimosa pudica, a South American annual. Among the useful plants belonging to Mimoseæ, and not included in the genus Acacia, are the Ingas sapida, dulcis, bigloboss, and some others, whose pods contain a sweet nutritious fæcula, which renders them fit for food; and several kinds of Prosopis, the astringency of whose pods and bark renders them valuable for tanning purposes. In general, in the northern hemisphere Mimoseæ are confined to tropical countries, or to those which have a high summer heat; but in the southern hemisphere they extend beyond such limits, as in Van Diemen's Land, where Acacias, called Wattles, are the commonest wood.

MINANGKABOU. [SUMATRA.]

MINARET (from the Arabic *menarah*, a lantern), in Turkish and Eastern architecture, a very slender and lofty turret, having one or more projecting balconies around it, that divide it externally into two or more stories. They are used in Mohammedan countries for the purpose of calling the people to prayers, and therefore serve the purpose of belfries. They are however generally more numerous than such purpose actually demands, there being one at each angle of the building, and sometimes a greater number, and hence they become highly characteristic features, as well on account of their frequency as their tall column-like shape, which causes them to contrast so picturesquely with the domes that crown the edifice, and together with which they serve to produce a pleasing and varied architectural outline. The resemblance to the column form is frequently greatly increased by the uppermost gallery being corbelled and ornamented for a short distance downwards, so as to assume the shape and mass of a capital, above which the structure is usually made to terminate in a small polygonal alcove, with open arches on its sides, and crowned by an ogive or bulbous dome.

MINAS GERAES. [BRAZIL.]

MI'NCIO. [PO.]

MINDANA'O. [PHILIPPINE ISLANDS.]

MINDEN, one of the three governments into which the Prussian province of Westphalia is divided, is composed of the antient principalities of Minden, Paderborn, and Corvey, of the county of Ravensburg, the bailiwick of Reckenberg, and the lordships of Rheda and Rittberg. Its area is about 2000 square miles, and the population 397,870. It is subdivided into 10 circles: there were formerly 13 circles, but some have been incorporated with others. The soil is of unequal quality. There are some barren spots, but the greater part is fertile in corn: hemp and flax also are generally cultivated, and supply materials for the manufacture of linen and thread, which, as in the rest of Westphalia, are the chief branches of industry. The pasturage is good, and cattle abound. Iron, lead, and salt are the most important mineral productions. The Weser is the principal river, and the trade on its banks is very considerable. That part of this government which formed the principality was formerly a bishopric, which was secularised at the peace of Westphalia, and assigned to the electorate of Brandenburg.

MINDEN, the capital of the government of the same name, is situated in 52° 18′ N. lat. and 8° 53′ E. long., in a very pleasant spot on the left bank of the Weser, partly in a plain, and partly on the declivity of a mountain-chain, in which, at the distance of about two miles from the town, there is an opening through which the Weser flows, forming the celebrated Porta Westphalica. Minden is one of the oldest towns in Germany. The streets are narrow and irregular; the houses are in general built of stone or brick, but old-fashioned. The Domplatz (the Close) is however a handsome square, planted with trees. The little river Bastan flows through the town, and falls into the Weser. Over the latter river there is a very old stone bridge, 600 feet long and 25 feet broad. The French, in their retreat in 1813, blew up two of the arches. Since 1815 Minden has been again converted into a fortress, and is now one of the strongest places in Germany. It has six gates. Among the public buildings are four Protestant and three Roman Catholic churches, the largest and handsomest of which is the cathedral. Besides the gymnasium and a seminary for schoolmasters, there are several public schools, a Lutheran convent, an orphan-house, a bible society, and other useful institutions. The manufactures are of woollen, linen, leather, tobacco, &c. Of late years the refining of sugar has been carried on to a great extent. The vinegar manufactories and beer breweries and brandy distilleries are considerable. In the vicinity there are oil and saw mills. As the seat of the administration, the various public offices and tribunals of the government and the circle, and carrying on a considerable trade on the Weser, exporting hemp, corn, brandy, timber, yarn, &c., Minden is on the whole a thriving town, and the population (now 8000) is increasing.

The history of Minden presents some interesting particulars. In the year 1026 the emperor Conrad II. held a diet here, in order to have his son Henry III. elected king of the Romans. The Reformation having been introduced in 1529, the town was placed under the ban of the empire in 1538, and taken by the emperor Charles V. in 1547. In 1626 it was taken by Tilly, and in 1634 by George duke of Lüneburg. In 1651 thirty-one persons were beheaded in the town for witchcraft, and afterwards burnt.

on which occasion a debate took place in the provincial assembly on the question 'whence they should get wood to burn the witches?' In 1757 it was occupied by the French, in 1758 by the Hanoverians, and again by the French under Marshal Broglie in 1759. The movements of Prince Ferdinand having caused the French under Castries to take up a position to the west of the town, near the neighbouring village of Todtenhausen, they were attacked by Prince Ferdinand, who had only 40,000 British and Hanoverian troops, on the 1st of August, 1759, and defeated, with the loss of 8000 men, of whom 3000 were made prisoners.

MI'NDORO. [Philippine Islands.]

MINE, a system of subterranean works or excavations formed in or going down upon any mineral or metalliferous deposit, for the purpose of exploring its contents, and extracting such portions of them as may be of sufficient value. These excavations are arranged in such a manner as to facilitate the drainage and ventilation of the works, to render them easily accessible to the miners, and to economise the application of labour in the extraction of the metallic ores or other mineral produce. In addition to the underground works which constitute the mine, properly so called, the term usually comprehends also the ground at the surface, together with the numerous appendages which are required there, as steam-engines, water-wheels, and other machinery for drainage, the extraction of the ores and their mechanical preparation, with various buildings and erections. The various works which constitute a mine, and their construction and arrangement, are fully described in the article Mining.

Mines are usually worked by companies, who hold grants or leases of the property from the mineral proprietors, for a certain term of years, commonly twenty-one. The risk and responsibility of the undertaking entirely devolve upon the former party, by whom the capital is provided and the management conducted, the proprietor of the mineral receiving a stipulated portion of the gross returns of the mine as a consideration for the use and deterioration of his property. This proportion varies much according to circumstances. In the north of England, where the mines are comparatively shallow and cheaply worked, it is commonly an eighth or a tenth; but in Cornwall, where the mines are deep and expensive, it seldom exceeds a fifteenth, an eighteenth, or a twenty-fourth, and is sometimes as low as a thirty-second. Although this payment, which is denominated 'dues' or 'royalty,' from the circumstance of all minerals having originally been the property of the king, is of course a matter of right, and claimed as such whether the mine is profitable to the parties working it or not, it is frequently good as well as liberal policy to greatly reduce or even remit it for a time, during periods of temporary poverty or loss, as a company may thus be encouraged to make further trials, which in the end may occasion discoveries highly beneficial to both parties. Considered as property, mines are exceedingly varied and fluctuating, some making very large profits, others barely paying their expenses, while upon many there is a heavy loss. Of the capital required to open mines in this country, no general average can be given: in some cases not more than 4,000*l.* or 5,000*l.* have been expended; in others, the sum has amounted to 150,000*l.* In the older and best established undertakings, the number of shares is small, as 64, 100, or 128. In some recent companies it has been subdivided into several thousands; but most of these have been unsuccessful. Of the profit of mines no general estimate can be given. In some cases it little more than repays the capital expended; in others it amounts to two or three hundred thousand pounds after paying back this sum, while of course every intermediate gradation exists. The duration of mines is very uncertain: some few are now working which are known to have been opened centuries ago, but these have been abandoned time after time in consequence of poverty or difficulties arising from imperfect machinery, and re-opened as improvements in the art of mining afforded a further scope for enterprise. It may probably be stated that mines of the soft metals, as copper, tin, and lead, rarely continue in a uniformly productive state for more than fifteen or twenty years together, although the discovery of fresh deposits of ore may prolong their existence greatly beyond this period. Coal and iron mines, on the contrary, are more permanent in their produce, and may continue to be worked for an indefinite term of years.

Great Britain is pre-eminently a mining country. With the exception of quicksilver and the precious metals, it contains every variety of mineral in great abundance, and has been estimated to produce annually a greater amount of mineral wealth than all the other countries of Europe together. Rich and extensive mines of copper and tin are worked in Cornwall and Devonshire; and in Wales and the north of England there are immensely productive lead-mines. There are rich mines of copper in Ireland, and lead-mines are worked both in that country and in Scotland. The most productive mines of coal and iron in the world are opened in South Wales, in Staffordshire, and in Scotland, while valuable coal-mines are worked in Lancashire, Cumberland, Yorkshire, Durham, Northumberland, and many parts of Scotland and Ireland. Beds of rock-salt are extensively worked in Cheshire, and large quantities of salt are obtained from brine-springs in Worcestershire. The depth which mines have attained in this country is very considerable, amounting in many cases to from 200 to 300 fathoms. The quantity of water drawn from them is far greater than in any other part of the world, and the machinery employed is of the most powerful and perfect description. The extent and produce of the English mines, the large capital employed in them, and the boldness, the skill, and ability with which their management is conducted, are the admiration of foreign engineers, who make frequent visits to this country to inspect them.

Mines are worked on a more or less extensive scale in every quarter of the globe, and almost in every country, but more especially in those in which igneous and metamorphic rocks are abundant. France and Belgium have numerous mines of coal and iron, and many in which copper, lead, zinc, and other metals are worked.

Spain is a rich mineral country, and even in its present distracted state the produce of its lead-mines, and more especially of its quicksilver-mines, is considerable. Germany has long been celebrated as a mining country, and there is scarcely a metal which is not now produced there. The mines of the Harz and of Saxony are well known from the skill with which they are wrought, and the quantity of silver which they produce, as well as copper, lead, and other metals. Austria has numerous mines, producing, together with other mineral substances, a large amount of gold, silver, and mercury. The mines of Russia are rich in iron and the precious metals, but sparingly productive of coal; those of Norway and Sweden produce copper and iron. Of the mineral produce of Asia and Africa little is known, but mines of coal are worked in India and in China. Tin is obtained in Banca, Borneo, and the Malayan peninsula, and gold-washings have long been carried on upon the coast of Africa. The continent of America, although abounding in metals and minerals, is most celebrated for its gold and silver mines; the former are chiefly situated in Brazil; the latter have been extensively worked in Peru and Mexico. The once celebrated quicksilver-mine of Guanca-Velica is situated in the former country, and rich copper-mines are now worked in Chili and Cuba. There are many mines of coal, iron, lead, and other minerals, now working in the United States of North America, and although hitherto little worked, mineral produce is probably abundant throughout many parts of British North America, in which the principal mines now existing are those of coal in Nova Scotia. The greatest depth to which any mine has ever penetrated is nearly 500 fathoms, or 3000 feet, and this only in one instance, in the Tyrol. The Samson mine in the Harz is about 2300 feet deep, and the celebrated Valenciana mine in Mexico attained the depth of 1800 feet, which is about the depth of the Consolidated Mines in Cornwall.

MINE'LLIUS, JOHN, was born about 1625, at Rotterdam, and died in 1683. He was rector of the public school in his native town, and edited many of the Latin classics, with short notes for the use of schools. He also published a translation of Terence in Dutch, Rotterdam, 1663.

MINERAL VEINS. [Veins, Mineral.]

MINERAL WATERS. [Water.]

MINERALOGY, according to the definition given by Kirwan, is the art of distinguishing mineral substances from each other; and it is further observed by Mr. Brooke (*Encyclopædia Metrop.*, 'Mineralogy'), that it may be regarded both as a science and an art: as a science, in reference to the knowledge requisite for supplying accurate descriptions of minerals, and forming what may be termed a *natural* classification; and an art, in reference to the arrangement of the descriptive characters for the purpose of afterwards distinguishing minerals from each other.

Mineralogy then must be considered as including the chemical composition of bodies, and an account of their external or physical properties. Both are requisite, for substances occur which agree in their chemical composition, and exhibit differences in their external characters; while there are other bodies which differ in their chemical constitution, but agree in their external properties.

Various methods of arrangement of minerals have been proposed by different authors, which we shall not minutely describe or discuss, as the alphabetical arrangement which has been adopted in this work precluding any other here. We may however observe that, according to Werner, minerals were divided into the four classes of earthy minerals, saline minerals, inflammables, and metals: Karsten classed them under the heads of earths, salts, combustibles, and metals: Haüy divided minerals into acidiferous earthy substances, earthy substances, nonmetallic combustible bodies, metallic bodies, substances not sufficiently known to admit of classification, rocks, and volcanic products. In Phillips's 'Elements of Mineralogy,' the classes are earthy minerals, alkaline-earthy minerals, acids, acidiferous earthy minerals, acidiferous alkaline minerals, native metals, metalliferous minerals, and combustible minerals. Berzelius has attempted a strictly chemical classification of minerals: he has however candidly admitted that considerable difficulties attend this method, owing, in part at least, to the uncertainty which exists as to what are the essential and what the accidental constituents of a mineral. The arrangement of Berzelius has however, with some slight modifications, been adopted by Mr. Brooke in the work to which we have already alluded.

We have already observed that mineralogy includes a knowledge of the chemical composition and of the external and physical properties of minerals, and they are all divisible into two great classes of crystallized and uncrystallized. With respect to regularly crystallized minerals we refer for an account of their forms to what is stated under CRYSTALLOGRAPHY. There are some substances which do not assume regular forms, but have an *imperfect crystalline structure;* while those bodies which are not either crystallized or crystalline, unless they are pulverulent, are described as *massive*, and these are subdivided into such as possess *particular forms*, as botryoidal, mammellated, nodular, stalactitic, reniform, globular, and *amorphous*, or *without any particular form.*

The *structure* of bodies is also an important character in some cases, and it may be compact, granular, fibrous, foliated, earthy, scaly, or laminar, and it is applicable both to crystallized and massive minerals.

Fracture is a very distinguishing characteristic in many cases; the principal are the conchoidal fracture, earthy, uneven, coarse, fine-grained, splintery, hackly, and irregular.

Hardness.—In this respect minerals differ greatly. [HARDNESS.]

Specific Gravity.—In this respect also minerals are very different from each other: for the modes of ascertaining it, see SPECIFIC GRAVITY.

Colour.—Minerals occur not only of every colour, but of every mixture of colours, and also colourless. Colour can scarcely be admitted as a very distinctive character, for there are some minerals which exhibit all colours: of this quartz is an example; for it is met with colourless, black, grey, brown, red, yellow, green, blue, purple, slightly bluish, pale grey, and slightly greyish.

Colour of Streak.—Sometimes resembles that of the mineral itself, but is often extremely different, so that it is impossible to foretel what it is likely to be. Hence the importance of the character. Sometimes the streak is merely shining, and its colour does not differ from that of the mineral.

Transparency, &c.—Minerals exhibit every degree of transparency, from the most perfect to absolute opacity. The different degrees are expressed by transparent, semitransparent, translucent, translucent on the edges, opaque: it is also to be observed that some transparent bodies are doubly refractive, as calcareous spar, &c.

Lustre.—Minerals are described as having vitreous lustre (which is that possessed by the greater number of them), resinous lustre, metallic lustre, adamantine lustre, pearly lustre, resinoso-metallic lustre, vitreo-resinous lustre. When perfectly devoid of lustre, the mineral is described as dull.

Phosphorescence is the property which some minerals possess of becoming luminous when heated: this is particularly the case with apatite and fluor spar.

Electricity.—There are certain minerals which become electric either by friction or by heat: this is the case with the tourmaline, diamond, &c.

Magnetism.—There are certain oxides of iron, some of which are natural magnets or loadstones, and others which obey the magnet. No minerals but oxides of iron, or such as contain this metal or the oxide, possess either the power of attracting as a magnet, or of being attracted by the magnet.

Besides the above more general and distinctive characters, the elasticity and flexibility of minerals are sometimes described; thus mica is flexible and elastic, while talc is flexible but not elastic. The touch, smell, taste, and adhesion of minerals to the tongue, are in some (but comparatively few) cases mentioned by mineralogists.

Without submitting the mineral to a regular analysis, advantage is often taken of the effects of heat by means of the blowpipe, with or without the aid of certain fluxes, as soda, phosphoric salt, &c.; and the mineral is stated to be either fusible alone, or with the assistance of the different fluxes, and the nature of the resulting compound is described; sometimes it is a colourless glass, at other times coloured, transparent, or opaque, &c.

MINE'RVA, or MENE'RVA, an antient Italian divinity, known to the Greeks as Pallas Athene. [ATHENE.] Her attributes corresponded in most respects to those of the Grecian goddess. She was the patroness of arts and industry, such as spinning, weaving, &c., and was the goddess of all the mental powers. Her statue was usually placed in schools; and the pupils were accustomed every year to present their masters with a present called *Minerval.* (Varro, *De Re Rust.*, iii. 2; compare Tertull., *De Idol.*, c. 10.) Minerva also presided over olive grounds (Varro, *De Re Rust.*, i. 1); and goats were not sacrificed to her, according to Varro, because that animal was considered to do peculiar injury to the olive (*De Re Rust.*, i. 2).

There was an annual festival of Minerva celebrated in Rome in the month of March, which was called *Quinquatrus*, because it lasted five days. (Varro, *De Ling. Lat.*, v. 3; Ovid, *Fast.*, iii. 809; Gell., ii. 21.) On the first day sacrifices were offered to the goddess, and on the other four there were gladiatorial combats, &c. There was also another festival of Minerva celebrated in June, which was called *Quinquatrus Minores.* (Ovid, *Fast.*, vi. 651.) There were several temples in Rome sacred to Minerva. Ovid mentions one on the Cælian Hill, in which she was worshipped under the name of Minerva Capta, but the origin of the name is unknown. (*Fast.*, iii. 835-839.) It also appears from several inscriptions, in which she is called Minerva Medica, that this goddess was thought to preside over the healing art.

The etymology of the name of Minerva is doubtful. The first part probably contains the same root min, men, or man, that we have in the Latin me-min-i, men-s, &c., the Greek *μέν-ος*, *μι-μνή-σκω*, &c., and the Sanskrit man-as. Cicero (*De Nat. Deor.*, iii. 24) gives a very curious etymology, 'Minerva, quia minuit aut quia minatur;' but some of the antient grammarians appear to have been nearer the truth in considering it a shortened form of *Meminerva*, since she was the goddess of memory. Festus connects it with the verb *monere.* Müller (*Etr.*, ii., p. 48) supposes that the word is of Etrurian or Sabine origin.

MINES, MILITARY, are excavations made in the rampart of a fortress, or underground, in order to contain gunpowder, which, being exploded, the rampart may be breached, or any works of the enemy, above or near the mine, may be destroyed.

The term *offensive* is applied to the mines which are formed by the besiegers of a fortified place; those which are formed by the garrison are called *defensive mines*, or countermines. The cavity in which the powder is deposited is called the chamber; and the approach to the latter is called the gallery. [GALLERY.]

Two kinds of mines were antiently employed in the attack of fortresses. One of them was merely a subterranean passage carried under the walls from the exterior ground; and being suddenly opened within the town, the assailants were enabled to enter the latter by surprise. The other kind was executed in a similar manner, and was intended to lay the rampart of the place in ruins; for this purpose, the gallery, having been driven as far as the walls, was carried on to the right and left under the latter, which were supported by props of timber till the time appointed for the assault was come: then, the props being drawn away or consumed by fire, a portion of the rampart fell into the ditch; and the troops, who were kept in readiness, passed over the ruins into the town. Mines of this kind are described in a relation of the siege of the castle of Boves near Amiens, at which siege Philip Augustus attended in person. At the siege of Melun, which was carried on by Henry V., king of England, and the duke of Burgundy, in the year 1420, the besiegers having driven their mine almost up to the walls, and the besieged having executed a mine in opposition, a barrier was erected where the two galleries met, and there the king and duke fought with lances against two Dauphinois.

As the parties engaged two abreast, it is evident that the galleries must have been much broader than such are made at present. The old French writers occasionally applied the term mines to what were also then, and are now, called trenches. Thus, at the siege of Harfleur, in 1449, mention is made of broad and deep trenches by which the approach to the wall is said to have been rendered secure; and the same works are immediately afterwards called mines.

Gunpowder was, in 1487, used in military mining by the Genoese at the siege of Serezanella, a town belonging to the Florentines; but on this occasion without success. It is stated however, in the life of Gonsalvo de Cordova, that Peter of Navarre, a Spanish engineer, formed mines with gunpowder at the siege of Cephalonia, near the end of the fifteenth century, when the Venetians and Spaniards took the island from the Turks. And in 1503 the same engineer, or, according to Vallière, an Italian called Francis George, succeeded in taking by such a mine the Castle del' Ovo at Naples. This fortress was situated on a rock nearly surrounded by the sea, and had during three years resisted the united arms of the Spaniards and Neapolitans. From that time the practice of forming mines with gunpowder has been almost constantly followed in the attack and defence of fortresses. By means of 1173 mines, great and small, the Venetians defended Candia during more than two years (1666 to 1669) against the whole power of the Turks: by mines also, in 1762, the town of Schweidnitz was defended during 63 days by the Austrians against the Prussians. In the course of this last siege two of the mines fired by the besiegers had charges of powder amounting to 5000 pounds each; and the depth of the charges below the surface of the ground was from 18 to 20 feet.

In the siege of any place the mining operations of the besiegers are directed to the discovery and destruction of the galleries of countermines; to the blowing up of any advanced works belonging to the garrison; to the demolition of the wall of the counterscarp, in order that the descent into the ditches may be facilitated; and occasionally, to the formation of breaches in the principal ramparts. On the other hand, the countermines are employed by the defenders to destroy the trenches and batteries of the besiegers beyond the foot of and upon the glacis; and also the lodgments which may be made on the breaches or within the works. It is easy to perceive therefore, that a system of countermines must add greatly to the strength of a place, by obliging the besieger to proceed with circumspection in his approaches aboveground, in order to avoid the risk of being blown up at every step; and, according to Bousmard ('Essai général de Fortification'), if the glacis of a fortress be countermined, the duration of the siege, which otherwise would have extended to one month only, may be prolonged to six weeks.

The chamber in which the powder is placed is a cubical excavation formed on one side of the gallery, very little larger than is necessary to enable it to receive the box which contains the powder; when this is deposited, the vertical face of the chamber is covered with boards, which are kept in their places by short timbers fixed in horizontal positions between them and the opposite side of the gallery. The latter is then filled up with earth, well rammed, to an extent in the length of the gallery greater than that of what is called the line of least resistance, that is, a line imagined to be drawn from the chamber perpendicularly to the surface of the ground above. The mass of earth thus filling the gallery is called the *tamping* of the mine. A train of powder in a cloth hose, forming a tube about three-quarters of an inch in diameter, and for security contained in a wooden trough called an *auget*, or a *casing-tube*, is laid from the box in the chamber through the tamping, to the place where the fire is to be applied; to its extremity is attached a piece of port-fire, as it is called, which, being lighted, the fire communicates by means of the train with the powder in the chamber, and an explosion takes place.

The dimensions of the crater or funnel formed by the explosion depend on the amount of the charge; its form may be considered as an irregular frustum of a cone, or paraboloid, and the mine is denominated *one-lined*, *two-lined*, &c., according as the diameter of the crater at the surface of the ground is equal to once, twice, &c. the length of the line of least resistance. Every explosion of this kind necessarily produces a compression of the earth in all directions about the chamber, to a certain extent; and the mines formed with high charges have been denominated *globes of compression* from this circumstance. A line drawn from the chamber to the circumference of the crater, on the ground, is considered as the radius of the globe of compression, or the distance from the chamber to which the lateral effect of the mine will extend. The last-mentioned kind of mine is used by the besiegers only, as it consumes more powder than the defenders can generally spare: its object is, by compressing the earth laterally to a considerable extent, to destroy a side wall of an enemy's gallery or blow down the counterscarp of a ditch.

The rules for determining the charges of mines are founded on the results of experiment, and it is evident that the charges must vary both with the nature of the soil and with the proposed figure of the mine, that is, with the ratio between the diameter of the crater and the length of the line of least resistance. When a mine of the kind called two-lined is formed in common earth, the amount of the charge in pounds is considered as very nearly equal to one-tenth of the cube of the line of least resistance in feet; but for a three-lined and a four-lined mine it is supposed that the cube of this line should be multiplied by ·21 and by ·45 respectively. In an experiment made at Potsdam, when a four-lined mine was formed in a sandy soil by the Prussian Major Le Febvre, the cube of the line of least resistance in feet was very nearly equal to the charge in pounds. According to the latest experiments of the French engineers, the charges of powder necessary to remove one cubic yard (English) of material are as follows:—

Common earth . .	1·21	pounds (English)
Strong sand . . .	1·64	„
Potters' clay . . .	1·75	„
Loose sand . . .	1·85	„
Old masonry . . .	1·94	„
Freestone . . .	2·14	„

Now the figure of the crater being supposed to be a paraboloid, of which the centre of the chamber is the focus—if a be the length of the line of least resistance in yards, and $n\,a$ represent the radius of the crater at the surface of the ground, also if $\pi = 3{\cdot}1416$, we shall have

$$a^3 \frac{n^2 \pi}{4} (1 + \sqrt{n^2 + 1})$$

for the volume of the crater in cubic yards: therefore, multiplying this volume by the numbers in the above table, we should have the charge in pounds.

In order to determine the proper size of the chamber, or rather of the box, which is to contain the powder, it will be necessary to observe that one pound of gunpowder occupies, in volume, about 30 cubic inches.

Experience has shown that the greater the charge of powder, the greater is the quantity of earth removed by the explosion. But this fact has its limits; for when the charge is considerable, since the whole of the powder does not take fire instantaneously, it will happen that the earth is partially displaced before the inflammation is complete; so that fissures being formed in the ground, the force of the powder is spent in the air without producing any effect. Hence it may be concluded that there is a certain charge of powder which will produce a maximum of effect; and it is supposed by Belidor that, in earth of mean tenacity, the greatest craters will have their diameters, at the surface of the ground, equal to about six times the length of the line of least resistance.

MINGRELIA. [GEORGIA.]

MINHO, River. [PORTUGAL.]

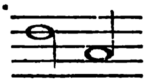
MINIATURE, a species of painting which, owing to its mode of execution being adapted only to very small subjects, and more particularly portraits, has acquired such a distinct meaning in popular language, that, unless it be otherwise expressed, the term is used to signify a very small portrait, let it be executed in whatever mode it may,—as for instance, in enamel on the lid of a snuff-box, &c. The term is also applied adjectively as synonymous with minute. A very small portrait in oil is likewise so termed. But miniature painting itself is in water-colours, though it is not at all similar in its process to that employed in water-colour drawings in general. Instead of being applied in washes or by different tints laid over each other, the colours are entirely dotted, stippled, or hatched upon the surface; although sometimes only the face and other flesh parts are so executed, as those requiring greater finish and delicacy, while the drapery and background are either partially or wholly executed according to the usual or less laborious mode of water-colours. The material employed for painting upon is generally ivory (the surface of which is first prepared for receiving the colours), or vellum; sometimes Bristol-board, or other drawing-paper of that sort. Ivory however is preferred, as not only being more durable, but bearing out the colours with greater brilliancy.

As may be supposed from the nature of the process, miniature painting requires great nicety and patience, and is also exceedingly limited in its subjects, being scarcely fitted for anything beyond the face and bust of a figure. It it therefore very seldom used except for likenesses, for which, besides possessing the advantage of portability—and they may be so small as to be worn even in a finger-ring—it recommends itself by the extreme softness and delicacy of the colouring, and by its excluding all those harsher markings and lineaments of the countenance which must, even if softened down, be indicated in any picture of the size of life.

Formerly miniature, though of a somewhat different kind from that now in use, was employed for decorating or illuminating missals and other books, prior to the introduction of printing, when the books themselves were entirely the work of the hand, and consequently of such cost and value as to be considered worth such expensive adornment. Very lately that style of book decoration has been partly revived, by means of ornamental margins and borders of fanciful or arabesque patterns printed from wood-blocks.

MINIEH. [EGYPT.]

MINIM, in Music, a character, or note, formed of a round open head, and a stem descending or ascending from its right side—



When first introduced, the minim was the shortest note in music, as its name (from *minimus*, the least) indicates. It is half as long in duration as the semibreve, and double that of the crotchet. [CROTCHET.]

MINIMS, or MI'NIMI, an order of religious who improved on the humility of the Friars Minors, by calling themselves the Least, or smallest. They were instituted about the year 1440, by Saint Francis de Paulo, and confirmed in 1473 by Sixtus IV., and by Julius II. in 1507. In France they had the name of *Bons-hommes;* and in Spain that of the Fathers of Victory, in consequence of Ferdinand IV. gaining a victory over the Moors, according to a prediction of Saint Francis de Paulo. In Spain a convent of nuns of this order was founded as early as 1495, followed in the course of time by other similar establishments. In France there was no female convent of this order till 1621; when one was established at Abbeville, and another subsequently at Soissons. (Moreri, *Dict. Historique;* from Louis Doni d'Attichi, *Hist. Gen. de l'Ord. des Minimes.*) No house of this order was ever established in England.

MINING. The art of mining embraces the contrivance and management of the operations necessary to effect the various objects requisite in a mine, as the discovery of mineral deposits, the preliminary trials of their value, and the final extraction of their produce by means of suitable excavations and the application of the requisite machinery. These occupations may be said to constitute the business of the miner in the more comprehensive signification of the term, and it will be evident that they demand an extensive range of acquirements in which knowledge both practical and scientific must be blended.

History of Mining.—A regular or detailed history of mining, however interesting in itself, would far exceed the limits of this article; we shall therefore briefly glance over some of the most important steps by which mankind have been led to their present bold and extensive operations for the extraction of metals and other mineral substances. The use of the metals, and consequently some process for their extraction and separation, may be traced to the most remote antiquity, and is there lost in the obscurity which veils the early history of our species. Moses ascribes the first use and manufacture of the metals to Tubal-Cain, the seventh in descent from Adam, who is said to have been the 'instructor of every artificer in brass and iron.' Upon so brief a notice we are not entitled to build much, but it proves nevertheless that the use of the metals is almost coeval with the human race. Profane history likewise shows that it was known to the earliest nations of antiquity, as the Greeks and Egyptians. Gold and silver were abundant among the antients; an alloy of copper and tin formed the armour and weapons of the Greeks, although iron was not unknown among them, and of this metal the Roman weapons were formed. These facts do not however imply any great knowledge of mining, properly so called, as it is well known that metalliferous deposits are often found near the surface, frequently in a state of extreme purity, as gold and copper for example; and in early ages, when they had been so much less ransacked by the miner, these superficial deposits must have been much more abundant than at present, and probably furnished a large proportion of the metallic produce of those times. Most of the mines of antiquity were probably of a similar nature to the stream-works of Cornwall, and it appears from Strabo* (175, Casaub.) that the Phœnicians at that early time used to trade to Cornwall for tin and lead. In early times the demand for the metals could not have been very great; their use was then either as instruments of luxury or war, and thus confined to a limited class, so that the quantity found near the surface was in all probability fully adequate, leaving but little inducement for deeper and more laborious research.

There is however evidence enough to show that operations similar to those of modern mining were carried on by the nations of antiquity. Herodotus (vi. 46, 47) observes that a mountain in the island of Thasos was completely burrowed by the Phœnicians in their search for the precious metals; and the curious fragment of Agatharchides preserved in Diodorus (b. iii., ch. 12, 13) shows that the art of forming shafts and passages for exploring mines and procuring the metals was well known in Egypt. The silver-mines of Laurium in Attica were worked by the Athenians, to some extent at least, as early as the beginning of the fourth century B.C. Under the Romans the quicksilver-mines of Almaden in Spain [MERCURY] were extensively worked.

It is singular to observe that an art for which this country possesses such great natural facilities, and which was certainly cultivated here both before the Roman conquest and during the Roman occupation of this island, should afterwards have fallen into decay, and indeed for a time have been chiefly practised by foreigners. Prior to the Norman conquest our mines had been much neglected, probably in consequence of incessant civil commotion; and subsequently to this period they were chiefly worked by Jews. In the reign of Elizabeth the art of mining had fallen into so much decay that an importation of foreign skill was found necessary to revive them; and the Germans, long and justly celebrated as skilful miners, received every encouragement to settle in this country and turn their attention to them. From this measure some success appears to have resulted, and in the following reign we find Sir Hugh Middleton, a citizen of London, deeply concerned in the lead and silver mines of Cardiganshire, from which he derived a large revenue, which was expended in that noble work from which the metropolis still benefits—the formation of the New River. About this time a new and important auxiliary was furnished to the art of mining by the application of gunpowder for blasting, and an invention which had revolutionised the art of war thus became the means of effecting an equally extensive change in one of the most prominent arts of peace. Of the early use of gunpowder in mining, and more especially in this country, we have probably no very accurate account; the following particulars have been given by Mr. John Taylor in a history of mining in Rees's *Cyclopædia:*—'The application of gunpowder to the purposes of mining first took place in Hungary or Germany, about the year 1620, and it was first introduced into England at the copper-mine at Ecton in Staffordshire, about the year 1620, by some German miners brought over by prince Rupert. It was in use in Somersetshire about 1684, and it was not till after this period probably that the Cornish miners became acquainted with this powerful assistant to their operations. Its importance may be judged of by the amount of the present consumption in the mines of Cornwall alone, which has been calculated at an annual value of about forty thousand pounds sterling.'

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* Strabo speaks of the Cassiterides, which can be no other place than Cornwall or the Scilly Islands; probably the former.

In the early part of the eighteenth century another important event took place in the history of English mining. The rich deposits of copper which have long constituted the principal mineral wealth of Cornwall, had up to this time been neglected, partly perhaps from this ore being confounded with 'mundic,' or worthless iron pyrites, common in most mines, and partly from its lying deeper in the veins than the ores of tin, which had always formed the chief object of search. When at length the nature and value of the Cornish copper ore was fully recognised, a powerful stimulus was given to this new branch of mining, which has been carried on to the present time with great and increasing activity, the copper-mines of that county being now the deepest, the most extensive, and most productive in the world.

The great invention of the steam-engine, the progress of which during the last century exercised such vast influence upon our arts and manufactures, was early rendered applicable to mining in this country, and in a great degree contributed to the present perfect state of the art. Savery, who, if we except the somewhat equivocal claims of the marquis of Worcester to that honour, was the first person who constructed a practically useful engine worked by steam, sought in the first instance the patronage of persons interested in mines, as we see by his publication entitled the 'Miner's Friend,' in which he describes the nature of his invention and its applicability to draining mines. At this period our mines, although comparatively shallow, were much inconvenienced by water, especially those which were not in situations where hydraulic machines could be employed, and hence the application to them of this new power was at once obvious. The introduction of Savery's engine into our mining districts probably led to the great improvements effected by Newcomen, a resident in Devonshire, which vastly extended its utility, and indeed completely altered its principle. Their conjoined patent was taken out in 1705, and from that date the steam (or rather, atmospheric) engine became a most useful auxiliary in the hands of the miner, and was very generally employed for draining mines, not only in Cornwall, but in the coal-mines of Staffordshire and the north of England. The great improvements introduced by Watt in 1765 and succeeding years were quickly appreciated by the mining interest, and his engines were speedily introduced in the mining districts of Cornwall, where they effected a great saving of fuel, and therefore of expense, the coal used in that county being brought from South Wales. It is chiefly to the object of economy that the efforts of late engineers have been directed, and so successfully, that their improvements have fully kept pace with the increasing depth of our mines, many of the most productive of which would have long since been abandoned had not this been the case. These great improvements have chiefly originated in Cornwall, where ingenuity has been stimulated by the high price of coal; and among the numerous individuals who have contributed to them, the names of Woolf, Trevithick, and Grose may be particularly mentioned.

The improvements in the manufacture of iron which took place in the latter part of the last century, while they vastly increased the demand for it, and thus gave a great stimulus to the working of this metal, and of coal also for its reduction, contributed much to the perfection of mining generally, by enabling the miner to employ iron pumps instead of wooden ones, which were before used. This change allowed a better construction and arrangement of the pitwork, one of the most important apparatus employed in mining, and hence greater depths have been attainable than might otherwise have been the case. Among many minor improvements which may be traced to the same source may also be mentioned the laying down of iron tram-roads underground in mines, as well as their use upon the surface: the carriage of the mineral to different parts of the works has thus been greatly facilitated and economised.

Simultaneously with the improved machinery and apparatus introduced towards the close of the last century, great improvements also took place in the internal economy of mines and the arrangements of the underground works. The antient mode of following down the ore by irregular isolated excavations, and of stoping the bottoms of the mine in the German manner, gave place to the present system of laying open the ground for discovery and extraction, by a well-arranged series of shafts, levels, and winzes. By this plan the ore or mineral is divided into more convenient masses for extraction, and can be worked much more economically than by the former mode of stoping or cutting away the ground in the bottom of the levels, as still practised on the Continent.

The most recent improvements which have been introduced into mining are those which regard the mechanical treatment of the ores after they have been extracted from the mine, and previous to their being fit for the furnace. The processes used for this purpose are technically termed 'washing' and 'dressing,' by means of which the ore is freed from many of its earthy impurities, and thus rendered much richer for metal, in an equal bulk. In effecting this object, several kinds of apparatus are employed, chiefly the stamping-mill, the crushing-mill, and the jigging-machine, the use of which has been known from time immemorial; but more attention has latterly been paid to their application, and it has also become far more general, to the great benefit of all mines, especially those in which a large proportion of the poorer ores are obtained. The competition with foreign mines, in which labour can be obtained more cheaply than in this country, has done much to promote this class of improvements, which, though less striking than some others, have, within the last few years, been productive of extremely beneficial effects, and may still be considered as in progress.

The history of coal-mining is in great measure distinct from that branch of the art which we have been tracing, and which chiefly relates to the extraction of the metals. The introduction of gunpowder, the invention of the steam-engine, and the improved manufacture of iron, have formed however epochs of common importance to both, having greatly contributed to the present extended scale upon which our coal-mines are worked. The great objects to which improvement has within the present century been directed are the ventilation of the works and the invention of lamps which should not be liable to explosion on contact with the fire-damp. The system of ventilation in our collieries has been greatly improved of late years by Mr. Buddle and others; and the beautiful and well-known invention of the safety-lamp, in 1815, by Sir Humphry Davy, has afforded the miner a valuable though not in all cases an effectual preservative against explosion. Many attempts have been made of late to improve the safety-lamp, but none of the improved lamps have been generally adopted; and it is highly probable that in most cases of explosion, where Sir Humphry Davy's invention has been used, the accident has arisen rather from the carelessness of the men than from any defect in the contrivance itself.

One of the most important events in the history of mining in this country is only at the present moment beginning to develop itself, the establishment of suitable means of instruction for the mining engineer. This desideratum was first supplied by the university of Durham, which opened a class for instruction in civil and mining engineering, in January, 1838. In the latter part of the same year a similar department was opened in King's College, London; and a similar institution has just commenced its operations at Truro, in Cornwall, having been organised under the auspices of Sir Charles Lemon, who has at length supplied a deficiency which has long been acknowledged to exist in that great mining county. The local position of the Durham University and of the Truro Institution is highly favourable to the joint acquisition of theoretical and practical instruction; an advantage in which King's College cannot participate, although it may afford valuable preliminary instruction to the mining engineer. These institutions can hardly fail, in time, to produce an important effect on the mining industry of this country.

Mineral Deposits.—In proceeding to treat of the practice of mining, some preliminary details will be useful; for as mining operations are of course in great measure regulated by the nature of the mineral or metalliferous deposits to which they are directed, and by which are determined the form and construction of the mine, and much of its internal economy, it will be necessary briefly to glance at this subject, and to point out some of the most important modes in which mineral masses are presented by nature to our research. Of the various classes into which mineral deposits may be divided, it will be sufficient for our present purpose to notice four only, *veins*, *beds*, *masses*, and *fragmentary deposits*, each of which is the repository of vast mineral treasures, but more especially the first two.

Veins have originally been, in most cases, long, narrow, and irregular fissures, traversing the rocky crust of the globe, which they penetrate to an unknown depth, and at a high angle of inclination. They are for the most part filled with sparry and stony substances, called the 'veinstone,' or the 'gangue' of the vein, but contain here and there irregular masses or 'bunches' of the metallic ores, often of immense size and value, and which it is the principal business of the miner to discover and extract. Most of the metals are of common occurrence in veins, as in this country, copper, tin, lead, and zinc, to which, in other parts of the world, may be added gold and silver.

Beds are layers of mineral substances interposed between the strata of solid rock, which, except in their containing valuable matter, they very much resemble. The layers of flint, which may be often seen imbedded in chalk wherever a section of this rock is made, will convey a good idea of a mineral-bed. Several of the metals, especially lead, are occasionally found in beds; coal, clay-ironstone, and rock-salt, exclusively so; but the last-mentioned mineral is far less regular and continuous than the former.

Masses, or 'pipe-veins,' as they are often termed by the miner, are not so easily defined: the best idea which can be given of them is that of an irregular branching cavity descending either vertically or obliquely into the rock, and filled up with metalliferous matter. Deposits of this nature are less common than the two former classes; they usually contain either copper or lead, and some of the rich oxides of iron appear to belong to a similar formation.

Fragmentary Deposits occur associated with and indeed forming part of many of the loose superficial beds of sand and gravel which occur in the valleys of mineral districts, consisting of the detritus of the neighbouring mountains, which has been washed down from thence at remote geological epochs. The mineral substances found in these deposits, which may be considered as having originally been derived from veins or beds in the vicinity, are not, in most cases, mixed up indiscriminately with the alluvial matter, their greater specific gravity having occasioned them to be deposited in distinct layers by themselves, usually towards the bottom of the mass. Tin and gold are the metals which most commonly occur in deposits of this kind.

Geological Position.—The above-mentioned mineral and metalliferous deposits are not found promiscuously distributed throughout all rocks or soils; on the contrary, there are certain rocks, or rather assemblages of rocks, to which they may be considered as in great measure peculiar. Granite, porphyry, and the older igneous rocks, generally are metalliferous, and often eminently so; but mineral deposits are on the whole most abundant in rocks of sedimentary origin, and more especially in and near situations where these two classes of rocks (the igneous and sedimentary) are in contact, or where a metamorphic structure has, from the action of internal causes, been superinduced upon the latter. It does not appear that nature has confined particular metals to any exclusive kind of rock, yet traces of a general association may still be perceived. Thus tin, copper, gold, silver, and certain deposits of iron, are most abundant in the class of rocks usually termed primary; while lead, zinc, mercury, and the earthy ores of iron, are most abundant in the older secondary rocks, which also contain our principal deposits of rock-salt. Veins are of most common occurrence in igneous and primary or metamorphic rocks, in the vicinity of which the derivative fragmentary deposits are therefore most often found, as is the case in the stream-works of Cornwall and the alluvial gold districts of Brazil. Mineral-beds, although sometimes occurring in primary rocks, are most common in secondary countries; and irregular masses, or pipe-veins, are most strikingly developed in limestone districts, where they probably occupy original cavities in the rock.

Metallic Ores and Mineralizing Substances.—The state in which the metals are found, the full consideration of which belongs to chemistry and mineralogy, will next require our attention, so far as it is immediately connected with the business of the miner. It must be well known that the metals are very rarely presented to us in a pure or metallic state, although native masses of copper and iron are occasionally met with; but gold, from its small affinity for oxygen and other mineralizing substances, although frequently alloyed, is never mineralized. The great bulk of the metals then, with the exception of gold, are found in the state of *ores*, that is, chemically combined with certain mineralizing substances, which completely disguise, and, in fact, till separated by metallurgical processes, destroy their usually recognised and useful properties. The most important of these mineralizing bodies are oxygen and sulphur; the next in rank are chlorine, and the sulphuric, carbonic, and phosphoric acids. The mode in which they combine with the metals is either in binary compounds, or in the union of two pairs of such compounds. Of the former we have examples in iron, lead, and mercury, which, when mineralized by sulphur, form respectively the following sulphurets, iron pyrites, galena, and cinnabar: we observe the latter in all cases where the metals are mineralized by acids, as in spathose iron-ore, or carbonate of iron, in which one binary compound, the oxide of iron, is united to another, the carbonic acid. From this naturally compound state, in which the metals almost invariably occur, arises the art of metallurgy, which, although generally considered totally distinct from that of mining, is nevertheless most intimately connected with it.

Earthy Impurities.—Independently however of those chemical combinations from which the metals can only be freed by the smelter when treated in the furnace, there are other mechanical impurities scarcely less important, which require to be partially separated on the mine, and which therefore fall entirely within the province of the miner. Although large masses of the metallic ores, as before noticed, are concentrated in bunches or deposits, confined to particular portions of the vein, there is also a great proportion of the ore in all mines, which is more or less intermixed with the veinstone, or often indeed finely disseminated through it; and as the expense of fusing this large mass of earthy matter would greatly exceed the value of the metal which it contains, while on the other hand it forms too large a proportion of the produce of most mines to be thrown aside and rejected, great skill has been shown in all mining countries in contriving mechanical processes for effecting its separation as soon as extracted from the mine. When this separation has been properly accomplished, the metallic residue, before worthless, can be profitably smelted, to the great benefit of all, more especially the poorer class of mines, while those in which the precious metals are worked are entirely dependent for their existence upon the skill and care with which it is performed. The mechanical impurities here spoken of are often sufficiently obvious even in hand specimens of the metallic ores, which, unless purposely selected from the richest parts of the vein, will often exhibit thin alternate layers of the ore and veinstone, or sometimes irregular masses of ore of different sizes which are completely intermixed with and imbedded in sparry and stony matter, and this must be considered the character of a very large proportion of ores in their natural state. It frequently happens too that ores of a worthless character are mixed up with the more valuable ones; thus copper and lead are very generally accompanied by iron pyrites and blende, both of which must be regarded as impurities, and therefore separated as far as possible previous to any process in the furnace. The great bulk of the metallic ores, when in their natural situation, constitute in fact a most heterogeneous mixture, in which the really valuable metal exists only in a small proportion, chemically combined with one or more mineralizing substances, and completely intermixed with sparry and earthy matter and ores of inferior metals. A proper perception of this fact, which is scarcely noticed in works on mineralogy, is most essential to a right understanding of the art of mining, and of the various ingenious processes which in this and other countries have arisen out of it, having for their object the separation and concentration of the metallic matter drawn from the mine, previously to its being submitted to the action of fire.

Preliminary Mining Operations.—As the construction of a mine, or the arrangement of the underground works, must depend in great measure upon the nature of the mineral deposit to be wrought, if we refer to the great division of mineral deposits into veins and beds, before noticed, it is evident that this construction must be principally of two kinds, adapted to each of the above cases, independently of the less definite processes adapted to the working of irregular mineral masses and fragmentary deposits. Thus in working a mineral vein, as in a copper or tin mine, the excavations will be formed either vertically or in a highly inclined position, and pursued laterally, or, as the miner terms it, 'upon the course of the vein,' while the advanced points tend progressively downwards, or 'in depth.' In working a mineral bed, on the contrary, taking a coal-mine for example, the principal excavations will be formed horizontally around the pit or shaft by which access is first obtained to the deposit.

As a very large portion of the metallic produce extracted by the miner from the earth, and more especially of the soft metals, copper, tin, and lead, is derived from veins, it is to the former of these arrangements that attention will be first directed. The working of coal and iron is considered hereafter, together with that of those minerals which are found in more irregular deposits. The general view of mining which falls within the limits of this article may conveniently be divided into the following considerations: the discovery of mineral veins or other deposits—the first opening of a mine and subsequent extension of the workings—the machinery and other appendages required by these operations, both underground and at the surface, with a brief notice of the surface works, and of mining economy and statistics.

Works of Discovery.—Mineral veins or beds are seldom visible at the surface of the ground, being generally concealed by the thick covering of diluvial matter which is spread over almost every portion of the globe, and hides from our view the solid rocky strata in which they are enclosed. In some cases however where this covering is partially wanting, they may be distinctly traced at the surface, and still more frequently they are rendered visible by the indentation of excavated valleys, and the channels worn by mountain torrents. The same effect is often produced by cliffs on the sea-shore, where veins occur in that situation, of which there are many examples on the coast of Cornwall.

As mineral deposits however present in most cases no trace of their existence at the surface, certain general indications must be had recourse to for their discovery. The most general of these indications (which can be but briefly noticed here) are furnished by geology, which teaches us that certain metals are most abundantly found in certain rocks, and further points out that they do not occupy any position indiscriminately in those rocks, but are almost exclusively found near their junction with other rocks of a different character, more especially near the contact of igneous masses with sedimentary strata, and that they commonly occur where rocks alternate together, and are broken and dislocated. Thus the tin and copper veins of Cornwall are situated chiefly in a species of clay-slate provincially termed 'killas,' and either near its junction with protruded masses of granite, or where it is intersected by channels of a porphyritic rock termed 'elvan.' In Wales and the north of England the lead veins are chiefly situated in the carboniferous limestone and rocks associated with it, especially in places where they are intersected and broken up by enormous faults and dislocations. Similar circumstances to these are very generally observed in all parts of the world, and it is also well ascertained that the local enrichment of veins is greatly influenced by their intersection with one another; and often indeed closely corresponds with the points of junction.

In addition to the general presumptions furnished by geological science, another and more precise indication of the existence of metalliferous deposits is afforded by finding pebbles or fragments of ore on or near the surface, generally either in the beds of streams or mixed up with superficial detritus. These scattered fragments, the result of diluvial action upon the outcrop of mineral veins or other deposits, may often be traced to particular spots, and thus the position of the deposits from which they originated may be established. In the north of England they are termed 'shoad stones,' and this mode of discovering veins is called 'shoading.' Should the exact situation of the vein whose existence has been ascertained in this or any other manner not be observable, it may be ascertained by opening trenches in the alluvial soil deep enough to expose the solid rock, their direction being at right angles to that in which analogy or the position of other veins in the neighbourhood would render it probable that the vein or veins in question might lie. This mode of finding veins is provincially termed in Cornwall 'costeening.' The object of discovery may be still more effectually attained, but at a greater expense, by excavating a nearly horizontal passage termed a 'level,' 'drift,' or 'adit,' from the bottom of the nearest valley, carrying it through the solid rock in the direction before mentioned, so as to intersect or 'cut' any mineral deposit which may exist in the ground through which it passes. This last plan is however seldom adopted, unless it is previously well ascertained that mineral veins do actually exist there, as it is too slow and too expensive to be undertaken upon uncertain grounds. Discoveries are sometimes made also by driving on the course of veins which occur in cliffs or are exposed in the sides of brooks: trials of this kind fall within the compass of working miners or persons of very small capital, and in some instances form the first step in opening mines which ultimately become of great importance.

Although the manner in which mineral deposits may be and sometimes are originally discovered has been thus detailed, it must not be supposed that the process is one of very frequent occurrence. The principal mineral districts in this and most other countries have been known and explored for ages, and by far the greater part of our mineral produce is extracted from deposits which have long been worked, the principal new discoveries being either made upon untried portions of known veins, or simply by excavating passages or 'cross-cuts' from mines now working, in a direction transverse to that of the vein upon which they are wrought, so as to prove the adjoining ground.

Financial arrangements, &c.—When however a new vein or mineral deposit has been by any process discovered, if the indications of metallic produce are such as to render it desirable to work it, the most usual step, after obtaining the consent of the proprietor, is the formation of a company for this purpose. For although mines are sometimes worked by individuals, experience has shown that a company is best adapted for carrying on mining operations, the amount of capital required being large and uncertain, and the risk great, while a long period may elapse before adequate returns are made. Hence, not only in England, but in most other countries, the system of working mines by companies has been adopted, being found decidedly advantageous. Certain stipulations are then entered into between the company and the proprietor of the land in which the vein or deposit is situated, or, should the mineral right not belong to him, with the person who does possess it. The principal terms of this agreement are to determine the extent of ground within which operations may be carried on, and to stipulate the proportion of the gross mineral produce or its equivalent in money which the owner is to receive free of all expense in raising and making it marketable. It often includes also compensation for damage done to the surface, and other considerations of less importance which are determined by the custom of the neighbourhood and other circumstances.

Before commencing operations, it is necessary to ascertain with some correctness (if it should not be previously known) the bearing or direction of the vein, and also its dip or 'underlie,' which may be done by sinking a few shallow pits upon it. These circumstances being known, there are two methods by which the vein may be explored, either by sinking upon its course from the surface, or by forming a horizontal passage to intersect it, commenced from some neighbouring valley or the lowest point on the surface which may be conveniently situated for the purpose; or both these modes may be carried on together if desirable. As however the practicability of forming a level or adit to prove the vein at a sufficient depth and within moderate limits as to time and expense must entirely depend on local circumstances, the former method, as being most expeditious, is generally resorted to, and is effected in the following manner.

Early Progress of the Works.—A spot determined either by convenience or by some promising indication is selected as the site of a shaft, which is frequently sunk in an inclined direction upon the course of the vein, or if intended to be perpendicular, it is commenced upon that side towards which the vein inclines or underlies, and at such a distance from its 'back' or outcrop, as to come down upon it a given depth, say 10, 20, or 30 fathoms. This depth is regulated by the means of the parties to prosecute the trial, and the depth at which analogy may lead them to suppose that ore in any quantity may be found, the superficial parts of veins being usually quite unproductive.

On cutting the vein, the shaft is for a time suspended, and two horizontal passages, often termed 'galleries,' but by the miner 'levels,' are excavated or 'driven' upon the vein in both directions. These passages are usually about six feet in height and three or four in breadth, and rather smaller above than below. They are the principal means of exploring the contents of veins, and are made larger or smaller according to their richness or poverty, their width, and the nature of the enclosing rock. Should the shaft be intended to cut the vein at any considerable depth, it may be desirable to explore it above the point of intersection, and this is done by driving a short transverse level or 'cross-cut' to it, and driving two levels from the place where the 'cross-cut' meets it, as before described. Should the depth of the shaft before reaching the vein be very considerable, two or three of these cross-cuts will be driven first, and levels extended from them. The perpendicular distance of the levels from each other is regulated both by custom and local circumstances, but is usually about ten fathoms, that interval having been found most convenient for the objects of the miner.

After cutting the vein, there are two modes of proceeding —continuing the shaft perpendicularly through the vein, or obliquely upon the vein. Which of these two plans is followed will depend in great measure upon its produce and promise, as already ascertained by the upper levels, and partly also on the means of the miner, the former plan being most expensive and requiring the longest time, although ultimately most advantageous, while the latter, though a cheaper and quicker mode of exploring the vein, since it renders cross-cuts unnecessary, and is itself continually proving one portion of it, is not well adapted for the application of pumps and machinery, an evil which may not at first be very sensibly felt, but which increases proportionally with the depth of the mine, and the quantity of water and stuff which require to be drawn from it.

Supposing the shaft to proceed perpendicularly after cutting the vein, on reaching the depth of ten fathoms or thereabouts below the point of intersection another cross-cut will be driven to it; but as the shaft is now on the opposite side of the vein, this cross-cut will have an opposite direction to the former ones; and as they had successively become shorter as the shaft approached the vein, they will now successively become longer as the shaft proceeding perpendicularly downwards recedes further and further from the vein. In this manner the shaft proceeds indefinitely, cross-cuts being driven at every ten fathoms or whatever distance is most convenient, and levels extended from each upon the course of the vein, the nature and value of which are thus thoroughly explored. The continuance of these and other operations necessarily supposes that ore in some quantity has been found in the upper levels, which will have been all this time in progress, or at any rate that the indications of future produce are sufficiently strong to encourage the miner to proceed with his undertaking, the magnitude and expense of which will now be daily increasing, while various difficulties will be encountered in the progress of his works, more especially the want of ventilation in those parts which are most distant from the shaft, by which alone they can be supplied with air. It is chiefly in the ends of the levels that the evil of imperfect ventilation begins to be felt, the air here gradually becoming close and unfit for respiration, as they advance further from the shaft, especially when from the hardness of the ground frequent blasting is necessary. As soon as this is found to be the case, a remedy of a very simple nature is applied, which consists in sinking a small pit, termed a 'winze,' *upon* the vein of course, from the upper level to the extremity of the one below it. This communication having been effected, the two levels become perfectly ventilated, each having a double communication with the atmosphere by which both an ascending and descending current is produced. By this plan it is evident that the levels may be extended for a considerable distance upon each side of the shaft, winzes being continually formed between them at convenient intervals. Besides the purpose of ventilation, these winzes answer another use, since they make trial of the vein in the intermediate space between two levels, and also divide it into solid rectangular masses, which may be examined all round, and thus the miner has the means of judging with tolerable certainty of the nature and value of the ores contained in each, and can extract the produce in the most expeditious and economical manner. That such is the case will at once be evident when it is considered that these portions of the vein are perfectly drained and ventilated, that they may be attacked at once from as many points as may be convenient or may contain ore of sufficient value, and from this circumstance no necessity exists for breaking down the unproductive masses which are often found to intervene even where the vein is richest and the ore most continuous. When the vein has been properly laid open, the ore may be worked away round such unproductive pieces of ground, which, being left standing, will answer the purpose of supports to the rock on each side of the vein; and where the excavations are extensive, such support is extremely necessary, and often requires the use of strong timbering.

The utility of winzes for working out the ore is indeed so great, that it is only when little or no ore has been found in a level that it will have proceeded far enough for ventilation to become very defective, before a communication of this kind has been made. When, on the contrary, the ore is found to be tolerably continuous in driving a level, winzes are generally sunk at intervals of 20 or 30 fathoms, their position being so regulated as to prove the richest and most promising parts of the vein, and to avoid hard and unproductive portions which do not appear worth exploring. We will suppose however that a continuous body of ore is met with in one of the upper levels, and that winzes have been regularly carried down to the level below it. Similar operations will then be required here, and winzes will be sunk from it to the next deeper one in the same manner, but they will generally be situated about mid-way between the former, so that each may explore the ground under the middle of the rectangle formed by the two upper winzes and the levels between which they are placed, so as effectually to explore the vein with the smallest number of excavations. The system of works by which a vein is thus laid open, although by no means so regular, is not unlike the seams formed by courses of masonry, the horizontal joints of which may be supposed to represent the levels, and the vertical ones the winzes. In cases where the ore extends above the upper level in the mine, this part of the vein may be laid open by perpendicular excavations similar to winzes, but formed in the reverse manner, or by 'rising' upwards instead of 'sinking' downwards, as in the former cases, the height to which these 'rises' are carried depending on the extent of the ore in that direction.

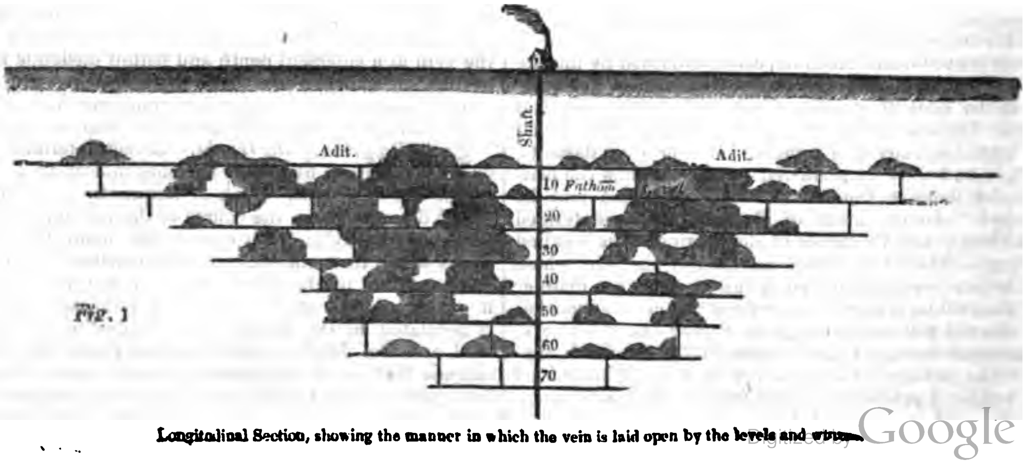


Fig. 1

Longitudinal Section, showing the manner in which the vein is laid open by the levels and winzes.

Should the vein be found to contain ore of good quality and in sufficient quantity, both laterally and in depth, the various operations which have now been described may proceed indefinitely. The shaft will continue to be sunk, cross-cuts driven to the vein at every ten fathoms or thereabouts, levels extended in both directions from them (the upper level being always of course considerably more advanced than the lower, from having been longer in progress), and the ground between them subdivided by winzes as before described. The excavations will now have assumed a regular form, and become what is properly termed a mine, the objects for which they were undertaken having been accomplished, or the contents of the vein thoroughly explored, and its produce, where of sufficient value, rendered capable of being economically and expeditiously extracted. In the accompanying sketch, *fig.* 1, this state of the works is shown, the shaded portion representing the parts of the mine whence the ore has been extracted as described below. *Fig.* 2 gives a cross section of the mine, and with the former will completely illustrate the foregoing description.

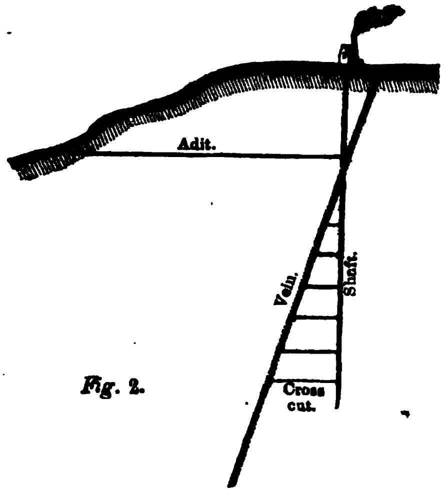


Fig. 2.

Cross Section, showing the progress of a shaft after cutting the vein.

Raising of Ore.—The operation last named, or the extraction of the ore, will not however have waited the advanced state of the works which we are now contemplating: a certain quantity will have been produced by driving the upper levels and sinking winzes below them, although not forming the primary object of these works; and wherever orey ground was seen in the 'back' or upper part of the level first driven, it will early have been pursued upwards towards the surface, and will yield the first returns of the mine. When by the further progress of the works the vein has been divided into the solid rectangular masses before described, the mine will have been brought into an effective state of working, and parties of men will be set to raise ores from all the most productive points. Where the vein is not very hard, the ore may be broken down with the 'pick' only, but it is generally necessary to blast it with powder, by which process large quantities are detached from the vein by every shot. In raising ores the men generally work upwards from the 'back' or upper part of one level towards the 'bottom' of another, and the excavations are so arranged that the ore may readily fall down to the level below them, whence it is carried in tram-waggons to the shaft, and thence raised to the surface. As in all large and well-regulated mines it is desirable to keep the quantity of ore raised as nearly as possible to a uniform standard, the process of 'opening ground,' as above described, will generally either keep pace with or even exceed the rate of exhaustion, so that a portion of the ore thus laid open may always be held as a reserve to keep up the returns of the mine during periods of temporary depression, when only poor and unproductive ground may be presented by the works of discovery. This judicious mode of proceeding is justly regarded as one of the greatest modern improvements in the economy of mining: it provides a compensation for those great irregularities and fluctuations to which all mineral deposits are continually subject; it keeps up the returns of the mine during temporary intervals of poverty, and enables those trials to be effected which may again place it in a productive state.

Extension of the Works.—As the workings of a mine become more extended, they gradually lose the simplicity which we have been supposing, and, from the multiplication of shafts and other excavations, become highly complex, a result to which the irregularity of mineral deposits greatly contributes. The nature of these ulterior operations will now be briefly described, still considering the mine as a mere system of excavations, and reserving till hereafter the subject of drainage, support, &c. When the levels have been extended to a considerable distance from the shaft, the ventilation will again become defective, notwithstanding their communication by winzes; the current of air, from the greater distance it is carried, becomes more and more feeble; and this evil is still further augmented by the increasing number of men now employed in the works, the number of candles, and the frequent process of blasting. The expense of the transport of ore and masses of rock and rubbish to the shaft also becomes considerable; and if the prospects of the mine continue such as to warrant the expense, a new shaft must now be sunk on one or both sides of the former. Whether one or two shafts will be necessary will depend on the direction in which the ore is found to extend, and the indications exhibited by the vein; and they will be so placed as to command that portion of it which, for reasons before stated, is without the reach of the former one, which by this time also may have become inadequate for the various purposes of extraction, drainage, and descent, to which it is applied.

In order to avoid the expense and delay of unnecessary cross-cuts, the new shaft will be so placed as to intersect the vein much deeper than the former, and this point will be so arranged as to correspond either with one of the deepest levels, or some proposed level deeper still. The new shaft may have been commenced in anticipation, while the levels were yet distant from the point where it is sunk; and in this case its communication with the mine will have been accelerated by driving levels to meet those which are proceeding from thence towards it. When this communication has been effected, its benefits will be immediately felt, both in the thorough ventilation of the mine and the increased facilities afforded for the extraction of ore and stuff.

As the process of sinking a shaft is often extremely slow, from the hardness of the ground (one fathom per week being a very good average, and sometimes half that progress being scarcely attainable), and as the most productive workings of a mine may be greatly impeded for want of another outlet to the surface, expedition is often of the utmost importance to remedy this evil, and it thus becomes highly desirable to accelerate the operation. The perfection which subterranean surveying has of late years attained enables the miner to accomplish this object by a very interesting process, whenever the workings of the mine have advanced near the spot where a shaft is required. The site of the shaft having been fixed upon and marked out at the surface, the miner, by a series of very accurate measurements of the length, windings, and direction of the levels, is enabled to ascertain correctly their relative position with regard to this spot, and consequently at what point each of them approaches nearest to a supposed vertical line penetrating the rock below it. This being ascertained, it is evident that by pursuing the same process still further, he may determine in what direction and to what distance cross-cuts must be driven from each of these points, in order to bring him exactly to this line, or underneath the site of the shaft; and having arrived there, that excavations exactly corresponding with it, both in form and dimensions, may proceed simultaneously both upwards and downwards from each cross-cut, while the shaft itself is being sunk from the surface, the work thus proceeding from several different points at the same time, as shown in *fig.* 3. It is found in practice that the various separate portions may be made to unite with surprising exactness; so much so, that even in very deep shafts, when complete, daylight may be seen from the bottom; and from the great saving of time which the process effects, it is now frequently used in mines of great depth, the working of which is much facilitated by it, as the work of many years may thus be brought within the compass of one or two. The most remarkable instance on record of a deep shaft being thus sunk from several points at once occurred at the Consolidated Mines in Cornwall, about nine years ago, where a perpendicular shaft, 204 fathoms in depth, was completed in less than a twelvemonth, being worked from fifteen different points at once.

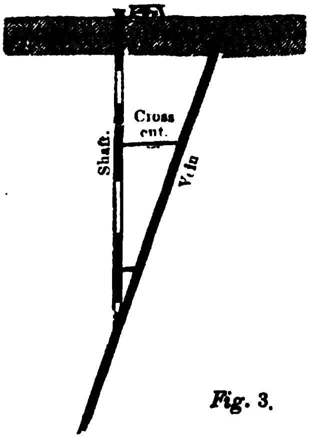


Fig. 3.

Cross Section, showing the progress of a shaft worked at several points.

As the working of a mine proceeds, the increase of shafts and levels tends to obliterate, in a great degree, the uniformity and simplicity of operations which were at first apparent, the position of these works being entirely regulated by the irregular distribution of the productive parts of the vein, as developed in their progress. When the depth becomes considerable, many of the first shafts are rendered in great measure useless, either from being inclined, and thus inconvenient for machinery, or from having passed through the vein at a shallow depth, and thus requiring long cross-cuts previous to commencing the deeper levels. Hence, in very deep mines, a double line of shafts will often be found to range along the course of the principal veins; and sometimes even three shafts will be found opposite each other, and intersecting the same part of the vein successively at greater depths. In this case, while the most recent shafts are used for drainage and extraction, the older and more shallow ones are often fitted up as 'foot-ways,' and serve for the partial ascent and descent of the miners. In some of the large mines of Cornwall it is usual to sink two shafts within a few fathoms of each other, one being of large dimensions, and intended for a drainage or 'engine-shaft,' the other smaller, and adapted to drawing stuff only. This arrangement is found more convenient than having a single large shaft arranged for both purposes, for which however one shaft is often made to answer, being divided down the middle by timbering, and one side appropriated to the pumps and ladders, while the other is occupied by the 'kibbles' or iron buckets used for drawing the ore and in many cases the rubbish, when the latter cannot be conveniently disposed of underground.

Shafts in this country are generally sunk of a rectangular form, except in our coal mines, where a circular form is often preferred. Those intended for the extraction of ores, or 'whim-shafts,' are commonly six feet by four; those employed for drainage, or 'engine-shafts,' as they are generally termed, vary from about six feet by eight to eight by ten, or sometimes are rather larger. In coal-mines the pits are generally about seven or eight feet in diameter, the dimensions varying according to the nature of the ground and the arrangements proposed in them.

As veins are generally found to run nearly parallel, and often at no great distance from each other, and as the neighbourhood of a productive vein is a favourable indication of the contents of others in its vicinity, transverse levels or 'cross-cuts' are frequently driven from mines at various depths, with a view to discovering side-veins, or making trial of branches which diverge from the main lode. Should a productive vein be found in the neighbourhood of the first, the most usual mode of working it is by extending levels upon it, at the same depth as those in the mine from which the cross-cuts are driven, commencing at the points where these intersect it. In this case the same shafts will probably serve for both the old mine and the new one, the one being, in fact, a mere appendage, as it were, to the other. Should the distance of the newly-discovered vein be considerable, it will prevent the workings from being carried on in this manner, both from the length of the cross-cuts and from the difficulty of ventilation and extraction; and it will therefore be necessary to sink shafts upon it, and lay it open as a separate mine, in a somewhat similar manner to that which has already been described.

Metalliferous veins are often traversed by other veins crossing them nearly at right angles, which seldom contain ore, excepting perhaps near the points of intersection: they are termed 'cross-courses,' or 'cross-veins,' and occur in most mines. Cross-cuts are sometimes carried upon these veins, partly to explore their contents, and partly because the work will often proceed more rapidly than when in the solid rock; but this is not considered so effectual a mode of exploring the ground and discovering new veins as by driving in the rock itself.

The intersections of veins are very generally accompanied by a shifting and derangement of the metalliferous vein, the two portions of which, on the opposite sides of the cross-vein, are often separated to a very considerable distance. As veins are most productive at or near the points where such intersections occur, the metalliferous mass on which the miner had previously been working is completely lost on coming to a cross-vein; and it is frequently a work of considerable difficulty to recover it again, as the productive vein may be thrown or 'heaved' completely out of its former course. The first object to be ascertained, in the search for the dislocated vein, is in which direction the 'heave' has taken place, whether to the right hand or the left; and from analogy the miner is generally, though not always, enabled to form a correct judgment on this head. He then continues the level upon the cross-vein in this direction, till the metalliferous vein is again met with on the opposite side, when the level is continued upon it as before. If the search should be continued for a long distance without success, he will drive in the other direction, in expectation of meeting with it there.

Adits.—Where a vein has been worked by driving a level towards it from a valley or other convenient point on the surface, the drainage to the point of intersection is, of course, complete; and hence in mountainous countries, where deep ravines occur, levels may be brought in one below another, so as to prove the veins and unwater the mines to a considerable depth, almost superseding the use of machinery for this purpose. Levels thus opening to the surface, and serving for drainage, are termed 'day-levels' or 'adits,' and few mines are without one. In cases where mines have been opened by sinking down from the surface, which is the most common method, an adit is generally commenced from the bottom of some neighbouring valley (see *fig.* 2), which is driven towards the vein with a slight inclination, so that the water may readily flow through it; and in large mining districts adits have been formed of enormous length, traversing a considerable number of mines, and carrying off the water to the lowest practicable point of drainage. The most remarkable work of this kind in England, or perhaps in the world, is the 'great adit' which traverses the extensive mining district of Gwennap, in Cornwall: it commences in a valley near the sea, and very little above its level, and has been extended through all the neighbouring mines, which it drains to that depth, the entire length of its ramifications being estimated at no less than thirty miles. The celebrated Nent Force level, in the north of England, forms a similar drain to the numerous mines on Alston Moor, and has been driven in a direct line between three and four miles, independently of its minor ramifications. In driving an adit, if the length be considerable before it reaches the mine which it is intended to drain, the distance is often divided into two or more portions by sinking shafts upon its course, and driving from the bottom of each on reaching the requisite depth. The work is thus expedited in proportion to the number of points from which operations may be commenced. Adits may often be made valuable as works of discovery, by making them cross the direction of the veins occurring in the district, so as to intersect them in their course, when they afford the means of trial at a cheap rate, by driving upon them at the points of intersection. In some cases adits may be carried almost entirely upon veins, to which they thus afford an important trial.

It is evident that the shafts and levels may be indefinitely extended in the manner which has now been pointed out, and should the produce of the mine be considerable, the portions of the vein successively laid open continue productive, and other veins be discovered by cross-cutting in its vicinity, this extension of the works may be continued for many years. Thus, in the course of time, from a few simple excavations, we obtain that almost infinite complication of shafts, levels, cross-cuts, and other workings, which characterise the workings of an extensive mine, with all its numerous appendages of pumps, machinery, and buildings.

The operations which have now been described are applicable to all large and regular metalliferous veins situated in countries where no distinct stratification exists, and where therefore, from the homogeneous nature of the rock, the metallic produce may extend to very considerable depths without any great fluctuation. The mining districts of Cornwall, and those of Germany and Mexico, are chiefly of this class.

Mining in Stratified Districts.—In working mineral veins in distinctly stratified countries, this geological feature has a great influence on the arrangement of the subterranean works, as it impresses a peculiar character upon the contents of the veins, the metalliferous portions of which are in great measure confined to certain strata, while the intervening parts are poor and unproductive. Thus, instead of exploring the whole mass of the vein, as in the former case, it is only necessary to lay open those limited zones which are embosomed in the strata most favourable to enrichment, and to which therefore the workings are chiefly confined. The lead-mines of North Wales, of Derbyshire, and of the North of England, are worked in the carboniferous limestone, and the grits and shales resting upon it, the two former being the productive rocks. In these mines therefore the mode of working above noticed is adopted, and, from the abrupt and mountainous nature of the country, great facility is afforded in carrying on the subterranean works, which are generally executed in the following manner. A point is selected in some valley or ravine where the edges of the strata are exposed to view, and from thence a level is commenced, if practicable, upon the vein itself, and in one of the beds known to be favourable to its enrichment, the progress of which effectually explores its produce, and admits of a convenient extraction of the ore. Should the vein itself not appear in any spot from which it can be directly driven upon, the level is driven as a cross-cut till it is reached, being either carried on one of the productive strata, or in some other bed adjoining them which may afford greater facilities for driving. Whenever bunches of ore are found in the progress of this level upon the vein, excavations are carried upwards and downwards into them, as far as the ore extends, thus laying it open in a convenient manner for extraction. Should the ore extend far enough towards the surface to render it necessary, levels may be driven from the 'rises' to render it more accessible, and should another productive stratum be situated at no great height above the first, similar operations will be extended into that also. The vein having thus been laid open, the masses of ore are placed in a proper state for working; they are broken from the vein either by the pick or by blasting, and the works so arranged that the stuff falls at once into the level below, whence it is transported in tram-waggons to the entrance, near which the dressing-floors are usually placed. *Fig* 4 represents the section of a mine worked in the above manner.

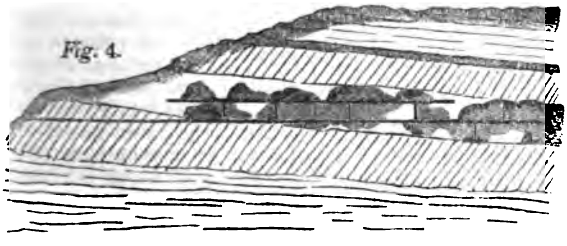


Fig. 4.

As the principal level of a mine worked in this manner is always, when possible, carried at or near the bottom of the lowest productive stratum, the whole process of working may often be carried on by rises, and no necessity will exist for sinking below the main level, which answers the purposes both of drainage and extraction. When however other productive strata exist below this, which from the nature of the country are inaccessible by day levels, recourse must be had to sinking winzes below it to explore them.

When a level has been driven a considerable distance from its mouth or entrance, a shaft will be required, which is usually sunk from the surface so as to come down upon it near the end. The deeper workings are then carried on by means of this shaft, which is either continued perpendicularly or upon the vein, till it reaches the next productive stratum, upon which a level will be driven. By extending the day level or adit upon the course of the principal vein, and such others as may be found in its vicinity, and by sinking shafts occasionally where they may be found necessary; a mine worked in this manner may be indefinitely extended, and its workings arranged so as to be accommodated to the nature of the metalliferous deposits which may be discovered in their progress.

Although the general principles which regulate the direction of mining operations will best be understood from thus tracing their most important modification from the beginning to a mature and systematic development, it must not be supposed that all mines are invariably worked upon the same plan, or even that the first opening of mines is a thing of very frequent occurrence. The local circumstances of mines are so exceedingly various, and the irregularity and complexity of mineral deposits so great, that a corresponding diversity must exist in the means adapted for exploring them, and hence, although the general principles and features are the same in all, no two mines will be exactly alike, nor would the same unvarying processes be suitable for them.

Mining Tools and Processes.—The tools and processes employed by the miner in the excavation of the rock or the vein are simple, and will require only a brief notice. As his work is chiefly of two kinds, simply *excavating* the ground when soft, and *blasting* it when hard, his tools are suited to each process, the 'pick' and 'gad' being used for the former; the 'borer' or 'jumper,' and the 'hammer' used to propel it, for the latter, with several minor accessories for firing the shots, when the hole has been completed to its proper depth. The *pick* is a very useful tool and much employed by the miner both in working in the rock and in breaking down ore where the ground is not so hard as to require blasting. It resembles a common pickaxe, but is smaller and more convenient, the iron head being sharp and pointed at one end, and very short and hammer-shaped at the other, a form which peculiarly adapts it to under-ground uses. The *wedge* or 'gad' is sometimes used in conjunction with the pick; it is made of wrought iron, and often with curved sides. The *borer* or 'jumper' is an iron rod or circular bar usually about two feet in length, steeled and formed into a flat sharp edge at the end; it is driven into the rock by one man with a heavy hammer, while the other continually turns it round so as to expose the cutting edge to fresh surfaces of rock. The pulverised matter is drawn out from time to time by a tool called a 'scraper,' and when the hole has proceeded to a sufficient depth, and been charged with powder, an iron wire with a copper point, or, what is still better, a piece of copper wire, with a loop at the end, is introduced, when the charge having been firmly rammed down with clay or other soft mineral substance, the wire or 'needle' is withdrawn, and a train of gunpowder inserted in its place. The train is then fired by a slow match (often a piece of brown paper smeared with grease), and the miners retire till the explosion has taken place. A very ingenious contrivance for firing the charge was invented some years ago in Cornwall by Messrs. Bickford, called the 'safety fuse,' which is now getting into very general use in our mining districts. The safety fuse consists of a small train of powder inserted in a water-proof cord, and being cut to the required length, regulates the time of the explosion by its known and steady rate of ignition. The use of this contrivance and the substitution of copper for iron in the 'needle,' have contributed of late years to prevent the accidents arising from premature explosion, which were formerly of very common occurrence in mines.

Auxiliary Operations.—Having now considered mining in the most simple point of view which the subject admits—as the arrangement of a system of subterranean works adapted to effect the great objects of discovery, extraction, ventilation, and drainage, it remains to notice the various auxiliary operations which the progress of these works will have required, and the complicated machinery which will thus have been called into action, both on the surface and under ground. The auxiliary works in question will have been directed towards two distinct objects, one portion of them being subsidiary to the actual working of the mine itself, and the other directed to the mechanical preparation of the ores extracted, so as to render them fit for the smelting works, to which they are finally consigned for reduction, this last process being sometimes carried on upon the spot and by the same parties, and in other cases being performed at a distance by a distinct agency. We now proceed to consider the former of these two classes.

The underground works of a mine will not have proceeded far before it becomes necessary to provide for several very important contingencies: water filters rapidly in, and, excepting where mines are worked by day levels or adits (or even then on sinking below them), requires some power to be provided for drawing it out; excavations are formed which require support; ventilation in places requires to be aided by mechanical means; and lastly, the continually increasing extraction of ore and rubbish renders powerful and efficient means indispensable for its discharge.

Drainage; Horse-Whim.—The drainage of a mine is one of the earliest things which it becomes necessary to provide for, as mineral veins are generally more open and porous than the surrounding rock, and thus form natural reservoirs into which the surface water collects. When penetrated by the workings of a mine, this natural drainage is rendered still more complete, and water pours abundantly into the excavations. The most obvious mode of relief, where local circumstances are favourable, is of course the formation of an adit, but excepting in verv abrupt and mountainous countries, where this work can be readily executed, mechanical power soon becomes necessary. This may be in the first place afforded merely by a 'horse-whim,' which will serve to raise both the water and the stuff broken in sinking; and in Mexico, before English skill and capital were applied to the working of the mines, this simple apparatus was the only power used in their drainage and extraction. Its application on the large scale is however so enormously expensive, so complicated, and so inconvenient, that in the mines of Europe it is only used upon a limited plan, and mechanical power is substituted as soon as possible for animal labour. The machine alluded to consists of an upright shaft carrying a large cylindrical cage or drum, and turned round by a long lever to which the horses are attached. A rope is coiled round the cage of the whim, with both ends at liberty, so that while one end is winding up, the other is unwinding, and both pass over a pulley placed above the shaft, having large iron buckets or kibbles attached to them, which by this arrangement are kept alternately ascending and descending, one kibble being loaded at the bottom while the other is emptied at the surface. This apparatus is termed a 'whim' in Cornwall, but in the north of England a 'whimsey' or 'gin.' Where mines are not very deep it is a convenient auxiliary in the extraction, but is only useful for drainage when the quantity of water is very trifling, as in sinking a mere trial shaft. See *fig.* 5.

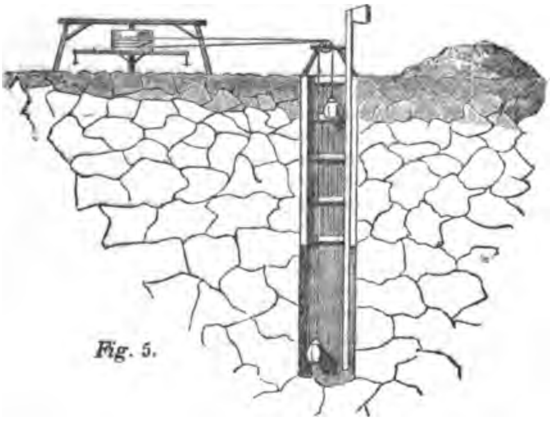


Fig. 5.

Water-wheel.—When the influx of water in a mine becomes at all considerable, recourse must be had to the power either of water or of steam to discharge it to the adit, or the surface, as the case may be. Should local circumstances be favourable to the application of water-power, it will of course have the preference, being recommended both by its economy and steadiness of action. The nearest stream of water available for this purpose will be turned into an artificial watercourse, or 'leat,' and conducted to the mine so as to obtain a sufficient fall to turn an overshot water-wheel, whose diameter and width will be regulated to receive it. Where a constant and abundant supply of water can be obtained, this power becomes extremely valuable, and the miner avails himself of it with great ingenuity, constructing large reservoirs in the valleys through which the stream passes, to render the supply more equable in time of drought, and erecting as many water-wheels on the mine, each receiving its supply from the tail of the other, as the declivity of the ground will admit. The water-wheels used in mines are invariably overshot; they vary from 10 or 12 feet in diameter to more than 50, and from 2 or 3 to 6 or 7 feet in breast: some of the largest exceed 100 horse-power The German miners have long been celebrated for their skilful application of water-power, which, from the mountainous nature of their mining districts, early presented itself to their notice. In this country, from the general application of the steam-engine to the drainage of mines, it has been less cultivated; but many fine instances of its use may be seen in some of our mines, where circumstances have been favourable to its adoption. Among these may be named the Fowey Consols Mines in Cornwall, the mines of Wheal Friendship and Wheal Betsy in Devonshire, and of Grassington in Yorkshire. The application of a water-wheel to the drainage of a mine is shown in *fig.* 6.

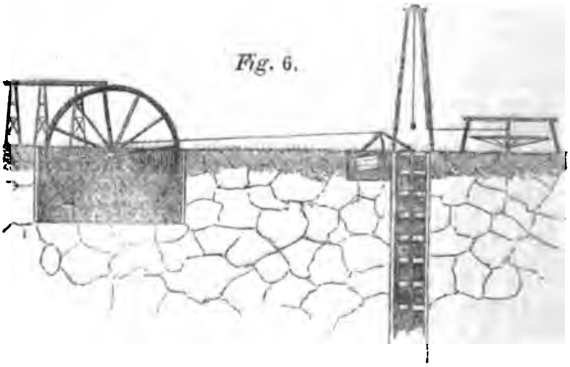


Fig. 6.

Pumps.—During the erection of the water-wheel pumps are fixed in the shaft, proportioned in size to the quantity of water to be drawn, 10 or 12 inches in diameter being a very common size, where there is only a moderate influx. The pumps used in mines do not act at all by atmospheric pressure, as in the case of the common household pumps; they are arranged in 'lifts,' or columns, of considerable height, often indeed from 20 to 30 fathoms, the water being discharged into cisterns placed at the foot of each, and raised entirely by lifting or by pressure. The construction and arrangement of the pump-work forms a very important branch of mining, and one which, from the great depth of our mines, and the vast influx of water so common in them, has been much cultivated in this country, and consequently brought to great perfection. Wooden pumps were formerly common in mines; but they have for a long while been entirely superseded by iron ones, which admit of the lifts being carried to a great height without leaking, or the danger of bursting. The whole column of pumps in a shaft is commonly worked by a single pump-rod, which goes down the middle of it and communicates with each column by a rod attached to its side. In order to give a reciprocating motion to the main pump-rod, a crank on the axle of the water-wheel is attached to one end of a horizontal rod, the other end of which is fixed to an apparatus termed a 'bob,' consisting of an upright post moveable on a centre, and firmly braced to a horizontal piece framed into it at the bottom, the further end of which is connected with the pump-rod. In this manner it will be seen that the rotatory motion of the water-wheel is converted into a steady reciprocating motion when communicated to the pump-rod, the weight of which is always counterbalanced by a large box filled with stones, old iron, &c., which is attached to the opposite end of the balance-bob (see *fig.* 6).

As the power of the water-wheels used in mines is entirely due to the gravity of the water, or the force it exerts in falling through a given space, minus the effects of friction, it is only where a considerable stream can be obtained that water-wheels of sufficient power can be erected; but in cases where the supply of water is very limited, and it is practicable to obtain a considerable fall, there is another very ingenious mode of applying it, by which the principle of hydrostatic pressure is called into action. This contrivance is termed the 'water-pressure engine,' and is a good deal used in the German mines, though only to a limited extent in this country. The principle consists in giving motion to a piston by the alternate pressure of a high column of water, which having performed its office, the communication is cut off, and the water in the cylinder escapes. The apparatus is not in fact unlike the working portion of a steam-engine, the hydrostatic pressure of a column of water being substituted for the force of elastic vapour, and the reciprocating motion thus produced may be directly applied to set the pumps of a mine in action.

Steam-engine.—From the great abundance of coal which exists in this country, and the cheap rate at which it can be generally obtained, the steam-engine has long been the great auxiliary of the English miner, and in its present improved state it has greatly contributed, as before noticed, both to the perfection of our mining system and the enormous extraction of minerals and metallic substances by which our mines are distinguished. In our coal-mines, where the fuel is of scarcely more than nominal value, the steam-engine is the only power ever employed for drainage, and in all deep and extensive works for extraction also. In our copper, tin, and lead mines, on the contrary, where the carriage of coal renders the use of it more expensive, water-power is always, as far as possible, rendered available. In all the deepest and most extensive mines of this description the steam-engine is however indispensable, and both the drainage and extraction have been in great measure performed by it, since its use has been so greatly economised by the reduced consumption of coal consequent upon late improvements.

The history and progressive improvements of the steam-engine are so intimately connected with its general application to mining purposes, and consequently with the present perfection which the art of mining has attained, and the vast produce afforded by our mines, that it requires some brief notice here. The efficiency of a steam-engine for mining purposes is estimated in Cornwall (where, from the great expense of coal, all the late improvements have originated) by the standard termed *duty*, which accurately and conveniently defines the work performed, with reference to the consumption of a given quantity of coal. Thus, by the duty of an engine is expressed the number of pounds (always millions) of water which have been raised through the height of one foot by the consumption of a bushel of coal, the data for this calculation being the quantity of water discharged from the pumps in a given time, and the quantity of coal consumed by the engine in the same period. This mode of calculating the efficiency of steam-engines was first practised by Watt, who thus estimated the saving of fuel effected by his engine compared with the atmospheric engine perviously in use, one-third of this saving being the remuneration claimed by him for the use of his invention. An admirable system for the registration of the duty and other peculiarities of the engines employed in Cornwall was organised in the year 1813, and this system has been ever since continued, the results being monthly ascertained and published in a convenient form. The effect of this system has been to excite an extraordinary degree of competition among the engineers, each of whom strives to improve the duty of his engines in every possible manner. The improvements which have thus resulted have been so unexpected and so extraordinary as to excite suspicion and incredulity among those engineers who resided in other parts of England, which have only been removed by the most rigorous scrutiny and experiments.

The progressive improvement of the duty of steam-engines has been very accurately traced by Mr. John Taylor, in his 'Records of Mining;' and the following is a summary of the results which he obtained:—

In 1769	the old atmospheric engine, by consuming a bushel of coals, raised	5,500,000 lbs.	1 ft. high
„ 1772	as improved by Smeaton	9,500,000 „	„
From 1778 to 1815	the steam-engine as improved by Watt . .	20,000,000 „	„
„ 1820	as improved by the Cornish engineers .	28,000,000 „	„
„ 1826	„ „	30,000,000 „	„
„ 1827	„ „	32,000,000 „	„
„ 1828	„ „	37,000,000 „	„
„ 1829	„ „	41,000,000 „	„
„ 1830	„ „	43,350,000 „	„

During the present year (1839) the duty has advanced to 54,000,000, at which it was stated in the usual return for the month of April last.

The above statement, it should be observed, refers only to the average duty, many of the best engines having always greatly exceeded this; and at the present time the duty of the best engines in Cornwall varies from about sixty to eighty millions. In the latter case therefore one bushel of coal performs as much work as fifteen bushels effected seventy years ago, or as was accomplished by four till within the last five and twenty years. When it is stated that some of the most powerful engines in Cornwall consume from three to four thousand bushels of coal per month, that some mines employ several of such engines, and that the mere expense of drainage is 12,000*l.* or 13,000*l.* per annum, the vast importance of the improvements above noticed will at once be appreciated.

Independently of the vast and practically unlimited power which the steam-engine places at our command, it may be considered as universal in its application, and entirely unrestricted by those limitations of local circumstances which circumscribe the utility of all other modes of drainage. The steam-engine may be erected on any spot which convenience requires, and possessing whatever degree of power may be considered requisite; fuel and water alone are needed for its operations; and while successive improvements have reduced the former to a fraction of its earlier consumption, it can always supply itself with the latter from the ground. This independence of local circumstances is of the more importance to the miner, as it is not in his power to make choice of localities: the manufacturer may erect his mill wherever water-power is abundant for driving his machinery, but the miner must carry on his operations on whatever spot nature has deposited her mineral treasures, and make the best of circumstances over which he can have no control. Thus the steam-engine smokes in the narrow valleys of Cornwall, almost at the sea-level, on the verge of the cliff at Botallack, and on the elevated table-land of Mexico.

The steam-engines employed for drainage are erected close to the shaft in which the pumps are fixed, which is called the 'engine-shaft;' one end of the beam hangs over the centre of it, and is attached to the pump-rod, which is raised at each stroke of the engine, afterwards sinking with its own weight, which is always counterbalanced by a 'balance-bob,' as before explained, so that the whole power of the engine is exerted in raising the column of water in the pumps. The engine is generally enclosed in a large substantial building, either two or three stories high, which affords convenient access to every part of it. The centre of the beam is supported by the front wall of the house, and a low building attached to it contains the boilers, which in Cornwall, together with the steam-pipe and cylinder, are carefully cased and covered up with some non-conducting substances. The arrangement of the engine, with that of the 'capstan' and 'shears' used in raising and lowering the pit-work, is shown in *fig.* 7. The engines employed in draining mines have generally cylinders of not less than 40 inches in diameter, and the cylinders vary from that size to a diameter of 80 or 90 inches, the latter being the largest size ever constructed, and estimated at 300 horse-power. The chief peculiarities of the Cornish engines consist in using high-pressure steam (40 or 50 lbs. to the square inch) expansively, by cutting off the communication with the boiler at one-fourth or one-fifth of the stroke; in allowing a short interval between each stroke for the perfect condensation of the steam, and in carefully preventing the radiation of heat from the boiler, cylinder, &c. The engines employed in our

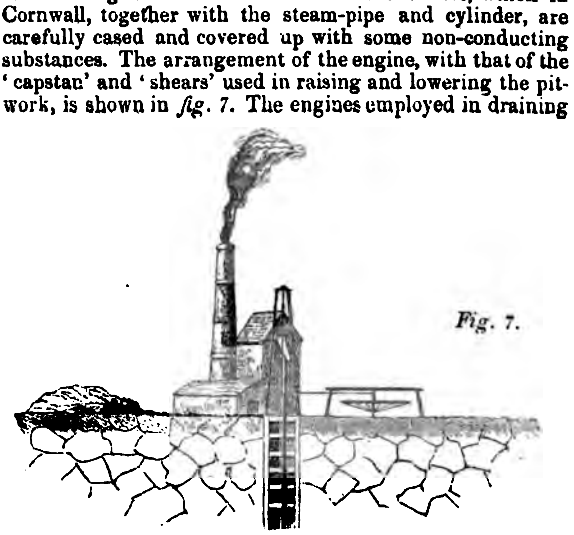
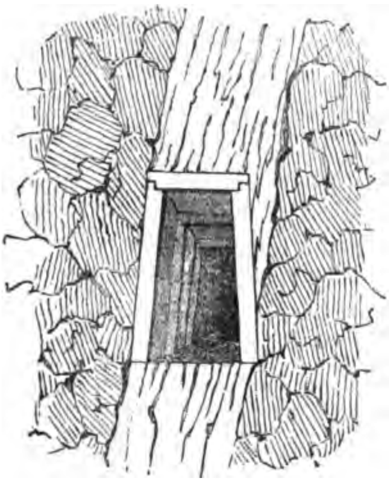


Fig. 7.

collieries present no peculiarity worthy of notice, nor has any great attention been paid to their improvement, owing to the cheap rate at which they can be supplied with fuel.

Support.—The support of mines is the next subject which requires our attention, and the extent to which it is necessary will depend very much on the nature of the enclosing rock, which may be either so hard as to stand of itself, or so soft as to crush together unless the excavations be properly secured. The mode of support used in mines is of three kinds—by leaving pillars of the vein, as before noticed, for which purpose the poorer masses are of course selected; by timbering; and by walling either with brick or stone. Timbering is a very common and convenient plan, and is thus practised:—In the case of a shaft, four pieces of timber of the requisite strength are framed into each other and fixed within it at intervals of about four feet apart, the intermediate ground being supported by driving thin boards between each set of timbers and the rock. Levels are supported by three pieces of timber placed in the form of a doorway, rather narrower above than below, and framed together at the top (see *fig.* 8), the ground between each of these doorways being supported in the manner above noticed. Shafts and levels are sometimes also supported by walling, and in coal-mines the pits are generally lined throughout with brick-work. The 'gunnies,' or large open excavations from which the ore has been taken, are kept open by strong pieces of timber placed across them, and pressing against the two walls of the vein, which they thus prevent from closing together, as might otherwise be the case, especially where the vein was much inclined, and the pressure of the unsupported hanging wall is consequently great. These open spaces are very useful for disposing of the deads and rubbish which are continually accumulating underground when the workings are carried on in the rock or in unproductive parts of the vein, and which it would be useless and expensive to raise to the surface. For this purpose a 'stull' is formed by placing strong timbers in the backs of the levels, upon which boards are laid, so as to form a close covering on which the deads and attle (or rubbish) are then thrown, till the space above has been completely filled up. The pressure of this mass gives it sufficient solidity to support the walls of the vein in an effectual manner; but notwithstanding the large quantity of rubbish thus disposed of in mines, a great deal always remains to be taken to the surface, as the waste heaps on the surface of every mine will show.

Fig. 8.



Ventilation.—The ventilation of mines is most generally and most effectually accomplished rather by a judicious arrangement of the works and frequent communication with the surface than by mechanical means, although it sometimes becomes necessary to resort to the latter. It will be evident that in mines constructed on the principles which have previously been explained, the disposition of the shafts, levels, and winzes is such that the entire workings will always be traversed by currents of fresh air, and it is only in particular cases where circumstances prevent the sinking of a shaft in places where it may be required, or where great delay is experienced in effecting the usual communications, that any mechanical process of ventilation is rendered necessary. A very efficient machine for this purpose was invented some years ago by Mr. John Taylor. It consists of a cylindrical exhausting apparatus, which may be fixed at the mouth of a shaft or level, and placed in action by any convenient power, when, by means of a series of tubes connected with it, the foul air is extracted from the interior of the works, and of course the pure atmospheric air rushes in to supply its place, and complete ventilation is thus effected. In sinking shafts a very simple contrivance is often found sufficient; small wooden pipes made tolerably air-tight are fixed in the pit from near the bottom to six or seven feet above the top, terminating in a funnel-shaped wooden box, which is moved round so as always to face the wind. The air rushing in passes down the pipes to the bottom of the shaft, in which a constant current is thus kept up (see *fig.* 5). When levels have to be carried to any great distance without any communication with the atmosphere, they are sometimes divided by a 'sollar,' or wooden platform placed a foot or two above the bottom, and in this manner a sufficient current of air is obtained to enable the miners to proceed. In the north of England a contrivance called the 'water blast' is often used in driving long levels into rising ground; it consists in putting down either a bore-hole or small shaft near the end of the level, and turning a small stream of water into it, which falls into a cistern placed at the bottom, and is found to carry with it a sufficient current of air to ventilate the works. In coal-mines the ventilation is much more difficult, and, from the rapid generation of explosive gases, more important also. It is generally effected by two shafts, one of which is called the 'downcast, and the other the 'upcast shaft,' the latter of which occupies the highest situation with reference to the dip of the coal, and has a large furnace continually burning near the bottom of it. The air being considerably rarefied at this point, an ascending current is formed, which passes upwards to the surface through the upcast shaft with considerable velocity, causing a descending current to pass through the downcast shaft to supply its place, and by a very ingenious arrangement of the workings this current of pure atmospheric air is made to traverse every part of the mine in succession as it passes from one shaft to the other.

Extraction.—The extraction of mines will require but little notice here, since it may be stated in general terms merely to require the adaptation of an efficient prime mover to any convenient form of winding apparatus, a purpose for which the steam-engine is very usually employed, although where water-power can be obtained it is equally effective. The horse-whim, or gin, as already noticed, is very useful in small mines or isolated workings, and before the introduction of more powerful machinery was very extensively employed for raising ore and stuff from our mines. In shallow preliminary excavations the common windlass is often employed, and in underground work is much used for various purposes, especially in sinking winzes, and raising the stuff from workings where no regular communications have been opened. The extraction of an extensive mine is enormous; indeed the quantity of ore raised is seldom more than one-third or one-fourth, sometimes indeed a fifth, or less, of the mass of stuff which is brought to the surface. At the Consolidated Mines in Cornwall the daily extraction is about 200 tons, a large proportion of which is raised from a depth of from 200 to nearly 300 fathoms. In the coal mines in the north of England the extraction is still greater, but here nearly the whole of the mass raised is more or less valuable, coal-mines being much less encumbered with dead or unproductive works than those of the metals. The South Hetton Colliery in Durham sends about 600 tons of coal 'to bank' daily, and is capable of affording a much larger extraction.

Mechanical preparation of Ores, or Dressing.—Having now traced the nature and progress of those subterranean works by which access is obtained to mineral and metalliferous deposits, and their produce extracted, we may briefly glance at the mechanical processes of separation, technically termed 'dressing,' which fall within the province of the miner, and to the carrying on of which a large portion of the surface-works of every mine is devoted. The object of dressing is to separate as far as possible the earthy matter accompanying, and, as before noticed, often mixed up with the ores, from the metallic portion, which is alone valuable; and the great principle upon which all the varied apparatus and processes which are used in different mines, and in different countries, to effect this purpose, entirely depend, is the difference in specific gravity between earthy and metallic matter, the one being generally double that of the other.

The dressing-floors of a mine are always arranged as near the mouths of the principal shafts and levels as possible, the ore being conveyed to them by a small railway; and they are always provided with an adequate supply of water by an artificial channel or 'leat.' The floor itself is paved, and there are on one or two sides ranges of sheds for the persons employed to work in, and buildings containing the apparatus used in the operation, which commences by picking the ore, which is brought from the mine in large irregular lumps, as blasted or broken from the vein. These lumps, of which more than half is often merely spar and veinstone, are broken into smaller pieces with hammers, an operation commonly performed by boys and young women, when a good deal of the sparry matter is picked out by hand and at once rejected: the residue is moderate-sized pieces of ore, more or less mixed with veinstone, and often nearly free from it. From rich veins a large proportion of the ore is obtained in a very pure state, and in this case it is only necessary to break down the large irregular masses into small fragments of a pretty equal size, in order to render it marketable and fit for the furnace, there being no earthy or sparry matter to separate from it. This rich ore is immediately therefore arranged in circular heaps upon the dressing-floors, containing a certain number of tons each, commonly fifteen or twenty, and in this state it has much the appearance of fine metallic gravel. The poorer class of ores, after being broken by hammers, and partially separated from the matrix by picking, have still a great variety of manipulations to undergo, which depend on the nature of the metal and the quality of the ore itself. Of these processes it will be sufficient here to notice three, 'crushing' or 'grinding,' 'jigging,' and 'stamping,' each of which is performed by an appropriate machine. The crushing-mill, or grinder, consists of one or more pairs of iron rollers, placed within a very short distance apart, and kept in motion either by the direct action of a water-wheel or by cog-wheels attached to it. Immediately above the rollers is a hopper, into which the lumps of poorer ore are thrown, when, falling through between the rollers, they are completely crushed into small fragments. In some crushing-mills there are two or three pairs of rollers, those below being placed very near together, so as to reduce the stuff falling from above still finer, and by an ingenious application of sieves, kept in motion by the machine, the stuff can be sorted into two or three different sizes. Although by passing through the crushing-mill the ore, with its accompanying veinstone, has been reduced to very small fragments, the two substances are still as completely intermixed as ever; but in the next process, by the jigging-machine, or 'brake-sieve,' they are, to a considerable extent, separated. This machine consists of a wooden frame, open at the top, and provided with a strong screen, or iron grating, at the bottom: it hangs over a cistern of water, being suspended to a long lever, the motion of which alternately plunges it into the water and raises it out, with a peculiar jerk each time. The ores being placed in the sieve, and subjected for a short time to this operation, the heavy metallic pieces settle at the bottom, while the lighter fragments of spar and veinstone are thrown to the top, and every now and then very dexterously skimmed off with a piece of board by a man who stands by. In the operation of jigging, a very important separation is thus effected, as three products are obtained by it—the small rich particles of ore, which pass through the sieve into the cistern below, and are removed occasionally, as may be necessary; the larger rich fragments, which occupy the bottom of the cistern; and the poor earthy matter, which forms a layer at the top. This last product, although poor, still contains too much metal to be lost: it consists of small fragments of rock or veinstone, many of which have small particles of ore either attached to them or intermixed with them, and, to any eye but that of the miner's, would appear quite worthless, no less from the small quantity of the ore than the manifest difficulty of separating it from such a mass of stony matter. To extract the ore from this refuse matter, several processes are used, which are chiefly grinding between rollers placed very close to each other, stamping to a fine powder by the stamping-mill, and finally, washing upon an inclined plane. In this operation the fine metallic mud or 'slime,' being carefully spread over the inclined plane at the upper end, a gentle stream of water is allowed to flow over it, which washes the light earthy particles towards the bottom, leaving the heavier metallic ones in a very pure state towards the top. As in this process, and indeed all other operations of dressing in which a stream of water is employed, many of the smallest and most minute particles of the ore are carried away by it, the waste of which, in an extensive mine, would be considerable, it is arranged that all such water shall pass into successive reservoirs, termed 'slime-pits,' in which the metallic particles fall to the bottom, and are from time to time collected and subjected to such treatment as to obtain them in a tolerably pure state, as a good deal of earthy slime is always deposited with them.

It will be seen from the preceding notice that by repeated pulverization, washing, and agitation, the metallic ores may be obtained at length in a very pure state, the earthy matter with which they were originally intermixed being by these processes almost entirely separated from them. When subsequently placed in the furnace, this residual earthy matter becomes fused together with limestone, used as a flux, and forms the vitrified matter termed 'slag;' while by continued heat, the sulphur, oxygen, and other mineralizing substances, which are in a state of chemical combination with the metal, are entirely driven off, and the latter obtained in a pure state. These operations constitute the process of metallurgy.

Variations of the Process.—Any further detail on the subject of dressing would here be out of place; yet it is necessary to observe that different ores require different processes, and that the general outline indicated above is thus subject to considerable modification. In the case of tin ore, which is very intimately disseminated in the rock or veinstone, a very minute pulverization is required: hence stamping is most extensively practised in our tin-mines; and as the ores of this metal may be dressed so as to give a produce of 50 or 60 per cent., very great attention is paid to this point, and the various manipulations are carried on with a greater degree of attention than in the case of other metals. In the case of copper ores stamping is less used, but jigging forms a very important process, and has consequently undergone great improvements of late years, having given rise to a very ingenious and useful invention, called the 'patent separator,' in which the sieve is stationary, but the water kept in motion. This contrivance was invented by Mr. Thomas Petherick, late manager of the Fowey Consols Mines in Cornwall, where it has for several years been in successful operation. The ores of the precious metals require also a peculiar treatment, being generally in a state of minute subdivision, and mixed up with a vast mass of earthy matter. Gold ores are usually stamped, and silver ores ground to an exceedingly fine powder; but from the great value of the metals, the process of washing is carried on differently from that of others, and, in some cases, is dispensed with altogether.

Management and Internal Economy of Mines.—Having now taken a general view of mining operations, and the auxiliary processes which they require, there is still an important branch of the subject which requires some notice, the management and internal economy of mines. As it is on the due regulation of this point that the success of mines in a very great degree depends, it has, both in this and other countries, received great attention, and been reduced to a system as perfect as possible. In England, more especially, all the practical improvements suggested by experience as essential to the profitable and well-regulated existence of large mining establishments have been freely adopted, as we are here unfettered by those formalities and restraints which influence the continental systems, individual interest being allowed a full and unlimited scope. The nature and importance of the subject now under consideration cannot be better expressed than in the words of a gentleman of the highest eminence as a mining-engineer, Mr. John Taylor, who has thus treated it, in connection with late mechanical improvements in the art of mining:—

'Important as the improvements are which we have contemplated in the instruments which the progress of physical science has placed in our hands, those which relate to the government of large bodies of workmen, to the inducement to active enterprise on the part of the labouring miners, to the removal of difficulties in their way, or of placing them in circumstances most favourable to effective exertion, are even more important, and to this may be added the judicious application of those very inventions which have been noticed. It must be recollected that, after all, the great expenditure in mining is for manual labour, and that we have no means as yet devised for penetrating the rocks which contain mineral treasures but those afforded by the patient and unremitting labour of a great number of men. The regulation therefore of this force, and its due application, is, after all, more important to the success of mines than even the most ingenious mechanical expedients. As an army would undoubtedly fail, however well provided with the most perfect artillery and all the best constructed implements of war, unless the men of which it might be composed were well directed, their efforts well combined, and their courage well assured by reasonable prospects of success, so in mining we may collect and apply the most complete mechanical arrangements; but if the greater power of manual labour be not wisely directed, no beneficial results can be expected.'

System of Tutwork and Tribute.—Such being the leading features of mining economy, we may proceed briefly to consider the manner in which they are practically carried into effect, more especially in the deep and extensive mines of Cornwall, where, both from the amount of capital and the number of men employed, every exertion has been made to perfect the mining system, the results of which have since been extended from thence to other parts of England. All the underground work of mines in Cornwall, and indeed of most other districts, is of two distinct kinds: dead work, or that carried on in the rock or metalliferous deposit, for the purpose of trial and discovery; and productive labour, which is employed in the actual breaking down and extraction of the ore. Now it is in the performance of the immense amount of manual labour requisite in these operations, and in the subsequent process of dressing the ores, that the great expenditure of mining consists; and the great merit of the Cornish plan lies in performing the whole by a system of contracts, which effectually unite for a time the interests of the miner and his employer, while, being renewed at moderate intervals, it continually allows of that re-adjustment which the fluctuating circumstances of the mine may require. The dead work is denominated 'tutwork,' and the raising of ores 'tribute;' these two species of employment being, by an excellent division of labour common in all mines, kept entirely separate and performed by different individuals, who thus acquire great skill and judgment in their peculiar occupations. The mode of payment adopted in tutwork and tribute is entirely different: in the former case, where the miner is employed in sinking shafts, driving levels, &c., the object being to extract as much useful labour as possible from him for a given sum, he is paid at so much per fathom, according to the work done; in the latter case, where the quality of the ore raised is a consideration equally important with its quantity, the miner receives a certain percentage on the actual value, being paid at the rate of so many shillings in the pound upon that value. The excellence of the above principle will readily be seen; and its advantages are still further increased by the open and public manner in which the contracts are made between the men and their employers, thus allowing of free competition as regards the former, and proving an equally effective check against oppression from the latter.

The usual period for making new arrangements with the men is at the end of every two months, when, all previous bargains having expired, both parties are again perfectly free to regulate their contracts. Previously, then, to this day, every part of the mine is visited and inspected by the underground agents, who afterwards consult together, and determine their plan of operations for the next two months, registering in detail the work to be performed, and what they consider as a fair price to be paid for each separate item. On the day appointed for the 'setting' or 'survey,' as it is termed, the men who usually work in the mine, together with others who may wish for employment there, assemble round the mine-office, upon a small covered platform, in front of which the agents, at the appointed time, make their appearance with a book in which their previous examination has been registered. Every piece of work to be performed in the mine is then called out in succession, and accurately defined, and the men make at the time a proposition for working it on certain terms. The price thus offered is, in the first place, usually more than would be fair, or than the men themselves expect to get; consequently, the moment a price has been named, another offer will be made somewhat lower, and so on till fair terms have been proposed, when the competition (except in rare cases) will cease, and the work or 'bargain' is considered as taken by the last and lowest bidder, whose name is immediately registered opposite to its description in the setting-book. As each piece of work will require the labour not of one individual but of many, the transaction is still further simplified by the bargain being taken and the contract made with one person only, each gang of men accustomed to work together always selecting one of their number to represent and act for them on these occasions. It is evidently desirable that there should be some plan for binding the men to their engagements, so that they should not be capriciously given up previous to the expiration of the term; and this is the more necessary, as, owing to the frequent fluctuations of richness or of hardness incident to the vein or to the rock in which they may be working, they may find themselves unable to realise the amount of wages which they had anticipated: sometimes indeed the change may be so great, that it is not worth their while to go on with it at all. To meet these contingencies there is in most large mines a printed set of regulations, to which all the miners working there must subscribe; and by which fines are established for the non-fulfilment of contracts, sufficiently heavy to prevent them from being given up while any fair probability exists of their being completed at any reasonable rate of remuneration. In this manner the exertions of the working miner are called into action, and prompted to surmount many of the minor obstacles and fluctuations which often baffle his calculations. Although it may appear harsh to exact a fine when a losing piece of work is given up, it must be remembered that, on the other hand, the vein will often improve in quality instead of deteriorating; and in that case the miner will be greatly benefited, as his labour will be employed upon rich ores at the same high rate of payment that was bargained for poorer ones; and from this favourable change he may benefit as much as the exertions of himself and his co-partners will allow, till the fixed time for the renewal of the contracts again comes round. The set of regulations before alluded to prescribe such other rules and fines as are found necessary for the proper management and conduct of the men; and by means of this simple code, the results of mutual and acknowledged interests, it is found in practice that the necessary discipline can be kept up over the large bodies of men employed in our most extensive mines.

Superintendence.—The mode of superintendence by which the foregoing system is kept in due check is very simple: the principle of self-interest which pervades the whole renders unnecessary much of that minute control which would otherwise be needed. The business of a mine naturally divides itself into several departments—the underground operations, the pit-work and machinery, the dressing and surface-work, accounts and financial matters, and lastly, the general control. For each of these departments proper agents or superintendents are appointed, all being subordinate to a general manager, who communicates and advises with the whole body of the shareholders or 'adventurers' at stated periods, or more commonly only with a select committee chosen by them, the whole body meeting but once a year. It may be observed that the agents of a mine are usually chosen from the most intelligent working-miners, who are peculiarly well qualified by their thorough practical knowledge both to form a sound judgment upon the state of the works, and to keep a check upon any frauds which might be attempted by the men, while this selection affords a powerful stimulus to good conduct among them, since it may be attended with such advancement. The general control of extensive mines is of course confided to men of superior education and ability, by whom scientific attainments are brought to the aid of the practical knowledge which superintends the inferior departments.

Education and Qualifications of Miners.—We may conclude this article by a few remarks on the education and qualifications of miners, and upon those institutions which have lately been established with a view to improvement in this respect. The business of the miner is essentially a practical one, and can only be acquired in the recesses of the mine, and amidst the busy operations carried on upon its surface. Though this obvious truth must be admitted to its full extent, it is impossible not to see that the results of science must, though unconsciously to the miner, be needed at every step. In the most costly, the most anxious, and at the same time the most precarious of all mining processes, the exploration of the ground for purposes of discovery and trial, geology may be made of the highest value: in understanding the nature and value of the heterogeneous mineral bodies presented to our view in underground works, chemistry d mineralogy are essential, and it is entirely upon the former science that the whole art of metallurgy is established. Again, we have seen that machinery and mechanical contrivance are necessary at every step of the miner's progress, a circumstance which renders a knowledge of mechanics indispensable; and in pursuing the complicated operations of underground discovery, loss and error can only be avoided by the aid of geometry and subterranean surveying.

Thus then we may perceive that, in addition to practical knowledge in mining, there is a wide scope for the application of scientific knowledge also; in fact it is continually in requisition, not merely in the general arrangements, but in the details also, and ought therefore to be possessed, to a certain extent, by the mining classes. Among those nations of Europe by which mining is most successfully cultivated, the value and necessity of scientific knowledge among miners have long been perceived, and ample provisions have been made for its attainment, as may be seen in the mining-schools of France and Germany. Although Great Britain possesses the richest and most productive mines in the world, it is a singular fact that, till within the last two or three years, nothing has been done in this country to provide the means of instruction for those who are designed for the profession of mining. Thus both the working miner and the mine agent have, in this country, no knowledge whatever of the principles on which the success of their operations depends, but proceed entirely upon the practical skill which they may have been able to acquire in the course of their experience. It is true that, notwithstanding this disadvantage, the English miner has accomplished the most difficult undertakings, has conducted mines on the most extensive scale, and has met with most successful results; yet, when we consider the increasing depth of our mines, and the competition to which we are now exposed from foreign countries, it will be obvious that this defect should at length be removed, and that the English miner should add to his acknowledged and invaluable practical skill all the benefits and resources to be attained from scientific knowledge.

Mining Schools.—When treating of the history of mining at the beginning of this article, the establishment of several institutions for the attainment of those acquirements which are needed in the professions of civil engineering and mining was noticed as forming the most recent event connected with the subject, and in a few years' time the benefits thus derived will no doubt be strikingly apparent. The mining-school of Cornwall recently placed in operation by Sir Charles Lemon, will supply able miners well instructed in all that relates to the working of our tin, copper, and lead mines; while the university of Durham will produce mining engineers whose qualifications will have a more especial reference to the working of coal and other minerals which occur in the stratified rocks of the north of England. Thus by introducing a system of sound mining education, and by the continual progress of science, aided by the efforts which are now being made by government to supply desiderata which have long been required by the mining interest, we may hope still to maintain our mines in a flourishing condition, notwithstanding their depth, their heavy expenditure, and the increasing competition of other countries.

MINING, COAL. Although it would be impracticable to enter upon the various modifications of mining processes which are required in the working of all the varied natural depositaries of mineral wealth, the peculiarities of coal-mining are such as to require a brief notice, important and extensive as are the coal-mines of this country, and the arts and manufactures supported by them.

The nature and distribution of our carboniferous deposits have been already fully described in the article COAL-FIELDS. In working mines of coal, or indeed of ironstone or rock-salt, and other minerals which are found in beds, the object to be attained is the effectual opening and extraction of a tolerably uniform mass of small thickness, but of great horizontal extension. The process thus differs considerably from the working of mineral veins, where the object of research is fluctuating and irregular in its produce, and either vertical or highly inclined in its position. The thickness of beds of coal may be said generally to vary from three or four to eight or nine feet, although sometimes, when several seams come together without any intervening layers of rock, they may expand to twenty or thirty feet, of which we have an example in the 'ten-yard coal' of Staffordshire. In every coal-field there are many seams of coal at greater or less intervals, one below another, of which as many as three or four are frequently worked in the same mine; and interstratified with the rock which divides them there are in many coal-fields extremely productive beds of ironstone, which are wrought at the same time, and in a similar manner with the coal.

The mode of working coal-mines will be most clearly understood by tracing the works from their commencement, in the same manner as in the former article. From the geological indications of coal and the known extension of its beds over very considerable areas, it is pretty certain to be found in the trials which are made for it, if carried on with proper judgment. The probable existence of beds of coal in depth having been ascertained, and perhaps the beds themselves discovered by boring, the first process is to sink a perpendicular shaft from the surface so as to intersect the various strata containing the coal, and of course as many of the beds of coal as are considered to be worth working. The shaft is generally circular, and may vary according to circumstances from six or seven to eight or ten feet in diameter; the upper portion, as far down as the solid rock, is either bricked or walled, and where the ground is weak this casing may be continued throughout. On reaching the first workable seam of coal, the sinking of the pit is for a time suspended, and a broad straight passage termed a 'bord' or 'gate' is driven from it upon the seam of coal in opposite directions. The breadth of this passage is usually twelve or fourteen feet, and it is formed the whole height of the seam of coal, so as to expose the stratum above, which is called the 'roof,' and the one below, which is termed the 'thill,' and its direction is always arranged so as to follow the cleavage of the coal which forms its sides, which thus presents a clean uniform surface. When the bord or 'mother-gate' has proceeded some distance on both sides of the pit, narrow passages, termed 'headways,' are driven from it at regular intervals, and exactly at right angles; and when these have proceeded eight or ten yards, they are made to communicate with another bord, which is opened parallel to the first and on each side of it. It will be seen that by continuing this system of excavation the bed of coal will be entirely laid open and intersected by a series of broad parallel passages or bords about eight yards apart, communicating with each other by narrower passages or 'headways,' which cross them at right angles, and likewise traverse the whole extent of the mines; immense square or rectangular pillars of coal being left standing between the two. A coal-mine in this state is not in fact unlike a regularly-built town; the bords and headways may be compared to the principal streets and the narrower streets which cross them; while the pillars of coal may be said to resemble the intermediate masses of buildings.

The water encountered in the above operations is drawn to the surface by a powerful steam-engine erected on the shaft, which is so arranged as also to raise the coal and rubbish, for which purpose either 'corves' or baskets are commonly employed. Supposing the above operations to have been successful as regards the prospects of the mine, another shaft will now be commenced at some distance from the first, and when the communication between them has been effected, the one being made downcast and the other upcast, the air is conducted from the latter to the former through all the bords and workings, which it must traverse in succession in consequence of 'stoppings' or doors which are fixed in various places to obstruct its progress and give a proper direction to the current passing to the upcast shaft. Till such communication can be formed, the first shaft may be divided by a 'brattice' or partition, and be made to answer the purposes of both; some few coal-mines are indeed worked entirely in this manner, but the danger of explosion is considerable when the workings become extensive.

While the workings on the first seam of coal are thus going on, the shaft may be sunk to a second or third seam, where similar operations will be commenced, small underground pits or 'staples' being sunk at intervals from the workings on the upper seam to those on the seam below, by which ventilation will be promoted. These operations, like those described in the former article, may be carried on indefinitely, and will thus in time form an extensive colliery. The regularity and uniformity of the workings however are greatly modified by the occurrence of faults and other local accidents, and the pillars themselves are finally removed to such an extent as to cause subsidences of the roof and undulations of the floor, which present a most frightful appearance to the stranger.

The mode in which the pitman carries his excavation upon the coal is by cutting a narrow fissure in the seam on each side of the bord, and undermining the coal between, finally detaching the great cubical mass thus circumscribed by putting in two or three shots, which are simultaneously fired at the top of the seam. From 60 to 80 or 100 tons of coal may thus be brought down at once, when it is put into corves drawn along a tram-road to the shaft, and thence raised by a steam-engine to the surface, where it is often passed over gratings or 'screens' in order to separate the small pulverized coal from the larger masses, which in coal countries are alone valuable.

In mines which are not endangered by explosive gases or 'fire damp,' the coal-miner or 'pitman' is guided in his operations by the usual subterranean light—a small candle stuck into a piece of moist clay; but where the fire-damp is apprehended the safety-lamp is used, which has long superseded the primitive contrivance of the steel-mill, the light of which was produced by the contact of a flint with the edge of a wheel kept in rapid motion. Notwithstanding the use of the Davy lamp, and the improvements which have taken place in ventilation, accidents from explosion are unfortunately still of frequent occurrence, although perhaps in most cases they may be traceable to some neglect or imprudence on the part of the men themselves.

MI'NIUM. [Lead, vol. xiii., p. 370.]

MINK, a name for the Vison-weasel, *Mustela* (*Putorius*) *Vison*. [Weasels.]

MINNISINGERS. [Germany—*Language and Literature*.]

MINNOW. [Leuciscus.]

MINOR, (Latin) *Less*, or *Lesser*, is a term used to distinguish the mode or key that takes a minor 3rd. It is also applied to all the diatonic intervals, but chiefly to the 3rd. The minor 3rd comprises a tone and a semitone—A, C: the major 3rd is composed of two whole tones—C, E. [Key; Mode.]

MINORCA. [Menorca.]

MINOS, in history, appears as the lawgiver of Crete. Those critics who consider all the personages of mythological history as little more than names to which is attached the history of social development, would view Minos simply as the concentration of that spirit of order which about his time began to exhibit in the island of Crete the forms of a regular polity. But we are not to consider, because there is much undoubtedly mythological about the history of Minos, that therefore he never existed. The concurrent testimony of Thucydides and Aristotle shows it to have been the general belief in their times, that Minos was the first among the Greeks who possessed any amount of naval power. According to the latter author, he conquered and colonised several islands, and at last perished in an expedition against Sicily.

In the second book of the 'Politics,' Aristotle draws a parallel between the Cretan and Spartan institutions, and he there ascribes the establishment of the Cretan laws to Minos. This comparison, aided probably by the connection which existed between Crete and Sparta, owing to colonies, as early as the time of Homer, has no doubt suggested the theory invented and supported by Müller, that Minos was a Doric prince; a theory, as Mr. Thirlwall asserts, utterly unknown to the antients. The subject is ably discussed in the *History of Greece*, i. 135.

Some post-Homeric authorities make Minos a judge in Hades in company with Æacus, Rhadamanthus being chief judge. In this character he appears in a short Platonic dialogue called 'Minos,' or 'on law,' which however some critics consider spurious.

Minos is a son of Jupiter; this being the usual method taken by the mythographers to express a person so antient that they could put him on a level with no mere mortal; and from Jupiter, as his father, he learns these laws which he afterwards delivers to men.

Minos is chiefly remarkable as belonging to a period when history and mythology interlace, and as uniting in his own person the chief characteristics of both. He is a son of Jupiter and yet the first possessor of a navy; a judge in Hades, but not the less for that a king of Crete. It is very curious, that Crete, so famous at this age, both for its naval power and for being the birth-place of the Olympian gods, should never afterwards have attained anything like that celebrity which its position seemed to promise. Its office seems to have been that of leading the way in naval supremacy. Too insulated for power of a durable nature, it was lost in the confederate or opposing glories of Athens and Sparta; but while they were yet in their infancy, its insular form (together perhaps with some Asiatic refinement) gave it that concentrated energy which in an early age is irresistible.

(Homer, *Il.*, ii. 65; xiii. 450; xiv. 321; *Odyssey*, xix. 175; Thucydides, i., c. 3; Plato, *Laws*, b. i. and ii., and 'Minos;' Aristotle, *Politic*, b. ii. and vii; *Philological Museum*, 'On the Names of some of the Ante-Hellenic Inhabitants of Greece.')

MINOTAUR, son of Pasiphaë, wife of Minos, by a bull. He lived on man's flesh, for which reason Minos put him in the labyrinth of Dædalus, feeding him with criminals, and afterwards with the youths and maidens sent from Athens. Theseus, by help of Ariadne, killed him, thereby delivering the Athenians from the obligation of sending their children to be eaten. Such is the mythological story. Its meaning is uncertain. It very likely belongs to that class of mythological tales which express a political fact, and the connection in which Theseus stands with the Minotaur adds probability to this theory, for the exploits of Theseus are generally such effects as would be produced in historical times by the course of events in the formation of a polity. Such at least are his exploits in and about Attica, and there appears no sound reason to exclude this from the number. It may then perhaps be assumed that under the slaying of the Minotaur is shadowed forth the abolition of certain obstacles existing in the way of free intercourse between Athens and Crete. But the descent of the Minotaur from Pasiphaë (Πασιφάη), probably a name of the moon, and the Bull, one of the zodiacal signs, may perhaps imply some astronomical fact connected with the recurrence of the tribute paid to Crete. The affection of Ariadne for Theseus, in mythological language, may be taken to mean a union of Cretan and Attic tribes. It should be observed that Schwenk, in a very fanciful but ingenious treatise on mythology, considers the first two syllables of the word Minotaur to be identical with *meis* or 'mēn' (μείς or μὴν μηνός), the German *mond*, and the English *moon*, so that we get the two parents of the Minotaur in the two parts of its name. This might lead us to believe that the name suggested the genealogy, and that the last syllable referred not to a bull's being the father of the Minotaur, but to the fact that horns were a symbol of the moon-goddess, which may be either Hera, Juno (as Io), or Artemis. In that case, as the slaying of Marsyas by Apollo undoubtedly means the replacing of a worship of which Marsyas was the type, by that of Apollo and Artemis; so the slaying of the Minotaur by Theseus might mean the introduction of the Attic worship, in place of the previously prevalent Dorian form. (Hoeck, *Kreta;* Schwenk, *Mythologische Andeutungen*, p. 65.)

MINSK, a government of European Russia, in the division called West Russia (formerly Lithuania), lies between 51° 12′ and 55° 50′ N. lat. and 25° 18′ and 30° 50′ E. long. It is bounded on the north by Witepsk, on the east by Mohilew, on the south-east by Tschernigow, on the south by Kiew and Wolhynia, on the west by Grodno, and on the north-west by Wilna. Its area is about 37,000 square miles, and the population 1,205,000. This government is divided into ten circles. The face of the country is one vast plain, broken only here and there by a hill or the high banks of the rivers. In the north and east there are large forests, and on the south and south-west extensive marshes. There is a great diversity of soil; in the north it is dry, and in some parts extremely fertile, but traversed by heaths and barren sandy tracts. In the south it is generally wet and marshy, yet it contains large tracts which are very fertile; the marshes also are rendered productive with little labour, and even the heaths yield to the efforts of cultivation.

The principal rivers are the Düna and the Dnieper, both of which however only touch the frontier; the former flows for a short space between this province and Wilna, and the latter on the south-east divides it from Tschernigow. Among the rivers that flow into the Düna are the Desna, which comes from Wilna, and joins it at the town of the same name, and the Ulla, which feeds the Beresina canal, which unites the Beresina, the Düna, and the Dnieper The Dnieper receives from this province two of its most important tributaries, the Pripes, which comes from Grodno, and the Beresina, which rises in the circle of Desna, and having received several minor streams falls into the Dnieper on the frontier of this province. In the fatal retreat of the French army from Russia in 1812, it sustained great loss on the banks of this river. There are many other rivers of less note. The province has no great lakes.

The climate is not very different from that of White Russia. The cold in winter is so severe that the rivers are every year frozen over for some time; in spring there are frequently hard frosts at night; the summer is hot, and drier in the north than in the south; in autumn the weather is agreeable and not variable, but the night frosts return in September, and winter begins at the end of October. On the whole the climate is healthy, but more so in the north than in the south. The plica Polonica is more common than in Lithuania and White Russia.

Agriculture is the chief occupation of the inhabitants, and might raise them to a considerable degree of prosperity if they applied themselves properly to it; but Minsk is one of the most backward of all the provinces in the empire with respect to its agriculture. The fields are ill cultivated, the agricultural implements wretched, and the cattle miserable. The circles of Pinsk and Mozyr are real deserts. The grain generally cultivated is rye, but the peasants grow also some barley and oats, and the nobles and great landowners grow some wheat. Buckwheat is grown on the heaths. The only other agricultural products are flax and hemp, both of excellent quality, which furnish linseed and tow for exportation. Kitchen vegetables and fruit are very little cultivated, except in the gardens of the nobles. There are extensive forests of fine trees, especially fir, which supplies good timber for building, planks, and masts, and yields likewise much resin, pitch, and potash. All kinds of game abound in the forests, which contain deer, wolves, bears, lynxes, foxes, beavers, otters, gluttons, ermines, martens, and wild boars. The horses are of the Polish breed, and are very spirited and hardy, but neither handsome nor large. Some of the nobles have studs of a superior breed. The urus, wild bull, or buffalo (the *aurochs*), is sometimes met with in the deepest recesses of the forests. The breed of cattle in the neighbourhood of the towns and on the estates of the nobility is better attended to than agriculture. Sheep are numerous in the northern part, and the great landowners have much improved the breed. The peasants have only sheep of the ordinary breed, and in the south very few, because the food in the marshes does not agree with the sheep. Goats, swine, and bees are kept everywhere. Though the rivers are so numerous, and many of them abound in fish, they do not supply sufficient for the consumption of the province, and great quantities of fish are brought from the interior of Russia and from the Baltic. Polish cochineal is collected, especially in the south, in great quantities, and manna is found in all the fields and meadows. The minerals are lime, marl, and stone for building, but there is no metal except bog-iron.

The domestic industry of the country-people consists in spinning and weaving flax, hemp, and wool, of which they make linen, sail-cloth, and coarse woollen cloth for the peasantry, but their dwellings are so small that they have scarcely room for a loom. They distil brandy enough for their own consumption. The manufactories are very few in number, and inconsiderable. The chief articles of exportation are square timber for ship-building, masts, spars, planks, pipe-staves, and potash; besides flax, hemp, linseed, corn, honey, wax, cochineal, and cattle. The inhabitants are of various races:—1, Little Russians (or Russniaks), who are the great majority, and speak a dialect composed of Russian and Polish. 2, Lithuanians, in the northern circles, who have their own dialect. 3, Poles, consisting only of petty nobles, above 26,000, and a few citizens, with a dialect of their own. 4, Tartars, probably near 50,000, who speak their own language, and remain faithful to Islamism. 5, Armenians and Greeks in the towns. 6, Great Russians and German colonists, in small numbers. 7, Jews, fewer in proportion than in the rest of Poland. 8, Some families of gypsies. The greater part of the inhabitants are of the Greek church; but the Catholics are very numerous; and there are some Protestants. The Tartars have their mosques, and the Jews synagogues. This is one of the most miserable of the former Polish provinces; the towns and villages are in general wretched, chiefly occupied by Jews, who are almost exclusively the shopkeepers, publicans, distillers, and even butchers. The petty nobility are scarcely above the peasants, of whom only the Tartars are reckoned free, while the Russniaks, Lithuanians, and gypsies are in the most degraded state of vassalage, which is greatly aggravated by the non-residence of the great landowners.

Minsk, the chief town, in 53° 40′ N. lat. and 27° 40′ E. long., is situated on the river Swistocz, one of the tributaries of the Beresina. Like all old Polish towns it is irregularly built, with narrow crooked streets. It has a fine cathedral, a handsome theatre, a gymnasium, an abbey of the Greek church, and is the seat of a Greek archbishop, a Roman Catholic bishop, as well as of the government of the province. There is some trade, and a much frequented fair. With regard to the number of inhabitants, a great increase would seem to have taken place in a few years, for it is stated by Stein, in 1820, at 1900; by Hassel, 1820, at 3000; but by Cannabich, 1836, Hörschelmann, 1833, and others of equally recent dates, at 20,000.

The other principal towns are, Bonrissow, on the Beresina, with 3000 inhabitants; Sluzk, with 5000 inhabitants; Daurdow, on the Horyn, with 3500 inhabitants; Neschwitsch, on the Uscha, with 3500 inhabitants; and Pinsk, which is surrounded with immense marshes, and has considerable manufactories of Russia leather, with 4500 inhabitants. Bobruisk, on the Beresina, now one of the strongest fortresses in the Russian empire, has 4700 inhabitants.

MINSTREL, from the French *menestral*, and that, in all probability, from *Ministrellus*, a diminutive of the Latin *minister*, as a term applied to a class of persons who were to administer by their skill to the amusement of their patrons. 'The minstrels,' observes Percy, 'were an order of men in the middle ages who subsisted by the arts of poetry and music, and sang to the harp verses composed by themselves or others.' They also appear to have accompanied their songs with mimicry and action, and to have practised such various means of diverting as were much admired in those rude times, and supplied the want of more refined entertainment. These arts rendered them extremely popular and acceptable in England and all the neighbouring countries, where no high scene of festivity was considered complete that was not set off with the exercise of their talents; and where, so long as the spirit of chivalry subsisted, they were protected and caressed, because their songs tended to do honour to the ruling passion of the times and to encourage a martial spirit.

The minstrels seem to have been the genuine successors of the antient bards, who, under different names, were admired and revered, from the earliest ages, among the people of Gaul, Britain, Ireland, and the north, and indeed by almost all the first inhabitants of Europe, whether of Celtic or of Gothic race; but by none more than by our own Teutonic ancestors, particularly by the Danish tribes. Among these they were distinguished by the name of Scalds, a word which denotes 'smoothers and polishers of language.' In short, poets and their art were held among them in that rude admiration which is ever shown by an ignorant people to such as excel them in intellectual accomplishment.

As these honours were paid to poetry and song, from the earliest times, in those countries which our Anglo-Saxon ancestors inhabited before their removal into Britain, Bishop Percy reasonably concludes that they would not lay aside all their regard for men of this sort immediately on quitting their German forests; at least so long as they retained their antient manners and opinions they would still hold them in high estimation. But as the Saxons, soon after their establishment in this island, were converted to Christianity, in proportion as literature prevailed among them, this rude admiration would begin to abate, and poetry would be no longer a peculiar profession. Thus the poet and the minstrel early became two persons in this island. Poetry was cultivated by men of letters indiscriminately; and many of the most popular rhymes were composed amidst the leisure and retirement of monasteries. But the minstrels continued a distinct order of men for many ages after the Conquest, and got their livelihood by singing verses to the harp at the houses of the great.

This derivation of the minstrels from the Scalds and Gleemen of the north rests on fair historical testimony; and the reader will not fail to call to mind the incidents recorded of several Saxon and Danish princes, who assumed the disguise of Gleemen, and chanted to the harp when exploring a hostile camp.

The name of minstrel is however Norman. 'It is well known,' says Percy, 'that on the Continent, whence our Norman nobles came, the bard who composed, the harper who played and sang, and even the dancer and mimic, were all considered as of one community, and were even all included under the common name of minstrels:' hence we may add their Latin names of *Mimi*, *Scurræ*, *Histriones*, *Joculatores*, &c.

Joculator Regis is an officer holding no less than three vills in the return of the Domesday Survey for Gloucestershire; and in the same survey, in Surrey, we have a *Joculatrix*. Wace, Gaimar, and our own historians William of Malmesbury and Huntingdon, all concur in the statement that a warrior-minstrel of the name of Taillefer rode before the conqueror's army previous to the battle of Hastings, flinging up and catching his sword in defiance, and singing the song of Roland.

To trace the existence of the minstrel profession minutely through the reigns immediately subsequent to the Conquest seems unnecessary. Rahere, the founder of St. Bartholomew's Priory in Smithfield, is recorded as the '*mimus Regis Henrici I.*;' nor can we forget the cruel punishment inflicted on Lucas de Barre by that king, for exercising the minstrel art to his disadvantage.

If king Henry II. was not an encourager of minstrels, his son Richard was himself of their number. The story of Blondel de Nesle, who went in search of Richard in his captivity, needs hardly to be repeated here. It is not so apocryphal as many have supposed. He came to a castle in which he heard that a person of importance was confined; his privileged character gave him a near access to the fortress, and he began a song which he and Richard had composed together. When Richard heard the song, he knew it was Blondel that sang it; and when Blondel paused at the end of the first stanza, the king began the other, and completed the song.

The minstrels, it appears, were no less patronised by Richard than by the favourites and chief officers of his court. Tyrwhit, in his 'Essay on the Language and Versification of Chaucer' (*Cant. Tales*, 4to. ed., vol. i., p. 39), shows from Hoveden that William bishop of Ely, Richard's chancellor, is expressly mentioned to have invited singers and minstrels from France, whom he loaded with rewards; and they, in return, celebrated him as the most accomplished person in the world.

Walter de Hemingford relates an anecdote of the fidelity of a minstrel who, in 1272, rushed into the tent of Edward I., at that time only prince, while on his expedition to the Holy Land, to rescue his master from a Saracen assassin.

In Rymer's 'Fœdera' (old ed., tom. iii., p. 978) we find king Edward II., in the sixteenth year of his reign, rewarding his minstrel William de Morle, called 'Roi de North,' with certain houses in the vill of Pontefract, which had lately belonged to John de Boteler, called 'Roi Brunard' (probably another minstrel), the king's enemy.

The instances of regard shown to minstrels in subsequent reigns are abundantly numerous. When Henry V. was preparing his great voyage to France in 1415, eighteen minstrels accompanied him, with an allowance of 12*d.* a day each (Rym., *Fœd.*, tom. ix., pp. 255, 260); and in the 34th Henry VI., A.D. 1456, an ordinance occurs for the impressment of youths to supply vacancies by death among the king's minstrels, 'ad quosdam pueros, membris naturalibus elegantes, in arte ministrellatus instructos, ubicunque inveniri poterint, tam infra libertates quam extra capiendum, et in servitio nostro ad vadia nostra ponendum.' (*Ibid.*, tom. xi., p. 375.)

Warton, in his 'History of English Poetry,' vol. ii., p. 105, has cited several instances of the high pay to minstrels at this period:—'During many of the years of the reign of Henry VI.,' he says, 'particularly in the year 1430, at the annual feast of the fraternity of the Holy Cross at Abingdon, a town in Berkshire, twelve priests each received fourpence for singing a dirge; and the same number of minstrels were rewarded each with two shillings and fourpence, beside diet and horse-meat. Some of these minstrels came only from Maydenhithe or Maidenhead, a town at no great distance, in the same county. In the year 1441 eight priests were hired from Coventry, to assist in celebrating a yearly obit in the church of the neighbouring priory of Maxtoke; as were six minstrels called *mimi*, belonging to the family of Lord Clinton, who lived in the adjoining castle of Maxstoke, to sing, harp, and play in the hall of the monastery, during the extraordinary refection allowed to the monks on that anniversary. Two shillings were given to the priests, and four to the minstrels; and the latter are said to have supped *in camera picta*, or the painted chamber of the convent, with the sub-prior; on which occasion the chamberlain furnished eight massy tapers of wax.'

In the reign of Edward IV. a sergeant of the king's minstrels occurs, and in a manner which shows the confidential character of this officer, and his facility of access to the king at all hours and on all occasions. Hearne has printed the passage relating to him in a fragment concerning the ninth year of Edward IV. at the end of Sprott's 'Chronicle':—'And as he' (the king) 'was in the north contray, in the moneth of Septembre, as he lay in his bedde, one namid Alexander Carlisle, that was *sarjaunt of the mynstrallis*, came to him in grete haste, and bade him aryse, for he hadde enemys comming.'

From this period however the real character of the original minstrel was becoming rapidly extinguished, and even the name seems to have been gradually appropriated to the musician only. At queen Elizabeth's magnificent entertainment by Leicester, at Kenilworth Castle, in 1575, it is true a personage was introduced to amuse the queen, in the attire of an antient minstrel, who called himself 'a squire minstrel of Middlesex;' but this was, no doubt, a part of the masquerade: it was the representation of a former day, not one of an existing profession. Laneham ('Princely Pleasures of Kenilworth,' Nichols's *Progresses of Queen Eliz.*, vol. i.) says:—'After three lowlie coursiez he cleered his vois with a hem and a reach, and spat out withal; wiped hiz lips with the hollo of his hand, for fyling his napkin, temper'd a string or too with hiz wreast, and, after a little warbling on his harp for a prelude, came foorth with a sollem song, warranted for stoory oout of king Arthurz acts.'

Before Elizabeth closed her reign the degradation of minstrelsy was completed. By a statute in her 39th year minstrels, together with jugglers, bear-wards, fencers, common players of interludes, tinkers, and pedlars, were at one sweep included among rogues, vagabonds, and sturdy beggars, and adjudged to be punished accordingly. Ritson quotes some satirical lines in allusion to this statute, written by a Dr. Bull:—

> 'When Jesus went to Jairus' house,
>   Whose daughter was about to dye,
> He turn'd the minstrels out of doors,
>   Among the rascal company:
> Beggars they are with one consent,
> And rogues by act of parliament.'

This act put an end to the genuine old minstrelsy as a profession; and the modern definition of minstrel is no more than 'a musician, a player upon some instrument.'

MINT, the place where money is coined, from the Anglo-Saxon mynet, and that in all probability adopted from the Latin *moneta*.

Of the manner in which the Britons conducted the coinage of their rude substitutes for money no notices can now be recovered. Few regulations indeed would be required where an equality of weight appears, from Cæsar's account, to have been the sole object in view.

If the Romans actually coined money in Britain, of which, we presume, there can be no doubt, their mints were probably superintended by the same officers as were employed in other parts of their dominions; but no documents have yet been produced in proof of it: nor is anything known respecting the mints of the British kings after the departure of the Romans.

On the early Anglo-Saxon coins are found, in addition to the names of the kings, those of other persons also upon the same piece, who are with great probability conjectured to have been the moneyers, because on later Anglo-Saxon money the names of those officers frequently occur, with the addition of their title of office. From the circumstance of their names being inscribed on the coins, it is reasonable to conclude that they were responsible for the integrity of the money; and likewise that they were the principal officers of the mint. The silence also of the Anglo-Saxon laws and of Domesday Book as to other officers of the mint, whilst they so frequently mention the moneyers, strongly corroborates the opinion that they were the only persons employed in the Anglo-Saxon and early Anglo-Norman mints, except perhaps occasional labourers. In the reign of Henry I. the money was so much debased as to call for exemplary punishment on the offenders, which is said to have been inflicted on moneyers only, without the least notice of any other officer. (*Sax. Chron.*, sub An. 1125.) This was also the case upon a similar occasion in the reign of Henry II. (*Chron. Joh. abb. S. Petri de Burgo*, Sparke, p. 78.)

In the Anglo-Saxon times an officer called the reeve seems also to have had some kind of connection with the mint, or some jurisdiction over it; for in the laws of Canute it is provided, that if any person accused of false coinage should plead that he did it by licence from the reeve, that officer should clear himself by the triple ordeal. If he failed to do this, he was to suffer the same punishment as the falsifier himself, which, in the same chapter of the law, is said to be the loss of that hand by which the crime was committed, without any redemption either by gold or silver. (*Leg. Anglo-Saxon.*, p. 134; *Ll. Cnuti*, § 8.)

After the Norman conquest the officers of the mint appear to have been, in some degree, under the authority of the court of Exchequer, as they were admitted to their respective offices in that court, and took the usual oath of office before the treasurer and barons.

Ruding observes that if the gerefa, or reeve, above mentioned was not the presiding officer of the Anglo-Saxon mints, he is unable to ascertain at what period it became necessary to place some permanent superintending authority in the mint to prevent any ill-practices of the moneyers; but he thinks it probable that such an officer was appointed between the 26 Henry II., when the moneyers alone were punished for the adulteration of the money, and the third year of Richard I., when Henry de Cornhill accounted for the profits of the cambium of all England, except Winchester. (Madox, *Hist. Excheq.*, vol. ii., p. 132.)

The mint however did not attain its full constitution of superior officers until the 18 Edward II., when a comptroller first appeared and delivered in his account, distinct from those of the warden and master, whose accounts also were distinct from each other. Thus they operated as mutual checks, and no fraud could be practised without the concurrence of all those three persons.

One of the principal offices, namely, that of cuneator, and probably others, descended by inheritance even in the female line, and the inheritor was sometimes allowed to sell it. See Ruding's account of this office in his 'Annals of the Coinage of Britain,' 8vo. edit., vol. i., pp. 109-114, where its descent is traced from the time of Domesday Book to the 4 Richard II.

In the Anglo-Saxon and the early Norman period there were many mints beside the king's, and some were continued to a much later time. Barons and bishops struck money, especially in King Stephen's reign, and in two or three instances the privilege of coining was granted to greater monasteries. Wolsey's exercise of this franchise, both as bishop of Durham and archbishop of York, is well known: and there are coins of the archbishops of Canterbury, distinctly marked as such, at intervals from Jaenberht, consecrated in 793, to the close of the reign of Henry VIII. Of the lay barons of Stephen's time, we have but one coin now extant, usually ascribed to Robert earl of Gloucester. Pegge's Dissertation on the Coins of the archbishops of Canterbury, Noble's on those of the bishops of Durham, and more particularly Ruding's enumeration of the places where Mints and Exchanges have been fixed in Britain and its dependencies, will supply the reader with the amplest information upon this subject.

From a very early time the moneyers seem to have enjoyed exclusive privileges. In the 33 Henry II. the moneyers of York were expressly exempted from the payment of the 'Donum' which was assessed upon the men of that city. (Madox, vol. i., p. 635.) In the 18 Henry III. the mayor, &c. of London were commanded not to infringe upon the liberties of the king's moneyers of London, by exacting from them tallages or other customs contrary to their privileges (Cl. 18 Henry III., m. 30); and before his 41st year those privileges appear to have been extended to the whole body of officers belonging to the mint; for at that time the bailiffs, &c. of Canterbury were ordered to appear in the Exchequer to receive judgment for having distrained upon the officers of that mint. (Madox, *Hist. Exch.*, vol. i., p. 748; Ruding, *Annals*, vol. iv., p. 273.)

The earliest grant of these privileges by charter was in the reign of Edward I., when the officers of the exchange and of the mint were (by the names of the keepers of the changes of the city of London and Canterbury, the labourers, or workers, money-makers, or coiners, and other ministers deputed or appointed unto those things which touch the office of the changes aforesaid) freed from all tallages, and were not to be put into any assizes, juries, or recognizance, and were to plead before the said keepers of the changes only, except in pleas appertaining unto freehold and the crown.

These privileges were granted to them so long as they should continue in the above-mentioned offices, and were confirmed by Edward II. in his second year, with this addition, that they were to be quit of all manner of aids and contributions, as well as tallages, and that if at any time they should, of their own proper will, grant any aid or contribution, such should be levied upon them by the keepers of the exchanges aforesaid, and that no other should intermeddle. The keepers themselves were in such case to be taxed by the barons of the Exchequer. Letters-patent to the same effect were issued by Edward III., Richard II., Edward IV., Henry VII., Henry VIII., Edward VI., and Philip and Mary.* All these are referred to in the charter of incorporation which was granted by Elizabeth in the first year of her reign, but those of Edward I. and Edward II. alone are given at length.

In that year Queen Elizabeth, at the humble suit of the keeper of the changes, the labourers, coiners, and ministers deputed or appointed to those things which touch the offices of the change, and in consideration of certain general words in the former grants which had occasioned them and their predecessors to be molested, inquieted, and vexed, and because they should be able more especially to apply themselves to the business of their office, was graciously pleased to grant and confirm to them the letters-patent and grants aforesaid; and to remove all the doubts and ambiguities to which the former grants were supposed to be liable, incorporated them by the name of the keeper of the changes, and the workmen, coiners, and other ministers deputed to the said office; to be from thenceforth one body perpetual and one commonalty perpetual, in deed and in name, and to have perpetual succession; to be of capacity in law to purchase lands, &c. by that name, and to hold to them and their successors for ever; to implead and to be impleaded; to answer and to be answered in all pleas, &c. in any court, and to have a common seal.

By this charter all the officers had privilege of not being put, against their will, in any assizes, juries, inquisitions, attaints, grand assizes, or recognizance whatsoever, even although they touched the crown. The workmen, coiners, and ministers were to stand right before the keeper of all manner of pleas, suits, actions, and plaints, touching themselves, pleas to freehold and specially pertaining to the crown excepted. None of the officers was to be made mayor, bailiff, collector, searcher, or assessor of the tenths, fifteenths, subsidies, tallages, or other impositions to be granted, or any part of them, or any other officer or minister of the crown, against his will. And all of them were to be quit and exonerate for ever, in the city of London, town of Calais, and all other cities and towns, from all and singular assizes, lones of and for wine, ale, beer, and all victuals whatsoever, to be made, and from all tallages, aids, gifts, contributions, fifteenths, tenths, scots, subsidies, and all other impositions to the queen, or to her progenitors late kings of England, granted or to be granted; and none of them to be distrained or molested in their lands, &c. for any of the premises, but to have due allowance and discharge of such tallages, &c. before the treasurer and barons of the Exchequer for ever; and no corn, hay, pigs, carts, oxen, poultry, or other merchandise, things, goods, victuals, and chattels of whatsoever kind, to be taken from them by any purveyor of the queen, or her heirs, any statute to the contrary notwithstanding. This charter bore date at Westminster on the 20th February, and there were subsequent confirmations of it in the second, third, fourth, and fifth years of her reign.

Ruding has cited various instances in which these privileges were intrenched upon: they were nevertheless confirmed by King James I. in the second year of his reign; by King Charles II. in his fourteenth year; and by the indenture which was in force in the year 1744, and which established the officers in their houses, places, &c., and in their charters and privileges.

These privileges they continue to enjoy to the present time. (Ruding, vol. i., p. 47.)

The following is the establishment of which the Mint at present consists:—

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* There were also confirmations in the 1 Henry IV., Pat., p. 5, m. 25; 1 Henry V., Pat., m. 28; 5 Henry VI., Pat., p. 1, m. 17; 18 Henry VI., Pat., p. 3, m. 25; 23 Henry VI., Mich. Commun. rot 1: Madox's MSS., No. 69, p. 94.

1. A Master and Worker, who is one of the queen's ministers.
2. The principal officers, forming a Board, viz. —
   - The Deputy Master,
   - Comptroller,
   - King's Assay Master,
   - King's Clerk, and the
   - Superintendent of Machinery and Dies.
3. Officers in the service, viz.:—
   - The Master Assayer,
   - Probationer Assayer,
   - Weigher and Teller,
   - Surveyor of Meltings,
   - Surveyor of Money-Presses,
   - Chief Engraver,
   - Second Engraver,
   - Medallist, and
   - Clerk Assistant and Deputy Master.

Besides these there are four clerks in the Mint-office, two porters, and two or three other inferior persons.

The Company of Moneyers receive a rate on the coinage, conditionally 40*l.* to each member when the coinage is under 500,000*l.*

Ruding has given some slight notices as to the wages of the officers of the mint from the records of early times. In the 35 Henry III. the warden's salary was two shillings a day. In the 33 Edward I. the porter of the mint and exchange received ninepence a-day, and the same in the 9 Edward II. and 23 Edward III. The warden's salary in the 23rd Edw. III. was, as before, two shillings a-day, at which time his clerk received ninepence and the keeper of the dies sixpence a-day. In the 25 and 31 Henry VI. it was two shillings and sixpence. In Henry VI.'s 32nd year the engraver had twenty pounds per annum. The person who held the offices of comptroller, exchanger, and assayer, in the 1 Edward IV., was to take the usual daily wages, amounting to 26*l.* 13*s.* 4*d.* per annum. In the second year of the same king the engravers' wages were, as before, twenty pounds per annum, and in his sixth year the salary of the warden's clerk was ninepence a-day. In the 10 Edward III. the workmen of the mint of London petitioned the king for an increase of their allowance for coinage, alleging that they were at that time at greater expense, and bestowed more labour in forming the moneys than had been usual in former times; so that they could not maintain and continue such expense and labour, unless their allowance was increased. The king, being willing to grant their petition, if just, commanded John de Wyndesore, warden of the mints of London and Canterbury, together with Lapine Rogers and others experienced in such matters, to inquire whether the allowance was sufficient, and if not, to determine what addition should be made; and they were ordered to make their report in Chancery, under their seals, without delay. A warrant was in consequence issued, and Lapine Rogers and Roger Pikeman, exchangers of London, and Stephen Boke, having been examined upon oath by the warden, the following report was made:—That, having inquired diligently respecting the necessary expenses occasioned by the waste arising from the whitening of the halfpennies and farthings, on account of the increase of the alloy, and from the hardening of the metal of the said coins in working and coining, they were of opinion that the work could not be carried on without an increase of threepence for each pound, at least, and with that the workmen ought reasonably to be contented. Then, whereas of old they received for all costs, colour, &c., for a pound of halfpennies sevenpence-halfpenny, and for a pound of farthings ninepence-halfpenny, they would receive for the former tenpence-halfpenny, and for the latter twelvepence-halfpenny: so that the master should have of increase twopence, and the workmen one penny.

Ruding (vol. i., p. 51-58) has given the tables of fees and wages for the several officers in the years 1584, 1599, 1649, 1689, 1739, 1743, and 1797.

A comparative statement of the salaries and allowances, contingent expenses, and rates of coinage, between the establishments of the French and English mints in 1836 will be found, p. 87-89 of the Appendix to the 'Report from the Select Committee of the House of Commons on the Royal Mint,' ordered to be printed 30th June, 1837.

In antient times extraordinary methods were resorted to in order to furnish the mint with workmen. Thus in the 31st Henry III., a writ was issued, authorising Reyner de Brussell to bring into England, from beyond the seas, persons skilled in the coinage and exchange of silver, to work in the kingdom at the King's charge. (Pat., 31 Hen. III., m. 3.) And in the 25th Edw. III., Henry de Brussell and John de Cicestra, masters of the mint, were appointed by letters-patent to choose and take as many goldsmiths, smiths, and other workmen in the city of London and other places, where it might seem expedient to them, as should be necessary for the works of the mint in the Tower of London; and to bring the said workmen to the said Tower, and to place them there to work at the wages allowed by the said masters. And any of them which should be rebellious in that case, to seize and arrest, and to detain in prison within the said Tower, and to keep in safe custody until the king should determine upon their punishment. These letters were directed to all sheriffs, &c., who were commanded to assist the said masters in carrying their provisions into execution. (Pat., 25 Edward III., p. 2, m. 13 dors.)

This power to take workmen, &c., for the service of the mint was not discontinued in the reign of Elizabeth. (*Indent. with Lorison*, 14 Elizabeth, in *Harl. MSS.*, Brit. Mus., 698.)

The custom of placing the moneyer's name upon the coins prevailed, as already observed, at a very early period in this island; indeed we find it upon the money of Ecghberht, king of Kent, which is the second in point of antiquity in the Anglo-Saxon series, and must be dated about the middle of the seventh century. It was usually stamped upon the reverse of the coin, but in some few instances it is found upon the obverse, whilst the name of the monarch is removed to the other side. The names of two moneyers sometimes occur upon the same coin. From the time of Aethelstan, with some few exceptions only, the name of the town was added, probably in conformity to his law that the money should be coined within some town. (Wilkins, *Leg. Anglo-Sax.*, p. 319.) The name of the moneyer is not found lower than the reign of Edward I., but that of the mint was not entirely disused in the last year of Queen Elizabeth.

Metal brought to the mint was assayed, reduced to standard, and then formed into money, by the instruments which at different periods have been invented for that purpose.

The mode of coinage in early times, at least in this country, as far as it can now be traced, was rude and inartificial; the sole expedient employed being to fix one die firmly in a wooden block, and to hold the other in the hand as a puncheon; when, by striking the latter forcibly, and repeatedly, with a hammer, the impression required was at length worked up.

This method appears to have been nearly coeval with the first invention of coined money; and it is a singular fact that no improvement of any importance was made in it, until the power of the screw was applied to coinage in the French mint about the middle of the sixteenth century. (Le Blanc, *Traité Hist. de Monnoyes de France*, p. 268.)

The new invention was not however admitted into our mint before the year 1561, when it was used together with the old method of coining by the hammer, until the latter was wholly laid aside in the 14th Charles II., A.D. 1662. From that time to the present, only very trivial improvements have been made, and the machine continues to be worked. It consists of a screw, to which the upper die is connected; this is worked by a fly, and forces that die which is attached to it with considerable force upon the other die, which is firmly fixed below. The advantage of this machine (known by the name of the mill and screw) over the old mode of striking with a hammer consists chiefly in the increase of force, which is so great as to raise the impression at one blow. The edges of the hammered money were left in a rude and unfinished state, which rendered them peculiarly liable to be diminished by clipping. After the mill was introduced, the coins began to assume a form nearly circular, which admitted of some addition to the impression, for the purpose of preserving the outward edge. This was first attempted by placing a graining so as to form a regular circle on the outside of the legend, quite to the edge of the coin. The earliest specimens of Elizabeth's milled money present instances of this invention. Afterwards, a legend was imprinted upon the edge of the larger pieces; but this, it is believed, did not take place until the year 1651, for the earliest instances of it which are known occur upon the coins made by Blondeau and Ramage, for the Commonwealth, of that date. This impression is given to the edge of the coin by passing it between two plates, one of which is fixed, and the other moveable by a pinion which works in teeth on the back edge of it. One half of the legend is engraved on each of these plates, so that when the coin has been carried by the moveable plate to the end of that which is fixed, it is then marked upon the whole of the edge. This machine was invented by M. Castaing, in 1685, and was introduced by him into the French mint. (Boizard, *Traité de Monnoyes*, tom i., p. 142.) Before this invention the letters were impressed upon the edge by including the blanks in a collar which contained the legend, and was of the same diameter as the piece, but of less thickness. The metal, thus placed, being struck with the die, expanded under it, and received the form of whatever was engraven on the inside of the collar, which opened with four joints in order to permit the coins to be taken out.

As it is scarcely practicable to impress a legend upon the rim of the smaller coins, a graining has been devised for the protection of their outer edge. This, which is generally known by the technical term milling, was first used in 1663, the strokes at that time going at right angles across the edge. That mode continued until 1669, when diagonal strokes were introduced. But these also being found insufficient for the purpose, angular strokes were devised in 1739, which added something to the difficulty of counterfeiting the milling; and the edge of the coin was still further protected by placing the top of the letters as close as possible to it. The position of the letters close to the edge of the coin, which first appeared upon some of the guineas of William and Mary, is still continued.

From the money, when completely finished, two pieces are to be taken from every fifteen pounds weight of gold, and two, at least, from every sixty pounds weight of silver, one for the private assay within the mint, and the other for the trial of the Pix.

The following is the process which at present takes place, from the time at which an ingot of gold is imported into the mint, to the period when it is issued from the mint in the shape of money, as stated in evidence to the committee on the royal mint, April 18, 1837, by J. W. Morrison, Esq., the deputy-master.

'The bullion or ingots are brought to the mint, and it being ascertained that such ingot has been melted by approved refiners in the trade, and also an assay upon the purchase by the king's assayer, they are taken into the master's assay-office, where pieces are cut out for him to assay; the ingots are then locked up under the keys of the deputy-master, comptroller, and king's clerk, and as soon as the ingots are reported by the master assayer, they are weighed by the weigher and teller in the mint-office, in the presence of the importer and the mint officers and the clerks, who calculate the fineness of each ingot, and ascertain the standard value of the whole importation, when a mint bill and receipt is given to the importer, signed by the deputy-master and witnessed by the comptroller and king's clerk; the mint being bound to return an equal weight of standard coin. The ingots are then made up into pots of a certain weight, and a portion of alloy or fine metal calculated, which is to be added in the melting to produce the standard; they are then cast into bars fit for the moneyer's operation; an assay being made by the king's assayer, with reference to the delivery of the bars, from a sample taken from each pot by the surveyor of melting for that assay, the moneyer rolls the bars to proper thickness, and cuts out the piece for the stamping of the intended coin; and having made that piece of the right weight, they are coined, and are put into bags of a given weight to be examined by the king's assayer, the comptroller, the king's clerk, weigher and teller, at the process called the pix. The money is then locked up till the assay is reported by the king's assayer, when it is delivered to the owner weight for weight, as expressed in the mint bill which had been given, and which bill and receipt are then returned.'

The reader who desires more extensive information than is here given upon the subject of the mint must consult the *Report from the Select Committee of the House of Commons*, already referred to, in the Appendix to which he will also find a large collection of papers relating to the French mint, the mint of the United States, and the Dutch mint. [Bullion; Exchange.]

MINU'CIUS, FELIX, a Latin Christian writer of the third century, was a native of Africa, came to live at Rom where he exercised the profession of advocate, and was much admired, according to the report of Lactantius and Jerome, for his eloquence. We have a work by him, entitled 'Octavius,' which is a dialogue between a Christian called Octavius and a heathen called Cæcilius, concerning the merits of the two religions which were then striving for supremacy. In this dialogue, Octavius repels the absurd imputations of the heathens against the early Christians, whom they accused of all sorts of impurities and crimes in their religious meetings. Through fear of persecution these meetings took place mostly at night and in concealed places, which circumstances exposed them to the obloquy of vulgar ignorance. At the same time Octavius retorts upon his co-disputant by exposing the notoriously licentious practices of the heathens. The style of this work is argumentative and sufficiently pure; the language is animated, and the mode of treating the subject attractive, being mixed up with mythological learning and much information concerning the customs and opinions of that interesting period. As an apology of Christianity, the work of Minucius Felix, is a companion to those of Clemens Alexandrinus, Athenagoras, Theophilus of Antioch, Justinus, Tertullianus, and other early advocates of the Christian faith in its times of trial and depression, and forms a link between them and those of Arnobius, Lactantius, Eusebius, Ambrose, and the other fathers of the fourth century. The dialogue of 'Octavius' has gone through many editions, among which those by James Gronovius, Leyden, 1709, and by Davis, Cambridge, 1712, deserve notice. The latter is accompanied by numerous notes by Dr. Davis and others, and a dissertation or commentary by Balduinus. The 'Octavius' has been translated into French by the Abbé de Gourcy.

Another work, entitled 'De Fato,' against astrologers, is mentioned by Jerome as being ascribed to Minucius, although Jerome expresses doubts concerning its authorship. This work is lost.

The 'Octavius' was at one time attributed to Arnobius, and was inserted as the 8th book of his Disputations 'Adversus Gentes.' Bouchard has published a *Dissertation on Minucius*, Kiel, 1685.

MINUET (*menuet*, Fr.), a graceful slow dance, which, according to Brossard, had its origin in Poitou, and, we conjecture, first made its appearance either in the middle or towards the end of the seventeenth century, for the term is not found in Mersenne, but is met with in the operas of Lully. Ménage derives the word from *menu*, 'little,' the paces of the minuet being small.

The minuet, as a dance, consists of two strains or parts, of eight bars each, in three-crotchet time, and both are repeated; but as it seems to have been introduced together with hoops and hair-powder, so it passed away with them, and, except now and then on the stage, is only seen in the dancing-schools. As an exclusively musical movement, in symphonies, quartets, &c., each strain of the minuet generally comprises sixteen bars, both strains being repeated; and it is followed by a second, called the trio; after which the minuet is played once more, straight through. But composers are not very strict as to its length, or to that of its supplement the trio. For the latter kind of minuet we are indebted to Germany: its time is always quick—*allegro*; and when repeated after the trio, the movement is rather accelerated.

MINUTE (*minutum, portio minuta*). [Angle; Time; Sexagesimals.]

MINX, a name for the Vison-weasel.

MINX-OTTER, Pennant's name for the Vison-weasel.

MINZO'NI, ONO'FRIO, more distinguished for the quality than the quantity of his poetry, in which last respect he is only one of the minor bards of Italy, was born at Ferrara, in 1734. He was educated by the Jesuits, and applied himself with great diligence to the study of theology and mathematics; but his forte lay rather in poetry,—it is as a poet, at least, that his name is handed down to posterity. Imbued with the study of Dante and Ariosto, he had caught much of their vigour of thought and energy of expression; and was comparatively careless of those mechanical beauties of versification which, in his time, were too generally accepted as equivalent to genuine poetry. Freshness of thought, distinctness of imagery, and nobleness of language are the characteristics of his poems, which consist chiefly of sonnets. He likewise distinguished himself by his eloquence in the pulpit so highly, that the citizens of Ferrara struck a medal in honour of him in 1783. In 1780 he was made canon penitentiary of that city, which office he discharged with the most exemplary zeal.

MIOSEN, Lake. [CHRISTIANIA.]

MIRABAUD, JEAN BAPTISTE DE, born at Paris, in 1675, first embraced the military profession, but left it soon after to devote himself to literature. He made himself known by a French translation of Tasso's 'Jerusalem,' which he published in 1724. He was afterwards made a member of the French Academy, of which he became secretary in 1742. He died at Paris, in 1760. Besides the above-mentioned translation, and a very inferior one of Ariosto's poem, he wrote—1, 'Le Monde, son Origine et son Antiquité.' 2, 'Opinions des Anciens sur les Juifs.' 3, 'Sentimens des Philosophes sur la Nature de l'Ame,' and other minor works. The atheistical work called 'Système de la Nature,' which made much noise at the time of its publication, was attributed to Mirabaud, but is known to have been written by the Baron d'Holbach, with the assistance of some of his friends. [HOLBACH.]

MIRABEAU, HONORÉ GABRIEL DE RIQUETI, COUNT OF, was born at Bignon, near Némours, in 1749, of a family which had emigrated from Florence in the thirteenth century, the name of which, Arrighetti, had become Frenchified into that of Riqueti. He was the son of the marquis de Mirabeau, a man of some literary note, the author of 'L'Ami des Hommes' and other works, and one of the leaders of the school of the 'Economistes.' The marquis, though a great advocate of liberty and philanthropy in his writings, was a harsh despot in his own family, and his harshness probably contributed to sour the temper of his son, and to drive him into the excesses which stained his earlier career. Young Mirabeau had violent passions, an ardent imagination, and great abilities. He was fond of pleasure, of love intrigues, and of spending money, and his father knew no better means of checking his irregularities than by obtaining 'lettres de cachet' against his son, and confining him in several state prisons in succession. His first imprisonment was in consequence of a love affair, after which Mirabeau served for some time in the army, on leaving which he married a young lady who had been promised to another. His dissipation however rendered the match an unhappy one; he became encumbered with debts, his father obtained an interdict against him, which declared him incapable of administering his property, and moreover a lettre de cachet, by which he was confined in the castle of Joux, in the Jura mountains. He was then twenty-five years of age. His captivating address won over the commandant of the fort, who allowed him to walk about the neighbouring town of Pontarlier, where he made the acquaintance of a young lady, the wife of an old man who was a magistrate in that province. Mirabeau seduced her, and carried her off to Holland. This is the person to whom he afterwards addressed several licentious works under the name of Sophie. For this offence the parliament of Dijon condemned him to death *par contumace*.

In Holland Mirabeau began to work for the booksellers as a means of subsistence. While he was thus employed, he was seized by the agents of the French police, with the consent of the Dutch authorities, and was finally shut up in the dungeon of Vincennes near Paris, where he remained more than three years. During his confinement he went through a course of general reading, made translations from Latin and modern foreign authors, formed a collection of extracts, and wrote several works, most of which were of the amorous kind, and some of them obscene. He also carried on a correspondence with his mistress Sophie, which was published after his death.

On his release in 1780 he wrote his work 'On the Lettres de Cachet, and on State Prisons,' which made a deep impression on the public. Repairing to Pontarlier, he pleaded his own cause and that of his mistress, and compelled the husband to enter into a compromise by which the prosecution was quashed.

About 1784 he visited London, where he became acquainted with Romilly. From England he wrote his 'Letters to Chamfort,' in which he praised the institutions of the country. 'Mirabeau,' says his friend and biographer Dumont, 'was then engaged in a work on the American order of Cincinnatus, and he had in his portfolio plans and sketches of several other works, upon which he took good care to consult every person capable of affording him information. He was then poor, and obliged to live by his writings. He wrote his "Doutes sur la Liberté de l'Escaut" (or Considerations on the Navigation of the Schelde) from a letter by Mr. Chauvet, which gave him the first idea of the work.

'Having become acquainted with a geographer, he began to think of writing a universal geography. Had any one shown him the elements of Chinese grammar, he would, I have no doubt, have attempted a treatise on the Chinese language. He studied a subject while he was writing upon it, and he only required an assistant who should furnish matter to him. He could contrive to get notes and additions from twenty different hands; and had he been offered a good price, I am confident that he would have undertaken to write even an Encyclopædia. His activity was prodigious. If he worked little himself, he made others work very hard. He had the skill of finding out men of talent, and of successfully flattering those who could be of use to him; he worked upon them by means of insinuations of friendship and of ideas of public benefit. His interesting and animated conversation was like a hone which he used to sharpen his tools. Nothing was lost to him; he collected with care anecdotes, conversations, and thoughts; appropriated to his own benefit the fruits of the reading and study of his friends; knew how to use the information thus acquired so as to appear to have always possessed it; and when he had begun a work in earnest, it was seen to make a rapid and daily progress.' (Dumont's *Recollections of Mirabeau.*)

The above sketch by a clever and impartial friend of Mirabeau gives an insight into the versatile character of this remarkable man, who might be styled the Alcibiades of the French revolution.

In 1786, Mirabeau's abilities having become known, he was employed by the French minister Calonne, on a secret mission to Berlin, where he spent about eight months, and witnessed the last days of the great Frederic, and the beginning of the reign of his weak successor. On his return to France he wrote his work, 'De la Monarchie Prussienne,' which was compiled from very good materials that he had obtained at Berlin. He also published an 'Histoire Secrète de la Cour de Berlin,' which contains many scandalous anecdotes, and which the French government caused to be burnt by the hand of the public executioner. He was paid twice for this work: once by the French minister Montmorin, for suppressing it, and a second time by the bookseller for publishing it.

It was about this time, in the latter part of 1788, that Dumont became acquainted with Mirabeau, whose character then stood very low even in Paris, in consequence of his law-suits with his family, his elopements, his imprisonments, and his licentious character, so that his acquaintances were almost ashamed of seeing him. He was at one time connected with Calonne and the other enemies of Necker, against whom he wrote several pamphlets. He published also a 'Letter' to the new king of Prussia, an 'Address to the Batavians' on the disturbances then existing in Holland, and a 'Letter to Joseph II.,' all of which are remarkable for their turbulent tone. He wrote likewise an 'Essai sur la Secte des Illuminés,' and a 'Lettre sur Cagliostro,' in which he exposed that impostor. His reputation as a writer stood very high, although he was indebted to his friends for most of his materials.

The convocation of the States-General, in 1789, opened to Mirabeau a new and brilliant career. Two years before he had attended the assembly of the Notables, to which he acted as secretary. He now presented himself before the states of Provence as a candidate for representing that province in the States-General, but he was rejected by the nobles on the ground of not being possessed of any fief. The true reason was that he was disliked, not so much for his irregular conduct as for the bold attacks which he made upon exclusive privileges.

He then offered himself as a candidate to the Tiers Etat, or Commons, and was returned to the States-General for both the towns of Aix and Marseille. He chose to sit for the former, but he paid a visit to Marseille to testify his gratitude to the citizens who had given him their votes, and was received in triumph. In the midst of his success however he showed himself a friend to social order, and by his personal influence repressed the disorders of the populace, which had broken out in alarming riots both at Marseille and at Aix. It is Mirabeau's peculiar boast, that throughout his political career his passions and party feelings never got the better of his judgment; he always remained master of himself; he knew where to stop, and where others ought to have stopped. Whilst Brissot, Barnave, Sièyes, Pétion, and others had chiefly in view the temporary triumph of their respective parties or systems, Mirabeau saw farther; he weighed the ultimate consequences of the measures that were agitated, and he looked to the permanent welfare and security of France, and to the establishment of an orderly rational government.

At the beginning of the great dispute between the two privileged orders and the third estate concerning their mode of sitting and of voting, Mirabeau opposed the motion of the Breton members, that the third estate should assume the title of the National Assembly, regardless of the other two orders. Instead of this he proposed a deputation to the clergy to invite them, 'in the name of the God of peace,' to join the Commons. This step however proving fruitless. Sièyes proposed to send a last message to the privileged orders, to request them to repair to the common-hall of the States, in order to verify their respective powers, and to judge as in default those who should not appear. That very day Mirabeau, foreseeing the consequences of the motion, requested an interview with Malouet, the personal friend of the ministers Necker and Montmorin, and told him that he was the friend of rational liberty; that he saw the storm which was impending, and that the question now was, whether the monarch and monarchy should outlive its fury. 'There are,' said he, 'among ourselves (in the third estate) several hot-headed dangerous men. In the ranks of the aristocracy the clever men have no common sense, and among the fools I know several who are capable of setting fire to the gunpowder and blowing us all up in the air. You, sir, are the friend of M. Necker and of M. de Montmorin; I do not like either of them, and I do not suppose that they like me, but that is of no consequence, provided we can understand each other. I should wish to know their intentions, and I request a private conference with them. They would be very guilty or very short-sighted, if they expected to deal with the present States-General as former ministers have dealt with those assemblies in the old times of the monarchy. That cannot now be. They ought to have a plan of conduct based upon certain principles for the interest of the monarchy; if that plan is reasonable, I shall engage to support it, to prevent the invasion of democracy which threatens to overwhelm us.' Malouet was delighted with the proposal, for he was aware of Mirabeau's power among the Commons, but the two ministers received the offer coolly, and Necker, having at last consented to see Mirabeau, asked him, in a distant supercilious manner, what proposals he had to make? Mirabeau offended at the word 'proposals,' answered in a few sharp words and went away to the assembly. In passing by Malouet he whispered to him, 'Your friend is a fool; he will hear of me again by and by.' To the honour of Mirabeau it must be said this feeling of irritation was transient, and that in the momentous discussions that followed, his pique against the minister did not carry him beyond the bounds which he had already prescribed to himself.' (Droz, *Histoire du Règne de Louis XVI.*, Paris, 1839.)

On the 15th of June, when the Commons were deliberating on the name which they were to assume, Mirabeau, after observing that the obstinacy of the privileged orders was inexcusable, that the third estate was evidently in the right, and that for this very reason they ought to avoid taking extreme measures, which are the last resource of despair, and theirs certainly was not a desperate situation, continued thus: "You cannot constitute yourselves as the States-General, because that denomination implies three orders, and the three orders certainly are not here. Will you assume another synonymous denomination, implying that you are the representatives of the whole nation? You will still require the king's sanction; you cannot do without it, if you mean to impart legality to your resolutions.' He then proposed to assume the title of 'Representatives of the people." But in France the word "people' had by long abuse become a word of contempt. Mounier proposed the title of 'Assembly of the majority of the Deputies deliberating in the absence of the minority duly invited and not appearing.' But this title was too long. The discussion occupied four sittings. Sièyes, Barnave, and Camus denied the necessity of the royal sanction. 'As for me,' replied Mirabeau, 'I hold the king's sanction to be so indispensable, that if he had it not, I should prefer living at Constantinople rather than in France. I declare to you that nothing appears to me more fearful than the sovereign aristocracy of six hundred deputies, who to-morrow perhaps might take it into their heads to declare themselves permanent, the next day hereditary; and which would end, like all aristocracies in the world, by invading and usurping all the powers of the state.' And he continued to support his proposed title of representatives of the people. 'Are you not the elect of the people? And do you blush at the name? Will you tell your constituents that you disdain the title which they have conferred upon you, that it is not brilliant enough, not pompous enough for your taste? More clear-sighted than we, the heroes of the Netherlands adopted the name of "gueux" which the insolence of their tyrants had cast upon them: the founders of Swiss liberty prided themselves in that of "boors," and these names, by rallying to their cause whole multitudes oppressed by aristocracy and despotism, became their strength and the pledge of their success. . . . .' Mirabeau's opinion however was violently opposed, and the denomination of 'National Assembly,' which had been sometimes used to designate the States-General, was adopted on the 17th of June, on the motion of Sièyes, the minority who voted against it consisting of ninety deputies. Mirabeau absented himself to avoid voting on the question. He wrote to his friend Major Mauvillon of the Prussian service as follows: 'Supposing even that the king should give his sanction to the new title which we have assumed, it is still true that the deputies of the third estate have staked a kingdom at a game of chance, whilst I wished to play at a game of chess in which I was the strongest. It is certain that the nation is not ripe. The excessive ignorance, the frightful disorders of the government have forced a hot-house revolution, and we are carried beyond our capabilities and our instructions.' (*Lettres de Mirabeau à un de ses amis en Allemagne.*)

But the great step once taken by the Commons, Mirabeau was faithful to them, and boldly supported the rights which they had assumed. After the memorable royal sitting of the 23rd June, in which Louis ordered the three estates to deliberate in separate chambers, the deputies of the Commons still retained their seats in the common hall; and when the Marquis de Brézé, grand master of the ceremonies, reminded them of the king's orders, Mirabeau rose and said: "We have listened, sir, to the intentions which have been suggested to the king; but you, who cannot act as his interpreter to the National Assembly—you, who hold here neither seat, nor vote, nor right of speaking—you are not a fit person to remind us of his speech. Go, and tell those who have sent you, that we are sitting here by the power of the people, and that bayonets alone can drive us hence.' All the deputies cried out, "That is the vote of the Assembly, and our firm resolution;' and the grand master withdrew. When he reported to Louis the answer of the Commons, the king, after a few moments' silence, said peevishly, 'Well, if they will not quit the hall, let them stay in it.'

Mirabeau was now acknowledged as the chief leader in the National Assembly, and he continued to hold this supremacy for nearly two years, till the time of his death. Without belonging exactly to any party, he was courted or feared by all. He wished to form a party truly national; and on the 27th June he made a speech, in which, after telling his colleagues that agitation and tumult could only be favourable to the enemies of liberty, he exhorted them to calm the people, and save them from the excesses into which a furious zeal might lead them. 'The number of our enemies is greatly exaggerated, for we must not consider as enemies all those who do not think as we do. Many of them wish the public good as much as we do, but they seek it by a different road; many are still biassed by early impressions and the habits of education; others, seeing us take a position without a precedent, are alarmed for their property; they fear that liberty may become a pretext for licentiousness and anarchy. All these men deserve our regard, our consideration.' And he drew an eloquent sketch of the advantages which a rational constitution would ensure to France; the equality of taxation, the freedom of industry, economy in the finances, the written law substituted for ministerial caprice.

Lous XVI., after having sanctioned and even commanded the union of the three estates into one National Assembly, allowed his courtiers to collect a great number of troops near Paris and Versailles, as if to overawe that assembly

It was then that Mirabeau, on the 8th of July, in an eloquent speech, denounced the measures of the court as a plot against the independence of the representatives of the nation, and moved a firm though respectful address to the king, whom he excused, as if unconscious of what was being done in his name, requesting him to remove the troops from the neighbourhood of the capital. The address was voted in the midst of acclamations. It has been said that this address, as well as many of Mirabeau's speeches, was written for him by others. But his oratorical powers are proved by his extempore speeches and replies, which, as well as his prepared speeches, have the same form and pressure, the same logic, the same inspiration, and his own peculiar bold and somewhat careless manner. He doubtless made use of notes with which his friends supplied him, but he had the art of making them his own, and stamping them with his original character. This is fully and honourably acknowledged in many places by Dumont himself, who claims (and we see no reason for questioning his statement) the greatest share in having written for Mirabeau.

Louis XVI. made an evasive answer to the address; the people of Paris took the alarm, which was increased by the sudden dismissal of Necker, and an insurrection, led by Danton, Camille Desmoulins, Santerre, and others belonging to the club of the Palais Royal, broke out in the capital, which led to the destruction of the Bastille on the 13th of July, and the organization of the militia of Paris. During this stormy period Mirabeau was constantly with the Assembly, day and night, at Versailles, supporting the firmness of the members, insisting on the necessity of the king withdrawing the troops from the capital, and sending repeated deputations to the palace for that purpose. The king at last consented to remove the troops, and went himself to Paris on the 17th, where he sanctioned the formation of the new municipality, the arming of the militia, and other popular measures. The Revolution was now complete, and the old monarchy was dead. It has been said that Mirabeau had conspired with the Paris insurgents, in order to make the duke of Orleans lieutenant-general of the kingdom; but this accusation, as referring to that epoch, was at least premature. Mirabeau may have known or suspected the intentions of the party of the duke of Orleans, but he also knew the weakness of the duke's personal character, his bad reputation, and his want of popularity; whilst Louis was still very popular with the people at large. At a later period, on the 5th and 6th of October, when the populace of Paris went to Versailles, insulted the royal family, and threatened their lives, a plot was attributed to the duke of Orleans, and Mirabeau was implicated in the supposed conspiracy; but the National Assembly declared that there was no ground of accusation against either. Dumont, who lived at that time in Mirabeau's intimacy, examines the matter pretty closely, and, in the end, leaves it in doubt. That some communications from the duke's party were made to Mirabeau through Laclos, the unprincipled author of the 'Liaisons Dangereuses,' and a familiar of the duke, seems certain; but the intentions of the conspirators, and how far Mirabeau participated in them, are still involved in mystery. Dumont seems to think that the object of the movement was to frighten the king away, and then to appoint the duke lieutenant-general of the kingdom, in which case Mirabeau might have supported him in the Assembly, and have been appointed in return prime-minister, which post was the object of his ambition.

Mirabeau was one of the committee of five appointed to present the model of a declaration of the rights of man, on the motion of the metaphysician Sieyes.

Mirabeau was, from the first, opposed to this declaration, which he considered as a puerile fiction. He however set about the task with his friends Dumont, Claviere, and Duroveray; and 'there were we, writing, disputing, adding, striking out, and exhausting both time and patience upon this ridiculous subject. At length we produced our piece of patchwork, our mosaic of pretended natural rights, which never existed. The principles intended to be established by this declaration are dangerous in themselves; for legislators should not be tied down to general propositions, which they are afterwards obliged to alter and modify; above all, they must not be cramped by false maxims. Men are born free and equal! That is not true; on the contrary, they are born in a state of weakness and necessary dependence. Equal! how are they so, or how can they be so? If by equality is understood equality of talents, of virtue, of industry, of fortune, then the falsehood is manifest.' Mirabeau, on presenting the project to the assembly, ventured to make some objections to it, and proposed to defer the declaration of rights until the constitution should be completed. 'I can safely predict,' said he, 'that any declaration of rights anterior to the constitution will prove but the almanac of a single year!' He however withdrew his motion out of weariness and disgust, and the declaration was decreed. (Dumont's *Recollections.*)

During this discussion the violent members of the Breton club (afterwards the Jacobin club) charged Mirabeau with abusing his talents, as if he wished to involve the assembly in contradictory resolutions; and one of them, stooping to personalities, reproached him with the irregularities of his private life. Mirabeau answered, with dignified calmness, 'No doubt that in the course of a stormy youth, partly by the fault of others, but chiefly by my own, I have committed many wrongs, and that there are few men who have afforded more matter for bad report and more pretexts for slander; but I dare attest to you all, that as a public man, as a political writer or speaker, no one can boast of greater courage, independence, disinterestedness, or of greater uniformity and consistency of principles. Thirty volumes of writings are there to prove my assertion.'

Then came the famous night sitting of the 4th of August, in which the assembly, on the motions of several members of the nobility and clergy, abolished feudal rights, game-laws, tithes, privileges, and indemnities, pensions not for actual services, the corporations of trades, and all the provincial franchises, states, and assemblies, as well as the charters of peculiar towns; questions involving an entire political system were decided in a few hours, put to the vote, and passed by general acclamation. From this sitting Mirabeau, Sieyes, and other leading members happened to be absent. The following day the first two strongly reprobated this hurried work; Sieyes made a speech against the sudden abolition of tithes, which he ended by the words, 'They want to be free, and know not how to be just.' Mirabeau exclaimed to Dumont, 'This is just the character of our Frenchmen: they are three months disputing about syllables, and in a single night they overturn the whole venerable edifice of the monarchy.'

The next important discussion was that on the king's veto. Mirabeau had determined to support the absolute veto, which, in the absence of a second or upper house, he considered of vital importance to the monarchy. His speech on the occasion excited much surprise and dissatisfaction among the deputies. Sieyes opposed the absolute veto, and Barnave and Pétion proposed a suspensive or temporary one. Their motion was carried. Mirabeau did not vote on that occasion; and such was the importance which even his antagonists attached to his name, that Camille Desmoulins and other democrats boldly asserted that he had voted in their favour.

Mirabeau's speech on the national bankruptcy was to him a complete triumph. In this speech he supported the minister Necker, to whom he was personally hostile, in his plan of a forced loan to make up the deficit in the revenue. Several members had proposed modifications, which Mirabeau thought would destroy the effect of the measure. He proceeded to remark upon the dangerous state of the public credit, the failure of the revenue, and represented a national bankruptcy, with all its horrors, as the probable consequence of the rejection of the plan. The force with which he presented so commonplace a subject was miraculous: he elevated it to sublimity. They who heard that speech never forgot it. No attempt was made to reply: the assembly was subjugated by the power of a superior mind, and the project was adopted unanimously. 'From that day Mirabeau was considered as having no rival in the assembly: there were indeed other orators, but he alone was eloquent; and this impression was stronger, because in his speech on this question he was obliged to depend entirely upon his own resources; for it was an unexpected reply, and could not therefore have been prepared.' (Dumont's *Recollections.*) Molé, the celebrated actor at the Théâtre Français, was so struck with the force of Mirabeau's eloquence and the brilliancy of his delivery, that, approaching the orator with visible emotion, 'Ah! monsieur le comte,' said he, in a pathetic tone of voice, 'what a speech! and with what an accent did you deliver it! You have surely missed your vocation.' Mirabeau was by no means displeased at this singular compliment.

After the removal of the assembly to Paris, some negotiations were entered into for bringing Mirabeau into office. Necker had nearly agreed to it, and the king was about to consent; but Mirabeau's condition was, that he should remain member of the assembly, without which he felt that his taking office would be of no use. Suspicions of the scheme having been bruited about, some of his antagonists, of Lameth's party, moved that no minister should be a member of the assembly. Mirabeau in vain opposed the motion, which was carried by a feeble majority. He appealed to the usage of the English parliament, but this appeal told against himself; for the least idea of imitation offended the pride of the innovators, who pretended to establish a monarchical form of government, without preserving a single element of monarchy. 'We are not English, and we want nothing English,' was the reply on such occasions.

Mirabeau was one of the first to propose a martial law to put down the insurrections which had then become extremely frequent all over France. The law was passed on the 19th of October, notwithstanding violent opposition; and, strange to say, Mirabeau's popularity was not affected by it.

About November of the same year Mirabeau unexpectedly communicated to Dumont a plan to draw the king away from Paris. After placing him in Metz or some other strong fortress, amidst faithful troops, he was to appeal to the people by proclamation, to dissolve the assembly, and order an immediate election of fresh deputies. Mirabeau was to remain at Paris, and watch the motions of the assembly; and, as soon as the royal proclamation should appear, he expected to induce all the moderate members to separate from the rest and follow the king. Mirabeau represented this plan as the only thing by which France could be saved from complete disorganisation. Dumont strongly remonstrated against the plan, and Mirabeau acknowledged to him that it had originated with the court party, and that he had intended to co-operate in the movement, in order to direct it in favour of liberty; 'otherwise,' said he, 'it will only lead to new errors and the total ruin of the country. If the plan does not succeed, the monarchy is lost.' Dumont represented to him that he would most probably be made use of only as a tool, and then discarded as a victim. A few days afterwards Mirabeau told him that the plan was given up, and the affair remained a secret.

During the year 1790, Mirabeau continued to hold the first rank as a leader of the National Assembly. He supported the law for the sale of church property in order to pay off the national debt, but with some restrictions in favour of the actual possessors, which restrictions were however disregarded. He also supported the issue of assignats or bonds on the security of that property, but limited their issue to a fixed amount. He also proposed, at Dumont's suggestion, a plan of gradual elections, by which a citizen should have to exercise certain civil functions for a stated period in order to qualify him to become a deputy to the legislature. This motion was at first received with favour by most members both of the right and left sections of the assembly, but Lameth, Barnave, and some others looked upon it as an aristocratic snare; they moved and carried an adjournment, and the motion was ultimately lost. In the important discussion on the right of peace and war, he declared, to the great dismay of the democrats, that the king ought to be invested with this prerogative, and supported his opinion by a logical and brilliant speech. Barnave opposed him, attacked Mirabeau violently, accused him of inconsistency, ridiculed his system, was cheered by the left side, and by the people in the galleries, and received with acclamations by the people out of doors, whilst cries of 'à la lanterne' resounded against Mirabeau. The debate was adjourned. The next day a libel was hawked about the streets with this title in large capitals:—'The great treason of the Count de Mirabeau,' in which he was accused of bribery. The paper was shown to him as he entered the assembly he glanced at it, and said, 'I know it all; I shall leave the house either triumphant or in pieces.' He ascended the tribune amidst the most profound silence: 'For several days past,' said he, 'the section of this assembly which wishes for the king's assent in questions of peace as war has been represented as hostile to public liberty; rumours of treason and corruption are artfully spread about; popular vengeance is nvoked to support the tyranny of party opinions. I also, whom a few days ago they wanted to carry in triumph, I hear myself now proclaimed in the streets as a great conspirator. I did not require this lesson to remind me that there are only a few steps between the capitol and the Tarpeian rock; but a man who wishes to be useful to his country, who cares little for the vain celebrity of a day, is not easily overcome; he expects his reward from his conscience and from time, the incorruptible judges of us all. I shall therefore resume the question in debate, and explain the true point of contention with all the clearness I am capable of.' He then repeated the objections of Barnave, maintained his former opinion, and urged it with redoubled force. He saw in the eyes of the audience the certainty of his triumph, and stopping rather abruptly, he concluded, in an ordinary and careless tone, with these words:—'I think, gentlemen, that the real point in debate is now well known, and that M. Barnave has not at all touched the question at issue. It would now be for me a task too easy and irrelevant to follow my opponent throughout his accessory details, in which, if he has shown a certain talent, he has not exhibited the least knowledge of state or worldly affairs. He has declaimed at length about the mischief which absolute kings can do and have done, but he has not observed that in our constitution the monarch is no longer absolute, and cannot act arbitrarily, and he has, above all, completely abstained from speaking of the evils resulting from popular movements.' Mirabeau left the tribune amidst a thunder of applause, which lasted for many minutes. His triumph was again complete, and his opinion prevailed.

He opposed the violent measures proposed against emigration, saying that it was tyrannical to interfere with the locomotive faculties of individuals—that such restrictions could not be carried into effect—that he, for one, would not obey them—and as the extreme left became louder and louder in their marks of disapprobation, he fixed his eyes upon them imperiously, and cried out with a voice of thunder, 'Silence aux trente voix' (silence, you thirty votes); and the extreme left quailed before him, and was silent accordingly.

On the question of the regency he told the assembly to judge for themselves, and not to heed the shouts out of doors; he told them that the very people who were applauding them to-day would shout still louder were they to see them some other day on their way to the scaffold; and at that moment a loud cheer from the galleries seemed to confirm Mirabeau's prediction.

Thus did this extraordinary man, while crushing the old aristocracy with one hand, repress the fury of the democratic faction on the other. Hardly disguising his contempt for the intellectual capacity of most of his colleagues, he still kept them all in awe; and while openly asserting his independence of clubs, and factions, and mobs, he retained his popularity to the last even with the lowest populace.

'Our little mother Mirabeau' was the endearing nickname which the fishwomen of Paris, who sometimes graced the galleries of the legislature with their presence, applied to him.

Mirabeau, assisted by Dumont and others, edited a journal entitled at first, 'Journal des Etats-Généraux,' and afterwards 'Courier de Provence,' which gave a clever and tolerably impartial report of the proceedings of the National Assembly, until about the middle of 1790, when it was forsaken by its original founders, and retained nothing of its former character except the name.

In January, 1791, Mirabeau was named president of the National Assembly. 'Never had this office been so well filled; he displayed in it a new kind of talent. He introduced a degree of order and clearness in the proceedings, of the possibility of which no member had previously the least conception. He simplified forms; he could render the question clear by a single word, and also by a single word put down tumult. His regard for all parties, the respect he always paid to the Assembly, the precision of his observations, and his answers to the several deputations at the bar—answers which, whether prepared or extempore, were always remarkable for dignity and elegance, and satisfactory even while conveying a refusal; in short, his activity, his impartiality, and his presence of mind increased his reputation and added splendour to his talents, in an office which had proved a quicksand to several of his predecessors. He had the art of fixing the general attention even when, being no longer able to speak from the tribune, he seemed to have foregone his most valuable prerogative. His enemies, who were jealous of his eloquence, and had voted him president in order thereby to cast him into the shade and reduce him to silence, were bitterly disappointed when they saw him add another wreath to the chaplet of his glory.

'He was far from enjoying good health at this time. "If I believed in slow poisons," he said to me, "I should think myself poisoned; for I feel that I am dying by inches—that I am being consumed in a slow fire." I observed to him, that his mode of life would long ago have destroyed any man less robust than himself. Not a moment of rest, from seven in the morning till ten or eleven at night; continual conversations and altercations; agitations of mind and excitement of every kind; too high living, at least as regards food—for he was very moderate in drink. "You must," I said, "be a salamander, to live in the fire which is consuming you." Like all public and ambitious men, in their moments of ennui and fatigue, he entertained at times thoughts of retiring from public life. The irritation of his system at this time produced violent attacks of ophthalmia; and I have seen him, whilst he was president of the National Assembly, sometimes apply leeches for his eyes in the interval during the adjournment of the sitting from the morning to the evening, and attend the Assembly with his neck covered with linen to staunch the blood.

'When we parted for the last time (Dumont was going to Geneva for six months), he embraced me with an emotion which I had never before seen him evince. "I shall die at the stake, my dear friend," said he, "and we shall never perhaps meet again. When I am gone, my value will be appreciated. Misfortunes to which I have put a stop for the present were overwhelming France in every direction; but that base faction, which I now overawe (the Jacobins), will again be let loose upon the country. I have none but direful anticipations. Ah! my friend, how right were we when, at the beginning, we tried to prevent the Commons from being declared a National Assembly. That was the origin of the evil. Since they have carried that point, they have not ceased to show that they are unworthy of confidence. They wanted to govern the king, instead of being governed by him; but soon neither they nor he will govern; a vile faction will rule the country, and debase it by the most atrocious crimes." Three months after this conversation Mirabeau was no more.' (Dumont's *Recollections of Mirabeau*.)

Mirabeau died on the 2nd April, 1791, of a short but violent disease, the result of his mode of living and of continual excitement. During his illness he suffered much, but endured his pain with sufficient calmness and resignation. He repeated to Talleyrand, who attended him, the same gloomy prognostications on the result of the actual struggle in France which he had before expressed to Dumont, and his determination, had life been spared to him, of supporting the king's constitutional authority against the attacks of the anarchists. 'I carry with me to the grave,' said he once, 'the last shreds of the monarchy.' He had been for some months in correspondence with the court, and had proposed a plan for dissolving the Assembly by the force and will of the nation itself, by getting up addresses from the departments, without having recourse to foreign armies or destroying the people's hope of freedom; for a new assembly was to be convoked forthwith, which would have revised the constitution. Mirabeau never intended to restore absolute power: he knew too well that he would have destroyed himself by such a measure; but all his ambition during the latter period of his life was centred in the idea of becoming prime minister of the constitutional monarchy of France, and he thought, that once in that office, he should eclipse every minister who had preceded him, and that he would attract within the sphere of his patronage all men of distinguished abilities, and thus form a halo of talents whose brightness should dazzle Europe. (Dumont; Bouillé's *Memoirs*.) Cabanis, then a young physician, published an account of Mirabeau's illness and a copy of his will. He died encumbered with debts. 'Much has been said of the venality of Mirabeau,' says Dumont, 'as if his talents were actually put up to the highest bidder; but this is an exaggeration. It may be admitted that he was not over-scrupulous in money matters, but he was too proud to be dishonest; and he would have thrown through the window any one who dared to make to him a humiliating proposal. At one time he received a pension from Monsieur (afterwards Louis XVIII.), and subsequently, during the last six months of his life, one from the king; but he considered himself as an agent entrusted with their affairs, and he accepted those pensions, not to be governed by, but to govern and direct those who granted them.'

Mirabeau was a brilliant orator, and a fluent though not original writer. The great characteristic of his genius consisted in his political sagacity, his anticipation of events, and his knowledge of mankind. No man at the time, at least in France, saw so far as he did into futurity, and his forebodings of impending calamities were attributed to disappointed ambition. But while he prognosticated the downfal of the monarchy, he had the most lively anticipation of the future destinies of his country. In a letter to Major Mauvillon, of the Prussian service, he said that he considered France as able to resist all Europe; and his correspondence contains many singular passages which show the wide range of his political views. At home he detected by his instinctive penetration the feelings of the principal members of the National Assembly, and often embarrassed his opponents by revealing their secret motives, and laying open that which they were most anxious to conceal. The severity of his judgments has been justified by succeeding events; and there has not been a man of any consequence in that assembly the sum of whose conduct has not corresponded with the opinion which Mirabeau had formed of him. His death gave courage to all the factious. Robespierre, Péthion, and others, who dwindled into insignificance before him, immediately became great men, when no longer overawed by his presence. His death was felt as a public calamity by the nation in general; a public examination was made on his body to convince the people that there was no ground for the suspicion of poison: his funeral was conducted with great pomp; all the theatres were closed, the deputies, the ministers, all the public authorities, and a number of other persons, forming a procession of more than two miles in length, followed his remains to the Pantheon, where they were deposited among the illustrious dead.

Little more than two years after, in November, 1793, the body of Mirabeau was disinterred by a decree of the Convention, as that of an aristocrat; and the ferocious and insane Marat succeeded to his honours. So short is the period of popularity in revolutions.

Mirabeau left a natural son, whom he adopted before his death, and who has published memoirs of his father, in 4 vols. 8vo., London, 1835. Besides the numerous works and pamphlets of Mirabeau which were printed in his lifetime, several collections have been published since his death:—'Collection complette des Travaux de Mirabeau à l'Assemblée Nationale,' Paris, 1791; 'Œuvres Oratoires et Choisies de Mirabeau,' 6 vols. 8vo., Paris, 1820.

Mirabeau was tall, thick-set, and naturally robust, but very plain in his features; and yet, when he chose, his manner was extremely fascinating. His large head was shaded by a vast mass of dark hair, which he took great pains to cultivate; and he used to say, when his antagonists were troublesome, that he would shake his locks at them, at the same time assuming a threatening look, which, added to his deep powerful voice, had the effect of completely silencing them.

As the history of Mirabeau's political life is closely connected with that of the States-General, and of the National Assembly, which grew out of them, and which effected the French revolution, it may be proper here to give an account of the formation of that assembly.

The States General were an old institution of the French monarchy. They were at first composed of the deputies of the two orders of the nobility and clergy, and were convoked by the king to consult with him in important cases, and also to furnish the monarch with money by grants styled 'free gifts.' It was a feudal institution, like the early Spanish Cortes and English parliaments. Afterwards, deputies of the chartered towns were admitted into the assembly, and these were called the Third Estate. It would appear that the third estate, or commons, were first introduced into the states-general under Philip le Bel in 1303, on the occasion of the quarrel between that monarch and pope Boniface VIII., about half a century later than the introduction of the knights of the shire into the parliament of England.

There were in France provincial states also, consisting of the three orders, in Provence, Britanny, Burgundy, and the other great fiefs of the crown, which provinces were accordingly distinguished, by the appellation of 'Pays d'Etats.'

from the other provinces directly subject to the crown, which were called 'Pays d'Election.' In the Pays d'Etats the states of each province were asked by the king for a certain subsidy, for which they voted the supply, and regulated the assessment of it, the nobility and clergy paying according to the value of the lands which they held, and this was called the real taille; the merchants, artificers, and tradespeople were assessed according to their wealth and station, which was called the personal taille; but day-labourers and other poor persons were not liable to the personal taille. The Pays d'Election were taxed at will by the king; and the tax called personal taille was assessed upon all the inhabitants by the 'élus,' or notables, of the respective communes. In this as well as in other respects the countries which had states had a decided advantage over the rest. It was also a principle or tradition of the monarchy at large that no *permanent tax* could be levied or maintained throughout the kingdom without the consent of the states-general of all France. There seems to have been no fixed period for the convocation of the states-general. it depended on the humour and necessities of the reigning king. But when they met, they were considered as representing the nation, and as being above all courts of justice and other authorities, and equal to the king himself. On the king's letters of convocation being issued, the deputies for each order were elected by the bailliages, or districts, from each of the three orders. When assembled, each order had its separate chamber or hall for deliberating, and the majority of the votes constituted the vote of the order. The whole assembly therefore may be considered as having three votes, and it may be easily inferred that in questions on which both the nobility and clergy had the same interest, the vote of the third estate was of no avail. But there were other cases in which the other two orders might differ, and the vote of the third estate would prove decisive. When the king came to communicate anything to the states, the three orders assembled in one common hall. This was called a royal sitting, and after the king's departure each order repaired to its separate hall. It is recorded however that on several occasions, and particularly at Orleans, in 1569, they agreed to deliberate together as one assembly, and chose one president for the whole.

The last states-general assembled in France previous to 1789 were convoked under Louis XIII., then just of age, in 1614. They asked for the abolition of certain taxes and duties, which the minister promised, but did not keep his word. The following ministers, Richelieu and Mazarin, and Louis XIV. after them, were little disposed in favour of national representation of any sort, and the states-general became almost forgotten. The disorder of the finances and the refusal of the privileged orders to come to the assistance of the exchequer, added to the remonstrances of the parliament of Paris, and the advice of the minister Necker, decided Louis XVI. to assemble once more the states-general: but the difficulty was to determine the mode of election, about which there was nothing certain or uniform in the records of former states-general; the total number of deputies, as well as the respective number for each deputation or province, having varied greatly. The qualifications of the electors were also differently stated. In 1356 the states consisted of 800 deputies, in 1576 of 826, in 1588 of 506, and in 1614 of 454. Dauphiny in 1576 returned 16 deputies, and in 1614 only 11; Languedoc sent 14 at the former period, and 29 at the latter; Guyenne 27, and afterwards 58. Again, with regard to the proportion of deputies among the three orders, the letters of convocation mentioned a deputy from each order at least for each bailliage, but the baillis generally sent more, especially from the third estate, probably because they more easily found in this estate men who would take the trouble. In 1614 the states-general consisted of 104 deputations, out of which 34 only consisted of an equal number of deputies for each order, 24 had as many deputies of the third estate as for the other two orders, and in others the proportion of the members of the commons was either greater or smaller. The total number of deputies were 140 for the clergy, 132 for the nobility, and 192 for the third estate. In 1789 the question arose as to giving to the third estate in all the bailliages a number of deputies equal to that of the other two, in order that if the states agreed to deliberate in common, as they had occasionally done before, and vote by heads, the third estate might have a fair chance. This, which was styled the double representation of the third estate, was granted by Louis XVI. in his letters of convocation, which decreed that the states should consist of at least 1000 deputies, of whom each bailliage should return a fraction in proportion to its population and the taxes which it paid to the treasury. But the important question remained, whether the three orders should deliberate in common and vote by heads, forming, in short, one house: the Commons desired it, but the other two orders refused. This question the king or his ministers did not decide, and that was the rock on which the monarchy was shipwrecked.

When at last the Commons obliged the other two orders to join them in one National Assembly, the members of the whole body consisted as follows:—48 archbishops and bishops, 35 abbots and canons, 208 parochial incumbents; 1 prince of the blood, 28 magistrates of the superior courts, and 241 gentilshommes or nobles; in all, 291 deputies of the clergy and 270 of the nobility: the third estate was represented by 80 inferior magistrates, 272 lawyers, 16 physicians, 2 clergymen, 11 of the nobility, who, like Mirabeau, had been returned by the Commons, and 176 merchants, landholders, and farmers; in all, 557 members of the third estate. In the course of the session however several members of the nobility and clergy emigrated.

The National Assembly continued its labours for several months after the death of Mirabeau. Having completed the new constitution which it undertook to make for France, it presented it to the king for his sanction in September, 1791. The king accepted the constitution, and the assembly dissolved itself on the 30th of the same month. The French generally designate the first national assembly as 'l'assemblée constituante,' from its having framed the constitution for the kingdom. That constitution lasted about twelve months, after which the republic was proclaimed.

MIRACLES. A man may acquire his knowledge of any event in either of two ways; by his own observation, or by information from others. The knowledge of an event which a man obtains from his own observation is generally, to him, the highest degree of evidence and the surest ground of belief; but not therefore the surest ground of a true opinion. The knowledge of an event which a man derives by information from others is not, to him, so high a degree of evidence as that which he obtains from his own observation; but it does not therefore follow that it is not so sure a ground of a true opinion. All the knowledge which a man derives from his own observation may be called experience: all that he derives from the observation of others may, for the sake of distinction, be called evidence; it is the experience of others communicated to him, either orally or by writing.

Every event which has taken place, or is said to have taken place, may be the subject of evidence. A man who has witnessed an event himself entertains no doubt of its reality, unless he has some suspicion that a fraud was practised, or that for some reason or other the event of which he was a witness was not such an event as it appeared to him to be. An eye-witness therefore of an event has nothing to guard against, so far as concerns his own conviction, but deception by others, or mistake or misapprehension on his own part. When a man derives his knowledge of an event from the information of others, there is, in addition to the causes of error which may exist where he is an eye-witness, the further cause of error which may arise from the witness whose evidence he receives being interested in deceiving him, or being, from whatever cause, disposed to deceive him. There is no supposable event which may not be the subject of evidence; and when all reason for supposing deception, mistake, or intention on the part of the witness to deceive, is removed, there is no event which, when witnessed, does not thereby acquire some degree of probability. It must be admitted that the ascertaining that there is neither deception, mistake, nor intention to deceive, is generally the main matter in estimating the value of evidence; but the estimating the value of the evidence in any given case is a different thing from determining what may be the subject of evidence, which is the matter that we are here considering.

Man is so constituted, that any event alleged to have taken place is at once placed by the mind either among events which are common or among events which are uncommon. In the former case, before any evidence is furnished as to the fact, there is a disposition to believe that it is true; and even the soundest judge of human events, though he will believe no alleged event without sufficient evidence, readily acquiesces in the probability of an alleged event of a common kind being a true event. In the case of an uncommon event, the matter is different; most persons are indisposed to consider it probable that the uncommon event has actually taken place, and many persons at once assume its impossibility, or at least assume that it has not taken place. But there is no rational ground either for admitting the truth of a common event without sufficient evidence, or for refusing assent to an uncommon event supported by sufficient evidence. An event the most common in the course of human life, an event the probability and possibility of which no man will deny, requires as much evidence in order to be proved as any event the most uncommon or any kind of thing or event that has never been heard of before. In both cases, the testimony of one eye-witness at least is required; and supposing the absence of mendacity in the witness and of all reason for supposing him to be deceived, the uncommon event is proved as much as the common event. How much and what will be necessary in either case to show the absence of mendacity or of deception, is a question that concerns the estimation of the value of the evidence in any given case, and cannot be determined generally.

Thus it appears that an event alleged to have taken place may either be one of a kind that is consistent with a person's experience, or it may be inconsistent with it. But the evidence in support of an event of either description may be precisely the same in degree and kind; it may be the evidence of persons of integrity unimpeached, of judgment approved, and of observation and acuteness unquestioned.

In the two cases supposed, the evidence is precisely the same: the only difference is in the mental state of the person to whom it is addressed. All intention or disposition to deceive, on the part of the witnesses, is by the supposition out of the way, and therefore the case is reduced to that of the receiver of the evidence being an eye-witness, and if he believes the witnesses to have as much penetration and judgment as himself, their evidence is as good to him as his own experience would have been; and if he thinks the witnesses have more penetration and judgment than himself, it is better. There is then no reason why a man should not, under the circumstances supposed, believe an event which is inconsistent with his own experience, as well as one that is consistent with it.

The true cause of all the dispute about the reality of events called miraculous is this: the estimation of the evidence in the particular instance, or instances, has been confounded with the question of evidence generally. As a matter of evidence, any fact may be alleged as the fact to be proved, and the possibility of a proof equal in value to the proof derivable from a man's own observation cannot be denied. But whether any alleged fact has been proved or not, is quite a different question. It is not here said that any supposable fact or event can be proved, but it is said that any supposable fact or event may, by possibility, be supported by evidence as strong as that arising from a man being an eye-witness.

The assertion that any alleged event is inconsistent with experience, may mean either the experience of the objector, or the evidence (that is, the experience) of others; or it may mean both. Taken in its widest acceptation, the assertion cannot be properly made of any fact or event alleged to have taken place; for by the supposition, the event is consistent with the experience of the person who bears evidence to it. If a fact or an event should be told to a person, of which there was no similar event on record, it might be said that experience did not show any similar event; but though this might be a very good reason for examining the evidence most strictly, it is no reason at all against evidence in support of it which is free from all the objections above enumerated.

But it may be said, what does this lead to? It leads to this,—to the admission that any alleged fact or event is a possibility; and it leads to the proper examination of the evidence by which it is supported. Suppose the event to be a shower of stones recorded in Livy. The investigation is relieved of one difficulty by the fact of showers of stones being attested by evidence in modern times much more satisfactory than that of Livy. A man may therefore commence such inquiry by admitting that the particular circumstance recorded by Livy may have taken place; though, if he had not satisfactory evidence of such a kind of events having taken place before, he could not commence his inquiry by making such admission; for the admission that such an event might have taken place could only be made when the event was proved to have taken place, and would then be useless. Further; prior to receiving any evidence, we cannot say that the event is one that could not have taken place. Whether a shower of stones, as recorded by Livy, did fall or not, depends for proof exactly on the same principles as other events recorded by him.

Now many of the facts or events which are called miracles are of the kind which may be considered as unlike any other events on record; the fact, for example, of Jesus raising Lazarus from the dead, which we will suppose, for the present purpose, to be the first event of the kind on record. With reference to an event of this kind, Hume remarks, 'In order to increase the probability against the testimony of witnesses, let us suppose that the fact which they affirm, instead of being only marvellous, is really miraculous; and suppose also that the testimony, considered apart, and in itself, amounts to an entire proof; in that case, there is proof against proof, of which the strongest must prevail, but still with a diminution of its force, in proportion to that of its antagonist.' The opposing proof here referred to is what Hume calls experience, a word which he has used in his Essay in a very loose sense. From what has been said in this article, it will be perceived that the view which the writer takes of evidence is altogether different from that of Hume. If the 'testimony, considered apart and in itself, amounts to an entire proof,' the thing or event is proved, whether it be one kind of thing or another; and this conclusion is logically contained in Hume's words. It is however clear that Hume did not mean to say that which his words do mean; for he urges against this, which would be entire proof if the thing were not miraculous, the objection that it is miraculous; and this is the whole of the matter that his Essay in effect contains, which, as it has been well remarked, 'confounds the principle of belief with the subject-matter to which it is to be applied.' (Starkie, *On Evidence*, i., p. 473, note.)* This is the case in the first part of Hume's 'Essay on Miracles;' the second part merely professes to show that no miraculous events have ever been established on so full evidence as may amount to entire proof.

Every person understands what is meant by the laws of nature. The material world and the world of thought are subjected to certain general laws, or, to speak more accurately, the phenomena succeed one another in a certain order, which, as far as evidence extends backward, has been generally unaltered. We say, generally, for deviations from this order are alleged to have occurred at various times and in various places. Now deviations from those laws are supposed to present, and indeed do present, events which stagger the belief of many persons, and which are regarded by others as totally untrue. Some have gone so far as to say that such events are impossible; thereby destroying the very ground of all evidence, for we can never determine beforehand the truth or falsehood of the matter offered to be proved; unless indeed the thing asserted and proposed to be proved should be a general proposition, and a man should be able by his own experience to contradict it in one or more particular instances: in such case, a man might beforehand deny the thing proposed to be proved. This is in fact Tillotson's argument against the real presence, which Hume 'flattered himself' was of 'a like nature' with the argument that he 'had discovered.'

Hume's definition of a miracle, at least the first part of it, appears unobjectionable: it is defined by him to be 'a transgression of a law of nature by a particular volition of the Deity, or by the interposition of some invisible agent.'

The true notion of a miraculous event then is an event that was inconsistent with the course of nature, as known at the time when the event is alleged to have taken place, and would be inconsistent with it if it were to take place now; and further, it must be such an event as by the supposition is inconsistent with and cannot take place by virtue of the laws of nature as established. If it is an event that happens by virtue of what is called a law of nature, known or unknown, it is not a miracle as the term is properly understood.

If the raising of Lazarus from the dead was an event which took place by virtue of a pre-established law or course of events, in which this one event, to us an apparent exception, was in fact a necessary consequence of this pre-established law or course of events, such event is not a miracle, nor such an event as is generally understood by the word miracle. Those then who would bring miracles within what are called the laws of nature, mistake the question. If the event of the raising of Lazarus from the dead, and all the attendant circumstances, took place in the course of things, agreeably to a general law unknown to us, such an event is as much an event consistent with what are called the laws of nature, as the event of any man's death; but in that case, it is not the kind of event which the 'New Testament' presents to us. Whether however it is the one kind of event or the other, matters not as to the evidence of it, which is in no way concerned about the kind or quality of the event.

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* It may not be improper to add, that the writer by no means assents to all the arguments contained in the note referred to.

To take then the case of a man being raised from the dead; can the evidence of such a fact amount to proof? It can amount to proof as strong as that which a man would derive from being an eye-witness of such an event, and having every opportunity of examining it. Whether, in a given instance, the proof is so strong as this, must be ascertained by weighing the evidence, which is quite a different matter from the possibility of such an event being proved, which is all that is here insisted on. Whether the proof, when made as strong as we have supposed, will convince a man, is no longer a matter that in any way belongs to the general question of evidence. The judgment that a man will form on the report of others must be left to himself. As a man must always decide for himself whether he will trust his own senses, so he must also decide whether he can believe that which a credible witness says that he has seen.

There is still another view of the kind of events called miraculous, which is taken by Brown, who thinks that it is not easy to get the better of Hume's sceptical argument, if we admit his definition of a miracle. Brown affirms that a miracle is not a violation of a law of nature, but a new consequent from a new antecedent, the new antecedent being the will of the deity. 'A miracle,' he says, 'is not a violation of the law of nature.' 'In a miracle it is the divine will that, preceding it immediately, is the cause of the extraordinary effect which we term miraculous, and whatever may be the new consequent of the new antecedent, the course of nature is as little violated by it as it was violated by the electrician who for the first time drew lightning from the clouds.' It is sufficient to observe, that as Hume's definition of a miracle admits the existence of the deity, that which he calls a transgression of a law of nature by a particular volition of the deity can be nothing more than a variation by the will of the deity in the phenomena of nature as known to man by his own experience and the evidence of others. Hume's definition then of a miracle does not differ from Brown's account of the matter, except that Brown, while he calls the thing a miracle, denies that it is a violation of the law of nature; and also includes among miracles those events which, whether called miracles or not, are not the same kind of events which Hume and theologians in general call by the name of miracles. Now inasmuch as a law of nature cannot, consistently with Hume's definition, be anything except a certain order in the phenomena which the deity has permitted and permits to take place, and which by the terms of the definition he can vary as and when he pleases,—in this sense, and with reference to the deity, no event can be said to be a violation or transgression of a law of nature, such terms being totally inapplicable to the will of the deity. But inasmuch as the sequence of phenomena as known to man is generally unvaried and regular, any interruption or transgression of such sequence may, with reference to man, be called a violation or transgression of a law of nature, with perfect consistency of language; and by such violation or transgression nothing else can be intended by those who can think with precision, than something which is contradictory to the course of nature as known to man, and not something, as electricity for instance, of which man, up to the time of the proper experiments being instituted, merely had no knowledge, and which, upon further examination, turns out to be perfectly consistent with all man's previous and all his subsequently acquired knowledge of phenomena. After all, it is rather strange that Brown should not have perceived that neither Hume's definition of a miracle, nor his own account of 'the extraordinary effect which we call miraculous,' can vary the event itself, which, by whatever name it is called, remains the same event, simply considered as an event, and is to be proved by precisely the same evidence.

Much has been written on the subject of miracles, both in connection with the general principles of evidence, and by way of reply to Hume's Essay. Though a great deal of it is of little value, it may be worth referring to by those who are desirous of forming clear notions on the subject of evidence.

(Rutherford, *Discourse on Miracles*, 8vo., 1751; *Credibility of Miracles defended*, 8vo., 1751; Adams, *Answer to Hume on Miracles*, 8vo., 1754; Campbell, *Dissertation on Miracles, in Answer to Hume*, 8vo., 1762; Bishop Douglas, *Criterion, &c.*, 8vo., 4th ed., 1832; Locke's *Posthumous Works*, 'Discourse of Miracles;' Bishop Conybeare, *On the Nature, Possibility, and Certainty of Miracles*, 8vo., 1722; Chubb, 'Discourse on Miracles,' in his *Miscellaneous Works*; Lardner's *Credibility*; Middleton, *Free Enquiry*; Paley's *Evidences of Christianity*; Price, *On the Nature of Miracles*; Woolston, *Six Discourses on the Miracles of Our Saviour, &c.*, 8vo., 1730; Ray, *Christ's Miracles vindicated*, 8vo., 1731; Bentham, *Rationale of Judicial Evidence*; Brown's *Inquiry into the Relation of Cause and Effect*.)

The above-mentioned works will furnish references to others.

MIRAGE. This word, which is French, has been received into our language. It is the name given to a phenomenon of unusual refraction, for which we have no specific appellative unless it be the sea term *looming*. As a general definition, we may say the mirage is an optical illusion occasioned by the refraction of light through contiguous masses of air of different density, such refraction not unfrequently producing the same sensible effect as direct reflection.

The illusions of the mirage differ according to circumstances, but they may all be arranged under one or other of the three following classes—vertical reflection, horizontal or lateral reflection, and suspension.

In the vertical reflection the mirage presents the appearance of a sheet of water in which objects are reflected, and of course reversed as they would be in a lake. It is this kind which is observed in Egypt, and which so cruelly tantalised the parched throats of the French soldiers during the campaign of Napoleon in that country. The effect of this mirage is thus described by Monge, one of the savans who accompanied the army. The soil of lower Egypt is a vast plain perfectly horizontal; its uniformity is interrupted only by a few eminences on which, in order to secure them from the inundations of the Nile, the villages are built. In the morning and evening the aspect of the country presents nothing remarkable, all objects appearing in their natural positions and at their proper distances; but after the soil has become heated by the presence of the sun, the prospect seems bounded by a general inundation. The villages beyond appear as islands in the midst of a great lake. Under each village its inverted image is seen as it would be if reflected from the surface of a sheet of water. On approaching however, the deceptive inundation recedes, and the reflected image vanishes, to be succeeded by another as some more distant object comes in sight.

This kind of mirage is not peculiar to Egypt; it is known in Persia also, where it is called *Serab* or *Sir-ab* (miraculous water); and it is seen by those who cross the western deserts of India, where it is known by the name of *Tchittram* (picture). Neither is it exclusively confined to inland countries nor low plains. Biot has observed it over the sandy beach of Dunkirk, and it is not unfrequent along the coast of the department of Calvados. The writer of this article has seen it at the Cape of Good Hope. Captain Maundy states, that he observed an effect of the mirage at the Shallout Pass in India. 'A deep precipitous valley below us,' says he, 'at the bottom of which I had seen one or two miserable villages in the morning, bore in the evening a complete resemblance to a beautiful lake. The vapour, which played the part of water, ascending nearly half-way up the sides of the vale, and on its bright surface trees and rocks being distinctly reflected.'

In the horizontal or lateral reflections the mirage presents the reflected image sideways. Thus, on the 17th of September, 1818, Messrs. Jurine and Soret observed a lateral mirage on the lake of Geneva. A bark, about 4000 toises distant, was seen approaching Geneva by the left bank of the lake, and at the same moment there was seen above the water an image of the sails, which, in place of following the direction of the bark, receded from it, and seemed to approach Geneva by the right bank of the lake, the image sailing from east to west, while the bark was sailing from north to south. This lateral mirage is known to the inhabitants of Merou, who call it *Si-kotè* (castle of the cold season); and by such as live in the plains watered by the Chumbul and the Jumna, where it is termed *Dissaser* (prognostic).

Colonel Todd mentions having witnessed this kind of mirage at Jaypoor, Rottah, and Hissar. He describes it as a high dark wall bounding the plain, which, as soon as the sun's rays break in upon it, presents various fantastic forms of ruins, such as, we may imagine from his description, may be not unaptly figured by the natural designs in what is called Florentine marble. Its force of refraction is such, says the Colonel, that it presented to my view the fort and bastions of Agarroa, distant thirteen miles. The natives of Hissar call it *Hertchendraja ka pouri* (the city of the rajah Hertchend), a celebrated prince of the brazen age of Hindustan.

In like manner Dr. Vince, on the 6th August, 1806, at 7 P.M., saw the whole of Dover Castle brought over and placed on the Ramsgate side of a hill situated between the two places and he adds, the image was so strong, that the hill itself could not be seen through it. The French coast is sometimes brought almost in contact with our own by the illusion of the lateral mirage. Thus, on the 26th July, 1798, at Hastings, at 5 P.M., Mr. Latham saw the French coast, which is about 40 or 50 miles distant, as distinctly as through the best glasses. The sailors and fishermen could not at first be persuaded of the reality of the appearance; but as the cliffs gradually appeared more elevated, they were so convinced, that they pointed out and named to Mr. Latham the different places they had been accustomed to visit, such as the bay, the windmill at Boulogne, St. Valery and other places on the coast of Picardy. All these places appeared to them as though they were sailing at a small distance into the harbour. From the eastern cliff Mr. Latham saw at once Dungeness, Dover Cliffs, and the French coast all the way from Calais, Boulogne, on to St. Valery and, as some of the fishermen affirmed, as far as Dieppe. The day was extremely hot, without a breath of wind, and objects at some distance appeared greatly magnified.

In particular situations both the vertical and lateral mirage may be observed together. Thus the late Mr. Blackadder has described some phenomena of both vertical and lateral mirage, as seen at King George's Bastion, Leith, which are very instructive. The extensive bulwark, of which this bastion forms the central part, is formed of huge blocks of hewn sandstone, and from this to the eastern end the phenomena are best seen. To the east of the tower the bulwark is extended in a straight line to the distance of 500 feet. It is eight feet high towards the land, with a footway about two feet broad and three feet from the ground. The parapet is three feet wide at top, and is slightly inclined towards the sea.

When the weather is favourable, the top of the parapet resembles a mirror, or rather a sheet of ice; and if in this state another person stands on it also, but at some distance, with his face turned towards the sea, his image will appear opposite to him, giving the appearance of two persons talking to or saluting each other. If again, when standing on the foot-way and looking in a direction from the tower, another person crosses from the eastern extremity of the bulwark, passing through the water-gate either to or from the sea, there is produced the appearance of two persons moving in opposite directions, constituting what has been termed a lateral mirage: first, one is seen moving past, and then the other in an opposite direction, with some interval between them. In looking over the parapet, distant objects are seen variously modified, the mountains in Fife being converted into immense bridges; and on going to the eastward extremity of the bulwark and directing the eye towards the tower, the latter appears curiously modified, part of it being, as it were, cut off and brought down, so as to form another small and elegant tower in the form of certain sepulchral monuments. At other times it bears an exact resemblance to an antient altar, the fire of which seems to burn with great intensity.

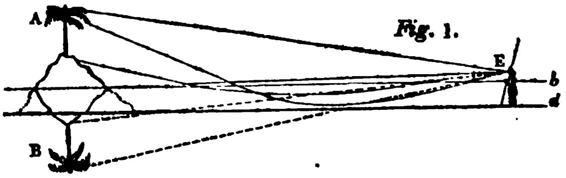
The phenomenon called suspension, which is the third kind of mirage, and is that to which the term looming is most strictly applied, is the picturing of an object immediately over it in the air, frequently without reversion of the image. Sometimes the objects are merely raised above the height at which, under ordinary circumstances, they would appear. Thus Sir R. K. Porter mentions a phenomenon of suspension or looming in the plains near Bagdad. 'A little before morning,' says he, 'I observed an elevated stream of water, which, from its situation, must be the Tigris. Its surface was brilliantly illuminated by the moon, but the longer I kept my eye fixed on this noble river of many interests, the more my surprise became excited at the extraordinary height of its waters above the level of the desert, till at length I began to suspect that some optical illusion from refraction was assisting the apparent elevation of the stream; but I had not conceived the extent of the deception, for as the dawn advanced the phantom river totally sunk from my sight.' The phenomenon of the looming is most generally observed at sea or near the shore. At Reggio the celebrated Fata Morgana is visible, which for many centuries astonished the vulgar and perplexed philosophers. A spectator on an eminence in the city, with his back to the sun and his face to the sea, and when the sun shines from that point whence its incident rays form an angle of about 45° on the sea, sees upon the water numberless series of pilasters, arches, castles well defined, regular columns, lofty towers, superb palaces with balconies and windows, villages and trees, plains with herds and flocks, armies of men on foot and on horseback, all passing rapidly in succession on the surface of the sea. These same objects are, in particular states of the atmosphere, seen in the air, though less vividly; and when the air is hazy and dewy, they are seen vividly coloured or fringed with all the prismatic tints. The image raised by suspension is sometimes reversed: the most remarkable instance of this is perhaps that mentioned by Captain Scoresby, who, in 1822, recognised his father's ship, the Fame, by its inverted image in the air, although the ship itself was below the horizon, and thirty miles off.

It frequently happens that the phenomenon of the vertical mirage is combined with that of suspension, so as to show in the air both a direct and an inverted image of the object, the latter being undermost.

Now all these phenomena and their various modifications depend on the different density of the lower strata of the air, and as this difference of density may be occasioned both by heat and moisture, and as heat may be reverberated from the mountain's side as well as from the horizontal surface of the plains, from the sea as from the land; and further, as contiguous columns of air, as well as horizontal strata, may be of different densities, it is easy to conceive why the mirage may be seen in very different situations, as also why it presents such varied appearances. It will also be evident that any cause which re-establishes the equilibrium of density in the different portions of the air must cause the illusions of the mirage to vanish.

Supposing the nature of refraction to be understood, the explanation of the way in which difference of density in different strata of the air occasions the mirage becomes very simple.

Fig. 1.

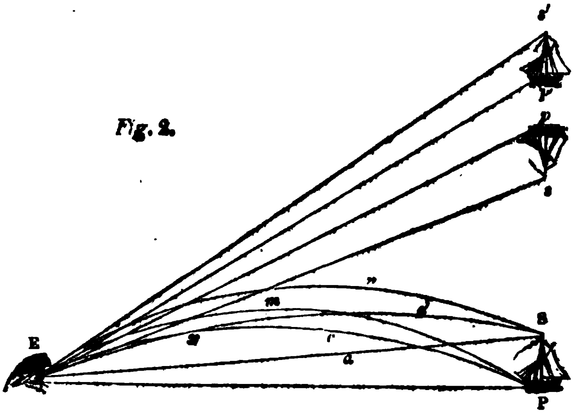


Let A represent an object on a hill; *a b c d*, a stratum of air heated by the reverberation from the soil beneath, so as to have a less density than that of the air above. Now if an observer's eye be at E, he will see the object by direct vision in its proper place, and also a reversed image of the same just below it at B, because the rays coming from it obliquely towards the ground are refracted from their direct course on entering the less dense inferior stratum of air, and, taking at first a direction inclining to the horizontal are afterwards bent up so as to meet the eye of the observer at E who thus sees the indirect image in the direction B, or exactly as it would appear if reflected; and moreover as the rays from that part of the heavens which form the background to the object are refracted in the same manner, the sky is reversed as well as the object, and presents the appearance of a sheet of water.

If the lower stratum of air be denser than the strata above, and the object be seen by direct vision through the denser stratum, then the curve or trajectory, instead of being convex towards the earth, will be concave, and the reversed image will be seen as if suspended in the air above.

Double images, and such are not unfrequent, are explained in this way. Let S P be a ship in the horizon, seen at E by means of rays S E, P E, passing in straight lines through a tract of air of uniform density lying between the ship and the eye. If the air is more rare at c than at a, which it may be from the coldness of the sea below a, its refractive power will be less at c than at a. In this case, rays Sd, Pc, which, under ordinary circumstances, never could have reached the eye at E, will be bent into curve lines Pc, Sd; and if the variation of density is such that the uppermost of these rays Sd crosses the other at any point x, then Sd will be undermost, and will enter the eye E as if it came from the lower end of the object. If Ep, Es, are tangents to these curves or rays, at the point where they enter the eye, the part S of the ship will be seen in the direction Es, and the part P in the direction Ep; that is, the image S P will be inverted. In like manner other rays Sn, Pm, may be bent into curves SnE, PmE, which do not cross one another, so that the tangent Es' to the curve or ray Sn will still be uppermost, and the tangent Ep' undermost. Hence the observer at E will see an erect image of the ship at $s'p'$ above the inverted image sp. It is quite clear that the state of the air may be such as to exhibit only one of these images, and thus these appearances may be all seen when the real ship is beneath the horizon. It is also evident, that if these different densities affect vertical columns of air instead of horizontal strata, the same phenomena may be produced laterally.

Fig. 2.



All the phenomena known by the names of the *enchanted island*, *Cape Fly-away*, the *flying Dutchman*, &c., are effects and modifications of the mirage.

These unusual refractions were known to the antients, and are well described by them, though they seem not to have understood the rationale of the phenomena. Quintius Curtius (vii. 5), speaking of the desert of Sogdiana, says, 'for the space of 400 stades there is not a drop of water; the violence of the sun's rays in summer kindles such an intense heat in the sand, that everything is burnt up; there also arises such a quantity of exhalations from the overheated earth, that day-light disappears and the plains offer the appearance of a deep and extensive sea."

MIRANDA. Seventeen places of this name are mentioned in Miñano's 'Diccio. Geograf. de la Peninsula.' The following are worth notice:—

In Portugal:—Miranda do Corvo, 4½ leagues south-east from Coimbra, is situated on the Dueça, over which there are two bridges. It contains 3881 inhabitants, or 6298, if we include two parishes that are without the boundaries of the town.

Miranda do Douro (perhaps the Roman Contia or Sepontia Parámica) is the capital of a district of the same name in the north-east part of Tras-os-Montes, a province composed of three other similar divisions, the comarcas of Braganza, Torre de Moncorvo, and Villa Real. It is divided from the Spanish provinces of Zamora and Salamanca by the Douro, on the right bank of which river this city stands. It was destroyed by the barbarians and rebuilt by Alfonso I. in 1136. The population of the city is 7000, and of the comarca 31,700. It is in 41° 22′ N. lat. and 6° 10′ W. long.

In Spain:—Miranda de Arga, situated on the left bank of the river Arga, 5½ leagues south of Pamplona, and 2½ west of Olite and of Tafalla. The population is 1643. At this place (not at Miranda de Ebro) was born Sancho Carranza, the master of Gines de Sepulveda, and the author of a well known Latin discourse delivered before Leo X., printed at Alcalá, in 1523. It is also the birth-place of Bartholomew Carranza (a nephew, not a brother, of the former), one of the luminaries of the council of Trent. The second dignity in the Roman Catholic church, the Spanish primacy, together with his eminent talents and virtues, which were duly esteemed by Charles V. and the pope, could not save this ornament of the church from the Inquisition, which, after keeping him prisoner in Spain and at Rome, wrung an abjuration from this old man in his seventy-second year, and confined him in the Dominican convent of his order, La Minerva, where he soon died.

Miranda de Ebro (Miroeca, Miranda Iberica, Deobriga) is intersected by the Ebro, the two principal parishes being on the right and a third on the left bank. It is 14 leagues south of Bilboa, and 64 north of Madrid. This town is beautifully and conveniently situated on the chief north road of Spain, and within the frontier of Old Castile. Travellers who come from the free Basque Provinces are examined here, and their goods are subject to the payment of duties. Here also begins the fine road which extends to Guipuscoa, the expense of which was defrayed by the province of Alava. This town has a strong bridge of six arches over the river, and a fine square, with fountains. The surrounding country is very picturesque and fertile. It abounds in secondary limestone. The population is 2390. It is not this, but another Miranda de Duero (Douro, in Portuguese), 3 leagues from Soria, which gave birth to the cardinal Iñigo Lopez de Mendoza y Zuñiga, archbishop of Burgos, ambassador to England and Naples, and the biographer of the abovementioned Sancho Carranza. There is also a Miranda in the kingdom of Naples, in the province of Sannio, one league and a half north-east of Isernia.

MIRANDA, SA DE, one of the earliest poets of Portugal, and one of the chief founders of Portuguese literature, was born at Coimbra about the year 1495. He was of a noble family, and being intended by his father for the legal profession, was educated accordingly, and became professor of law in the university of his native town. Having however no inclination for such studies, upon the death of his father he resigned his appointment, and visited Spain and Italy, chiefly for the purpose of studying the languages and literature of those countries. On his return to Lisbon he obtained an appointment at court, where he was regarded with much esteem, but was afterwards obliged to retire to his country seat of Tapeda, near Ponte de Lima, in the province of Entre Douro y Minho, in consequence of some unpleasant affair in which he involved himself. In this seclusion, so well suited to his melancholy turn of mind, he devoted the remainder of his days to rural enjoyment, to his literary studies and occupations, and to music, of which he is said to have been passionately fond. It was also his good fortune to have for the companion of his retirement a wife to whom he was tenderly attached, although she was neither very young nor very beautiful when he married her. In 1553 he had the misfortune to lose his son, who was killed in Africa, and whose death he has bewailed in an elegiac composition of a strong devotional cast. His own death happened in 1558, and was an event that excited general regret. Sa de Miranda has been styled the poet of reason and virtue; and it has been said of him that he was a philosopher in poetry and a poet in philosophy. Yet greatly as the literature of his country is indebted to him (and he was the first to adopt the metres of Dante and Petrarch), few of his productions are of a class to interest the modern reader. Except as specimens of language and versification, frigid eclogues and detached thoughts in the form of sonnets—not many of which are of striking merit—possess scanty attraction at present, for they have not even historic value as portraying the manners and sentiments of their own age. A considerable number of his compositions, and among them some of his best, are written in Spanish, a fashion in which he had afterwards many imitators, greatly to the prejudice of the native literature. As a dramatist, again, he not only imitated those of Italy, Macchiavelli and Ariosto, but laid his scenes in that country, and described Italian manners and characters. This however is of less consequence, as neither of his two pieces, 'Os Estrangeiros,' and 'Os Vilhalpandos,' (and he produced no others,) shows much dramatic skill in contrivance, or comic power in execution. What is chiefly remarkable in them is the freedom with which the dissolute morals of the Italian clergy are delineated by one who was himself a rigorous Catholic. His *Cartas*, or poetical epistles, are of far greater intrinsic value than any of his other productions, and are interesting as records of the state of morals and manners in Portugal in the first half of the fifteenth century. They also throw some light on the poet's personal character, and show him to have been of a good disposition and a sincere well-wisher to his countrymen.

MIRANDA, FRANCISCO, the founder of the independence of Spanish America, was born about the middle of the last century, at the city of Caracas, of which province his grandfather had been governor. He travelled on foot at the age of twenty through various parts of the New Continent. He afterwards became a colonel in the Spanish army, and was entrusted occasionally with important matters by the governor of Guatemala. In 1783 he visited the United States, and afterwards travelled on foot through England, France, Italy, and Spain, a country which he detested. Even at that time he ventured to speak of the emancipation of his own country to Pitt and to Catherine II., who treated him with great regard, especially the empress, who entreated him to enter into her service; but the nigh expectations of the French revolution, being far more congenial to his own, drew Miranda from Petersburg to Paris in 1790. He was warmly welcomed there by Péthion, to whom he was recommended by the leaders of the opposition in the English parliament, and in consideration of this recommendation, as well as of his military talents and enthusiasm for the popular cause, he was appointed major-general to Dumouriez, who was sent against the Prussians, then intent on putting down the French cause lest it should become a European question. But unfortunately Miranda did not answer the expectations of his new friends, either in raising the siege of Maastricht, on account of General Valance not coming to his assistance, nor at the battle of Neerwinde, where the left wing of the army was defeated, a reverse which Dumouriez imputed to Miranda. This charge however he most ably and triumphantly refuted, with the assistance of Tronçon Ducoudrai, before the revolutionary tribunal, which sat eleven days on this case, and, greatly to their credit, acquitted an innocent foreigner whose life was demanded by humiliated national pride, and who was then bereft of all patronage, since the Girondists were no more. Being again seized and condemned by the Directory on the 18th Fructidor, Miranda escaped, and came as a refugee to England. He returned to Paris in 1803, whence he was banished, a second time, by Bonaparte. Finally, he devoted himself exclusively to his country's independence. He sailed from New York, in 1806, with a ship and some volunteers, and touched at St. Domingo, where he chartered two schooners, which were captured by Spanish cruisers (*guarda costas*). He himself escaped with his ship, and landed at Venezuela in the month of August. He sustained however a complete defeat, which prostrated the American cause till 1810. The supreme junta of Caracas for a moment roused the Spanish Americans again in favour of Ferdinand, who was then a captive of Napoleon, and subsequently against Napoleon's sway, April 9, 1811. But the cause of independence went on prosperously till the same day of the following year (1812), when a tremendous earthquake destroyed 20,000 persons in Caracas, La Guayra, and Merida. The clergy took advantage of the calamity, and stigmatised the patriots as enemies to God, whose anger they had provoked by their rebellion. This fanatical outcry worked on the terror of the people, which was already great, and gave the Spanish army a complete triumph. General Miranda was forced to surrender, but he surrendered last of all, and not without honour. But a hard fate still awaited him; for, when he was about to leave the country, he was arrested by some of the officers of the independent party, and accused by Bolivar of being a traitor, and a secret ally of the British cabinet. Such a charge was strange indeed (if it does not provoke a heavier censure) at a time when both British interests and sympathies so effectually coalesced, in spite of diplomatic professions, in forwarding the emancipation of the Spanish colonies. The assistance and the money which it was alleged that Miranda had derived from English officers and friends, ought to have endeared him to all his countrymen whom envy had not debased. Nor should it be forgotten that Bolivar obtained a safe conduct to retire to Curaçao from the Spanish general Monteverde, to whom he delivered his prisoner Miranda. Monteverde, instead of protecting a man who was the victim of jealousy and envy, violated his agreement with Miranda, and sent him in chains to Spain. He was lodged in the prison of the restored Inquisition at Cadiz, till 1816, when death released from his sufferings this most unfortunate veteran and martyr of American freedom.

MIRANDE. [Gers.]

MIRA'NDOLA. [Modena; Pica della Mirandola.]

MIRECOURT. [Vosges.]

MIRE-CROW, a name for the Laughing Gull. [Laridæ, vol. xiii., p. 335.]

MIRE-DRUM, a name for the Bittern.

MIREPOIX. [Arriege.]

MIREVELT, MICHAEL JANSEN, born at Delft in Holland, in 1568, was one of the ablest and most successful painters of the Dutch school. He was a disciple of Abraham Blockland, and at the beginning of his professional career painted historical subjects. Finding however a great demand for portraits, he was induced, as many other artists have been, to abandon the higher but less advantageous department of the art for the more lucrative branch of portrait-painting, in which he acquired such extensive reputation, that he was invited by King Charles I. to visit his court; but as the plague was raging at that time in London, he was deterred from accepting so advantageous an offer. His portraits were esteemed for the extraordinary accuracy of the likeness, for good taste, high finish, and great freedom of pencil. The esteem in which he was held and the extent of his practice are proved by the number of portraits which he painted, which Houbraken states to have been five thousand; Sandrast, and after him Descamps, and the 'Abrégé de la Vie des Peintres,' say ten thousand, which is quite incredible, though Sandrast indeed makes him to have lived to the age of ninety, whereas all other writers agree that he died at the age of seventy-three, in 1641, in the town of Delft, which he had never quitted, except occasionally to visit the Hague, to paint the portraits of some of the princes of the house of Nassau, by whom he was highly esteemed. He must have made a large fortune, for he never received less for his smallest pictures than 150 florins (15*l.*), and more in proportion for those of a larger size.

MIROUNGA, Mr. Gray's name for a genus of *Seals* [Phocidæ.]

MIRROR (from the French *miroir*), any polished surface which reflects light so as to form an image. The mathematical theory will be found under Speculum.

MISCHNA. [Mishna.]

MISDEMEANOR is a term applied in the law of England to crimes and offences, whether of commission or of omission, less than felony. [Felony.]

At common law, persons convicted upon an indictment [Indictment] for a misdemeanor are punishable by such fine, or by such term of imprisonment short of imprisonment for life, or by such amount both of fine and imprisonment, as the court before which the offenders are convicted, in its discretion awards. By several statutes special modes of punishment are provided for some particular misdemeanors. But it frequently happens that even in creating new misdemeanors, the legislature affixes no particular punishment. In such cases, the newly constituted offence is punishable as a misdemeanor at common law. Generally, wherever a statute prohibits an act, as a matter of public grievance, or commands an act, as a matter of public convenience, all things done or omitted contrary to the prohibition or command are punishable as misdemeanors at common law; it being a common-law offence to disobey a statute, even though the act or omission be not attributable to a corrupt motive. Where a statute, in respect of an offence which was a misdemeanor at common law, provides a mode of proceeding different from that of the ordinary course by indictment, either the extraordinary or the ordinary mode may be adopted. Thus if a statute give authority to the court of quarter-sessions to make an order respecting some particular matter, and prescribes a particular remedy in case of disobedience, a party disobeying an order made in pursuance of the statute may be proceeded against either in the mode prescribed by the statute or by indictment. He would be guilty of a misdemeanor at common-law, both as having disobeyed a public statute, and as having disobeyed an order made by a court having authority to make such order. Where however a statute has made a matter a felony which before was a misdemeanor only, the offender cannot be indicted for the misdemeanor, as the minor or lower offence is said to be merged, that is, drowned or absorbed, in the higher. [Misprision.] Where a statute creates a new offence, by making unlawful that which was lawful before, and appoints a summary mode of proceeding, the specific statutory course must be pursued, and an indictment will not lie. An act done in contravention of a statute which extends only to private persons, or relates to disputes of a private nature, cannot be made the subject of an indictment; for no injuries of a mere private nature not in any degree concerning the king, and not accompanied by a breach of the peace, can be made the subject of a criminal prosecution. Nor will an indictment lie for an infraction of the bye-law of a corporation. But under some circumstances an indictment will lie for a personal injury, where the act or omission amounts to a violation of duties incumbent on the party as a member of civil society, as in the case of a parent wilfully omitting to supply proper food to an infant unable to provide for itself. Where a child is put out apprentice by an order of magistrates, the master, if he refuse to provide for the child, may be indicted for disobedience of such order. Any act of wilful negligence, whereby human life is endangered, is a misdemeanor; as to put on board a ship a package containing gunpowder, oil of vitriol (sulphuric acid), or other dangerous articles without giving notice of the contents of the package, so as to enable the master of the vessel to use proper precautions in stowing it. Every act done for the purpose of committing either a felony or a misdemeanor, is itself a misdemeanor.

As to the course of proceeding upon indictments for misdemeanors, see Traverse.

Where a peer or a commoner is impeached by the House of Commons for a misdemeanor, the lords spiritual as well as the lords temporal are judges. The judgment is pronounced by the lord chancellor, and it is binding though the king dissent from such judgment; whereas in capital cases the royal assent is necessary, and the judgment is pronounced by the lord-high-steward. [Steward.]

MISE'NUM. [Naples.]

MISHNA. [Hebrew Language.]

MI'SILUS, a genus of *Foraminifera*.

MISITRA, or **MISTRA**. [Laconica; Sparta.]

MISPRISION (from *mesprendre*, which means sometimes to deal improperly with, sometimes to treat with contempt), is a term used in English law in different senses.

I. In the sense of criminal nonfeasance, or neglect to perform important public duties, the term is applied to concealment of treason or felony. Misprision of treason consists in a party's withholding his knowledge of a treason committed or about to be committed, or in omitting to give information respecting it within a reasonable time to some public authority. If the concealment or omission to reveal the treason be accompanied by express assent to the treasonable act or purpose, or by any circumstances from which a tacit assent will be implied, the party is guilty of high treason, as well as of misprision of treason; and the crown may prosecute either for the higher or the lower offence. Misprision of treason is a misdemeanor [Misdemeanor], punishable by imprisonment for life and the forfeiture of the personal property of the offender absolutely, and of the rents and profits of his real property for life.

Misprision of felony is a similar concealment in respect of felonies, and it is punishable by fine and imprisonment. In some, if not in all cases of felony, the party may be proceeded against for the minor offence, or misdemeanor, although a felony has actually been committed by him.

The concealment of treasure-trove [Treasure-Trove] is another species of criminal neglect, which constitutes a misprision punishable by fine and imprisonment.

II. Misprision by malfeasance, (by doing something which ought not to be done,) is the commission of such misdemeanors as are construed to involve a contempt of the royal authority or prerogative. Maladministration in high offices of public trust, though indictable as a misprision, is commonly, on account of its importance, made the subject of parliamentary impeachment.

It is a contempt of the prerogative to refuse to assist the king when called upon, either in his councils by advice, or in his wars by personal service within the realm in cases of invasion or rebellion; to refuse to join the posse comitatus, or power of the county, when duly required by the sheriff or justices; to accept a pension from a foreign potentate without the consent of the king; to go abroad when forbidden so to do either by writ of ne exeat regno, or by a general proclamation, or to neglect to return from abroad when commanded by the king's letters; to disobey an act of parliament where no particular penalty is enacted; to speak or write against the king's person or government, or do any thing tending to lessen him in the estimation of his subjects; to weaken his government, or to raise jealousies between him and his people; to deny the king's title to the crown in common unadvised speech [Præmunire]; to use threatening or reproachful words to a judge in court; to assault or threaten the adverse party in a suit, or his counsel or attorney, or a juror for his verdict, or a gaoler or other officer for exceeding his duty; to commit an affray near the courts of Westminster Hall, or at the assizes, but out of the view of the judges; to dissuade a witness from giving his evidence; to advise a person to stand mute; to disclose an examination before the privy-council or a grand-jury. All these are positive misprisions or contempts, punishable by fine and imprisonment. Maliciously striking in the palace in which the king resides, whereby blood is drawn, is punishable by fine, forfeiture, imprisonment, and loss of the offender's right hand. Rescuing a person from the custody of one of the superior courts of justice, in Westminster Hall, or at the assizes, is punishable by imprisonment for life, forfeiture of personal property, and forfeiture of the rents and profits of real property during life. A stroke or blow given in any of these courts, whether blood be drawn or not, or an assault upon a judge whilst he is sitting in court, by drawing a weapon, though no blow be struck, subjects a person to the same penalties as those last mentioned, and also to the additional punishment of loss of the right hand.

The misprision which is stated above to be included in the actual commission of treason or felony, may be referred to this second division, as it consists in mal-feasance rather than in non-feasance. There is also one species of misprision of treason by malfeasance, created by act of parliament. The 13th Eliz., cap. 2, enacts that those who forge foreign coin, their aiders, &c., shall be deemed guilty of misprision of treason. (3 Blackst. *Comm.*, 119.)

III. The term misprision is also applied to careless but involuntary mistakes, or, as they would now be called, clerical errors, particularly those committed by public officers in entering the proceedings in a cause or in a judicial proceeding upon the rolls or records of the court; though it is also applied to misrecitals and mistakes in deeds, &c. (Roll. *Abr.*, 'Grant.')

MISSAL (from the Latin *missa*), the book or ritual containing the several masses to be used on particular days or feasts.

The Roman missal was originally compiled by Pope Gelasius, and afterwards reduced into better order by Gregory the Great, who called it the Book of Sacraments. The 'Missale Romanum, ex decreto Concilii Tridentini restitutum,' is that at present in use. We have an edition before us, printed at Rome, in folio, 1826.

Antiently, each diocese, and each order of Religious, where they chose, had their particular Missal, accommodated to the festivals of the province or order. Such were the 'Directorium Missæ Ecclesiæ Moguntinensis;' the 'Missale Ecclesiæ Herbipolensis,' fol., Herbip., 1484; the 'Missale secundum rubricum Archiepiscopatus Ecclesiæ Pragensis,' fol., Norimb., 1508; and such in England were the Missals of the churches of Hereford, York, and Sarum, the last of which continued to be printed as late as 1557. Among the Missals prepared for the orders of the Religious may be named, the 'Missale secundum ritum et ordinem sacri Ordinis Præmonstratensis, authoritate Joan de Pruetis, Abbatis Præmonstratensis, auctum et editum,' fol., Par., 1578; and the 'Missæ propriæ Sanctorum trium Ordinum Fratrum Minorum ad formam Missalis Romani redactæ, et exactius examinatæ; additis Missis à sacra Rituum Congregatione noviter concessis et approbatis,' fol., Ven., 1700.

We have also the 'Missale Illyricum,' 4to., Ven., 1528, the 'Missale Chaldaicum, juxta ritum Ecclesiæ Maronitarum,' fol., Rom., 1592; and the 'Codex Mysterii Missæ Armenorum, seu Liturgia Armena,' *Lat. et Armen.*, fol. Rom. 1677.

The Missals of the thirteenth, fourteenth, and fifteenth centuries, written previous to the discovery of the art of printing, present us, in many instances, with the finest specimens of illumination now preserved in our libraries.

MISSEL-THRUSH. [Thrush; Merulidæ.]

MISSELTOE, a parasitical plant found wild in this country, is the Viscum album of botanists, and is in many respects a production of great interest to the physiologist. Instead of describing so very common a plant as this is we shall advert to some of the more striking facts connected with it. The seeds in germination seem to offer an exception to a general law, that the radicle of the embryo shoots downwards, and the plumula upwards; for it is found that the radicle of the misseltoe invariably turns itself down upon the body to which it is attached, whatever may be the position of the surface of that body with respect to the earth. For instance, if a cannon ball, to which misseltoe seeds are glued on all sides, be suspended by a cord some distance from the earth, both the upper and under seeds, as well as those at the sides, all direct their radicle to the surface of the ball. This property ensures their growing upon the branches of trees, to whatever side they may happen to stick. According to Dutrochet, they owe this property to a tendency on the part of the radicle of the misseltoe to avoid light; he attached seeds to the inside of a square of glass in a window, and the radicles were all directed to the interior of the apartment; he then glued others upon the outside of the squares, and they turned their radicles down upon the glass, thus directing themselves towards the dark interior; and other experiments were tried with the same result.

In fixing itself upon a branch, the embryo of the misseltoe curves its radicle down upon the bark, and then adheres firmly to it, and it is a twelvemonth before the plumula begins to extend; this may be to give the radicle time to pierce the bark and introduce itself below the liber, where it expands and acts the part of a root by attracting thence the fluids which are necessary for the support of the parasite.

It is not a little remarkable that in the structure of its ovary this plant, and others of its order, should offer the singular fact of the ovule not existing at the time of impregnation, nor appearing till from six weeks to two months later; at present no explanation has been offered of this very unintelligible circumstance.

The fruit, which is covered with a viscid pulp, is made by the Italians, and even in Herefordshire, into a kind of birdlime; and as it is a favourite food of the large or *missel* thrush, it is thought to have given rise to the proverb, 'Turdus malum sibi cacat.'

The plant is not of any known use to man, and is of popular interest chiefly as having been connected with Druidical superstitions. The misseltoe of the Druids was exclusively that found upon the oak, and was possibly so much valued because of its rarity; for its appearance on that tree is now so rare, that many persons have believed the Druids' misseltoe either to have been some other plant or to have had no real existence. But it has lately been found on more than one oak-tree in Herefordshire, and it is probable that it was plentiful in the oak woods of Snowdon before the damp western parts of Britain were disforested. A good account of the misseltoe will be found in Loudon's *Arboretum Britannicum*, vol. ii., p. 1021.

MISSIONS. The 15th verse of the 16th chapter of *Mark* is the great scriptural authority for missions. In the sixth century (590-604) Pope Gregory the Great sent missionaries to Britain, to convert the people to the Christian faith. Similar means were adopted in other countries, until, about the close of the tenth century, when the Christian religion had become the prevailing faith throughout Europe. Other fields for missionary exertion were then sought. Attempts were made to propagate Christianity in Tartary and China; and the Portuguese, who visited Abyssinia about 1490, endeavoured to bring over the Christians of that country to the Catholic faith. The history of this mission may be seen in Mosheim's 'Ecclesiastical History.' [ABYSSINIA; ALVAREZ; LOBO.]

With the earliest maritime discoveries of the Portuguese the desire for the conversion of heathen people was excited with renewed zeal, and may even be said to have been instrumental in stimulating the passion for maritime expeditions. About 1430 Pope Martin V. granted plenary indulgence to the Portuguese who conquered pagan and infidel countries. Columbus himself was strongly urged to discovery by the desire of propagating the Roman Catholic religion.

Modern missions may be said to have commenced at the same period with these discoveries, in which the popes took great interest. On the return of Columbus to Spain from his first voyage, the results were formally announced to Pope Alexander VI.

The work of converting heathen people was at first undertaken in a barbarous spirit The commanders of the expeditions which Don Henry of Portugal sent out in the fifteenth century had 'orders to convert the natives of the coast of Africa to Christianity;' and nominal conversions were often effected by the sword.

In 1484 Diego Cam brought four natives of Africa to the court of Portugal; they were sent back with presents and a message to their sovereign, desiring him to embrace Christianity. The natives whom Columbus brought to Spain were baptised, the king and the prince his son acting as sponsors. In his second voyage to the new world, Columbus was accompanied by priests with church vessels and ornaments, and they received orders to bring the natives within the pale of the church by 'fair means.'

The conduct of Cortes in Mexico is an example of the spirit in which conversion was attempted in the New World. Having cast down and destroyed the altars in one of the Mexican temples, a new altar was erected, which was hung with rich mantles and adorned with flowers. Cortes then ordered four of the native priests to cut off their hair and to put on white robes, and placing the cross upon the altar, he committed it to their charge. They were taught to make wax-candles, and Cortes enjoined them to keep some of the candles always burning on the altar. A lame old soldier was left by Cortes to reside in the temple, to keep the native priests to their new duties. The church thus constituted was called the first Christian church in New Spain. Father Almedo, who accompanied Cortes in his expedition, explained to the Mexicans the 'mystery of the cross.' He then showed them an image of the Virgin, and told them to adore it, and to put up crosses in their temples instead of their accursed images. When the Mexicans began to feel the power of Cortes, some of the chiefs conciliated his favour by presents. Twenty native women were presented to him, who were baptised by one of the ecclesiastics, and Cortes gave one to each of his captains. 'These were the first Christian women in New Spain.' The natives both of India and the New World soon perceived that one of the means of conciliating their conquerors was to make a profession of Christianity. In Hispaniola, many natives did this in order to oblige and conciliate Columbus. In 1538, Andrea Galvano, governor of the Molucca islands, sent a ship commanded by Francis de Castro towards the north, 'with orders to convert as many as he could to the Christian faith.' Castro himself baptised many of the principal chiefs of Amboyna. Many similar facts might be adduced to show that at this period true religion made little or no progress in newly discovered countries; and yet during the sixteenth century not a fleet sailed for India or America without its missionaries.

The stream of missionary enterprise was at length directed and regulated by different religious orders and distinct institutions. One of the objects of the Society of Jesuits, established in 1540, was the extension of the Roman Catholic faith, and the Jesuits soon became the most active and energetic missionaries to heathen countries. Their activity roused the zeal of the Franciscans, Dominicans, and other orders, and early in the seventeenth century institutions were founded with a view of rendering the labours of missionaries more effective by a preparatory course of training. In 1622, Pope Gregory XV. founded at Rome the 'College de Propaganda Fide,' which was soon richly endowed. Pope Urban VIII. was one of its principal benefactors. This college consisted of 13 cardinals, 2 priests, 1 monk, and a secretary. It sent out large numbers of missionaries to aid the propagation of the Catholic faith in all parts of the world; published books to facilitate the study of languages; distributed works of piety among various nations in their own language; and maintained in various institutions young men intended for foreign missions. To the above institution was added the 'College or Seminary for the Propagation of the Faith,' founded by Pope Urban VIII. in 1627, which became the central institution in which missionaries were prepared. This establishment was endowed by a Spanish nobleman, who presented his palace and all his possessions to the pope for the purpose. His liberality had soon many followers. Numerous institutions of a similar character were soon after founded in France. The 'Congregation of Priests of the Foreign Missions' was instituted by royal authority, and about the same time the 'Parisian Seminary for Foreign Missions' was established by an association of bishops and other ecclesiastics, for the education of foreign missionaries. The 'Congregation of the Holy Sacrament,' also a French establishment, was another of these institutions. These establishments were under the authority of the 'De Propaganda' of Rome. Henry III. of France took considerable interest in foreign missions, and Henry IV. and Louis XIII. assigned funds for their support. Private associations were also formed in France, in the time of Richelieu, for sending missionaries to Canada, which were joined by many persons of rank and distinction. The Jesuits first visited Canada in 1608. In 1700, at the desire of Louis XIV., they endeavoured to propagate Christianity among the natives on the banks of the Mississippi. Towards the close of the seventeenth century there were not fewer than eighty seminaries in different parts of Europe which prepared and sent out missionaries. The Jesuits, Dominicans, Franciscans, and Capuchins were the most active in these undertakings, which were conducted on a large scale and with a regularity and combination of means altogether superior to the efforts made immediately after the discovery of America and of the path to India round the Cape of Good Hope.

India, Japan, and China were the principal fields of exertion. Xavier, who was canonized by Urban VIII. under the title of the 'Apostle of the Indies,' proceeded to India at the request of John III., king of Portugal, for the purpose of extending the Christian religion in that quarter, the king being disappointed with the little progress which it had made. Xavier was a man of superior genius and laboured with unexampled energy. Having preached the faith with considerable success at Goa, on the coast of Comorin, at Malacca, in the Moluccas, and in Japan, he died in 1552, on the frontiers of China. In Japan, where Xavier was succeeded by missionaries from Portugal, great numbers made a profession of Christianity: in 1596 the converts were estimated at 400,000. The exercise of practical charity, which was inculcated by the Christians, is said to have been the main cause of this success; the native priests let the sick and needy die of neglect and starvation. After an existence of nearly a century, the protection which the Christian religion had received from the rulers of Japan was withdrawn, and a cruel and bloody persecution commenced, which the native Christians endured with a spirit worthy of the early martyrs. This disastrous termination of the mission has been attributed to the intrigues of the Dutch, who wished to possess themselves of the commercial privileges enjoyed in Japan by the Portuguese. Puffendorf, in his 'History of Europe,' says that a letter or pretended letter of the Jesuits was shown to the emperor of Japan, in which they had promised the pope to bring Japan under his authority. Since this period no successful missionary operations have been caried on in Japan. (Charlevoix, *Progrès et de la Décadence du Christianisme dans l'Empire du Japon*, Rouen, 1715.)

China was, for a long time, a scene of successful missionary exertion under the direction of the Jesuits. Father Roger, a missionary of this order, first preached the gospel in China, in 1581. Matthew Ricci, an Italian Jesuit, was the first missionary who obtained an introduction to the court, and is justly regarded as the founder of the Chinese mission. Ricci proceeded to China in 1583, but he was not introduced to the emperor until 1601, when he presented to him a picture of Christ and another of the Virgin, and obtained permission to preach. Individuals were chosen for this mission on account of their scientific acquirements, and it was Ricci's mathematical attainments which rendered him acceptable to the emperor and the court. The empress consented that several ladies of the court should receive instruction in the Christian religion, and some of them were afterwards baptised. Adam Schaal, another of the missionaries, was employed to reform the Chinese calendar and their system of astronomy. Shortly afterwards two handsome churches were erected at Pekin with the permission and under the protection of the emperor. Under these favourable circumstances Christianity made considerable progress. In 1664 the missionaries were fearful of a persecution, but the storm passed over, and the people were forbidden to disturb the Christian converts or to profane their churches; but in the succeeding year their fears were confirmed, and 3 Dominicans, 1 Franciscan, and 21 Jesuits were banished to Canton, only four of the missionaries being allowed to remain at court. A few years afterwards the missionaries regained the favour of the emperor, and Father Verbiest was appointed president of the Tribunal of Mathematics, and for five months gave lessons to the emperor in the mathematical sciences. An assembly of mandarins decided that the Christian religion taught nothing that was evil or that tended to sedition; but the erection of new churches was forbidden, and the Chinese were warned not to desert their antient faith. Notwithstanding this, it is stated that in this year 20,000 Chinese were baptised. In 1685, five French missionaries arrived at Pekin, with the title of 'mathematicians of Louis XIV.' One of them attended the emperor when he travelled, and three of them translated and explained to him lessons in the sciences twice a-day. In 1692 the missionaries obtained from the emperor a more favourable edict for their religion. He also granted them a site for the erection of a house and church within the walls of the palace, giving them building materials, and appointing mandarins to superintend the work. The church was consecrated and opened in 1702. In 1710, a cardinal legate was sent by the pope to settle differences which had arisen amongst the members of the mission, but he died at Macao, and his successor did not reach China until 1721, when he was honourably received by the emperor, with whom he had several interviews. In 1717 however the missionaries had been again accused of seditious designs, and the emperor confirmed a decree prohibiting the building of churches, and Europeans were in future only allowed to remain in China on condition of their promising never to return to Europe. In 1723 the throne was filled by an emperor who at first was rather favourably disposed towards the missionaries, but he afterwards issued an edict under which they were driven from the churches and only tolerated at Pekin and Canton. Duhalde, on whose authority the above statements are given, says that above 300 churches and more than 300,000 Christian converts were deprived of religious instruction by this act. Several families of rank were degraded or exiled by the emperor on account of professing Christianity. In 1732 the missionaries, thirty in number, were banished to Macao, having from motives of conscience disobeyed the edict which forbade the propagation of the Christian religion. Converts were at this period kept together by native catechists, and a few of the missionaries remained in China in concealment, or re-entered the country by stealth. The mission is still carried on, in spite of the occasional attempts of the government to put it down. The years 1805, 1811, and 1815 were years in which the Christians were actively persecuted. In 1810, 23 missionaries and 80 native agents were engaged in China, and the number of native Christians was 215,000. In 1820 a European missionary was strangled in the provinces by order of the government. At present there are Catholic communities in all the provinces, where service is performed by native priests. The Catholic community of Pekin amounts to 26,000 members. In the province of Sze-chuen, Christians are interred in the churchyards, and the cross is planted at the head of the dead. If a native clergy can be formed, greater toleration may be expected, as Christianity is chiefly objectionable as an instrument of European influence. The local authorities, having once tolerated a community, are interested in preventing the circumstance being known in higher quarters. (Medhurst's *China*, 1838.)

In November, 1836, a violent decree was issued against the missionaries and Christians of the Fo-Kien mission; the churches were closed, and safety was sought in flight; but the decree was not a general edict, and was issued only by the provincial governor. In August, 1837, several Catholic churches were destroyed in Cochin-China, and some of the Christians were executed, among whom was a French missionary. The college of St. Joseph at Macao is for the education of Chinese students. The number of missionaries who proceed to the interior from Macao is considerable in every year. Notice is given to their adherents on the route, and at length they arrive by stealth at their destination, where they often live in great seclusion, the converts coming to them secretly for instruction. In some parts the worship is conducted openly. In 1836 a new church was opened at Pekin. Mr. Medhurst was informed by a commercial gentleman that the different superiors of the missions in Macao negotiate bills in Europe to the amount of 40,000*l.* annually. Dr. Milne, the coadjutor of Dr. Morrison in China, speaking of the Catholic missionaries, has eulogised the 'learning, personal virtues, and ardent zeal' of many of them. They translated the greater part of the New Testament into Chinese, and promoted a knowledge of science and the arts. The Catholic missionaries in China at the present day are far inferior to their predecessors.

In the seventeenth century the Jesuits sent many missionaries to the East Indies, to Tonquin, Bengal, Madura, the coast of Coromandel, and to Surat. In the course of fifteen or sixteen years above eighty missionaries were sent to those countries, of whom some were shipwrecked, and others died on the voyage, and from the effects of hardships and difference of climate. The East India mission had many attractions for the ardent missionary, and it was represented that one individual might calculate upon converting from five to six hundred of the heathen yearly. In the Madura mission it was stated that each missionary baptised every year at least a thousand converts. The manner in which the missionaries of this period endeavoured to add to the number of converts has been often censured. The compulsory and barbarous system of the early Spanish and Portuguese commanders was said to be in some instances exchanged for more subtle though still unscrupulous and unjustifiable means. The missionaries were accused of corrupting the purity of the Christian doctrine; and the moral system which they substituted for that of the natives did as little violence as possible to rooted prejudices. In India it was alleged that converts to Christianity were permitted to exercise the least objectionable rites of their former faith; but this licence was not sanctioned by the church. Respect was so far paid to the prejudices of the Hindus as to appoint separate missionaries to exercise their calling amongst the Pariahs. One of the Jesuits, in order to promote the success of his mission, is said to have assumed the character of a Brahmin, and produced a piece of parchment containing forgeries professing to prove that the Brahmins of Europe were more antient than those of India, and that the Jesuits of Rome were lineally descended from the god Brama. Many similar statements have been made, which are doubtless somewhat exaggerated. (Juvenci, *Histoire des Jesuites;* and Vorbert, *Mém. Hist. sur les Missions des Malab.* Also *The Missionaries' Arts discovered,* London, 1687; and on the other side, *Défense des Missionaries de la Chine, &c.,* Paris, 1688.)

It is somewhat difficult to form a just estimate of the labours of the Jesuits in America. Some writers are favourable and others unfavourable to them. It may perhaps be said with truth that the Jesuit missions to America did little to develop the energy and good qualities of the natives, although in Paraguay, and in Upper and Lower California, the missionaries were in possession of all the resources of the country, and enjoyed the extraordinary power which these circumstances conferred. In California the country was left almost entirely in their hands, and they soon acquired a dominion as complete as in Paraguay; but, whether from ignorance of human nature or the unfitness of ecclesiastics to superintend the whole social economy of a people, the converted natives both of North and South America dwindled under their care into the most helpless and ignorant of beings. The object of the experiment was to bring a wild race to domesticated habits, and the Indians were gathered into communities where they worked for a common stock; but their independent character was destroyed, and nothing better arose in its place. Of the one hundred thousand inhabitants living in thirty towns under the control of the Jesuits when that order was expelled from South America in 1767, there were not a thousand remaining in those east of the Parana in 1825. The towns beyond the Parana have fared little better under Dr. Francia. (Sir Woodbine Parish's *Buenos Ayres and Provinces of La Plata.*) The Jesuits, in the course of about a century and a half, converted upwards of a million of the natives of both Americas. In Dr. Forbes's 'California,' compiled from original sources, the process of conversion is described as consisting of the offer of a mess of pottage and holy water; the acceptance of the latter being the condition of the former grant, and its reception a proof of faith. Attendance to prayers and meals were the exterior evidence of conversion. Sir Woodbine Parish states that the misrule of their civil governors, and the little respect inspired by the friars who were sent in place of the Jesuits, brought about the ruin of the Jesuit communities in little more than a quarter of a century. When they were displaced, and the people of the mission of St. Louis sent a memorial praying that the fathers might be allowed to remain, which Bucarelli, the governor, interpreted as the prelude of an insurrection, the simple people were found not in arms but in tears.

In 1700 the three orders of Capuchins, Jesuits, and Carmelites, were the most active missionaries. The Capuchins had twenty-five missions in Turkey, and missionary stations were established in Persia, Georgia, and Africa. The Jesuits had ten missions in Turkey, and the Carmelites three. Many of these missionaries had acquired a knowledge of medicine, and obtained access to families as physicians. In 1717 the Jesuits supported missions in the islands and continent of America, in Greece, Asia Minor, and the Archipelago, and in Egypt, Syria, and Persia, besides those in India. Louis XIV. made grants of land to the missionaries in Canada, and to them we are indebted for some of the earliest descriptions of North America.

In 1822 the cause of missions was revived in France by the 'Institution for the Propagation of the Faith,' which has committees at Paris and Lyon. Several popes have granted to its members certain indulgences; and in 1837, as a mark of gratitude and approbation, the pope presented the institution with the body of St. Exuperius, which had been recently discovered in the catacombs at Rome. The remains, richly ornamented at the expense of his Holiness, are enshrined in one of the churches of Lyon. Seventy-six Roman Catholic bishops in various countries have publicly expressed their approbation of the institution. Its income in 1838 amounted to 62,800*l*., of which 41,678*l*. was collected in France, 2998*l*. in Belgium, 2776*l*. in the Sardinian states, 1098*l*. in the United Kingdom (768*l*. from England), 824*l*. from the States of the Church, 500*l*. from Prussia, and from other countries smaller sums were received. The receipts for France were 16,000*l*. more than in 1837. The 'Annals of the Propagation of the Faith' are published by the Society every two months; 48,000 copies are printed in French, 9500 in Italian, 6000 in German, 2000 in English, and 1000 in Flemish. The funds are placed at the disposal of the 'Seminary for Foreign Missions,' and the superiors of the Lazarite Missions and the Jesuit Missions. There is no part of the world in which Catholic missionaries are not supported. (*Geography of Missions.*)

The first Protestant mission of which we have any notice was founded by the church of Geneva, which sent missionaries to America in 1556; but it is believed to have existed only a short time. Early in the seventeenth century the Dutch, who had taken Ceylon from the Portuguese, admitted the natives to employments under their government only on condition of subscribing to the Helvetic Confession, and becoming members of the Reformed church. The higher rank of natives professed to abandon their former religion, and those whom the Portuguese had converted deserted their creed. Converts were baptised after learning the Lord's Prayer, the Commandments, and grace before and after meals. In 1663 the number of converts in one district was 62,000; and in 1668, in a district containing 278,000 inhabitants, 180,000 had made a profession of Christianity. In Java, Formosa, and Amboyna, the Dutch made attempts to gain converts. A church at Java was opened in 1621, and a century afterwards there were 100,000 Christians in the island. Translations from the Scriptures were made in the Cingalee and Malay languages.

It was some time after the English had begun to form settlements in North America before attention was directed to the religious condition of the natives. In 1644 a petition was presented to parliament from a minister of the Church of England, supported by many English and Scotch divines, which urged the duty of attempting to convert the natives of America to Christianity. Soon afterwards an ordinance of the Lords and Commons appointed the earl of Warwick governor of the islands and plantations of North America; and a committee was appointed to assist him in several matters, 'but chiefly for the advancement of the true Protestant religion, and for the spreading of the gospel of Christ among those that yet remain there in great and miserable blindness and ignorance.'

In 1646 the General Court of Massachusetts passed the first act 'for encouraging the propagation of the gospel amongst the Indians.' In 1649 an incorporated body was established with the authority of parliament, under the title of the 'President and Society for the Propagation of the Gospel in New England.' In 1661 Charles II. renewed the Society's charter, on the ground that it was now fit to lay a foundation for 'educating, clothing, civilising, and instructing the poor natives.' The design of the Society was to support and maintain ministers and schoolmasters to instruct the natives in the English language, and to teach them useful trades. Eliot, called the 'apostle of the Indians,' and Mayhew, had already laboured for several years in the conversion of the native tribes of New England. In a narrative of their exertions, published in 1653, and dedicated to Cromwell, an account is given of the conversion of several chiefs. In 'A Later and Further Account,' published in 1655, Eliot states that a great desire for baptism had arisen amongst the Indians; but never was there a missionary so conscientiously scrupulous as to trusting to professions of this kind. He told the Indians 'how necessary it was that they should first be civilised by being brought from their scattered and wild course of life;' and he began the formation of a village, in which they might learn the advantages of living in a community. The Indians were taught various useful arts, and after several years were admitted as church communicants, previous to which they were required to give an account of their conversion and faith at a public examination.

In 'A Further Account,' published in 1659, there are sermons or short discourses of several converted Indians. Five Indian youths were receiving an education at the Cambridge grammar-school in Massachusetts, two of whom had been examined in Latin before the magistrates and elders of the place. In 1670 several 'praying towns,' as the villages of the converted Indians were called, had been erected under Eliot's auspices. In 1674 there were four 'praying-towns' in Massachusetts. Eliot died in 1690, at the age of eighty-six. Mather, Bourne, Sergeant, and Brainerd succeeded each other in the work of bringing the Indians to a knowledge of Christianity, but none of them laboured so successfully as Eliot. Brainerd was an ardent and enthusiastic labourer, and exhausted himself by his extraordinary exertions. He was sent to America in 1742, by the 'Honourable Society in Scotland for promoting Christian Knowledge,' and died in 1747. Amongst the supporters of the missions to the Indians of North America was the Hon. Robert Boyle, who, by will dated 1691, left a sum of money 'for the relief of poor Indian converts,' besides the residue of his estate to be laid out for 'the advance or propagation of the gospel amongst infidels.'

By the end of the seventeenth century the population of the English settlements in America had greatly increased, while the means of spiritual instruction had not been proportionally extended, and the small number of Episcopal churches which existed roused the friends of the Church of England at home to make exertions to supply the deficiency. While the conversion of the natives had chiefly attracted the attention of pious persons, it was found, in 1675, that 'there were scarce four ministers of the Church of England in all the vast tracts of North America.' Compton, bishop of London, prevailed upon Charles II. to allow 20*l.* for passage-money to ministers and schoolmasters who should go out to supply the deficiency; and a royal gift of 1200*l.* was procured to purchase a Bible, Prayer-Book, and the Homilies, for each parish. In 1679 it was stated that there was not a minister of the Church of England either in Pennsylvania, the Jerseys, or New England, and that these settlements were only occasionally visited by the chaplain to the fort at New York. Many families had never attended any public religious service since they had left England. The Society for the Propagation of the Gospel in Foreign Parts originated in the desire to supply the spiritual destitution of these and other settlements, and received a charter of incorporation on the 16th of June, 1701. The Society was composed, by charter, of the chief prelates and dignitaries of the Church, and several of the most eminent persons in the state. Archbishop Tennison was the first president. The amount received by the Society in the first four years after its incorporation was—first year, 452*l.*; second, 575*l.*; third, 864*l.*; fourth, 1343*l.* The number of subscribers, according to the first printed list, in 1718, was 260. The efforts of the Society were at first directed to building churches and sending out orthodox clergymen to the colonies. At the same time, and also before the Society was chartered, strong representations were made to the government of the important political influence which the French Jesuit missionaries exercised in Canada in keeping tribes neutral or in alliance with France; and at a court held at St. James's, April 3rd, 1700, representations being made to the effect that the five nations of Indians bordering on New York might probably be seduced by the French, the council came to the opinion, that besides the usual method of gaining the Indians by presents, 'another means to prevent the influence of the French missionaries upon them, and thereby more effectually secure their fidelity, would be to appoint two Protestant ministers, with a competent allowance, to dwell amongst them, in order to instruct them in the true religion and confirm them in their duty to her majesty. Ordered that the matter be referred to the archbishop of Canterbury.' The state of the Indians was one of the objects to which the charter directed the attention of the Society, but its funds were for some time expended in maintaining ministers within our own settlements. In 1704 Col. Dudley, governor of Newfoundland, wrote to the lords of the Board of Trade and Plantations, that if ministers were not sent amongst the Indians, 'to defeat the French missionaries, to whom they are infinitely bigoted,' we should lose their allegiance.

About the year 1680 the condition of the negro slaves in our settlements began to excite attention. In 1680 Morgan Godwyn, 'some time student of Christ Church, Oxon,' wrote a 'Persuasive to the Instructing and Baptising of the Negroes and Indians in our Plantations.' Towards the close of his life, Eliot had begun to instruct the negroes in New York; and in 1704 the Society for the Propagation of the Gospel established catechising schools in New York for the negroes, the number of negroes and Indians in the city being then 1500. In 1727, Gibson, bishop of London, addressed the missionaries in the English plantations, exhorting them to assist in instructing the negroes. In a sermon preached by Beilby, bishop of Chester, in 1783, before the above Society, the civilisation and conversion of the negroes were announced as one of the great objects of the Society.

The Danish and Moravian missions were the first two in which the chief object was the conversion of the heathen; for the exertions of the Society for Propagating the Gospel were for some time limited in its operations, and may be regarded in the early part of its existence rather as a 'Pastoral Aid' Society. The Danish missions owed their existence to Frederick IV., who, about 1705, became anxious that the gospel should be preached in the Danish settlements in the East Indies. Ziegenbalgh and Plutscho, who had been educated at Berlin, were the first missionaries sent out; they proceeded to Tranquebar, on the Coromandel coast. A correspondence on the subject of missions and the state of the heathen was commenced with persons in Denmark, Norway, Germany, and England, who took an interest in the subject. The reports of the two missionaries, which appeared annually, under the title of 'A Brief Account of the Measures taken in Denmark for the Conversion of the Heathen,' and which was translated into English, excited considerable attention. The Danish missionaries immediately established schools, and prepared tracts and small works in the Malabar language. In 1707 their first church was consecrated. In 1708 the translation of the Testament was begun, and completed in 1711: but they had no press, and were obliged to employ transcribers. The 'Society for the Propagation of the Gospel' opportunely forwarded a printing-press, a hundred reams of paper, six cwt. of type, and engaged a printer for the mission. In 1714 the missionaries had published thirty-four different works in the Malabar language, and fourteen others, written by Catholic missionaries, were used by their scholars and converts. They maintained and clothed fifty-six children in the schools, to defray the charge of which they had 'no certain fund that will supply the expense for one day.' In 1714 Frederick IV. established a college, or society, for the promotion of missions, the members of which were required to make an annual report of their proceedings. The instructions to the Society indicate both good sense and earnestness. The Society was directed to take into consideration the prospects and condition of converts:—'How they and their children (besides the knowledge of the principles of Christianity) may be instructed in useful arts, and how also they may be employed, according to their respective conditions and capacities.' Ziegenbalgh came to England in 1715, and had an interview with George II. and several members of the royal family. The archbishop of Canterbury and the bishop of London promised to assist the mission. About 1727 the Danish missionaries were desirous of extending their labours beyond the district of Tranquebar; and a missionary named Schulze was sent to Madras by the English Society for the Propagation of the Gospel. In 1721 Egede, a Danish missionary, proceeded to Greenland.

The Moravian missions commenced in 1731, and were supported with singular activity and perseverance. Count Zinzendorf, the founder of the Moravians, or United Brethren, while attending the coronation of Christian VI. at Copenhagen, saw two natives of Greenland who had been baptised by Egede, and he heard with regret that the government was on the point of abandoning the mission in that country. About the same time he learned from a negro, who had become acquainted with his servants, and had a sister in one of the Danish West Indian islands, that the latter was earnestly desirous of receiving religious instruction. The congregation of the United Brethren at Herrnhuth, then consisting of only six hundred exiled persons, poor and despised, were warmly affected by the statements which Count Zinzendorf made on this subject, and some even expressed themselves willing to sell themselves as slaves to have the opportunity of instructing the negroes. In eight or nine years after they had begun to send out missionaries, Greenland, the islands of St. Thomas and St. Croix, Surinam, Berbice, Lapland, Tartary, Algiers, Guinea, the Cape of Good Hope, and Ceylon, had become the scene of their labours. The Greenland mission was commenced in 1733, and was supported in spite of extraordinary hardships and difficulties. The missionaries were often compelled to put to sea in crazy boats to obtain a supply of fish, and shell-fish and sea-weed were not unfrequently their only food. For five years they persevered in bearing up against these hardships, though as yet the mission had not been productive of the slightest advantage to the natives. Their endeavours were however at length successful, and a community of natives was established at New Herrnhuth. In twenty-five years about 700 Greenlanders had been baptised; and in 1767 the settlement contained 830 individuals, and had become a pleasant village in the midst of a desolate region. Sheep, goats, and vegetables had been introduced. Some of the Greenlanders had learned to read and write, and were taught church music. In 1758 a second settlement was formed, called Lichtenfels; and in 1774 a third, called Lichtenau. The mission in the island of St. Thomas was commenced in 1732; and in 1738 about 800 negroes were under religious instruction, and some time afterwards the number of baptisms averaged 100 a-year. From 1732 to 1762 sixty-six brethren and sisters who had gone out as missionaries died in the three Danish West India islands. In 1754 three of the Moravian brethren proceeded to Jamaica at the request of several gentlemen of the island, owners of estates, who built a house for their residence, and encouraged them in instructing their negroes. Scarcely any opposition was made to the missionaries, but after a time the work languished. In 1734 a party of the brethren settled in Georgia, in North America, with the intention of introducing Christianity amongst the neighbouring tribes of Indians; but the European settlers in the colony, by their constant persecution, at length drove the brethren into Pennsylvania. The colonists had represented that the brethren were in league with the French Canadians; and for the sake of annoying them, used every means in their power to demoralise the Indians. In the back settlements of Pennsylvania, to which they were at length obliged to remove, they built a village for the baptised Indians, called Gnadenhutten, which was broken up by an Indian war. In 1757 the village of Nain was built, and after a few years was in like manner destroyed. They then built a town called Friedenshutten. The settlement of Bethlehem was so obnoxious to the colonists in the two Jerseys, that proclamation for its destruction was made by beat of drum, and every means were taken to exasperate the lower classes of the people against the brethren. They were obliged to keep guard night and day for fear of an attack, and at length were removed for safety to Philadelphia, where they and the Indians remained in the barracks for sixteen months, during which numbers died of fever and small-pox.

In 1735 an attempt to send a missionary to the Calmuc Tartars failed; but about 1747 the brethren formed a settlement in Asiatic Russia, where they had constant intercourse with the Calmucs, but made no converts, with the exception of four girls whom they ransomed, and a blind girl who had been left to die. In 1739 it was determined to send a missionary to Abyssinia to form a correspondence with the Christian church there; but this design was not effected until 1752. In 1759 and 1768, settlements were formed in Tranquebar and in the Nicobar islands. A mission to Labrador, which had been attempted without success a few years before, was established on that coast in 1752, with the encouragement of the English Board of Trade and Plantations, and the Lords of the Admiralty. Some of the missions paid their own expenses, with the exception of buildings and journeys of the missionaries. The brethren introduced amongst their converts a discipline similar to their own, and baptism was only administered to those whose life gave evidence of a change of heart. In 1742 the Moravian brethren residing in London formed themselves into a 'Society for the furtherance of the Gospel.' They received and entertained missionaries who came from the Continent to London to embark for distant countries. This Society was revived in 1818.

Till within the ten years preceding the close of the last century, England had taken a very small share in missions. The Society for the Propagation of the Gospel in Foreign Parts was incorporated in 1701, and nearly a century elapsed before any other similar institution was founded. At present Great Britain is the most active of all Christian countries in the work of converting the heathen.

The 'Society of Particular Baptists' formed the second association in England for the conversion of the heathen. Before the year 1786, Carey, a minister of this persuasion, and afterwards eminent as a linguist and missionary, had directed his attention to this subject, to which he was in some degree led by a great love of geographical knowledge; and some time after the above date he published 'An Enquiry into the Obligation of Christians to use means for the Conversion of the Heathen.' He brought the subject under the notice of a meeting of Baptist ministers held at Clipstone, Northamptonshire, some time in 1791. At a similar meeting held at Nottingham, in May, 1792, the following resolution was adopted:—'That a plan be prepared against the next ministers' meeting at Kettering, for forming a Society amongst the Baptists for propagating the Gospel among the Heathen.' In October the Society was formed: at a second meeting, at the end of the month, several subscriptions were announced; and 70*l.* was sent from Birmingham by the Baptist congregation there, who had formed themselves into an Auxiliary Society. In November, a public address on the state of Heathen countries was issued. In March, 1793, Mr. Thomas, who for nearly ten years had been exerting himself in India to promote Christianity, was chosen with Mr. Carey as the first of the Society's missionaries; and they shortly afterwards embarked for the East Indies. Having set up a factory, in the hope of making the mission pay its own expenses, the propriety of missionaries engaging in secular employments was warmly contested by the Society at home, and a letter of 'serious and affectionate caution' was addressed to the missionaries at a meeting held in April, 1795. At this meeting a resolution was adopted for establishing a mission at Sierra Leone; but of the two missionaries sent out, one embroiled himself with the authorities and went to America, and the other came home for his health. In 1796 a third missionary was sent to India. The following form of agreement was entered into by the Baptist missionaries in Bengal, in 1805:—'It is necessary, in our intercourse with the Hindoos, to abstain, as far as we are able, from those things which would increase their prejudices against the Gospel. . . Nor is it advisable at once to attack their prejudices by exhibiting with acrimony the sins of their gods; neither should we, upon any account, do violence to their images, nor interrupt their worship; the real conquests of the Gospel are those of love.' In this spirit the Baptist missions have effected considerable good in India, by the establishment of native schools, and translations of the Scriptures, as well as by preaching. At an early period of the mission, a printing-office was established at Serampore, and in 1806 proposals were made for the translation of the Scriptures into fifteen Eastern languages. A total expenditure of 13,000*l.* was incurred in the Serampore mission in the course of five years, of which only 5740*l.* was received from England, the remainder being made up by the labours of the missionaries, and the emoluments arising from the professorship which Dr. Carey held in the college of Fort William. In 1807 the tracts issued by the mission were required to be submitted to the Indian government before publication, in consequence of some inconsiderate expressions used in a tract which had been issued without revision; in which, amongst other things, Mohammed was called a tyrant. In March, 1812, the printing-office was burnt down, and founts of type in sixteen languages were destroyed, and sheets of translated works in progress. On the disaster being known in England, the sum of 10,611*l.* was raised in less than two months to replace the loss, besides a considerable sum in Bengal, and 1500*l.* in the United States. In 1827 the missionary efforts of the Baptists were divided by a separation of the Serampore mission from the general missions of the Society, but the differences were terminated in 1838, and the two Societies are now united. Foreign missions have also been established by the Free-will Baptists and by the American Baptists.

The 'London Missionary Society' was formed in September, 1795, and consisted at first of Christians of various denominations, but it is now supported by the Independents. In consequence chiefly of a memoir read before the Society by the Rev. Dr. Haweis, rector of Aldwinkle, Northamptonshire, this Society directed its first efforts to the South Sea Islands, where no missionaries had before laboured. In August, 1796, twenty-nine missionaries, several of whom had wives and families, embarked on board the ship 'Duff,' which the Society had purchased. The 'Duff' reached Otaheite in March, 1797, and the missionaries were received by the natives in the most friendly manner, and a district being ceded to them in due form, twenty-five persons, including seven women and children, took up their abode in the island. The commencement of this mission was a period of great excitement to the friends of the cause in England; and on the return of the 'Duff,' a day of thanksgiving was appointed in the Independent churches. In December, 1798, the 'Duff' sailed on her second voyage to the South Seas with twenty-nine missionaries and a superintendent, but was captured by a French privateer on the 19th of February, and taken to Rio, and on re-embarking at that place, they were again captured, and ultimately returned to England after an absence of ten months. In the meantime the mission in Otaheite was almost on the brink of ruin, the natives having become unfriendly to it. Eleven of the missionaries, with eight women and children, left the island for Port Jackson, seven of the missionaries determined upon remaining, and several proceeded to Tongataboo. To prevent an attack of the natives, the missionaries who had remained at Otaheite offered to give up their personal property and stores and tools to Pomare, the king, but he declined taking charge of them, and they were daily in fear of personal injuries. One of the missionaries relapsed, and married a native female, and another made a declaration of infidel opinions. In May, 1800, before these events had become known in England, eleven other missionaries had sailed for Otaheite in a convict ship, in which a malignant fever broke out. Of this number one died at Port Jackson, one abandoned the mission at that place, and one was taken home, at the request of his brethren, for insubordinate conduct. The missionaries who had been left on the island made no progress in their work, and in the course of five years had scarcely acquired a slight knowledge of the language. In 1808, on a war breaking out in Otaheite, the married missionaries sailed for Huaheine; when their houses were burnt and their gardens laid waste. In February, 1810, they retired to New South Wales. Misfortunes had also overtaken the mission at Tongataboo. One missionary returned his Bible to his brethren, three were murdered during a civil war, and the remainder were destitute of clothes and often of food, and were frequently ill-treated by the chiefs. A mission to the Marquesas was also broken up. In July, 1811, some of the missionaries returned to Otaheite at the request of Pomare. In 1821 the Society sent out a deputation to visit the various stations in the South Seas, their directions being 'to make themselves thoroughly acquainted with the state of missions and of the islands.' The result of their inquiries is contained in a 'Journal of Voyages and Travels,' by Tyerman and Bennet, edited by James Montgomery, London, 1831. In December, 1798, the Society sent out missionaries to South Africa, and before 1804 they had established themselves at Bethelsdorf, on the Zak river, Orange river, and in Namaqualand. In 1804 the Society extended its operations to the East Indies, and missionaries were stationed at Vizigapatam and Travancore. In 1807 Mr. (afterwards Dr.) Morrison proceeded to China with the intention of preparing a translation of the Scriptures into the Chinese language, as a preliminary step to the introduction of Christianity into the Chinese empire. [MORRISON.] In December the attention of the Society was directed to the West Indies, and a missionary station was established in Demerara.

In 1804 the 'Society for Missions to Africa and the East' was established by some members of the Established Church. The Society is now called the 'Church Missionary Society for Africa and the East,' though it sends out missionaries to every quarter of the world. The first missionaries sent out by the Society were educated at the Missionary Seminary in Berlin, and commenced their labours in the Susoo country. The Episcopalians of the United States also have independent missions in foreign countries.

The Wesleyan Methodists were for many years engaged in missionary labours before they formed the 'Wesleyan Methodist Missionary Society' in 1817. Wesley himself visited America for the purpose of affording religious instruction to the slaves in Georgia. In 1786, Dr. Coke, accompanied by three other individuals, proceeded to Nova Scotia, and before their return they visited some of the West India islands, where they met with great opposition on the part of the planters. The peculiar difficulties which the Methodists encountered in their attempts to instruct the negroes are detailed in Dr. Coke's 'Rise, Progress, and Present State of the Methodist Missions,' published in 1804. The attempts made by the Jamaica House of Assembly to put a stop to the preaching of the missionaries, engaged the house in a contest with the government at home, which was marked by singular duplicity, and attempts, on the part of the assembly, to evade the authority of the English parliament. The Methodist Episcopal Church in the United States sends out foreign missionaries.

In 1796 the 'Edinburgh Missionary Society' was established by some ministers and members of the Established Church of Scotland. In conjunction with the Glasgow and London Societies, it sent out missionaries to the western coast of Africa, but death and disease prevented the success of the mission. In 1802 a mission was established by this Society in the neighbourhood of the Caspian Sea. The emperor of Russia granted them land on favourable terms, and in 1810 the settlement of the missionaries consisted of thirty-nine persons. A printing-press was set up, tracts were distributed, and slaves ransomed with a view of being instructed to act as catechists.

In addition to the above societies, there has been lately formed in England the 'Colonial Missionary Society.' The 'Society for propagating Christianity amongst the Jews,' which expends above 17,000*l.* a year in this object, may in some respects be regarded as a missionary institution; and there are several similar societies, but as they are not designed for the conversion of heathen people, they do not come within the limits of the present notice. The 'Home Missionary Society' belongs to this class. It has stations in districts where there is a deficiency of places of worship. The annual income of the Society is about 7000*l.* The Baptists have established a Home Society, which has an annual income of upwards of 2500*l.* a year. The 'Pastoral Aid Society' is designed to remedy the deficiencies in the Established Church, and was instituted in 1836. It grants about 18,000*l.* a year to 179 clergymen and lay assistants, who are sent to populous districts which are not sufficiently provided with regularly appointed clergymen. Within the last four years, 'City Missions' have been formed in London and several of the large towns. Agents are appointed who visit the poor and exhort and read to them the Scriptures. The 'London City Mission' has an income of upwards of 4000*l.*, and employs 49 agents, who last year made 186,515 visits, and distributed 223,056 tracts. The 'Society for the Promotion of Christian Knowledge,' the 'Bible Society,' and the 'Tract Society,' though not missionary societies, are auxiliaries of foreign missions, whose objects they promote by grants of books, &c.

There are many missionary institutions in Europe and the United States. The 'American Board of Commissioners for Foreign Missions' is the principal institution of the kind in the United States; and each of the principal sects in that country, as in the case of the American Baptist, has its own institutions for sending out missionaries, each of which has numerous auxiliary societies in union with the central society. In continental Europe the principal missionary societies are—the Berlin Society, German Society, Netherlands Society, Paris Society, Rhenish Society, and the Society of the Moravian Brethren.

Present State of Societies.—The expenditure of five of the principal British societies engaged in missions amounted to above 350,000*l.* according to their last annual Reports; and the material support which is afforded them by other religious institutions would considerably swell this amount; there are also several institutions whose operations are on a small scale.

1. Incorporated Society for the Propagation of the Gospel in Foreign Parts. Receipts for 1837, 43,365l.; expenditure, 55,949l.; number of subscribers about 12,000; the number of legacies of above 100l. received from 1702 to 1837, 571, of which 50 amounted to sums above 1000l., including two of 45,000. and 30,000l. each. The receipts consisted of subscriptions, donations, and legacies, to the amount of 16,082l.; legacies, 475l.; dividends and rents, 5747l.; special fund raised for the education and religious instruction of the negroes in the British West Indies, 8059l.: portion of parliamentary grant for erection of school-houses in the West Indies, 13,000l. The chief expenses were under the following heads:—North America (dioceses of Quebec and Nova Scotia), 12,254l.; India, missionaries and teachers, 8933l.; expenses of Bishop's College, Calcutta, including the college press, 4325l.; several general expenses of missions and schools, 1821l.; Cape of Good Hope, 2 missionaries and outfit, 339l.; West Indies, payments for the erection and enlargement of churches, chapels, and school-houses, 13,890l.; towards the support of clergymen and unordained teachers engaged in the religious instruction of the negroes, 7169l. Urged by the recent social changes in the West Indies and the spiritual destitution of the penal settlements in Australia, the Society has recently made exertions in those two quarters. From 1813 to 1833, the Society had the management of a grant annually voted by parliament for the support of clergymen in the North American Colonies. Notice was given in 1832 that this grant would be discontinued in future; but on the remonstrance of the Society, that the whole of the missionaries would be unprovided for, the government agreed to continue the allowance for three years longer on a reduced scale. In 1832 the sum of 12,000l. was voted; 8000l. in 1833; and 4000l. in 1834. The Society has been compelled to reduce the salaries of its missionaries in that quarter, and in 1837 was compelled to sell 10,000l. of its funded property to meet deficiencies. Previous to 1823, the 'Society for promoting Christian Knowledge' expended a portion of its funds in supporting missionaries in Southern India, but in that year this department was placed under the Gospel Society. The number of missionaries now employed is 231, of whom 160 are employed in British North America.

2. Baptist Missionary Society, 1837-8. Receipts, 22,416l.; expenditure, 20,622l. The cost of maintaining missionary stations in the following countries, in 1837, was—for Continental India, 4237l.; Ceylon, 390l.; Java, 346l.; Sumatra, 10l.; Jamaica, 7452l., and 250l. for chapels in the same island; Bahamas, 1249l.; Honduras, 380l.; South Africa, 27l. At these and the various sub-stations in connection with them, 59 missionaries, 44 native preachers, and 59 schoolmasters were maintained. In 1835 the Society received a legacy of 5784l.

2. London Missionary Society, 1838. Receipts, 70,255l.; expenditure, 76,818l. Disbursements in 1837-8 on account of the following missions:—South Seas, 10,327l.; Malacca, 1989l.; Singapore, 200l.; Penang, 972l.; Java, 637l.; Northern India, 6962l.; Southern India, 16,104l.; Russian Empire, 552l.; Corfu, 107l.; South Africa, 8814l.; Mauritius, 426l.; Demerara, 3841l.; Berbice, 5316l.; Jamaica, 7497l. Of the amount raised by the yearly contributions, 15,779l. were specially subscribed for seventeen different objects, of which 4001l. was for a South-Sea mission-ship; 800l. for exploratory voyages; 1451l. for female education. The sum of 4500l. was received from government in aid of school-houses in the West Indies. The Society, at 455 stations and out-stations, maintains 640 European missionaries and assistants, of whom 135 are missionaries, and 32 European and 473 native assistants. The number of churches under their care is 93, with 7347 communicants; and 568 schools contain 36,974 scholars. The Society possesses 17 printing establishments.

3. Church Missionary Society, 1837. Receipts, 72,031l.; expenditure, 91,453l. The West African mission was maintained at a cost of 4014l.; South African, 1709l.; the Mediterranean missions (including Malta, Greece, Asia Minor, Egypt, and Abyssinia), 6558l.; North India, 11,523l.; South India, 8472l.; Western India, 2927l.; Ceylon, 3987l.; China, 491l.; New Zealand, 12,754l., including the purchase of goods for barter with the natives; New Holland, 172l.; Jamaica, 9210l.; Guiana, 1439l.; Trinidad, 3594l.; North-west America, 1945l. At 95 principal stations, 68 English and 10 Lutheran clergy are maintained, and 81 laymen and 3 female Europeans, besides 5 native clergymen and 352 laymen, and 18 female teachers, making 541 individuals. Number of schools 441, attended by 21,591 scholars.

4. Wesleyan Methodist Missionary Society, 1837. Receipts, 84,818l.; expenditure, 100,077l. The number of missionaries employed was 314; catechists and readers, 3176; salaried teachers, 295; gratuitous teachers, 3336: making the total number of agents 7121. The number of members in society was 66,629, and 49,538 children and adults attend the schools; the total number of persons immediately under the care of the Society in foreign parts being 116,167, as far as could be ascertained. In 1837 twenty donations were received of 50l.; fourteen of 100l.; six averaging above 360l. each; and one anonymous gift of 2000l. The sum of 3864l. was received from Ireland in subscriptions, and upwards of 2000l. from the town of Leeds. In 1818 a legacy of 9986l. was received. Expenses of stations:—Ireland, 3530l.; France, 2169l.; Spain, 944l.; Ceylon, 6412l.; Continental India, 5451l.; New South Wales, 1880l.; Van Diemen's Land, 2292l.; New Zealand, 2323l.; Friendly Islands, 3315l.; South Africa, 8956l.; Western Africa, 3959l.; West Indies, 22,000l.; British America, 9000l. During the year the Society sent out 48 missionaries, 17 of whom were accompanied by their wives.

5. Missions of the Church of Scotland, 1837. The mission under the direction of a committee of the General Assembly is at present confined to the department of general, scientific, and religious instruction, and has seminaries at Calcutta, Bombay, and Madras. In the Assembly's school at Calcutta upwards of 700 boys and young men, of all classes and castes, are taught the common branches of education, algebra, mathematics, and other sciences. At Bombay above 1000 native children attend the Society's schools, and there is also a school at Poona, in the same presidency; and in 1837 a school was established at Madras. The funds received in aid of the Assembly's missions average about 4000l. a year.

A society has recently been established at Glasgow which has sent missionaries to Caffraria. The 'London Corresponding Committee' is an auxiliary of the General Assembly, and about 500l. a year are raised by it in aid of foreign missions. Missionary operations have been commenced at the Cape of Good Hope, in connection with the Church of Scotland.

6. Missions of the United Brethren, 1837. These missions have long been held in high estimation in England, and about 4300l. are annually contributed here for their support, under the direction of the 'London Association.' The number of missionaries employed by the Moravian Brethren has been increased from 155, in 1817, to 237, in 1838. A sum amounting, on an average, to 12,000l. a year is raised for their support, of which 5840l. is received from persons of other denominations. About 50,600 souls are under the care of the Brethren, namely, 44,000 negroes in the West Indies, 3600 Hottentots and Caffres, and 3000 natives of Labrador, Greenland, and North America.

Most of the societies publish periodical accounts of the state of their respective missions. The last Annual Report of the Church Missionary Society shows that about 2500l. had been expended in preparing and publishing these works, viz. for 12,280 copies of Annual Report, 20,000 abstracts of do., 145,500 of 'Missionary Record,' 601,375 of 'Quarterly Paper,' and 3050 copies of the 'Missionary Register.' The London Society's expenditure under the same head was 1754l., and others in proportion; but it is by this extensive dissemination of missionary intelligence that the public have been brought to entertain so strong an interest in missions.

The exertions of other missionary societies are noticed in the following section.

Geography of Missions.—In the Thirty-eighth Report of the Church Missionary Society it is observed that each mission is marked by various degrees of ignorance and knowledge. 'There is a kind of graduated scale, measuring from the Zoolu tribes, who are at the lowest point, where even the sovereign is only learning to spell; advancing further, to the New Zealanders, who are just beginning to catch the most elementary ideas of the Scriptures; thence further, tracing the plain but useful studies of the negro on either side of the Atlantic; then reaching further, to the yet imperfect modern literature of the eastern regions of the Mediterranean; thence, rising higher still, to the varied acquirements of India; and, highest of all, to the cultivated and improving native society of Calcutta and other parts of Bengal.' Under fourteen heads we give a view of the missions of all the principal societies.

1. *Western Africa.*—Stations at Sierra Leone, Bathurst, Cape Coast, Cape Palmas, Freetown, Kissey, &c. Stations of the Church missions, 12; 7 European clergymen and 9 laymen employed, and 19 native teachers; communicants, 902; schools, 24; scholars, 3663; baptisms, 91; candidates, 697; average attendance on public worship, Sunday morning, 3870—evening, 1880—week-day evening, 1880. Wesleyan missions: 14 missionaries and 42 catechists and readers, 24 salaried teachers, 2324 members in society, and 1495 children and adults in the schools. At Macarthy Island, 300 miles up the Gambia, 200 individuals have been baptised. A grammar in the Mandingo language has been printed, and also the Gospel of St. Matthew in the same language. The 'Foulah Mission Institution' is intended to promote the temporal as well as the spiritual welfare of that people. The 'German Missionary Society' has established a mission in the Ashantee country, and the 'American Episcopal Missions' one at Cape Palmas, to which three missionaries have been appointed, who are intending to establish a superior school. The 'American Board of Missions' has a station in the same quarter, where a printing-press has been set up and schools established. The children are docile, and learn to read with tolerable ease in three months. The 'American Baptists' have also missionaries employed in this part of Africa, which is also the scene of the labours of the American Colonization Societies.

2. *South Africa.*—The United Brethren employ 45 missionaries amongst the Hottentots, Caffres, and Tambookies. At the settlement of Genadendal the natives are employed as smiths, waggon-makers, carpenters, tanners, and masons. In the schools reading, writing, and accounts are taught; sewing is taught in the female schools. Infant schools have been established. Amongst the Tambookies many of the women have begun to wear gowns; some of the men have planted wheat, and manured their land. The London Missionary Society has 31 stations, 24 missionaries, and 18 assistants; 18 churches, 1382 communicants, and 4721 scholars. This statement includes the stations amongst the Caffres, Griquas, and Namacquas, and others beyond the colony. The state of the schools among the Hottentots is encouraging; the people are rapidly improving in a knowledge of agriculture, and many of them lead a moral life. The Bechuanas are said to be most anxious in their desire after knowledge. Wesleyan missions: 21 missionaries, and 24 salaried and 173 gratuitous teachers, are employed in the Cape Colony and amongst the Caffres and Bechuanas; the number of members in society is 1281, and 1594 children attend the schools. The missionaries use the Sichuana language, and several elementary books have been printed at the mission press for the use of the natives. The French Society of Protestant missions has four principal stations in South Africa, north of the Orange river. The French missionaries state that among the Bechuanas the progress of conversion has been very slow, and that the chiefs impede this work as much as possible; but their hopes are in the rising generation. Among the Bassouto-Bechuanas many adults have learned to read, and both men and women have clothed themselves in the European manner. The Rhenish Society employs missionaries, who are chiefly engaged in preaching to the colonists of the Cape of Good Hope, as well as in organising schools. The American Board has four stations in the neighbourhood of Port Natal, and the missionaries have set up a press for printing tracts in the Zoolu language. The Church Missionary Society and the Baptist Society have only lately commenced missions in South Africa.

3. *African Islands.*—Madagascar. In 1835 the work of missions was making considerable progress, when an edict was issued suppressing all Christian instruction. [MADAGASCAR.] A few converts afterwards met in secrecy on a mountain, for the purpose of reading the Scriptures and other religious exercises; but the practice becoming known to the authorities, sixteen were apprehended, one of whom, a woman of superior mind named Rafaravary, was put to death, after having been flogged with great severity, in the hope that she would make a confession of the names of her companions. She met her death with firmness and composure. There have been other martyrs, and no instance of apostacy has yet been recorded of the Christian converts. A large number of persons are still in bonds or in slavery, and the queen proposed to put them all to death, but was dissuaded by her officers. No change in this state of things is expected at present.

4. *Inland Seas.*—The Red, Mediterranean, Black, and Caspian seas, and Persian Gulf. At Malta the Church Missionary Society has a press, at which, in 1837, 25,338 copies of tracts and other works were printed in the Greek, Arabic, and Turkish languages. The Wesleyan Society has also a station at Malta. In the kingdom of Greece above 1100 young persons, from 4 to 17 or 20, are receiving instruction through the instrumentality of missions. The American Board has stations at Athens, Argos, and Ariopolis in Laconia, and the missionaries are employed in preaching, and in the publication and distribution of tracts, and in establishing schools. In 1837 above 17,000 copies of books, containing 616,427 pages, were printed at Athens at the expense of the mission. American Episcopal Missions:—Schools have been established at Athens, which are attended by above 600 scholars. The mission family comprises 40 souls. So successfully has the work of education been conducted in the mission seminary, that applications have been received by the heads of the mission from Constantinople, Asia Minor, Moldavia, &c., to take under their care the daughters of rich Greeks, to educate them as they thought best. Five male and eight female Greek teachers are employed. In the island of Syra the Episcopal (American) Missions have a printing establishment, which, in 1837, issued 29,000 copies of thirteen publications, varying in size from 6 to 428 pages each. This press is about to be given up. Crete is also a station of the same Society. The state of education in this island is deplorable, and scarcely a copy of the Scriptures is to be found. Corfu is a station of the London Missionary Society, and their missionary performs the duties of inspector-general of schools in the Ionian Islands. The British government has recently ordered books to be printed for a regular course of instruction in the Lancasterian schools of the Ionian Islands. The American Board has established schools at Constantinople for the Greeks and Armenians of that capital, and endeavoured to excite among them a religious spirit; but these efforts have met with great opposition.

Asia Minor.—The exertions of the Church Missionary Society to establish Greek and Armenian schools at Smyrna have been unsuccessful, the Armenians declining their services, and the Greek hierarchy warmly opposing them. In the meantime the missionaries are preparing useful and scriptural books in the Turkish language. The American Board has a press at Smyrna, at which, in 1836, there were printed 25,618 copies of thirty-eight different works in modern Greek, besides copies of works in Armenian, including a new version of the Armenian Testament. Two magazines, in Greek and Armenian, are published monthly. The schools which were attempted to be established have failed; but an interest has been excited on the subject of education, and the missionaries at present chiefly direct their attention to the distribution of books in Asia Minor.

Egypt.—The Church Missionary Society has established schools at Cairo, which are mostly attended by Copts. There are 114 scholars in the female school, in which needle-work is taught, and reading and writing.

Abyssinia.—In consequence of the opposition excited against the servants of the Church Missionary Society, they have been obliged to return to Cairo. The mission was encountering considerable difficulties, when the arrival of an Italian priest and a Frenchman, for the purpose, it is understood, of reviving the Roman Catholic mission in Abyssinia, considerably increased the clamour against them. The Italian priest afterwards penetrated to Gondar, and opened a communication with the king of Shoa. The ejected missionaries had procured a firman to the king of Shoa, and at the latest accounts were preparing to visit his territories. Persia:—the American Board sent a mission to the Nestorians in 1835, with instructions to form a station on the western side of the Kurdish Mountains. One of the objects of the mission is to improve education. There are 38 pupils in the seminary, or boarding-school, who are taken from different Nestorian villages; a Sunday school has been established; and a fount of Syro-Chaldaic type been received; but the Board has not been able to find a printer to undertake this department of the mission. A physician is attached to the mission, who is resorted to by the people from all quarters. The American Episcopal Society is on the point of sending a missionary to Northern Persia, Syria, and Palestine: the American Board has stations at Beyrout and Jerusalem, and service is performed in the Arabic language. Twelve pupils belonging to the Maronite, Greek, Greek-Catholic, and Armenian churches, with two Protestants and a youth of Jewish descent, are boarded in the Mission Seminary, and are educated with a view to future usefulness in the missionary cause. The female school is attended by 25 pupils. The missionaries state that a female boarding-school might be advantageously opened at Beyrout. At the press 16,200 copies of seven different works were printed in 1837 for distribution. At Jerusalem a small native congregation has been formed. Male and female schools have been opened. The demand for books is said to be increasing in Syria and Palestine.

Asiatic Russia.—The stations of the German Missionary Society were abolished by an ukase of the emperor in 1837. Siberia:—conversions have been rare in this quarter. The London Missionary Society has a station 160 miles south-east of Irkutsk, and another at Khoton, where a press has been established, at which a translation of the Bible is now printing; and there is a third station at Ona.

Mohammedan Missions. A visit to Persia has induced Mr. Merrick, of the American Board, to form an opinion that missions to Mohammedan countries are at present premature, and that the preliminary step should be to elevate the character of the Oriental churches, whose condition degrades Christianity in the eyes of the followers of Mohammed.

5. *China and India beyond the Ganges.*—In China the difficulties in the way of missionaries obtaining access to the country have been latterly rather increasing than diminishing; the frontier stations are therefore regarded with great interest by the friends of missions. Most of the principal missionary societies throughout the world have stations in India beyond the Ganges. The Catholics are the only European missionaries who preach Christianity in the interior parts of the Chinese empire. The London Missionary Society has not yet been able to fill the vacant station at Canton. At Singapore the Society has two labourers and two at Malacca; and at the latter place service is performed every Sunday to a crowded congregation of Chinese. In 1837 the number of Chinese baptised was 29; and there were 205 boys and 115 girls in the Chinese, and 70 boys and 20 girls in the Malay schools. The Chinese girls' schools are entirely supported by the sale of useful and fancy articles sent from England. The number of students in the Anglo-Chinese college is six, besides Chinese youths. Above 30,000 copies of the Scriptures, or portions thereof, and tracts, are distributed annually. At Penang there are two missionaries but no native communicants. Five Malay schools contain 111 scholars, and 11 Chinese children are under instruction. The issues from the press at Penang, in 1837, were 12,500 publications in Malay; and the circulation 19,000, of works in the Malay, Chinese, Tamul, Dutch, and English languages. The Malay publications were sheet-tracts and were issued in consequence of some atrocious murders. A Society has been formed at Penang for the Diffusion of Christian Knowledge amongst the Chulicks and Bengalees inhabiting the island; and a school for girls has been established under its auspices. The American Baptists have missions in Siam, and at Bankok, a city supposed to contain about 500,000 inhabitants, four-fifths of whom are Chinese, they have established printing and lithographic presses. In 1837 about two million octavo pages in the Chinese and Siamese languages were printed. These publications are distributed as fast as they can be worked off. Four of the missionaries devote themselves to the Siamese, and five to the Chinese. In a recent excursion about 60 miles north of Bankok, a point never before reached by Protestant missionaries, 900 Siamese and 3000 Chinese tracts were distributed to eager inquirers. Evidence is adduced in the 'Report' showing that these tracts are extensively read. In a letter from the Roman Catholic Apostolic Vicar of Siam, it is stated that 'books are received, because they cost nothing; are laughed at, but no one is converted.' The American missionaries, it is stated, make handsome presents to the authorities, and have built 'commodious houses, where they spend their time agreeably in the society of their wives and families.' The Catholic missionaries, on the other hand, regard the mortifications and hardships of their labours as calculated to promote the objects of their mission. (*Annals of the Propag. of the Faith*, 1838.) The American Baptists have also a Burmah mission consisting of several stations, at which 30 missionaries and a large number of native assistants are employed. In 1836, 343 Karens and Burmans were baptised. The missionary press is conducted on a scale which the most sanguine would scarcely anticipate. The printing-office is in the heart of the city of Maulmein, and is built of brick in the form of an L, 78 feet long each way and 56 wide, and is two stories high. It contains a power-press, four hand-presses, twenty-five cases of types, founts in three languages, and, with the binding department, employs 25 natives. By this time five additional presses and a large supply of paper have been received. It is intended to set up a press in an out-station where 8000 tracts had recently been distributed in two days at a festival. At the station of Sudiya the Board have three missionaries, a printer, and assistants. About nine years ago the American Board commenced a mission in China, and it has now two missionaries stationed at Canton, who are chiefly occupied in preparing works for the press, and revising the Scriptures. At Macao the Board has set up a press, and the printer who superintends it is studying the Chinese and Japanese languages. Two missionaries and a physician are stationed at Bankok, the latter of whom is daily visited by 20 or 30 patients, whom he addresses on subjects of religion. A Chinese and a Siamese school have been established, which are attended by only a small number of pupils. Four missionaries and a physician are stationed at Singapore, who are acquiring the Chinese language. The school is considered the most important department at this station. The press is very actively employed in printing Chinese tracts, also works in the Malay and Japanese languages; but it is stated that the ability of the Chinese to read is over-rated. The Chinese station of the American Episcopal Missionary Society is at Batavia, but its efforts are intended to be directed to China. Here also are two missionaries and a physician engaged in studying the Chinese and Malay languages. A Chinese school of 20 boys and 9 girls is found an invaluable aid in acquiring the Chinese colloquially. The Church Missionary Society and the Baptist Missionary Society are the only English societies which at present send missionaries beyond the Ganges. The former Society has stations at Akyab, an island 450 miles south-east of Serampore, and at Chittagong; and the latter has one missionary at Singapore, who is studying Chinese and Malay.

6. *India within the Ganges.*—This quarter is by far the most important field of missionary exertion, and the moral obligation to convey religious instruction to nearly 150,000,000 of people under our dominion has been deeply felt in Great Britain. India is also the active scene of missionary labours for the American and many of the European societies. It is difficult to separate the exertions of such institutions as the Bible Society from those societies whose exclusive object is the conversion of the heathen. The British and Foreign Bible Society has expended 112,000*l.* in this portion of India, either in grants of books or paper, or for the purposes of translation: and the Scriptures have been printed in all the principal languages and dialects of India. The 'Christian Knowledge Society' has sent funds for the erection of churches and mission-houses, and presented depôts of books and lending-libraries, and has supplied the materials for furnishing schools and printing-offices. The Prayer Book and Homily Society has sent out its translated works. The Religious Tract Society distributes annually an immense number of its publications through the various missions; and there are also several important local institutions which are engaged in promoting education, and are conducted more or less in a spirit of missionary co-operation The Society for the Propagation of the Gospel founded a mission college at Calcutta in 1820; and it has established missions in connection with the college in the neighbourhood of Calcutta and Cawnpore. The Society has a seminary at Vepery and a grammar-school. A number of native teachers is expected from these institutions. In the dioceses of Calcutta and Madras 22 missionaries and 11 catechists are employed. In the last Report of the Church Missionary Society it is stated that as respects the extension of Christianity in India the great obstacle is the difficulty of finding willing and competent agents either at home or abroad. Baptist Missions:—At Calcutta, to which six out-stations are attached, with sub-stations in many villages, the missionaries devote

their time to translating and publishing the Scriptures, and improved versions are in progress; and in forming and superintending schools, from many of which native teachers and preachers proceed to aid in the work. A few individuals are annually baptised. Church Missionary Society:—In Northern India, extending from Calcutta to Agra, and including Benares, there are 12 stations, at which fourteen missionaries are employed, two native missionaries, two catechists, forty-one native and Eurasian teachers. Communicants (at Calcutta and Benares) are 32; attendants at public worship 1111; schools 63, scholars 3844, chiefly boys. The bishop of Calcutta states that the education of youth on Christian principles has 'loosened the chains of Hindooism.' The Western Indian Mission has its principal stations at Bombay and Nassuck. Within 12 miles of Bombay 450 children are under instruction; and, as at Calcutta and Madras, there is an institution for the purpose of giving a superior education to young natives who give promise of becoming useful missionary labourers. At Nassuck there are schools for 357 boys and 80 girls. The missionaries endeavour to promote their object by discussions, conversation, and preaching. The South Indian mission includes Cochin, on the Malabar coast, and Madras, with the stations in the Tinnevelly mission:—missionaries employed 11, catechists 4, native missionaries 3, native assistants 151, communicants 314, schools 149, scholars 4634. Of the Palamcottah station it is stated that the congregations are increasing, 'but the new comers are evidently influenced by worldly motives,' and should they be disappointed, they will relapse into heathenism. The conduct of the converts 'differs in very few respects from that of the heathen, except in the outward mode of worship.' The German Missionary Society had recently a missionary in the Tinnevelly district. London Missionary Society:—Principal stations at Calcutta, Chinsurah, Berhampore, Benares, Mirzapore, Surat, Belgaum, Bangalore, Salem, Coimbatore, Trevandrum, Nagercoil, Neyoor, Combaconum, Chittore, Madras, Cuddapah, and Vizagapatam. Number of stations and out-stations 310, missionaries 36, European and native assistants 375, schools 293. These numbers refer to the territories of the East India Company and those of the protected states. It is stated that the natives who become acquainted with English are much more favourably disposed than those who remain ignorant of it. At Chinsurah the people have themselves established English schools under native masters. The mission presses are actively at work, and great numbers of tracts are printed, which are inquired for by people from all parts. In the Coimbatore district, at the commencement of the mission, no schoolmaster could be found who would teach Christian books; now there are 12 boys' schools on Christian principles. The prejudices against female education are rapidly giving way. In the Travancore district, in an area of 450 square miles, about 6000 persons, including children, are connected with the mission. In the seminary for training native missionaries, four of the youths read the Greek Testament with facility. The effects of missions in the district of Chittore are favourably displayed in the habits and conduct of the natives, many of whom, in place of resorting to mendicancy, are engaged in honest labour, but 'spirituality is scarcely visible.' At Madras the native congregation consists of 80 persons, of whom 35 are communicants. General Baptist Missions:—Stations at Cuttack and five other places within 350 miles of Calcutta; 78 communicants, but this number includes Europeans. At Cuttack a printing-press has been set up, at which 10,000 hymn-books, 20,000 tracts, 2000 Baxter's 'Call,' and 4000 'Pilgrim's Progress' have been printed. Wesleyan Missionary Society:—Principal stations at Bangalore, Gobee (a town in the Mysore country), Negapatam, and Madras, each of which embraces an extensive district; missionaries 12, assistant-missionaries 7, salaried teachers 24, members 346, scholars, chiefly Hindus, 1375. The gospel is preached in English, Tamul, Canarese, and Portuguese, and religious instruction has occasionally been given in Telogoo. Church of Scotland Missions:—The nature of their labours has already been described, and statements given showing the great importance of their schools at Calcutta, Bombay, and Madras. The German Missionary Society has four missionaries at Mongalore, and three at Dharwar, and five were sent out last year to establish a mission at Hoobly. In 1837 a seminary was begun for training native catechists and schoolmasters, and was soon attended by 22 young Canarese. American Board of Missions:—In the Mahratta missions 6 missionaries, 2 assistants, and 1 printer are employed. The seminary at Ahmednuggur, supported at an annual cost of 1000 dollars, has about 60 pupils from 5 to 16 years of age, and the course of study embraces several years, and includes the acquisition of English. The English residents are liberal supporters of this institution. At the mission-press, which has been also employed by other societies, 51,450 copies, containing 3,127,850 pages, were printed in 1839 in the Mahratta language. The Tamul mission has stations at Madura and four other places, at which 11 missionaries, 1 medical missionary, 1 physician, and 16 native assistants are engaged. At Madura daily preaching is usually maintained amongst the people at the schools and in the vestibules of the idol temples. The opportunities of instructing the natives are numerous during a journey. When the missionary stops at a school the people assemble out of curiosity, and while seated on his horse he may profitably hold a discourse of from two to ten minutes. In Madura and its vicinity there are 43 schools, containing 1730 scholars, and at Dindegal 17, containing 554 scholars. A small proportion of the people can read, but the population being immense, the number of readers is great. Applications for books are received from the most remote villages. In the district comprehending Madras there are 25 schools, with 750 scholars, and the attendance on preaching varies from 350 to 400. The American Board has recently purchased the extensive printing establishment of the Church Missionary Society at Madras. It contains eight printing-presses, a lithographic press, fifteen founts of type for printing in English, Tamul, and Telagoo, also an hydraulic press, and all the means for casting type and binding books. The Bible has not been completed in Telogoo. In a few years it is expected that the operations of this press will supply the reading population amongst the Tamul people with portions of the Scriptures, tracts, &c. American Presbyterian Mission:—Stations at Loodianah, the most remote of the British stations to the north-west, near the Sutlej, which divides the territories under the power or influence of England from those of Runjeet Singh. There are 2 schools, English and Hindustanee, and 2 printing-presses, under the care of one missionary. Sharanpu, 110 miles distant from Loodianah, is another station of this mission, and was selected on account of the large fairs held at Hurdwar, which are attended by people from every part of Asia except China, amongst whom tracts can be usefully distributed. Persian books and tracts are in demand. Allahabad, the remaining station, is resorted to by immense multitudes of pilgrims from distant parts. At the last account only one missionary resided here, but others have been since sent from the United States to join him.

7. *Ceylon.*—Baptist missions:—Stations at Colombo and five other places. A controversy is carried on with the Roman Catholics, and fifteen numbers of the 'Protestant Vindicator' have been published. Church missions:—stations 4, missionaries 8, printer 1, native catechists and teachers 81, attendants on public worship 2365, communicants 120, schools 55, scholars 1880, chiefly boys. Service is performed in the Tamul and Singhalese languages. Since 1823 above 100 youths have been educated at the mission seminary. The increasing knowledge, experience, and stability of the native agents is regarded as the most promising feature of the mission. Wesleyan Missions:—The Ceylon mission is conducted in two divisions, the Singhalese and the Tamul, the northern part of the island being inhabited by a distinct race professing Buddhism, and the south by Hindu idolaters and Mohammedans. Stations in the Singhalese division 5, missionaries 5, assistant-missionaries 9, salaried teachers 99, members in society 656; scholars, adults, and children, 4471. In the Tamul division there are 4 stations, 8 missionaries and assistants, 37 salaried teachers, 139 members, and 2136 scholars. The missionaries report that regular congregations are established all over the island; thousands of tracts in four different languages are distributed every month, which are said to be eagerly read; schools might be increased to any extent; discussion on religious subjects is almost universal; and the 'entire evangelization' of the island engages the anxious attention of the Society. American Board of Missions:—stations and out-stations 13, missionaries 6, native preachers 4, native assistants 71, physician 1, printer 1, female assistant-missionaries, being the wives of missionaries and the physicians, 7. In sixteen places of worship, average attendance 2700

persons, communicants 330. In 187 free-schools there are 4732 male and 1044 female scholars, besides 151 in the male and 98 in the female boarding-schools. The press gives employment to fifty natives. A few years ago the only tracts distributed were written on the olla, and a single writer could only make four or five copies a-day. In 1837 the number of pages printed, of tracts, of the Scriptures, and other works, was 12,436,000. This mission being in some difficulties in 1837, the governor, in his official capacity, sent a donation of 200*l.*, 'in token of the high sense entertained of the services of the mission in the northern provinces.'

8. *Indian Archipelago.*—In August, 1837, a regulation in reference to foreign missions in these seas was issued by the Netherlands (local) government:—'That no missionary from any foreign country shall be permitted to establish himself anywhere in Netherlands India, excepting on the island of Borneo, this permission to be granted only to Netherlands missionaries, under restrictions hereafter to be made.' The authorities on the west, south, and east coasts of Borneo are called upon 'to advise the government what progress the missionaries have made there, and to give their opinion whether or not it is advisable that more should be admitted.' The Netherlands Missionary Society employs eighteen missionaries in Dutch India. There are two stations at Sumatra, one at Rhio, one near Batavia, also one at Timor Coupang, one at Makisser, and one at Moa; at Litty and Amboyna there are two at each; and there are stations at several other places. In Celebes numerous nominal conversions to Christianity have taken place. In Borneo there are some German missionaries, who have no connection with the Netherlands Society. The Moluccas have not been considered as a profitable field for missions. About twenty years ago the Baptists had a missionary station at Bencoolen, in Sumatra, where a press was put into operation, and many tracts and books distributed; but the missionaries removed to India on the island coming into the hands of the Dutch. The London Missionary Society has a station at Batavia, where two schools have been established for Chinese youths, and one for Malays, and a printing-press has been actively employed. The American Board supports four missionaries at Borneo, and the American Episcopal Missionary Society has a station at Batavia.

9. *Australasia.*—The Church Missionary Society has a station at Wellington Valley, 240 miles north-west of Sydney, where, at different times, more than a hundred of the aborigines have been under instruction. Several have learned to read. The native vocabulary has been revised and enlarged, and the Gospel of St. Matthew, and nearly the whole of the morning and evening services of the Church have been translated. Service is performed in this language every Sunday. 'In the seed-time natives attended at the plough daily for upwards of a month; and in the harvest thirteen natives were employed in reaping. The children, in general, improve as much as those of European parents in all ordinary branches of education—reading, writing, sewing, and religious knowledge.' At Port Philip, in South Australia, the Wesleyan Missionary Society has stationed two missionaries, who are to instruct the aborigines. The local government has undertaken to defray half the preliminary and half of the annual expenses. In 1838 several German missionaries were conveyed out at the cost of the English government, with a view of instituting a German mission to the aborigines. They are stationed at Moreton Bay, and at present act under the Scottish synod of New South Wales. The Gospel Society has engaged to contribute towards the outfit and support of 32 additional clergymen in New South Wales and Van Diemen's Land. The Catholics are extending their activity to the same quarter, and Sydney has become the central station of an important mission, embracing Polynesia. New Zealand:—The Church Missionary Society commenced its labours in these islands in 1815, and there are now 10 stations and 1 out-station, at which 91 persons are employed. Attendants on public worship 2176, communicants 178, schools 51, scholars 1431. In the printing-office 5000 copies of the New Testament have been printed; and a New Zealand grammar, in English, and a translation of the 'Pilgrim's Progress,' are preparing. Dr. Lang, in his 'New Zealand in 1839,' has severely attacked the members of the Church Missionary Society on account of their having become land-jobbers. Mr. Polack, who resided in New Zealand six years, says that but for the missionaries the island would have been wholly unsafe as a residence for commercial men. The missionaries, in the absence of a regular government, are often required to exercise political and magisterial power. (*Report of Commons' Committee on Aborigines.*) The Wesleyan Missionary Society is the only other English institution which sends missionaries to New Zealand. Members 600; 500 are under school instruction; a printing-press is in full operation, and employed in preparing elementary books for the schools. New Zealand has just been visited by Catholic missionaries, who say, 'The natives are enchanted with the beauty of our ceremonies.'

10. *Polynesia.*—Wesleyan Missions:—Stations in the Friendly Islands and in the Fejee Islands. In the Habai and Vavou Islands the people have 'generally embraced the true religion.' They are said to be 'truly converted,' and living in the enjoyment of 'great spiritual peace.' London Missionary Society:—The missionaries of this Society occupy stations in the Navigators' Islands, Georgian Islands, Society Islands, and Harvey Islands. The American Board of Missions has selected the Sandwich Islands. The Rev. H. Douglas states that in more than thirty islands of the South Seas paganism has ceased to be the national faith. (*Travels in Eastern Asia.*) Ellis's 'Polynesian Researches' contains an interesting account of the progress and results of missionary exertions in this part of the globe. A 'History of the Sandwich Islands Mission' has been published by the London Tract Society, in 1 vol. 12mo.

11. *Guiana and the West Indies.*—Baptist Missionary Society: Jamaica—19 missionaries, 42 male and female assistants, 69 stations and out-stations, 18,720 members, 17,781 inquirers, 2447 day-scholars, 992 evening-scholars, 7464 Sunday-scholars, 2120 baptisms, and 382 new communicants in the year. Bahamas—4 missionaries, 13 assistants, 36 stations and out-stations, 360 members and 50 inquirers, 200 day-scholars, 450 Sunday-scholars. Church Missionary Society:—stations 27, missionaries 12, catechists and teachers 23, country-born teachers 18, attendants on public worship 2005, communicants 88, schools 54, scholars 3712. Of the stations of the Society many are in the most neglected parts. Wesleyan Missionary Society:—85 missionaries are assisted by 1159 salaried and 1582 gratuitous teachers; the members in society are 40,234, and the number of scholars is 16,027. In 1838 assistance was obtained from the government towards building 24 school-houses. United Brethren's Missions:—at 29 stations there are 125 male and female labourers, who have 43,892 persons under instruction, of whom 13,952 are communicants. In 1838 the Brethren received assistance from government for the erection of 19 schools. The Scottish Missionary Society has 5 missionaries employed. The means of education will soon be more generally extended amongst the negroes in the West Indies than in the United Kingdom. The Ladies' Negro Education Society has established 120 schools during the last fourteen years. In Jamaica, under the Mico Charity, there are three model-schools, for boys, girls, and infants. The greatest difficulty exists in supplying competent teachers. The Gospel Society makes large grants towards the erection of schools and churches; and 42 clergymen derive a part of their income from its funds.

12. *North American Indians.*—American Board of Missions:—27 stations, 23 missionaries, 3 medical missionaries, 3 physicians, 11 teachers, 6 farmers and mechanics, 3 native preachers, 1 native assistant, and 55 native assistants. United Brethren's Mission:—About 360 Delawares and Cherokees are under the care of eight missionaries and one assistant. The Church Missionary Society has at the Red River settlement 4 churches, 1 missionary, and 7 schoolmasters; attendants on public worship 1560, communicants 267; at 10 schools there are 649 scholars, including 60 youths and adults. 'The plough, the spade, the sickle, and the mill, are very essential articles in this mission.' The Wesleyan Missionary Society has missions among the Chippewa and Mohawk Indians. The American Episcopal Missionary Society is labouring amongst the Indians. In the Report of the American Episcopal Board it is stated that the government at Washington is about to congregate the remnant of twenty-eight Indian tribes, about 130,000 in number, in a district 200 miles by 600 in extent, the exclusive possession of which is to be secured to them.

The North American Colonies are greatly indebted for the means of religious instruction to the Gospel Propagation Society, and in every one of the British provinces it has gathered congregations together. In Newfoundland the Catholics have an active mission.

13. *Labrador.*—Fifteen of the United Brethren have 973 Esquimaux under their care, among whom there are 360 communicants.

14. *Greenland.*—At 5 settlements, 15 of the United Brethren have 1785 natives under their care, including 80 communicants.

For a 'General View of the Results of Missionary Effort,' the reader may refer to the Rev. Howard Malcolm's *Travels in South-Eastern Asia.* Briefly stated they are as follows:—1. Numerous and formidable impediments have been removed. An entrance and location among strange nations have been effected. Missionaries everywhere find brethren to welcome them. 2. One thousand ordained missionaries, fifty printers, three hundred schoolmasters and assistants, and above one thousand native preachers and catechists are in actual service. 3. The Scriptures, in whole or in part, have been translated by modern missionaries into nearly a hundred languages. 4. A considerable number of languages have been reduced to writing. For some of them characters have been invented. In most of them a considerable number of the people have been taught to read. 5. Missionaries have given to the heathen nearly all the useful literature they possess. They have, with a few exceptions, been the introducers of the art of printing amongst them. 6. Tracts and practical works have been produced in considerable variety: in Bengalee 75 tracts and other works; in the Tamul language 200, in Malay 50, in Chinese about 100, in Burman 28, &c. &c. 7. In nearly every mission there have been prepared a grammar, vocabulary, and dictionary. 8. An amount literally incalculable of Bibles and tracts has been put into circulation. 9. Great mechanical facilities have been created. Upwards of 41 printing-offices are in full operation in heathen lands, some having 10 presses at work. Binding establishments are in connection with these; and the natives have learned the arts of printing and bookbinding. 10. Schools, some of them for superior education, have been established in vast numbers; the number of children in missionary schools is estimated at 3000. 11. The blessings of Christian morality have been widely diffused. 12. In some places the entire fabric of idolatry is shaken. Mr. Malcolm estimates the present number of converted heathens at above 100,000.

(*Missionary Map of the World;* Wyld's *Map of Missions; Missionary Register* for January, February, March, and April, 1839; *The Missionary Vine; Missionary Gazetteer,* by the Rev. C. Williams; &c. &c.)

MISSISSIPPI (or the 'Great Water,' as the term signifies in the native language), is one of the largest rivers on the globe, which drains, with its numerous branches, a surface of about 1,100,000 square miles, and probably not less than one-fifth of the North American continent.

Its basin extends from 29° to 50° N. lat., and from 77° to 111° W. long. It is widest on the west, averaging from north to south, and west of 90° W. long., about 1200 miles, whilst its average width east of 90° W. long. does not exceed 560 miles. The greatest length of the basin from east to west is near 42° N. lat., where it measures nearly 1500 miles. Its basin comprehends, besides the immense tract of country along its western and north-western border, still in possession of the aboriginal tribes, the territories of Iaway, on the west, and that of Wisconsin, on the east of the Mississippi; and also the states of Missouri, Arkansas, and Louisiana, on the west; and those of Illinois, Indiana, Ohio, Kentucky, and Tennessee, on the east of the river. It also contains the larger portion of the state of Mississippi, and parts of Alabama, Georgia, North Carolina, Virginia, Pennsylvania, and New York.

The sources of this river are two small lakes, situated in 47° 10′ N. lat., and between 95° 30′ and 96° W. long. The western, called Lake Itasca, is about eight miles long; the eastern, Usawa Lake, is hardly two miles in length. These lakes are estimated to be about 1500 feet above the level of the sea. From each of these lakes a small stream issues in a northern direction, which unite, after a circuitous course of 50 or 60 miles, in 47° 38′ N. lat. The united stream falls into Lake Travers, which is about 12 miles long from north to south, and six or seven broad, and is the most northern point attained by the river. Issuing from the eastern side of this lake, the river flows south-eastward to Cass Lake. From Cass Lake it still runs in an eastern direction to Little Winnipeg Lake, from which its south-eastern course begins. Up to this point its course lies through a country studded with lakes, and united with each other by channels full of rapids and small cataracts. The surrounding country consists of an alternation of small eminences and swampy ground. The elevations or ridges are composed of diluvial sand, on which large granite boulders are scattered, and are overgrown with pine-trees. In the swampy ground other trees grow, especially hemlock, elm, and ash, which are covered with moss. In some parts small prairies occur. The bed of the river is lined by sandy hills, and its waters run over rocks of primitive formation: its course is often impeded by boulders.

Issuing from Lake Winnipeg in a southern direction, the Mississippi continues to traverse the region of lakes. The country in which this part of its course lies is similar to that about its source. The river itself continues to flow with great velocity, and forms several small falls. In some places the river is skirted by narrow strips of alluvial soil, subject to inundation, and in others its bed is already wide enough to form islands, especially above the Big Falls, where twenty islands occur in the space of four miles, called the Beaver Islands. Nine miles above the place where the Mississippi is joined by its first great affluent, the St. Peter's river, which falls into it from the west, occur the largest cataracts in the river, called St. Antony's Falls. The Mississippi, though considerably narrowed by the rocks, is about 640 yards wide at this point. In the middle is an island about 100 yards wide, and covered with trees. The fall on the eastern side is 230 and that on the western 310 yards wide, and the perpendicular height 16 feet. There is a considerable rapid both above and below the falls, and goods must be carried over a long portage. The difference of level between the places of disembarking and reloading is fifty-eight feet. For several miles farther down rapids occur. The falls of St. Antony may be considered as the point where the Mississippi terminates its upper course.

From the Falls to Lake Pepin the river winds through a country of prairies, whose surface is rather undulating than hilly, the elevations being of moderate height, and seldom attaining 200 feet above the level of the water. The valley through which the river runs is now more regular and uniform in width; but the river itself is winding, and intersected with several small islands; its channel is also impeded by sand-bars, and the current is rapid. At Lake Pepin commence the bluffs, or wall-like high grounds, which generally run parallel to the course of the river, and at some distance from it. Lake Pepin, in most parts, nearly fills up the whole space between the bluffs, which rise about 450 feet above its level. The lake is about 21 miles long from east-south-east to west-north-west, and its breadth varies between one and three miles. The country at the back of the bluffs is rather undulating, and assumes the character of a prairie land, being only wooded in isolated spots. Below Lake Pepin the vale of the Mississippi varies from 3 to 10 or 12 miles in width, except at Rock Island and Des Moines Rapids, where it is only wide enough to receive the volume of the river. At the Rock Island rapids, which occur a short distance above the mouth of Rock river, the bed of the Mississippi is contracted to 800 or 1000 yards; and at the Des Moines rapids, which are near the mouth of the Des Moines river, it is only 1000 yards wide. At Rock Island Rapids the river descends 44 feet in a distance of 15 miles; and at Des Moines Rapids 30 feet in 11 miles. In many places the river occupies half the vale, spreading out to the width of five or six miles, and appearing to lose itself among numberless islands, between which it runs in narrow channels. Between Lake Pepin and the mouth of the Missouri not less than six hundred and forty islands of considerable size have been enumerated, which are formed of the alluvium brought down by the stream, and are chiefly sandy; many of them are covered with a vigorous vegetation. The vale of the river is bounded by high bluffs, which are generally abrupt, and often precipitous. Below Lake Pepin the bluffs are said to be 700 or 800 feet high; at the mouth of the Wisconsin river they are 400 or 500; but near that of the Illinois, only from 100 to 150 feet high. These bluffs are intersected by numerous deep ravines and watercourses, which give the country a hilly and broken aspect. On the western side of the river, above the mouth of the Wisconsin, forests cover the high grounds to the distance of six or eight miles from the river: behind them is a prairie region of great extent. The vale itself has a level surface; but in some places, and especially in the vicinity of Lake Pepin, isolated knobs and hills of considerable magnitude, based upon horizontal strata of rocks, and rising to various heights, frequently occur. These hills appear to be the remains of the elevated tract through which the river has scooped out a broad and deep vale. This level is covered with an alternation of prairies and forests. The prairies are generally elevated a little above the floods, and richly carpeted with herbage and flowers: the woodlands are subject to inundation, and sustain a dense and heavy growth of trees. Between the Falls of St. Antony and the mouth of the Missouri river the Mississippi receives no considerable affluent from the west, except the St. Peter's river; from the east it is joined by St. Croix, Wisconsin, Rock, and Illinois rivers. At the mouth of the Missouri the middle course of the Mississippi terminates.

Below the mouth of the Missouri, the river and the vale through which it flows present different features. The river, though less in width, has a more imposing aspect, flowing with a comparatively gentle course, in one sheet of water, rarely interrupted by islands. The only serious obstruction to navigation occurs about 30 miles above the mouth of the Ohio, where two bars of limestone, called the Big and the Little Chain, extend across the bed of the river. In the low state of the river these bars have little water on them, which circumstance, added to the rapidity of the current, renders the ascent of vessels very difficult. The vale widens more and more as it proceeds southward. It consists of an alternation of high lands with an undulating surface, and of low bottoms partly covered with swamps. Both are of great extent, and are generally opposite to one another, so that when the high ground approaches the banks of the river on one side, extensive bottoms skirt them on the other side.

The most northern of these bottoms, called the American Bottom, begins four miles above the mouth of the Missouri, on the eastern bank at the Piasa Hills, and extends to the mouth of the Kaskaskia river, a distance of seventy miles in a straight line. It is several miles wide, and has a soil of astonishing fertility, consisting of comparatively recent deposits from the river. Its surface however slopes, as is commonly the case with bottom-land, from the river to the high lands which skirt the bottom on the east, and along the foot of these high lands are pools of stagnant water, which render this fine bottom unhealthy. Opposite this bottom, on the west side of the Mississippi, the high lands approach the river, presenting abrupt declivities, prominent points, and in many places perpendicular precipices from one to two hundred feet high. The country at the back is partly wooded and partly prairie. These high lands continue along the right bank of the Mississippi somewhat farther than Cape Girardeau, north of which place they attain their greatest elevation, which is 350 feet. Between the mouth of the Kaskaskia river and that of the Ohio are also high lands of inferior elevation, but about thirty miles above the mouth of the last-mentioned river the banks begin to be low, and continue so to its very mouth. Its soil consists of recent alluvium, and is covered with dense forests: the width is about 10 miles.

This low alluvial tract continues south of the mouth of the Ohio for about seventeen miles, where the river runs at the base of the Iron Banks, which rise nearly perpendicularly about 130 feet above the level of the river, and are annually wearing away by the action of the water, which sets strongly against them. From the Iron Banks southward, bluffs less than 200 feet high skirt the banks of the river as far south as 35° N. lat., with the exception of a bottom-ground about 30 miles long and from three to four wide, which lies between 36° 30′ and 36° N. lat.; it is a swamp covered with high trees, and hence called Wood Swamp. South of it some bluffs attain an elevation of 200 or 300 feet, especially the four hills called the Chickasaw Bluffs. The country opposite to this high bank, on the west side of the river, is low. It begins on the north, about ten miles below Cape Girardeau, with the Tywapatia Bottom, a fine tract of wooded country, and extends to the mouth of the St. Francis river, a distance of more than 160 miles in a straight line. Its width is more than fifty miles, and its western side is skirted by bluffs of moderate elevation, which, for a considerable distance, run along the western banks of the Black and White rivers, nearly parallel to the Mississippi. This extensive tract is traversed in all its length by the St. Francis river, which is joined not far from its source by an offset of the Mississippi, by which, during the time of the freshets, a great volume of water is poured towards the middle of the plain, so that the greatest part of it is inundated, and a considerable extent is a swamp all the year round. This swampy tract, extending on both sides of the St. Francis river, is called the Great Swamp. The country is unhealthy, and covered with a continuous forest.

On the south, this low region borders on another, which is not much more elevated, but is less subject to inundations. The whole tract extending from the mouth of the St. Francis river to 33° N. lat. is quite level, without any elevations, and does not form bluffs along the banks of the Mississippi. It is covered with recent alluvium, and mostly wooded. Its width may be between 30 and 40 miles; and on the west it borders on a more elevated hilly region covered with pine-forests. Opposite to this region, on the left bank of the Mississippi, is an immense swamp, which may be called the Chocktaw Swamp, as that nation was in possession of the widest part of it. This swamp extends from opposite the south of the St. Francis river to that of the Yazoo river, a distance of about 150 miles, with a width of about fifty miles in the middle, where it is widest, and an average breadth of about thirty miles. It seems to owe its origin to an offset of the Mississippi, which branches off about 20 miles above the mouth of the St. Francis river, and runs through the low country in a southern direction. This branch is called, at least in its lower course, False river, and falls into the Yazoo river about 20 miles from its mouth. This low region is generally swampy and impassable, and it is only along the watercourses which flow through it that the banks are dry for several months in the year. On the east it is bordered by a much more elevated tract, which is generally wooded on its margin, but farther inland extends in wide and open prairies.

South of the mouth of the Yazoo river, the bluffs on the eastern bank of the Mississippi re-appear, and extend south of Baton Rouge (about 30° 30′ N. lat.). In some places very narrow tracts of low inundated ground separate the bluffs from the bed of the river, but their base is generally washed by its waters. As in the other bluff region, the surface of this tract is intersected by numerous watercourses, which give to it the aspect of a hilly country; but at the distance of about 10 miles from the river it extends in an undulating plain. The bluffs themselves rise rather steeply from 100 to 200 feet above the bed of the river. Opposite to this bluff region is another low and generally swampy tract, which is traversed by the Tensas river, another outlet for the superabundant waters of the Mississippi during the floods. It is from 20 to 30 miles wide, beginning north of 33° N. lat., and extending southward to the mouth of the Red River and the efflux of the Atchafalaya branch of the Mississippi, where it is connected with the extensive low regions of the delta. This region, as well as the delta itself, which constitutes the most southern portion of the vale of the Mississippi, is more particularly described under LOUISIANA.

The Mississippi falls into the Gulf of Mexico by six mouths, after a course of more than 3200 miles; but if we consider the Missouri as the principal river, the whole course is at least 4400 miles.

Countries constituting the Borders of its Basin.—The basin of the Mississippi, like that of most other rivers, is narrow near its mouth. As far north as the beginning of the bluff region, near Baton Rouge, it is confined to the inundated region of the delta. On the west of the delta are the extensive and elevated prairies of the Attacapas and Opelousas, from which the low country is separated by a fertile and sloping tract. But towards 31° N. lat. the country along the border of the basin begins to be more uneven, and is covered with pine-forests. North of the road leading from Nacogdoches in Texas to Nachitoches in Louisiana the change is still greater, the surface in those parts being much more broken, and intersected with hills several hundred feet high. Near the parallel of this hilly region the basin of the Mississippi widens greatly towards the west, running along the parallel of 33° N. lat. from the sources of the Sabine river, or from 98° W. long., to the sources of the Red River in the Rocky Mountains, or to 105° W. long. The country which separates the Red River from the numerous rivers which descend into the Gulf of Mexico through the province of Texas, is only hilly and wooded about the sources of the Sabine river; farther west it has the form of an earth-wall several miles wide, mostly level on its surface, without trees, and sloping with rather a gentle declivity towards the Red River. Its elevation above the sea is not known: towards the western extremity, about the upper branches of the Red River, it joins the wooded hills of St. Saba, a branch of the Rocky Mountains. From the source of the Red River, the long and continuous chain of the Rocky Mountains forms the western border of the basin of the Mississippi in all its extent, from 33° to 48° N. lat. [ROCKY MOUNTAINS.] As these mountains run in a north-west direction, the western part of the basin of the Mississippi continually widens as it extends northward. Near the parallel of 33° N. lat. the river is only about 550 miles from the western border of its basin, but near 44° N lat. it is 1000 miles from it. Farther north the distance is somewhat less, as the river in these parts flows in a general south-eastern direction.

The northern border of the basin of the Mississippi begins on the west at the base of the Rocky Mountains, and the most southern branch of the river Saskatchevan about 48° N. lat. It does not run directly east, but in a north-eastern direction until it attains 50° N. lat., when it extends nearly along that parallel eastward to the banks of Assiniboine, a distance of 400 miles. In 101° W. long. it turns to the south-south-east, and continues in that direction to the sources of the Red River of Lake Winnipeg (about 45° 30′ N. lat.) in Lake Travers. Hence it turns to the north-east on the eastern side of the Red River to Lake Itasca, the source of the Mississippi and Lake Travers, and continues in that direction to 48° N. lat., along which it extends to the banks of Lake Superior. Lakes Superior and Michigan may be considered as lying on the margin of the basin, as the rivers which empty themselves into these lakes have a very short course. From the southern extremity of Lake Michigan the margin of the basin runs east to the most southern extremity of Lake Erie, whence it continues at a short distance from the southern shores of that lake nearly to its eastern extremity. From this lake it turns east-south-east, and terminates at the base of the Alleghany Mountains between the sources of the rivers Alleghany and Genessee, near 42° N. lat. This northern border extends from 110° to 78° W. long., a distance of nearly 1400 miles in a straight line. It is remarkable that no part of such an extensive line is formed by a mountain-range, or what with propriety could be called so, though the countries lying along it present a great variety of natural features. The most western portion of it, which separates the rivers that fall into the Missouri on the south, and into the Saskatchevan on the north, and extends as far east as the Mandan villages (100° W. long.), is a vast plain uninterrupted by any elevations. It is destitute of wood and water, and the few springs which occur are generally salt. This tract however furnishes excellent pasturage. The bottoms along the large rivers are from half a mile to two miles wide, and from 150 to 300 feet below the surface of the plain, whose edges are steep. The soil of the bottoms is alluvial, but not generally very fertile. This tract is probably more than 3000 feet elevated above the sea-level. Where the basin of the Mississippi turns to the south and runs parallel with the course of the Missouri river below the Mandan villages, its border is formed by a wide expanse of elevated ground, which has received the name of Coteau des Prairies. It begins on the north near 49° N. lat., not far from the banks of the Assiniboine, and runs south-south-east, between 99° and 98° W. long., along the vales of the Red and St. Peter's rivers. Its elevation is about 1000 feet above the level of the adjacent country, and its breadth is said to be more than 50 miles. It presents a rounded summit, with few irregularities of surface, and is for the most part destitute of trees. At both extremities this huge mass of elevated ground disappears in a multiplicity of hills, which give to the country a highly varied aspect.

East of the Coteau des Prairies, and at a distance of about 25 miles from its base, a valley runs in the direction of the elevated tract from south-south-east to north-north-west. In this valley are the sources of Red River of Winnipeg lake, and of St. Peter's river. The former is the outlet of Lake Travers, and the second of Big Stone lake. The space between these two lakes is but little elevated above their level, and the water has been known in time of flood to rise and cover the intermediate ground so as to unite the two lakes. In fact, both these bodies of water are in the same valley, and it is within the recollection of some persons that a boat once floated from Lake Travers into St. Peter's river. One of these rivers empties itself into Hudson's Bay, 57° N. lat., and the other into the Gulf of Mexico, 29° N. lat. They rise in the same valley, within three miles of each other. (Long's *Expedition to the Source of St. Peter's River.*)

On the east of the valley of Red River of Winnipeg lake, and between it and the upper branches of the Mississippi (Itasca river and R. de Corbeau), the prairies of the western side become a swampy ground, which is traversed from south to north by a somewhat elevated ridge of diluvial formation, consisting of oceanic detritus. This region, whose surface is partly occupied by numerous lakes, extends to the north of Lake Cass and Lake Little Winnipeg. It is from 1300 to 1500 feet above the sea-level, and contains the sources of many rivers which join the Mississippi, of St. Louis river of Lake Superior, which is considered as the source of the St. Lawrence river, and of several rivers which fall into Great Lake Winnipeg and Red River. The rivers which thus run off in different directions have their heads and upper courses so near to one another, that the Indians and traders constantly pass in their canoes from one to another.

Most of these rivers rise or flow at a distance not exceeding 100 miles from the western extremity of Lake Superior, and many of them approach much nearer: their beds also are more than 600 feet above the surface of the lake. They are however prevented from flowing into it by a rocky tract which surrounds that extensive sheet of water on all sides. Between 48° and 49° N. lat., this rocky, barren, and rugged region extends from the shores of Lake Superior westward to the vicinity of Great Lake Winnipeg, more than 300 miles. But a degree farther south (47° lat.), it is hardly 60 miles wide from east to west. Though it descends with a precipitous declivity towards Lake Superior, its level is probably very little elevated above the swampy tract in which the upper branches of the Mississippi rise. Its surface, which is extremely broken, consists mostly of naked rock, with a few patches of thin soil, and is overgrown with scrubby trees and bushes.

The country extending along the southern shores of Lake Superior, on the borders of the basin of the Mississippi river, is of a similar character. With the exception of the tracts adjacent to the embouchures of the small rivers which fall into it, and a few other places, the rocks along the lake rise from 200 to 400 feet above its surface, and in some places to 800 or even 1000 feet. Farther inland they also rise somewhat, but are followed by an extensive table-land of a very broken and diversified surface, interrupted by numerous large lakes, as the Tomahawk lake and others. This broken region, to which the name of the Wisconsin Hills is given, is probably more than 1200 feet above the sea-level. The rivers which rise on it, and run off towards all points of the compass, are separated from one another by short portages, but are not navigable to any extent on account of the rapidity of their current. Though wooded in many places, the tracts consisting of bare rock are very extensive. This region terminates on the south-west with the Ocooch Mountains, which occupy the tract between the Mississippi and Wisconsin, one of its affluents; but towards the shores of Lake Michigan it descends gradually, or perhaps in terraces, as the small lakes seem to indicate, which occur at certain distances from Lake Michigan. On the south side of this more elevated region, and probably along its base, a deep depression runs across the country lying between the eastern banks of the Mississippi and Lake Michigan, in a south-western and north-eastern direction. In this depression run two rivers, the Wisconsin, falling into the Mississippi, and Fox river, which empties itself into Green Bay in Lake Michigan. These two rivers are separated from one another by a portage of about one mile and a half across a flat meadow, which is occasionally subject to inundations, at which time it offers a water-communication between the two rivers.

South of Green Bay the border of the Mississippi basin is in no place more than 30 miles from the shores of Lake Michigan. As far as it is known, it consists of prairie land, mostly with a level surface and a shallow soil, which in some few places supports a few scrubby trees. In some places it is separated from the lake by a margin of low, flat, and swampy ground, thickly covered with high grass; but the lake is generally skirted at a distance of a few hundred yards from its shores by a range of steep low sand-hills. The sand is loose and unconnected, and the hills appear to have been produced by the constant accumulation of sand blown from the beach by the strong north-easterly winds.

The line which constitutes the border of the basin of the Mississippi between Lake Michigan and Lake Erie is somewhat curved to the south. Along the western part of this line is a fine level plain covered only with thick grass: it is followed by a deep depression, the surface of which is swampy, and through which two small streams run, which establish a water-communication between the Kankakee river, an affluent of the Illinois, and the St. Joseph's river, which falls into Lake Michigan. Farther east the country spreads out in extensive prairies, almost destitute of timber, except on the bottoms of the watercourses (Elkheart river) and on the banks of the small lakes or ponds with which these plains are intersected. These prairies contain a great number of sink-holes or conical depressions of the surface, from 8 to 10 feet deep, and from 20 to 30 feet in diameter. Between these prairies and the most western bend of Maumee river stretches a country 30 miles wide, consisting of low flat ridges, the summits of which present extensive levels, intersected with many small lakes and lagoons. They rise abruptly and with a steep declivity from the lower country to an elevation of 20 or 30 feet, and are uniform in height, but of unequal breadth. They are divided from each other by narrow strips of prairie land. The soil of the ridges is poor and gravelly, and covered with a thin growth of scrubby oak: it consists of an antient diluvial formation, which has been divided by valleys of a later origin, and these lower grounds are filled with alluvium. The remainder of the border, which skirts the southern banks of the Maumee river, is generally a swampy plain.

The swampy country ceases at Sandusky Bay. The southern shores of Lake Erie rise to some elevation above its level, and are not swampy. Behind them the country rises gently, and with a rather level than undulating surface, and attains at the watershed between the rivers which fall into Lake Erie and those which join the Ohio an elevation of more than 900 feet above the sea, and about 350 feet above the surface of the lake. The high grounds extend in alternate prairies and woodland, and the bottoms along the watercourses, which are considerably depressed below the plains, are of moderate extent and wooded. Swampy tracts are of rare occurrence on the plains. This country continues eastward to the boundary-line between the states of Ohio and Pennsylvania. The remainder of the northern border of the Mississippi basin, which surrounds the numerous upper branches of the Alleghany river, runs close to the shores of Lake Erie to 42° 30′ N. lat., and then turns south-east, terminating where the parallel of 42° traverses the Alleghany Mountains, at the head of Genessee river. The country adjacent to this border is very hilly, consisting altogether of a succession of elevated ridges and valleys. The whole tract is considerably elevated above the level of the sea, as Pittsburg, which lies near its southern extremity, at the confluence of the Monongahela and Alleghany rivers, is 265 feet above the level of Lake Erie, and the country which constitutes the watershed in this part probably rises 300 or 400 feet higher. This tract is almost entirely covered with forests.

The eastern border of the basin of the Mississippi, between 42° and 35° N. lat., is formed by the Appalachian Mountains, which as they extend from north-east to south-west continually approach nearer to the bed of the river. Hence the outer border of its basin, between 40° and 42° N. lat., is about 500 miles from its bed, but at the parallel of 35° N. lat. that distance is reduced to about 250 miles. [For the natural features of this region see APPALACHIAN MOUNTAINS.] Though the Appalachian Mountains cease to constitute a mountain-chain in the north-eastern part of the state of Alabama, a tract of elevated and hilly country branches off from their southern extremity, to the west-south-west and west, and terminates on the banks of the Mississippi, north of the Choctaw Swamp, in the hill called the Fourth Chickasaw Bluff. This hilly tract is mostly covered with pine forests, and resembles the country which extends from its southern declivity to the shores of the Gulf of Mexico. About fifty miles from the river this hilly range is traversed at right angles by another tract of elevated ground, which extends from about thirty miles south of the mouth of the Tennessee river, southward through the middle of the state of Mississippi, and terminates in a long slope near the northern shores of the lakes Pontchartrain and Borgne, which belong to the delta of the Mississippi. This elevated ground is broken and rocky between the Tennessee and Mississippi; but in the state of Mississippi it extends in wide plains, which towards the north exhibit extensive prairies and towards the south are covered with pine forests. In this part the outer-border of the basin of the Mississippi is less than a hundred miles from the bed of the river.

Countries included within the Basin of the Mississippi.—The countries comprised within this basin may be divided into the hilly country, the prairie country, and the desert. The hilly country borders on the east on the Appalachian Mountains, from the base of which it extends westward to the meridian of 96°, being crossed nearly in the middle by the Mississippi and the swampy bottoms adjacent to its bed. Towards the south this region extends to the very borders of the basin, namely, east of the river to 35° N. lat., and west of it to between 33° and 34° N. lat. Its northern boundary, east of the Mississippi, is formed by the Ohio river, and west of it by the Missouri, as far as its confluence with the Kansas river, when the latter river forms its boundary nearly to the place where its two great forks unite. The prairie region occupies the whole of the basin north of the Ohio, and also the country between the Mississippi and Missouri. The desert occupies the western portion of the basin, extending from the meridian of 96° and from the banks of the Missouri, where this river flows in a southern direction, to the base of the Rocky Mountains. We shall notice these regions briefly.

The eastern portion of the hilly region, or that which lies between the Appalachian Mountains and the vale of the Mississippi, varies in its natural features and in fertility. The eastern districts, extending as far west as 86° W. long., have a very uneven surface, which is cut by the watercourses to a considerable depth. The rivers run in deep trenches, and have seldom a bottom of any extent. They flow from 100 to 300 feet below the adjacent country. The upland country is a continual succession of ascents and descents, but the acclivities are gentle, and the whole region is covered with a good soil, loaded with timber in its natural state, and yielding rich crops when cultivated. To the west of 86° W. long. the level of the country sinks considerably, which is shown by the rivers traversing wide and open valleys separated from one another by regular ridges or low hills; but the soil of this portion is inferior, and there are several tracts, though none of comparatively great extent, which are without trees, and partake in some measure of the character of the prairies. Towards the banks of the Mississippi the hills decrease in height and expand in width, but to the very edge of the water the country has a broken aspect. The fertility of this portion is still less, and several tracts are covered with sand, and a few are swampy.

On the west of the Mississippi, the hilly region commences near the banks of the river in the districts which extend from the confluence of the Mississippi and Missouri downwards to Cape Girardeau, but farther south it retires to an average distance of 60 or 70 miles from the river. Probably one half of this region is occupied by the Ozark Mountains and their declivities. The Ozarks with their offsets occupy a space of about 100 miles in width and 400 miles in length, beginning on the south on the banks of the Red River between 94° and 97° W. long., and stretching in a north-eastern direction to the confluence of the Mississippi and Missouri rivers, where they terminate between 90° and 92° W. long. Their general direction is parallel to the Atlantic coast and the Appalachian chain. The highest part of this region lies towards the southern extremity, where, between the Red and Arkansas rivers, they constitute a continuous mountain-ridge rising about 2000 feet above their bases. This ridge is called the Masserne Mountains. The hills which occupy the remaining part of the mountain-tract are much lower, but highest along its western border, where they likewise form a ridge which terminates on the banks of the Missouri, between the Gasconade and Osage rivers, in hills hardly 200 or 300 feet above the bed of the river. The whole surface of this tract, with the exception of the river bottoms and valleys, is occupied by hills and mountains, rising from 500 to 1500 feet above their base, consisting of numerous knobs and peaks, with rounded summits and perpendicular cliffs and abrupt precipices. The soil is poor and only bears pine-trees, cedar, scrub-oaks, and hickory. The valleys have a rich soil, but are occasionally subject to excessive floods brought down from the hills and mountains. These floods are so sudden and great, that sometimes the water has risen, in the course of one night, more than 20 feet, and inundated the whole valley to the depth of 10 or 12 feet. The southern and northern districts of this region, namely those adjacent to the Red River and the northern banks of the Arkansas, and those which extend from Cape Girardeau along the Mississippi and Missouri to the mouth of Gasconade river, as well as a tract west of the mouth of the Osage river, an affluent of the Missouri, are not hilly, but the surface exhibits broad and elevated swells of land separated from each other by wide and deep valleys. These districts are diversified with woodlands and prairies. The soil, though not of the first quality, is generally good. The country west of the Ozark Mountains, as far as 96° W. long., resembles these districts in its surface, but the soil is much inferior; the proportion of forest is very inconsiderable, and the timber of a scrubby character. At least nineteen-twentieths of its area are occupied by prairies.

We pass to the prairie-region. Though prairie land generally prevails in that portion of this region which lies east of the Mississippi, there are extensive tracts without any prairies. Of this description is the country which extends along the northern banks of the Ohio river, and in some places 60 or 70 miles from it. It may be considered as divided from the prairies bordering on the north of this tract by a line beginning on the Mississippi river at Cape Girardeau and running in a north-easterly direction to the Miami river, and thence eastward to the Muskingum, which it crosses near Zanesville: thence its course is north-east to the sources of Big Beaver river and to Lake Erie. The tract of country included by this line and the vale of the Ohio is exceedingly diversified with hills and valleys. At the distance of half a mile to one mile and a half from the Ohio the hills rise with a steep ascent to an elevation varying between 300 and 500 feet. On attaining this elevation the country appears uneven and rough, but the hills are comparatively small, though very steep. Their summits have a tabular form. The undersoil is generally either limestone or sandstone. The general elevation of the upland grounds may be from 600 to 1000 feet above the sea-level, but this elevation decreases towards the Mississippi. The inequalities of the surface do not render it unfit for cultivation. The valleys, especially along the principal streams, are exceedingly fertile, and the hills, though less productive, are capable of cultivation.

The country north of the above-mentioned line has an undulating surface towards the east, but no considerable hills occur. This district is entirely covered with forests. The prairies begin to make their appearance on the banks of the Muskingum river, where however they are frequently interrupted by forests, but farther west the prairies increase in number and extent, until in the neighbourhood of the Mississippi the forests are limited to the banks of the rivers. In these districts extensive tracts occur with scarcely an undulation upon their surface. They are generally dry, and water is only found at a considerable depth, but towards the border of the basin of the Mississippi the extensive levels are marshy. The tract of land in which the rivers, which on one side fall into the Ohio, and on the other into the lakes Michigan and Erie, take their origin is lower than the country south of it, and decreases in elevation as it advances westward, being at the source of the Miami 964 feet, and between Lake Michigan and the upper branches of the Illinois river only about 700 feet above the sea-level. The valleys of the rivers in this prairie-region are generally broader than among the hills farther south, and more regularly defined, being separated from the high lands by parallel ranges of bluffs or mural banks.

The prairies extend between Lake Michigan and the vale of the Mississippi northward to the lower course of the Wisconsin river (43° N. lat.). North of that line commences a hilly region, which extends northward to Lake Superior. This region, which is known by the name of the Wisconsin Hills, has been already noticed. The Ocooch Mountains, which constitute its southern extremity, rise about 1200 feet above the Mississippi, and 2000 feet above the sea-level, and near the great bend of the Wisconsin, but on the south-east of it is an isolated mountain-mass called the Smoky Mountains, which rise to the height of 1500 feet. The country which extends south of this region contains a greater proportion of forest than that on the banks of the Illinois river.

On the west of the Mississippi, about the sources of that river and of its affluent the St. Peter's, extends that swampy region of lakes which we have already noticed. South of it, and as far west as the Coteau des Prairies, the general surface of the country, which is about 100 feet above the river bottoms, is undulating. In many places tracts occur of moderate extent, covered with trees, but the prairies greatly prevail, especially near the Coteau des Prairies. This huge swell of elevated ground, which has been already noticed, is said to be followed on the west by a broad valley of prairie land, traversed by the James river, and this valley is stated to be divided from the valley of the Missouri by another elevated tract similar to the Coteau des Prairies. These two ridges of elevated ground terminate on the south between 42° and 43° N. lat. The remainder of the country between the Mississippi and Missouri contains no hills of any considerable magnitude. The whole has a waving surface, diversified with broad river-valleys and creeks, and intervening tracts of undulating upland united to the valleys by gentle slopes. Belts of forest situated upon the margins of the watercourses divide the whole into extensive parterres. If the tracts contiguous to the Mississippi and Missouri are excepted, at least nineteen-twentieths of the country are entirely without large trees. In some places it is covered with scrubs and furze. The valleys along the rivers expand to a great width compared with the streams which run through them, but they are not bounded by abrupt bluffs, except along the Mississippi and Missouri rivers. These valleys are generally covered with luxuriant grass and other herbage, and occasionally contain forests of moderate extent. The soil of the uplands does not appear to be bad, but the great scarcity of timber and of springs renders them useless for agricultural purposes, except in the vicinity of the river-valleys.

The desert, which occupies the whole basin of the Mississippi west of 96° W. long. to the base of the Rocky Mountains, has an undulating surface, with here and there a hill, knob, or insulated tract of table-land. These eminences become more frequent and more distinctly marked as we approach the Rocky Mountains. The table-lands rise from 600 to 800 feet above the common level, and are often surrounded by rugged slopes and perpendicular precipices, which render their summits almost inaccessible. Their surfaces are usually waving, and in some instances rise into knobs and ridges several feet high; many of them are clothed with a scanty growth of pine, cedar, or scrubby oak, whilst others exhibit a bald or prairie surface. But these table-lands occupy only a small portion of the desert. Hills or knobs occur also frequently, and occasionally swells of greater or less extent. The country is divided into extensive parterres by the valleys of rivers and creeks, which are usually 150 or 200 feet below the common level, and bounded in some places by perpendicular precipices, and in others by bluffs or gentle slopes. Between the Missouri and the Rocky Mountains, and nearly at an equal distance from both, there appears to extend a low range of sandstone hills from south-south-west to north-north-east, which towards the north are called the Black Hills; but we are very imperfectly acquainted with their position and extent; their surface is exceedingly broken and rugged. The surface on the east of this range is not an absolute plain, but is diversified with gentle undulations, such as the draining of water from an immense table-land of arenaceous earth may be supposed to have occasioned. The gradual intermixture of the exuviæ of animals and vegetables with what was formerly a poor silicious sand, has produced a soil capable of supporting a scanty growth of grasses, which are now the only covering of this tract. West of the range called the Black Mountains, the fine sand is exchanged for a gravel made up of rounded granitic fragments, varying in dimensions from the size of six-pound shot to tolerably fine sand. Nearer the mountains pebbles and boulders become frequent, and at length almost cover the surface of the country. In this part larg tracts occur which scarcely exhibit a trace of vegetation, and the whole desert is almost entirely destitute of timber-trees, with the exception of some sandy knobs and ridges, which are thickly covered with red cedars of a dwarfish growth. In the neighbourhood of the Arkansas river the surface of the country is in many places covered with numerous fragments of volcanic rocks. There are some tracts where stones of this description are so numerous as almost to prevent all vegetation from springing up. Various ridges and knobs containing rocks of this character also occur in this district. There are no swamps in the desert. Its surface rises gradually towards the Rocky Mountains, at the base of which the desert is probably between 3000 and 4000 feet above the sea-level.

Rivers draining the Basin of the Mississippi.—The rivers which fall into the Mississippi from the east drain a country which is cultivable to a great extent. The most northern on this side is the St. Croix river, which joins the Mississippi between the mouth of the St. Peter's river and Lake Pepin. It rises in Upper St. Croix lake, near the headwaters of Bois-Brulé river, which falls into Lake Superior, and there is a portage of two miles between the streams. It flows in a general southern direction, receives numerous tributaries, and about forty miles from its source enters the Lower Lake St. Croix, which is thirty miles long, but of inconsiderable breadth. The river is navigable for about twenty miles above the lake, where it is obstructed by a rapid, but above the rapid it is sufficiently deep for loaded canoes. Its course exceeds 120 miles.

The Wisconsin or Ouisconsin river rises in the centre of the mountain-region called the Wisconsin Hills, through which its course is in a general south direction for about 180 miles. Where it approaches the sources of the Fox river of Green Bay, it turns gradually to the east, and its course in this direction also is estimated at 180 miles. When swollen it is navigable in the lower part of its course for boats of considerable burden, but at the time of low water its navigation is obstructed by shoals and sandbanks. Its valley is rather narrow, its course rapid, and its bed studded with many islands. Its connection with Fox river of Green Bay has been already mentioned.

Rock river rises near 44° N. lat., near the western shores of Lake Michigan, and runs in a south-south-western and western direction about 300 miles, falling into the Mississippi near 41° 30′ N. lat. It is only navigable for small boats. Not far from its head a natural water-communication is said to exist between it and Manawakee river, which falls into Lake Michigan.

The Illinois is formed by two branches, one of which, the Kankakee, drains the country immediately adjacent to the southern extremity of Lake Michigan, and runs westwards; the other, the Plane river, runs at a short distance from the western shores of the same lake. Both rivers are navigable for boats, and have a natural water-communication with Lake Michigan. Between the Plane river and the Chicago river there is a low tract which is inundated during the spring floods. At this season boats frequently pass over it, and there is a project for forming a canal in this tract from the Illinois to Chicago. Kankakee is united by a swampy tract not far from its head to St. Joseph's river, which falls into the eastern side of Lake Michigan. This low ground is covered with water during the spring floods, and then also is passable for boats, but it is not much used. Both rivers unite after a course of about 70 miles, and form the Illinois, whose waters are soon increased by the Fox river, which comes down from the north, and is navigable for a considerable distance. Some miles below its mouth there are rapids in the Illinois which are utterly impassible for boats except in time of flood. At this place the projected canal is to commence. Below the rapids to the mouth of the river, a distance of about 250 miles, the navigation is easy for boats of moderate draught and burden. The current is exceedingly gentle. The river valley is broad, and bounded by parallel bluffs; the bottoms are covered with dense forests, and the upland open prairies have an undulating surface, covered with rich grass and herbage. Among the tributaries in its lower course the most important is the Sangamon, which comes from the east, and is said to be navigable for more than one hundred miles.

The Ohio, the largest and most important of the eastern affluents of the Mississippi, is formed by the confluence of two rivers, the Alleghany and Monongahela. The Alleghany rises in several branches south of the eastern extremity of Lake Erie, and the source of one of these branches is only five miles from the lake. The general direction of its course is first south-west and then south, and after a course of about 200 miles it unites with the Monongahela, the sources of which river are nearly 300 miles south of those of the Alleghany. The Monongahela rises in Virginia, in the Laurel ridge of the Appalachian Mountains, and runs northwards: its course may be about 200 miles. These two rivers, uniting at Pittsburg, form the Ohio, whose course from this place to its junction with the Mississippi, in a direct line, is 548 miles, but measured along its windings 948 miles. At Pittsburg its mean level is 850 feet above the tides of the Atlantic Ocean, and at its junction with the Mississippi about 320 feet. Except in high floods the current of the Ohio is gentle and nearly uniform. About 300 miles from its mouth, near the town of Louisville in Kentucky, are some rapids, where the river falls 22 feet in less than two miles. In times of high water an acceleration of current, not usual in other parts of the river, is all that is perceived in passing down these rapids; but at other times the water is dashed and broken upon the rocky bed of the channel, called the *Indian chute*, through which a great part of the water passes. To avoid these rapids a canal has been made on the south side, called the Louisville and Portland canal. About 15 miles from the mouth of the Ohio a limestone bar extends across the river, called the Grand Chain. This place is impassable for boats of considerable burden in the lowest state of the water. With the exception of these two places, the Ohio has sufficient water during a part of the year to float vessels of 300 tons burden as far as Cincinnati, and boats may ascend it to Pittsburg, and also both of its upper branches for a considerable distance above their confluence. The Ohio runs in a valley, enclosed on both sides by ranges of hills, called River Mountains: these hills vary considerably in height, but are generally between 300 and 500 feet; their ascent is sometimes rocky and abrupt, but often sufficiently gradual to admit cultivation to the summit. The hills diminish in altitude as they approach the rapids of Louisville, where they rise again to a height nearly equal to what they attain at the head of the river; and from thence they gradually lower, until they disappear a little above the confluence of the Ohio and Green rivers. At this point a low country commences, which extends to the mouth of the Ohio, a distance of more than 150 miles: the river also increases in width and diminishes in velocity. The low country on its banks is thickly wooded, and its soil is a deep alluvium. The low hills which bound the alluvial district are at some distance from the stream. As the country is higher along the banks of the river than at the base of these hills, the inundations to which this district is subject leave extensive pools of stagnant water, which during the summer send forth noxious exhalations. The whole vale of the Ohio is well wooded.

The rivers which fall into the Ohio from the north, as the Big Beaver, the Muskingum, Sciota, Miami, and Wabash, are navigable in the greatest part of their course. The Muskingum and the Sciota have lately acquired great importance, owing to the Erie and Ohio canal, which runs chiefly along their courses, beginning on the Ohio at Portsmouth and terminating on the southern shores of Lake Erie at Cleveland. The largest of these affluents is the Wabash, which has a course of above 500 miles, and is navigable for more than 400 miles, though it is obstructed by some rapids about 70 miles from its junction with the White River. As the remotest branches of this river approach the upper course of the Maumee river, which falls into Lake Erie, a canal has been projected and begun, which commences at Tippacanoe on the Wabash, and terminates on the Maumee at no great distance from its mouth: it is now (1839) in progress, under the superintendence of the states of Ohio and Indiana, and will probably be completed in the course of next year; and thus a double water communication will be established between the Ohio and Lake Erie.

The rivers which join the Ohio from the south, especially the Kenhawa, Great Sandy, Kentucky, Green, Cumberland, and Tennessee, are navigable for keel-boats, and many of them for steam-boats, to a great distance from their mouth during the boating season, which generally commences about the 20th of February, and terminates early in June. During the remainder of the year it is only the lower parts of these rivers that are navigable for boats of moderate burden.

South of the mouth of the Ohio no considerable river joins the Mississippi from the east, except the Yazoo, which falls into it five degrees of latitude farther south. Its course may amount to about 250 miles, and it is navigable for boats, in the spring season, for 50 miles from its mouth.

The rivers which join the Mississippi from the west have a much longer course, as most of them rise on the declivity or near the base of the Rocky Mountains; but as they flow for the greater part of their course through a country which, in the opinion of persons well qualified to form a just judgment, can never sustain a numerous population, nor be applied to agricultural purposes, they can never acquire any great importance. The most northern is the St. Peter's river, which, though it has a comparatively short course, may acquire importance on account of the adjacent country containing many fertile tracts of land. It rises on the northern border of the basin of the Mississippi, in Big Stone lake, which, as already observed, is in the same valley which contains Lake Travers, the source of the Red River of Winnipeg lake, and runs about 300 miles south-east and 200 miles north-east, though its whole course in a straight line does not exceed 275 miles. Its course is exceedingly winding, changing from side to side in its valley, and it is interrupted by several rocky ledges. During the vernal floods it is navigable for boats to Big Stone lake, there being but two obstructions that are impassable on such occasions, namely, at Patterson's Fall, nearly 300, and at Great Portage, about 400 miles from its mouth. At both these places there are portages of moderate length; but during low-water time the upper part of the river is obstructed by shoals and rapids. The vale in which it flows is in the lower parts a mile and a half wide, and enclosed by bluffs about 100 feet high. Along the upper course it is wider, expanding in some places to two or three miles, and the bluffs are lower. The vale presents a mixture of woodlands and prairies; the former however are less frequent along the upper course, and at last disappear, with the exception of some belts which fringe the water. Some parts on the lower course are swampy.

The largest of the affluents of the Mississippi is the Missouri; and as the sources of the Ohio drain the most north-eastern corner of the basin of the Mississippi, so those of the Missouri drain its most north-western angle. It rises in two branches, in which all the waters descending from the eastern declivity of the Rocky Mountains between 42° and 49° N. lat. unite. The northern, called the Missouri, rises near 44° N. lat., and runs northwards to north of 47°, partly within the range of the Rocky Mountains, and partly along its base, a distance of more than 300 miles; it then turns to the east, and, after a course of 400 miles, meets the other branch, the Yellow Stone river, which rises between 43° and 44° N. lat.; but its southern affluents rise as far south as 42° N. lat. Its course is first north-north-east and then east, approaching gradually to the Missouri, which it joins after a course of 800 miles. Though the course of these two branches, according to a rough estimate, amounts to 700 and 800 miles, it is very probable that they run upwards of 100 miles more; so that at their junction each of them may be compared with the Rhine in length, and probably also in volume of water, as the Yellow Stone river is 860 yards wide near the junction. But though the numerous affluents which the Missouri receives in its upper course bring down a large body of water from the Rocky Mountains (portions of which are covered with snow, if not all the year round, at least for the greatest part of it), the Missouri loses much of this water during its long course through a sandy desert; and though it is joined in the lower part of its course by some large rivers, it is stated, and very probably, that the volume of water which it pours into the Mississippi is not greater than what it contains immediately after its junction with the Yellow Stone. After the junction of its upper branches the Missouri continues its eastern course for 200 miles, declining however a little to the south, until it reaches the Mandan villages (near 100° W. long.), where it is deflected by the Coteau des Prairies to a southern course for above 300 miles, until it unites with White River. In this course of 500 miles it is joined by several affluents from the west; and though some of them flow from 200 to 300 miles, none of them increases the volume of its water to any amount, as their course lies through the sandy desert. From its junction with the White River it again flows eastward for 200 miles, and then to the east-south-east for 300 miles, to the mouth of the Kansas river, which is its largest tributary, with the exception of the Platte river, which joins it about 180 miles farther up. After the junction with the Kansas river it runs still 250 miles, turning a little to the south of east, and joins the Mississippi near Belle Fontaine, after a course which, according to a rough estimate, exceeds 2150 miles, but which probably is not less than 3000 miles. The Missouri is a very rapid river in the whole of its course, but it contains no falls except in the vicinity of the Rocky Mountains, where it flows over several ledges of rocks for above 18 miles. In the lower part of the course its vale is wide and very fertile, and it is generally covered with a deep and heavy growth of timber and underwood for about 350 miles from its mouth. There are however prairies of considerable extent, even in this part of its course. Higher up the prairies within its vale become more numerous and extensive, till at length all woodlands disappear, except the small tracts at the points formed by the windings of the river.

With respect to the tributaries of the Missouri, it is observed that their mouths are generally blocked up with mud, a fact which seems properly attributed to the floods of these rivers taking place earlier in the season than those of the principal river, whose course is much farther north. The flood of the tributaries carries off the mud which is deposited at their mouth; but on the rising of the principal river, which is caused by the melting of the snow, its floods back up the waters of the tributaries, which are loaded with mud, to considerable distances up these rivers, and in this stagnant state of the waters the mud at their mouth is deposited. It is only in spring-time and before the time of flood in the principal river that these tributaries have any considerable depth of water at their mouths.

We shall notice only two of the affluents of the Missouri, the Platte and Kansas rivers. The Platte or Nebraska rises in the Rocky Mountains with two branches of nearly equal size, called the South and North Fork, which unite after an easterly course of more than 300 miles. After their junction the river flows nearly 500 miles in the same direction. It derives its name from the circumstance of its being broad and shallow: its average breadth is about 1200 yards, exclusive of the numerous islands which it contains; and its depth, in the average state of the water, is so inconsiderable, that the river is generally fordable. The vale in which the river flows, from its mouth to the junction of its forks, is 10 or 12 miles wide, and forms a most beautiful expanse of level and often fertile country. It is bounded on both sides by lands which are from 25 to 30 feet above the vale, and connected with it by gentle slopes. The vale of the Platte river however contains no wood even in its lower course, except on its numerous islands, some of which are of considerable extent, and are all covered with cotton-wood and willows. The islands decrease in number and size as we ascend the stream, till at length they disappear entirely. Along its northern and southern forks scarcely a tree or even a shrub is seen. This river is seldom navigable except for boats made of hides (bull-boats, as they are sometimes called), and for these only when a freshet prevails.

The Kansas river rises in the desert between the southern fork of the Platte river and the Arkansas, with two great branches, the Republican and Smoky Hill forks. These branches unite after an easterly course of nearly 500 miles, about 100 miles from the mouth of the river. This river is navigable for boats of some size, but only during high freshets, and then only for about 150 or 200 miles, the navigation being obstructed by shoals. The vale in which it runs resembles that of the Platte: woodlands occur only in narrow belts along the watercourses. Much of the country upon the forks is said to have a good soil, but is uninhabitable for want of timber and water. The bottoms have a light sandy soil.

Below the mouth of the Missouri the Mississippi is joined by no considerable river from the west for about 400 miles, until south of 35° N. lat. it receives the St. Francis river. This river rises in the hilly country adjacent to the banks of the Mississippi, west of Cape Girardeau; but after about 40 miles it enters the bottom of that river, of which the Great Swamp constitutes a great portion, which is traversed by the St. Francis in all its length. Flowing through a very level country for about 200 miles, its course is very gentle; but the navigation is entirely obstructed by rafts and fallen trees.

The White River follows next. It rises in the Ozark Mountains, towards the western border of that mountain-region, and runs first northward under the name of the Buffalo Fork; afterwards it turns to the east and south east, traversing the mountains and hills in that direction. Where it issues from that region it is joined by the Big Black River, which rises on the northern border of the mountain-region; and in skirting its eastern border, is joined by numerous rivers, which rise to the west, and bring down a considerable volume of water. From the junction with the Big Black the White River runs south, and joins the Mississippi a few miles above the mouth of the Arkansas. The course of the White River exceeds 400 miles, and it is navigable in a moderate state of water for more than 300 miles. The Black River and several of its branches, as the

Strawberry, Currant, Eleven-Point, and Spring rivers, are also navigable to a considerable extent. The rich bottoms on this river are, with the exception of that on White River, subject to sudden and excessive floods, and consequently less adapted to agriculture than to the rearing of cattle.

The Arkansas joins the Mississippi a little farther south: the vale traversed by it, and its great tributary, the Canadian river, are noticed under ARKANSAS RIVER.

The last considerable river which falls into the Mississippi from the west is the Red River. Its most remote feeders rise in the Sierra del Sagramento, or that portion of the Rocky Mountains which separates the elevated valley of New Mexico from the extensive plain east of it. This plain is traversed by its eastern course for nearly 500 miles, after which it traverses the mountain-region of the Ozarks, south of Mount Masserne, for about 200 miles, still running in the same direction. The remainder of its course, which is about 300 miles, is south-south-east. Measured along its winding course, the length of the river is probably not less than 1500 miles. About 300 miles from its mouth is a low swampy district 40 or 50 miles wide, filled with numerous lakes, and inundated for several months in the year. This tract is called the rafts of Red River. Up to this point the river is navigable during the greatest part of the year for large boats, with the exception of one place, near the town of Alexandria in Louisiana, where two ledges of rocks extend across the channel about three-quarters of a mile from each other, and occasion rapids, which however, in high-water, form no obstruction to the passing of boats. At the raft the navigation is intricate and troublesome. That part of the river which is above the raft is rendered impassable for large boats by shoals and sandbars; but keel-boats of ten or fifteen tons may ascend it for some hundred miles above the raft. The upper portion of its vale seems to contain a greater portion of woodland than the other rivers which drain the desert; but its bottom is not extensive, and the bluffs along the southern banks sometimes rise to the height of 500 feet. The lower part of its vale is described under LOUISIANA. The most considerable of its affluents is the Washita, or Ouashita, which is formed by the numerous streams which descend from the southern and northern declivity of Mount Masserne: it runs in a south-eastern and southern direction, receiving numerous tributaries, especially from the wide bottom of the Mississippi. After its junction with the Tensas it takes the name of Black River, and unites with the Red River about 20 miles from its mouth, after a course of about 400 miles. That part of its course which is denominated Black River can always be navigated by boats of considerable burden, and smaller boats may ascend it for 300 miles nearly all the year round. The upper part of its course lies through a hilly country covered with pine-forests, except the bottoms of the river-courses, which sustain a heavy growth of other trees, and are fertile, but subject to inundation, like all the rivers which originate in the Ozarks. The lower part of its course and that of some of its tributaries are in the wide bottom of the Mississippi, and partake of the fertility, marshes, and swamps which charactérise the lowlands of the principal stream.

Inundations of the Mississippi.—With respect to the volume of water brought down by the river at different seasons, it is to be observed that this river flows from north to south, from the colder to the warmer regions. As the whole of its basin is situated without the limits of the tropical rains, it is partly fed by autumnal rains, but mostly by the melting of the snow, which falls within the whole of this extensive region, with the exception of the delta. Though the quantity of snow does not appear to be great if compared with that which annually falls on the great plain surrounding Hudson Bay, or on the nortnern countries of Europe, the great extent of the basin supplies a large body of water at the time of the melting of the snow. The whole however is not supplied simultaneously, but successively: the southern rivers send it down early in the year, while the northern continue to furnish their supply up to midsummer. The Mississippi is at its lowest level in autumn and winter, from October to January. It begins to swell in February, when the freshets come down the Red River, which last for two or three months; but in March and April they are increased by the floods of the Arkansas, and nearly at the same time by those of the Ohio. Before they subside, in May, the great floods of the Missouri and Upper Mississippi commence, and continue to maintain the high level of the water to the middle of July, or even to the end of that month. From the middle of August to October the river is low. In the month of October its level is somewhat increased by the autumnal freshet of the Ohio, but it soon subsides again.

The inundations extend only over the wide bottoms adjacent to the banks of the Mississippi, and differ in all of them, both as to time and duration. The American Bottom and the somewhat elevated country between the mouth of St. Francis river and 33° N. lat. are inundated only for a few weeks in April and May, and the water rises only a few feet. These tracts are accordingly cultivable. But a large proportion of the other bottoms is inundated for several weeks, and the low country of the delta even for six months, and exactly at the season which alone is favourable to cultivation, from March to August. These extensive tracts are therefore swampy. The water rises on them from 8 to 15 feet, and in some parts of the delta even to 30 feet.

Depth and Navigability of the Mississippi, Missouri, and Ohio.—Though only two of the six mouths of the Mississippi have as much as 12 feet of water (the other four varying between six and eight feet) [LOUISIANA], the river deepens considerably a short distance above the mouths, and continues to increase in depth to the town of New Orleans, where it is stated to be 130 feet deep at low water As far as the town of Natchez in Mississippi, few obstructions to navigation occur, the river being so deep, that sunken trees and sandbars are too far below its level to cause any danger to the vessels. From Natches upward to the confluence of the Missouri, the impediments become more numerous and difficult. Still the main channel, though intricate in many places, has always a sufficient depth of water for boats of five or six feet draft to ascend to the mouth of the Ohio. Between the mouth of the Ohio and that of the Missouri, during the low state of the water, the navigation is obstructed by shoals and the two ledges of rocks called the Big and Little Chain, and only vessels drawing about three feet of water can be used. Between New Orleans and the mouth of the Missouri, the average velocity of the current is supposed to be three miles and three-quarters per hour, in a moderate state of the water; but when the river is high, its velocity is considerably increased. Above the mouth of the Missouri, the Mississippi is generally much less rapid, and does not exceed two miles or two miles and a half per hour; but its navigation is more intricate and difficult on account of the numerous islands and shoals. This upper part of the river is also generally blocked up with ice during the winter season. The navigation of the Missouri is much more difficult and intricate, on account of its numerous sandbars and islands, and more dangerous on account of the frequency of sunken trees and rafts. During the high floods (from March to July) there is a sufficient depth to admit boats of almost any burden; but during the remainder of the year it can hardly be called navigable, except for boats drawing no more than two or three feet. The average velocity of its current, in a middling state of water, may be estimated at four miles and one-third, which, in times of freshets, is accelerated to five or five miles and a half per hour. The river is usually blocked up with ice during the winter.

The Ohio has a much more gentle current. Its average velocity, in a moderate state of the water, may be estimated at two miles and a half, and in a high state, at three miles per hour. The obstructions to its navigation are sandbars, some few sunken trees, and rapids, to which we must add the intricacy of its channel in several places. During a middle and high state of water these obstructions entirely disappear, and an accelerated current is the only difficulty to be encountered. There are large masses of floating ice during part of the winter. The season in which the navigation of this river can be depended upon commences between the middle of February and the first of March, and continues to the latter end of June. An autumnal freshet usually takes place in October or November, and the river is again navigable for a few weeks. During the remainder of the year only boats from 50 to 75 tons burden can be used, and they meet with numerous obstructions in their progress from the lowness of the water.

Navigation and Trade.—The city of New Orleans carries on an active trade with the countries which skirt the lower course of the Mississippi, and particularly with those on both sides of its great tributary, the Ohio, and its numerous affluents, and the trade is rapidly increasing. As the goods are exclusively conveyed by water, the number of steam-boats and of flat-bottomed and keel boats which navigate the Lower Mississippi and Ohio is very considerable. According to an estimate, the number of steam-boats employed in this trade at the beginning of 1834 amounted to 230, measuring more than 39,000 tons, namely:—

	Tons.
25, each above 200 tons, passing between Louisville and Cincinnati, on the Ohio, and New Orleans, measuring	8,484
4 between Florence, on the Tennessee, and New Orleans	1,617
7 between Nashville, on the Cumberland river, and New Orleans	2,585
4 between St. Louis, on the Mississippi, and New Orleans	1,002
7 between the places on the banks of the Mississippi where cotton is grown, for the transport of that commodity	2,116
57, from 120 to 200 tons, in other branches of trade on the Lower Mississippi . . .	8,641
The remainder, about 126, were of small size, under 120 tons, and employed in various trades	14,653
	39,098

The number of flat-bottomed and keel boats employed in this trade has been estimated at four thousand, with a tonnage amounting to 160,000, so that the whole tonnage employed in this trade is about 200,000.

The Missouri is only navigated by the fur-traders from Mackinaw. The difficulties of the navigation, added to the hostile character of several of the tribes which frequent its banks, render the progress of the common boats very slow, and expose the crews to great dangers in those places where they are obliged to sail near elevated and wooded banks, and are exposed to the sudden attacks of the Indians. At present the American Fur Company established at Mackinaw sends steam-boats up the river as far as the Mandan villages, to collect the furs which the Indians bring down the tributaries of the Missouri in bull-boats.

(Lewis and Clarke's *Travels to the Source of the Missouri*; Pike's *Exploratory Travels through the Western Territories of North America*; James's *Account of Major Long's Expedition from Pittsburg to the Rocky Mountains*; Keating's *Narrative of Major Long's Expedition to the Sources of St. Peter's River*; Darby's *View of the United States*; Schoolcraft's *Narrative of an Expedition through the Upper Mississippi to Itasca Lake*; Irving's *Astoria*.)

MISSISSIPPI, THE STATE OF, one of the states constituting the North American Federation, is situated between 30° and 35° N. lat., and between 88° and 91° 40′ W. long. Its length from north to south is 333 miles, and its average breadth about 150 miles. The surface is estimated at 51,000 square miles, an area somewhat larger than that of England without Wales; but according to some authorities, the area is only about 48,000 square miles. The river Mississippi forms its western boundary from 35° to 31° N. lat., by a course of about 530 miles, dividing it from Arkansas and Louisiana. The parallel of 31° N. lat. separates this state from Louisiana, between the Mississippi and Pearl rivers, for about 105 miles; and the remainder of the boundary-line between these two states is formed by the Pearl river, from 31° N. lat. to its mouth, a distance of more than 60 miles. The Gulf of Mexico washes the southern extremity of the state for about 80 miles. On the east it borders on Alabama, which is separated from it by a line extending nearly 340 miles, and running between 88° and 88° 40′ W. long. On the north the parallel of 35° N. lat. divides Mississippi from Tennessee.

Surface and Soil.—The shores near the mouths of the Pascagoula and Pearl rivers are low and sandy, and in many places interrupted by swamps; these tracts are therefore unhealthy. In the space between the two rivers there is a higher tract of land, beginning two miles east from St. Louis Bay, and stretching to Biloxi Bay, a distance of nearly 24 miles. This tract is healthy, and is resorted to by the inhabitants of Lower Louisiana during the sickly season. The country which stretches northward from this coast to 31° N. lat. is low, and the soil is uniformly sandy and covered with extensive pine-forests, which on the Pearl river contain many large trees adapted for the construction of vessels. The country between 31° and 32° N. lat. includes by far the best portion of the state. The tract contiguous to the Mississippi river consists of numerous hills, very irregularly scattered over the surface, and rising from 50 to 150 feet above the narrow low tract which in some places lines the course of the river. The hills, the base of which is washed by the Mississippi, are called Bluffs, and this region is generally called by that name. It extends from 10 to 25 miles inland, and is of great fertility, being covered with forests of oak, sweet gum, poplar, tulip-tree, ash, maple, and hickory, with a few pine-trees. This tract appears to be the western continuation of the country farther east, which rises imperceptibly higher, and extends in wide plains. The numerous watercourses which rise on these plains have furrowed their outer edges, along the Mississippi, and imparted to them a hilly aspect, together with a great degree of fertility. The surface of the plains themselves generally consists of an unproductive sand, and is covered with the long-leafed pine; but the continuity of the level ground is interrupted by the bottoms, which extend along the numerous affluents of the Mississippi, Pearl, and Pascagoula rivers, are several feet lower than the surface of the plains, and from half a mile to three miles wide. These bottoms have a rich and productive soil, covered with a fine growth of trees, such as gum, laurel, oak, and cotton-tree, intermixed in the more elevated parts with lofty canes, and in the lower with cypress. The Bluff region continues northward to the mouth of the Yazoo river. The plains, which are covered with pine-forests and furrowed by streams, extend somewhat farther north, where they begin to be intersected with prairies, which increase in number and extent as we proceed farther north, and seem to occupy the greatest portion of the country lying north of 33° N. lat. The fertility of these prairies is doubtful, but they are covered with grass during the greatest part of the year, though the country is dry, and suffers from want of water. East of this prairie region extends a fertile tract on the upper course of the Tombigbee, which resembles the bottoms in fertility, but is more extensive. In the northern districts is a range of hills of moderate elevation, terminating on the Mississippi river with what is called the Fourth Chickasaw Bluff, which extends 10 miles along the river, is from 60 to 100 feet above its bank, and is stated to be fertile to a considerable distance from the river. Between these hills and the Walnut Hills, with which the southern Bluffs terminate in about 32° 20′ N. lat., a distance of more than 170 miles, the country is occupied by an immense swamp, produced and fed by the inundations of the Mississippi. A few miles south of the Fourth Chickasaw Bluff the river sends off a branch on the eastern side, which traverses the low region, and covers it with water early in the year. Some parts of this low region become dry towards the end of the year, but the others are a perpetual swamp. This tract extends to the banks of the Yazoo river, and is in the widest part (near 34° N. lat.) above 50 miles wide. Like the swamps on the banks of the Atchafalaya, it is covered with timber-trees, especially cypress.

Rivers.—Several of the smaller affluents of the Mississippi rise and terminate in this state. The most important are the Homochitto, the Big Black, and the Yazoo rivers. The Homochitto runs about 70 miles, and is navigable to some distance from its mouth for small craft. The Big Black River flows about 160 miles, mostly in a south-western direction, and is navigable about 70 miles from its mouth in the rainy season. The Yazoo river rises in three branches in the range of hills which traverses the northern part of the state, and flows mostly with a south-south-western course for more than 220 miles. Not far from its mouth it unites with False River, that branch of the Mississippi which leaves the great river south of the Fourth Chickasaw Bluff, and traverses the swampy region. In spring large vessels can ascend the Yazoo for 50 miles from its mouth, to the junction of its two great branches, which are navigable for small boats some distance farther up. The Pearl river rises in the centre of the state, and runs first south-west, and afterwards south-south-east, for about 250 miles. It falls by several branches into the Rigolets, or straits which unite Lake Pontchartrain with Lake Borgne. It is stated to be navigable for boats for 150 miles, but its entrance is shallow, and does not admit vessels which draw more than five feet. The upper branch of the Pascagoula rises, under the name of Chickasawhay, in the prairie region, between 32° and 33° N. lat., and flows south for about 120 miles, when its waters are increased by those of the Leaf river, a large affluent running down from the north-west. Below this junction the river assumes the name of Pascagoula, and continues to flow southwards for 50 miles, when it falls into the bay of the same name, opposite Cuerno or Horn Island. Near its outlet it is joined by a considerable tributary, the Dog river, which runs parallel to it. The Pascagoula is stated to be navigable for small boats to a distance of 120 miles from its mouth, but the æstuary into which it falls is too shallow to admit vessels drawing more than four feet water. In the north-eastern districts are a part of the Tombigbee [ALABAMA] and the Tennessee rivers.

Climate.—As this state rises from a low shore to 500 feet and upwards in its central and northern districts, a great difference of climate prevails in the different regions, especially as the northern districts are nearly five degrees from the southern. Little however is accurately known respecting the more elevated parts. Along the southern coast the winters are mild, frost being of rare occurrence. The heat of the summer is less oppressive than in many states farther north, a circumstance which may be ascribed to the prevalence of the sea breeze from the Gulf of Mexico during this season. The Bluff region along the Mississippi river differs considerably in climate. The summer is in general very hot and the heat oppressive, whilst the winters are colder than might be expected. Every year the thermometer sinks to about 25°, and occasionally so low as 18°. In 1807 the creeks in the neighbourhood of Natchez were frozen, and in many instances covered with ice more than an inch thick.

Productions.—The principal objects of cultivation are cotton and Indian corn, and a little sugar. Wheat, rye, and oats do not thrive so well as in the northern states, and are only cultivated for home consumption. Indigo and tobacco were formerly grown to some extent in the neighbourhood of Natchez, but they have lately been superseded by cotton. Plums, peaches, and figs are abundant; but oranges do not ripen even in the southern districts. Most of the vegetables of Europe thrive well, but their cultivation is not much attended to. Cattle are very numerous, though of a small size. The horses are of a small breed. Sheep are also not numerous; and it is stated that their wool is coarse. Wild animals, such as pumas, wolves, bears, and wild cats, still abound. Alligators occur in the Mississippi as far north as the mouth of the Arkansas river, and in some of the smaller rivers. Parroquets are seen as far north as Natchez; wild turkeys and pigeons abound. There is said to be coal in the north-eastern districts near the Tombigbee and Tennessee rivers.

Inhabitants.—More than half of the territory of this state was, a few years ago, in possession of two aboriginal tribes, the Chocktaws and Chickasaws. The last-mentioned nation occupied the country between 35° and 34° N. lat., and also a tract south of 34°; and the Chocktaws, the country between 34° and 33° along the Mississippi, but along the eastern boundary-line of the state they spread to some distance south of 32°. The number of individuals composing both tribes within this state was then estimated at 23,000 or 24,000, and no state in the Union had a greater number of aborigines within its limits. Though many of them adhered to their mode of life, others had made settlements, and cultivated some patches of ground, but they attended more especially to the rearing of cattle and swine. By an agreement with the State government in 1832, the Indians consented to evacuate the country gradually, and to settle in the territories west of the Mississippi river. We do not know if this has already taken place to the full extent. The Natchez and Yazoos, who lived formerly along the banks of the Mississippi, are wholly extinct.

The other inhabitants are whites, principally from other states of the Union, and negro slaves. Their number amounted in 1820 to 75,448, and in 1830 to 136,623, of which number 95,659 were slaves. The best peopled section of the state is the south-west angle, where the most extensive body of productive soil exists; all the other districts are very thinly inhabited, but the population is rapidly increasing along the upper course of the Tombigbee river.

Political Division and Towns.—That portion of the state in which the whites have formed settlements is divided into 42 counties, including those lately laid off in the Indian country. The seat of government is at Jackson, an inconsiderable place, on the banks of the Pearl river. The most important town of the state is Natchez, built on a series of small hills, about half a mile from the bank of the Mississippi, and, according to some accounts, about 100 feet above its bed, but it is not visible from the river owing to the intervention of a steep bluff. Though its population in 1820 amounted only to 2184, and in 1830 to 3540, it carries on an extensive trade, exporting annually from thirty to forty thousand bales of cotton. Among the other towns, Monticello on the Pearl river, Vicksburg near the Walnut Hills, and Shieldsborough on St. Louis Bay, are the principal; and even these are very inconsiderable places. St. Louis Bay is nearly 10 miles long and four wide, but it is too shallow to admit even small vessels. Jefferson college, at Washington near Natchez, is well endowed: there also ample funds for popular instruction, but hitherto little has been done with them.

Manufactures and Commerce.—The manufactures do not extend beyond the most common mechanical arts. Though this state has a coast-line of about 80 miles, it has no harbour deep enough for schooners; and the adjacent country does not produce one single article for exportation. The fertile tract along the Mississippi, which produces cotton and Indian corn in abundance, sends these articles down to New Orleans, whence it is supplied with those goods of foreign growth or manufactures which are consumed in the country.

History and Constitution.—The first settlements were formed in the neighbourhood of Natchez by some Frenchmen in the beginning of the last century, but they did not thrive. When the country was ceded to the British in 1763, some respectable settlements were founded in the same parts, but under the sway of the Spaniards (1783 to 1800) they again began to decline. In 1800 all that is now comprised in Mississippi and Alabama was formed into a territory by the name of Mississippi Territory. In 1817 this territory was divided into two portions, and the western was admitted as a member of the Union, and the present constitution was formed. The legislative body consists of a senate and a house of representatives, the members of which are chosen by all free citizens of the state who are twenty-one years of age. The executive power is vested in a governor, elected, with the lieutenant-governor, every two years by all the free citizens. Mississippi sends two members to the senate and one to the house of representatives at Washington.

(Darby's *View of the United States*; Warden's *Account of the United States*; Pitkin's *Statistical View of the Commerce of the United States*.)

MISSISSIPPI COMPANY. [LAW, JOHN.]

MISSOURI, River. [MISSISSIPPI, River.]

MISSOURI, one of the states belonging to the North American Confederation, lies on the west of the Mississippi, between 36° and 40° 36′ N. lat. and 89° 5′ and 94° 30′ W. long. Its mean length from south to north is 280 miles, and its mean width from east to west 225 miles. Its surface is estimated at 63,000 square miles, or nearly 5000 miles more than the area of England, including Wales. The Mississippi flows along its eastern boundary for 550 miles, its numerous windings included, and divides it from the states of Illinois, Kentucky, and Tennessee. The southern boundary-line runs along the parallel of 36°, between the Mississippi and St. Francis, for about forty miles, then along the course of the last-mentioned river northward rather more than eighty miles to 36° 30′, which parallel forms the boundary to 94° 30′ W. long. This meridian forms the western boundary-line, and the parallel of 40° 36′ the northern as far east as the river Moines, which for the last twenty miles of its course separates Missouri from the country in possession of the Fox Indians.

Surface and Soil.—Beginning with the most southern district, we find that an extensive bottom land extends along the Mississippi, which commences on the north opposite the mouth of the Ohio river, and extends southward to that of the Arkansas. It is uninterrupted by hills or high lands, and is subject in many places to being inundated by the Mississippi. It includes many large swamps, which are rendered almost impenetrable by a dense growth of trees, mostly cypress. The most extensive of these swamps, called the Great Swamp, commences near the head of the bottom and passes southwards to the mouth of the river St. Francis, penetrating far into the state of Arkansas. This swamp is about 150 miles in length, with a width varying from five to twenty or twenty-five miles. The cypress-trees, though of superior quality, are of little value on account of the difficulty of removing them. Within the bottom are numerous lakes, lagunes, and marshes, but it contains also many isolated tracts of considerable extent, which are elevated above the range of the highest floods. The bottom, almost throughout its whole extent, supports a dense and heavy growth of timber of excellent quality, but few settlements have been made in it. Between the mouth of the Ohio river and Cape Girardeau is the Tywapata Bottom, which is about twenty miles long, from three to six in breadth, and covered with a thick growth of timber and rushes. As it is well adapted for the growth of grain, cotton, and tobacco, several settlements have been formed on it.

The high grounds along the Mississippi begin twelve miles below Cape Girardeau, and extend to the mouth of the Missouri river. The highest part lies between St. Genevieve and the mouth of the river Maramec, where the banks of the Mississippi, composed of solid masses of limestone, rise in some places 360 feet above the water. This undulating country extends westward to the river Gasconade, occupying the basin of the Menimack or Maramec river as far south as the lead-mining district. It is diversified with prairies and forests, the lower lands being well wooded, but the high grounds very thinly; scarcely a shrub is seen on the natural meadows. This is the most populous section of the state.

Between the rivers Gasconade and Osage, both of which are affluents of the Missouri river, a range of low hills approaches the Missouri, rising from 150 to 200 feet above the level of its water. They are thinly wooded, and constitute the most northern offset of the Ozark mountains, a region of which the undulating country between Cape Girardeau and the river Gasconade may be considered as the most northern and lowest portion. The range extends from this point in a south-western direction to the southern extremity of the state of Arkansas, where it terminates on the banks of the Red River. The length of this mountain tract may be 450 miles, and its average breadth about 150 miles. It covers more than one-half of the surface of that portion of Missouri which is south of the Missouri river, bordering on the east on the wide bottom of the Mississippi, and on the west on the undulating country through which the Osage river flows. The surface of this tract is extremely hilly, broken, and mountainous; the hills and mountains rise from 500 to 1000 feet above their base, though not so high as in Arkansas, where they attain the height of 1500 feet and more. The hills are exceedingly numerous, but do not form continuous ranges, being divided into a multiplicity of knobs and peaks with rounded summits, and presenting perpendicular cliffs and abrupt precipices of sandstone. They are covered with a poor soil, which is generally shallow, and overgrown almost exclusively with pitch-pine, cedar, and bramble. Along the numerous rivers which originate in this mountain tract are bottoms of moderate extent, which, with some valley land, are the only parts of it which have a rich soil, and would repay cultivation. Few settlements however have been formed on them, because they are subject to excessive floods occasionally brought down by the rivers from the hills and mountains. These floods come so suddenly, that on some occasions the water has risen, in the course of one night, more than twenty feet. The country west of this mountain-region, especially the basin of the Osage river, resembles that which is east of the river Gasconade, its surface being undulating and diversified with woodlands and prairies. But the prairies cover a much greater portion of the country, and the forests, in addition to being of only moderate extent, produce nothing but stunted timber. The dry prairies occupy at least nineteen-twentieths of the surface. This region however does not extend to the banks of the Missouri, being separated from it by a rich alluvial soil, which extends along the river from the mouth of the Osage river to that of the Mine river, with a width of four or five miles, and is usually denominated the Boon's Lick country. This bottom contains a considerable number of settlements, and it is probably the most fertile portion of the state. Opposite to it extends a similar bottom land along the northern banks of the Missouri from Côte sans Dessein to Chariton river. These two tracts are better settled than any other part of Missouri, with the exception of the country near the confluence of the Missouri and Mississippi; but the greater part is still in a natural state and covered with a deep and heavy growth of timber.

In the country north of the Missouri, which comprehends about one-third of the state, the fertile tracts are nearly exclusively confined to the bottoms along the Missouri and Mississippi. Those of the last-mentioned river, though equally extensive, are not so fertile as those of the Missouri, which appears from their containing less forest in proportion to their area, the prairie land being of greater extent and occurring more frequently. The surface of the country between these two large rivers is in general undulating, though it is not entirely destitute of abrupt hills and precipices. The whole is diversified by the broad valleys of rivers and creeks, and intervening tracts of undulating upland, which are united with the valleys by gentle slopes. The woodlands occur only upon the margins of the water-courses, and the uplands are extensive prairies completely destitute of a timber-growth. These prairies occupy at least nineteen-twentieths of the whole region, and comprehend some of the best land in the state, which however cannot be cultivated at present, as they supply neither wood nor stone for making fences.

Rivers.—The Mississippi washes the eastern boundary for 550 miles, and the Missouri traverses the state from west to east, with a winding course of about 400 miles. [MISSISSIPPI.] Some of their affluents require notice. White River and Francis river are described in ARKANSAS TERRITORY. Maramec river, which enters the Mississippi about 40 miles below the mouth of the Missouri, is only a small river, its course not exceeding 100 miles; but it is important as flowing from the lead district and affording navigable channels to a fertile and improving tract of country. Salt River, which joins the Mississippi about 60 miles above the mouth of the Missouri, runs more than 200 miles with rather a gentle course, and through a tolerably fertile bottom, on which the number of settlements is increasing. Of the rivers which join the Missouri, the Gasconade and Osage are the principal. The Gasconade is rather small, and runs about 120 miles; but derives some importance from its position, though the number of settlements on its banks is small. The Osage river rises in the plains between the Arkansas and Kansas rivers, and flows in a general direction east-north-east about 300 miles, joining the Missouri very near near the centre of the state. On its northern bank is a tolerably wide bottom with an alluvial soil of considerable fertility, where several settlements have been made. It is navigable through the greatest part of its course.

Climate.—The climate of Missouri is cold and extremely variable. The winters are severe and long. Three years out of five the Mississippi can be crossed on the ice at St. Louis, and sometimes it is frozen for two months and more. The summers are often hot, but subject to sudden and frequent changes of temperature. This circumstance is mainly to be attributed to the north-western winds, whose chilling blast is experienced over all the countries west of the Alleghany mountains, and even east of them, but in this state they are felt in all their force. Though they are dry and bracing, they produce sudden and unpleasant changes in the temperature of the atmosphere. The mean annual temperature of St. Louis is estimated at 56°, or about 6° more than that of London, but it has probably been overrated.

Productions.—Wheat and Indian corn are the staples of this state; but in the south-east section cotton is produced. Agriculture is still in its infancy, as may be expected in a country which has been so lately settled. It seems that most of the vegetables and fruits of England would grow if they were attended to. Tobacco, hemp, and flax are cultivated on the bottoms along the Mississippi. Cattle abound where the bottoms and prairies are near one another. In summer they feed on the grass of the prairies, and in winter on the cane and rushes of the alluvial soil. Horses and hogs are numerous. Buffaloes are met with in large herds on the prairies east and west of the Ozark mountains, and also elk and deer. The animals, which are killed for their skins only, are beavers, otters, bears, foxes, cats, racoons, martens, and lynxes. The fur trade however has somewhat decreased of late years.

The mineral wealth chiefly consists of lead, coal, iron, and salt. The principal lead region is in Washington county, on both sides of Big River, an affluent of the Maramec river, and extends about 100 miles in length by 40 in width; but this mineral occurs in detached masses in other places also, between White River and the Missouri. In some years these mines have produced more than one million of pounds. Coal exists in several places, but it is not worked, though it must soon become of importance in a country which is so cold and so generally destitute of wood. Iron-ore in abundance occurs in the hills.

Inhabitants.—There are still some aboriginal tribes within this state. The Delawares and Shawanese, or Shawnees, with some Creeks, Chocktaws, and Chickasaws, have emigrated from the countries east of the Mississippi, and retired into the country extending between the White and St. Francis rivers, where they live in large and commodiously built houses. They cultivate maize and vegetables, and rear horses and cattle, but have not abandoned hunting. Along the western border of the state are the Osages, who have their permanent dwellings in villages beyond the boundary-line, near the head-waters of the Osage river; but their hunting-grounds extend within the territories of Missouri. They also cultivate maize, pumpkins, beans, water-melons, and squashes. The number of individuals composing these tribes is stated to exceed five thousand. The remaining population consists of whites and blacks. In 1820 their number amounted to 66,586, of which 55,988 were whites, 376 free persons of colour, and 10,222 slaves. In 1830 the number had increased to 140,190, of which 115,200 were free people and 24,990 slaves.

Political Division and Towns.—Missouri is divided into 34 counties; but some extensive tracts, especially in the south-western and north-western sections, are not yet laid out in counties. The seat of the government is Jefferson, an inconsiderable place, situated on the Missouri, about twenty miles above the mouth of the Osage river. The most considerable place is St. Louis, which stands on the gently sloping banks of the Mississippi, about twenty miles below the mouth of the Missouri. The buildings spread from the margin of the river to the brow of the bank, beyond which the country extends in a level and mostly open prairie. In 1816 the population amounted only to 2000, but it is now much increased. The whole commerce of the country is concentrated in this place, which is a depôt for all European and foreign goods destined for the consumption of the countries bordering on the Upper Mississippi, Missouri, and Illinois rivers. The channels by which St. Louis is supplied with them are the Lower Mississippi and the Ohio river. Four steam-boats were employed in its trade in 1834, measuring more than 1000 tons. St. Genevieve, with 2000 inhabitants, on the Mississippi, is the principal depôt of the produce of the mines, which is brought down by the Maramec river. In the mining district is Potosi, a small but thriving place. New Madrid, a small place, in the vicinity of which cotton is grown, stands also on the Mississippi: it was visited by a dreadful earthquake in 1811. St. Charles, on the Missouri, about 20 miles from its mouth, has 1200 inhabitants, and some commerce with the country about the town. Franklin, on the Missouri, below the mouth of the Mine river, has 1500 inhabitants, and is the starting place for the caravans which visit Santa Fé, in New Mexico, and go even to Chihuahua.

There is a Roman Catholic college at St. Louis, conducted by the Jesuits, and another Roman Catholic seminary at Bois-Brulé Bottom. The principal sects are Roman Catholics, Methodists, Baptists, and Presbyterians.

Manufactures and Commerce.—Most manufactured articles are imported from the states east of the Mississippi. Commerce is limited to the export of Indian corn and live stock, with cotton in a moderate quantity, and lead. Besides its own live stock, many horses and mules which are imported from Mexico are sent to the states farther east. Furs still form a considerable article. The imports chiefly consist of manufactured goods, with some colonial goods and wine.

History and Constitution.—Although this country for more than a century had been visited by the French from Canada, no settlement was formed before 1763. In this year St. Genevieve was founded, and in 1764 St. Louis. But these and a few other places remained in a backward state up to 1803, when the United States got possession of the country, which was then comprehended in Louisiana. The following year the state now called Louisiana was separated from it, and Missouri became a separate territory. In 1821 it was admitted as a member of the Union, and formed its constitution. Slavery is allowed in this state. The legislative body is composed of two assemblies, a senate and a house of representatives. The members of both are chosen by all the free citizens who have completed their twenty-first year. The executive power is vested in a governor, elected, with the lieutenant-governor, every four years by all the free citizens. The judges are appointed by the governor, with the advice and consent of the senate: they hold office during good behaviour, but not beyond the age of 65 years. Missouri sends two members to the senate, and one to the house of representatives at Washington.

(Darby's *View of the United States;* Warden's *Account of the United States;* James's *Account of an Expedition to the Rocky Mountains, performed by Major Long;* Pike's *Exploratory Travels through the Western Territory of North America;* Lewis and Clarke's *Travels to the Source of the Missouri;* Pitkin's *Statistical View of the Commerce of the United States of America.*)

MIST. The vapour of water, when mixed with air of the same or a higher temperature, is invisible; but when the temperature of the air is reduced below that of the vapour, the vapour becomes visible, and forms a *mist.* Water, in the state of vapour, is continually rising into the atmosphere at all the usual temperatures. At and even below the freezing-point water evaporates, and ice and snow, in a dry atmosphere, gradually disappear without becoming liquid. But as heat is the sole cause of the conversion of water into vapour, the quantity produced, other things remaining the same, is in proportion to the temperature; so that in very hot weather the air is not easily saturated with vapour, and in cold weather evaporation is slow: thus there is more vapour in the air in summer than in winter, and in hot countries than in temperate climates, in all cases where similar surfaces of water are exposed to the sun's rays. Indeed, it has been found that the quantity of vapour in the air diminishes nearly uniformly with the temperature from the equator to the poles. But as the quantity of vapour which the air will hold at any given temperature is limited, whenever that quantity is near or at the point of saturation, a very small reduction of temperature renders the air misty, and a further reduction converts the vapour into rain.

As every reduction of the temperature of the air has a tendency to destroy the transparency of the vapour which it contains, the atmosphere in our variable climate is seldom very clear. Soon after sunrise however, in fair weather, the vapour near the earth having been precipitated by the night-cold in the form of dew, and the sloping rays of the sun having little power to raise more vapour, the air is almost perfectly transparent, and every object has a clearness and sharpness of outline which it never has at any other time of the day.

When the mist is very thick, it is called a *fog.* The fogs which frequently occur in London in the winter arise from the large quantity of vapour produced by a great city being condensed by cold: and as it is not carried off by winds, it is mixed with the smoke, and forms a thick mass in and about the town; while at a short distance the air is often quite clear, and the limits of the fog may be distinctly observed.

When the vapours in the upper regions of the atmosphere are condensed and become visible, they form clouds. [CLOUD.] When those near the surface of the earth are precipitated upon cold objects, they form *dew* and *hoar-frost.* [DEW.]

MISTONUSK, one of the Cree Indian names for the American badger, *Meles Labradoria* (Sab.).

MITAU, MITTAU, or **MIETAU,** a government of European Russia, is composed of the antient duchy of Courland and Semgallen or Semigallia. It is situated between 56° 20′ and 57° 45′ N. lat., and between 22° 38′ and 25° 18′ E. long. Its area is 10,000 square miles, and the population 600,000. [COURLAND.] MITAU, the capital (in Lettonian, Jelgawa), in 56° 40′ N. lat. and 23° 43′ E. long., lies on the Drixe, a small stream which falls into the Aa a few miles north of the town, and the Jacob's canal, which was completed in 1822, and supplies the town with water. It was founded in 1272 by Conrad von Medun. The town is surrounded with old much-decayed ramparts, and has 16,500 inhabitants, among whom are 2700 Jews. There are nine churches of the several Christian sects, a synagogue, a gymnasium, founded in 1775, which has a museum, an observatory, a library of 24,000 volumes, and a separate free-masons' library of 16,000 volumes; there are several well-ordered schools and charitable institutions. The town, which lies in a flat marshy spot near the Aa, has not an inviting appearance, though it is not closely built; it contains large gardens within the walls, and has some broad, straight, regularly built streets, only a few of which however are paved. Out of the town is the fine palace (which was never completed), the former residence of the dukes of Courland, but now converted into barracks. The manufactures are linens, leather, and soap. Mitau was for several years (prior to the treaty of Tilsit, 1807) the residence of Louis XVIII., king of France, during his exile.

MITHRADATES, or **MITHRIDATES**, a common name among the Medes and Persians, which appears to have been formed from *Mitra*, or *Mithra*, the Persian name for the sun, and the root *da*, signifying 'to give,' which occurs in most of the Indo-Germanic languages. The name however was written in several ways. In Herodotus (i. 110) we find Μιτραδάτης; in Xenophon (*Anab.*, vii. 8, § 25), Μιθριδάτης; in the Septuagint (*Ezra*, i. 8, iv. 7), Μιθραδάτης, which represents the Hebrew מִתְרְדָת; and in Tacitus (*Ann.*, xii., c. 10), *Meherdates*. On the Greeks coins it is written Mithradates.

A large class of names in different dialects of the Indo-Germanic languages have the same termination as Mithridates. Thus in Sanskrit we find the names *Devadatta*, *Haradatta*, *Indradatta*, *Somadatta*, that is, 'given by the gods,' 'by Hara or Siva,' 'by Indra,' 'by Soma, or the moon;' and in Greek, such names as *Theodotus*, *Diodotus*, *Zenodotus*, and *Herodotus*. In Persian names the same termination occurs; as in the *Hormisdates* of Agathias, the *Pharandates* and *Pherendates* of Herodotus (vii. 67, ix. 76), and the *Madates* of Curtius (v. 3).

Mitra, or Mithra, is said by some writers to have been one of the most powerful good spirits created by Ormuz. The mysteries of Mithra were celebrated with much pomp and splendour on the revival of the Persian religion under the Sassanidæ; but we do not read of the worship of the sun under this name in the earlier Greek writers. (Hyde, *Hist. rel. vet. Pers.*, c. 4, p. 109.) The word is evidently the same as *mitra*, one of the names for the sun in Sanskrit. This word also appears in many other antient Persian names, as Μιτροβάτης (Herod., iii. 120), Ἰθαμίτρης (ix. 102), Ἰθαμάτρης (vii. 67), Σιρομίτρης (vii. 68), &c.; and in Μιτρᾶιος, Μιθρίνης, or Μιθρήνης (Xenoph., *Hell.*, ii. 6; Arrian, *Anab.*, i. 17, iii. 16), which appear to be derivatives. (Pott's *Etymologische Forschungen*, i., p. xlvii., &c.; Rosen, in *Journal of Education*, ix., p. 334, 335.)

The most celebrated race of princes of the name of Mithridates were the kings of Pontus, who were descended from Artabazes, one of the seven Persian chiefs who overthrew the Magi, B.C. 521. (Florus, iii. 5; Diod., xix. 40; Polyb., v. 43.) The following is a list of these kings:—

MITHRIDATES I., of whom little is known. (Aristot., *De Rep.*, v. 10.)

MITHRIDATES II. succeeded Ariobarzanes II., B.C. 363. He took an active part in the various wars which were carried on by the successors of Alexander the Great; and being an active and enterprising prince, he greatly extended his paternal dominions, whence he is frequently surnamed the founder (κτίστης) of the kingdom of Pontus. He also ruled over Cappadocia and Phrygia. He was put to death by Antigonus, B.C. 302, at Cius, in Mysia, at the age of eighty-four, according to Lucian (*Macrob.*, c. 13), because he was suspected of favouring the interests of Cassander.

MITHRIDATES III., son of the preceding, ruled from B.C. 302 to 266.

MITHRIDATES IV., B.C. 240-190?, the son of Ariobarzanes III., was left a minor by his father. He attacked Sinope, which was taken by his successor Pharnaces, and carried on war against Eumenes II. He was in close alliance with the Rhodians, and joined with some other princes of Asia Minor in making valuable presents to that people, to repair their losses after an earthquake. (Polyb., v. 89, 90.) He married the sister of Seleucus Callinicus, by which alliance he obtained Phrygia. His own daughter was married to Antiochus the Great.

MITHRIDATES V., surnamed Evergetes, reigned from about 156 to 120 B.C. He was an ally of the Romans, and assisted them in the third Punic war with a considerable fleet. He was assassinated at Sinope, and was succeeded by his son

MITHRIDATES VI., B.C. 120, surnamed Eupator, and called the Great, was one of the most formidable enemies that the Romans ever encountered. He was only eleven years old at the death of his father; and during his minority his life was frequently in danger from the numerous conspiracies against him. He is said to have been in the habit of taking an antidote discovered by himself, which was sufficient to counteract the effect of the most violent poisons. (Plin., *H. N.*, xxiii. 77; xxv. 3; xxix. 8.) Mithridates possessed a strong mind and a vigorous body; he excelled in all athletic sports, and was distinguished in his early years by his bodily strength and his daring spirit. He had also paid great attention to the study of philosophy and polite literature; and, according to Pliny, was able to converse in twenty-two different languages (*H. N.*, xx. 3).

As soon as Mithridates was old enough to take the government into his own hands, he attacked the Colchi and the other barbarous nations who dwelt on the eastern shores of the Black Sea, whom he reduced to subjection. The next acquisition which he made was Paphlagonia, which was said to have been left to the kings of Pontus by Pylæmenes II., king of Paphlagonia, who died about B.C. 121. Part of Paphlagonia he gave to Nicomedes II., king of Bithynia, who was, next to Mithridates, the most powerful monarch in Asia Minor. Nicomedes however was jealous of the increasing power of Mithridates; and on the death of Ariarathes VII., king of Paphlagonia, who had married a sister of Mithridates, Nicomedes married his widow, and seized the kingdom of Cappadocia, to the exclusion of the son of Ariarathes. Mithridates immediately took up arms in favour of his nephew, defeated Nicomedes, and placed his nephew on the throne under the title of Ariarathes VIII. In a few months afterwards he was murdered by his uncle at a private conference, who placed a son of his own on the vacant throne, and defeated successively the brother of the late king, and a pretender to the throne, whom Nicomedes represented as a son of Ariarathes.

Unable to cope with his formidable enemy, Nicomedes applied to Rome; and the Romans, who had long been anxious to weaken the power of Mithridates, declared both Cappadocia and Paphlagonia to be free states, but allowed the Cappadocians, at their own request, to elect Ariobarzanes as their king. Mithridates however did not tamely submit to the loss of his dominions. He entered into alliance with Tigranes, king of Armenia, to whom he gave his daughter in marriage; and with his assistance he expelled Ariobarzanes from his kingdom, and also deprived Nicomedes III., who had lately succeeded his father, of Bithynia. The two expelled kings applied to the Romans for assistance, who reinstated them in their kingdoms, and sent an army, under the command of Aquilius, to support them.

A war with the Romans was now inevitable, and Mithridates conducted it with the greatest vigour. The Roman armies were defeated one after another; Aquilius was taken prisoner, and put to death by having melted gold poured down his throat; and in B.C. 88 the whole of Asia Minor was in the hands of Mithridates. In the same year he commanded all Romans to leave the country; but before they could do so, they were massacred by the inhabitants of the different provinces of Asia Minor, to the number, it is said, of 80,000. Whether this massacre took place by the command of Mithridates, or was occasioned by the hatred which the Asiatics bore towards the Romans, is doubtful. The islands in the Grecian Archipelago followed the example of the countries on the mainland. Athens also submitted to his power, together with several other places in Greece. The Rhodians, the only people who offered him any vigorous resistance, were attacked, but without success.

In B.C. 87, Sulla arrived in Greece, and immediately commenced the siege of Athens, which was taken on the 1st of March in the following year. Sulla followed up this success by the defeat of Archelaus, the general of Mithridates, near Chæronea, and shortly afterwards by another victory near Orchomenus.

During the successes of Sulla in Greece, the party of Marius had obtained the ascendency in Rome; and Flaccus, who had been consul with Cinna, was sent to succeed Sulla in the command. Flaccus however was put to death by Fimbria, his lieutenant-general, an unprincipled man, but who possessed considerable military talents, and prosecuted the war against Mithridates in Asia with great success. The victories of Fimbria, and the state of parties at Rome, made Sulla anxious for peace, which was at length agreed upon (B.C. 84) on condition that Mithridates should abandon all his conquests in Asia, and restore Bithynia to Nicomedes, and Cappadocia to Ariobarzanes.

But this war was scarcely finished before Mithridates was again involved in hostilities with the Romans. Mithridates had collected a large army to carry on war against the Colchi. Muræna, who commanded in Asia, perceiving or pretending to perceive a disposition in Mithridates to renew the war, seized the opportunity of enriching himself, and, without any authority from the senate or Sulla, invaded the dominions of Mithridates, and collected much plunder. Mithridates, having in vain complained to the senate, collected an army to defend his dominions, and completely defeated Muræna on the banks of the Halys. But as Sulla was displeased with Muræna for having attacked Mithridates, the peace was renewed, and thus an open rupture was avoided for the present.

During the next eight years Mithridates employed himself in making preparations for a renewal of the war; and in B.C. 75 he broke the treaty which existed between him and the Romans by the invasion of Bithynia. Lucullus was appointed to the command, B.C. 74, and commenced the campaign by besieging Cyzicus, a city on the Propontis, which had been supplied by Mithridates with every description of military stores. In the following year Mithridates made an effort to relieve the town, but was defeated by Lucullus, and obliged to retire to Pontus. He was soon after followed by Lucullus, and having lost another battle at Cabiri, on the borders of Pontus and Bithynia, he fled into Armenia to his son-in-law Tigranes. His own son Machares, who had been appointed king of the wild tribes on the eastern shores of the Euxine, refused to assist his father, and provided for his own safety by making peace with Lucullus.

Coin of Mithridates.
British Museum. Actual size. Silver.

In B.C. 69, Tigranes was completely defeated by Lucullus, during the absence of Mithridates, near his capital Tigranocerta, which was soon after taken by the conqueror. In the following year Tigranes was again defeated, together with Mithridates, near Artaxata; but Lucullus was not able to derive all the advantages he might have done from his victories, in consequence of the mutinous disposition of his troops. [Lucullus.] Mithridates was thus enabled to collect another army without opposition; and having returned to Pontus, he defeated the Roman general Triarius, with the loss of 7000 men, before Lucullus could march to his assistance. This victory was followed by others; various parts of Asia Minor again submitted to his authority; and the Romans appeared to be on the point of losing all the acquisitions they had made during the war. But the power of Mithridates had been shaken to its foundation; and on the appointment of Pompey to the command, B.C. 66, the war was soon brought to an end. Mithridates was defeated on the banks of the Euphrates; and in consequence of Tigranes having submitted to Pompey, he fled to the barbarous tribes dwelling to the north of Caucasus, who received him with hospitality and promised him support. The spirit of Mithridates had not yet been broken by adversity; and he purposed, with the assistance of the Colchi and Scythians, to carry into execution a plan which he is said to have formed in his earlier years, namely, of marching through Thracia and Macedonia, and invading Italy from the north. But these plans were frustrated by the plots of his eldest son Pharnaces, who gained over the army to his side, and deprived his father of the throne. Unwilling to fall into the hands of the Romans, Mithridates put an end to his own life, B.C. 63, at the age of 68 or 69, after a reign of fifty-seven years.

(Appian's *Mithridatic War*; Strabo; Livy's *Epitomes*, Plutarch's *Lives of Sulla and Lucullus*; Justin; Velleius Paterculus; Clinton's *Fasti Hellenici*, vol. iii., Appendix 8, 'Kings of Pontus.')

MITHRAS. [Mithradates.]

MITHRAX. [Maiidæ, vol. xiv., p. 299.]

MITRA. (Zoology.) [Voluta.]

MITRAL VALVE. [Heart.]

MITRE (from *mitra*, μίτρα, a head-band or diadem), the crown or pontifical ornament worn on the head by archbishops and bishops, and in some instances by abbots, upon solemn occasions. The original meaning of Mitra, as it appears from Homer, is a 'band' or 'belt,' adapted to protect the lower part of the body. It is used by later writers to signify a band for the head, worn by the Greek females; and also more particularly to indicate the head-dress worn by Lydians, Phrygians, and other nations of Asia Minor, which is sometimes called the Phrygian cap or bonnet. It is not known when it was first adopted by the hierarchy. Gough, in his 'Sepulchral Monuments,' vol. i., p. cliii., says, 'The mitres of Christian prelates were borrowed from the Apex or Tutulus of the Flamen Dialis.' The pope has four mitres, which are more or less rich according to the solemnity of the feast-days upon which they are to be worn. The cardinals antiently wore mitres, before the hat, which was first granted to them by the council of Lyon in 1245. Furetière, in his 'Dictionnaire Universelle,' says that it was not till the eleventh or twelfth century that abbots were allowed to wear mitres. The Premonstratensians procured a constitution, which was confirmed by Pope Innocent III., that all the abbots of their order should wear them.

In England the Mitre was certainly used by bishops as early as the time of the Saxons, and continued as long as the Roman Catholic religion was that of the state. Since that time the mitre has appeared only as an heraldic ensign, surmounting the episcopal coat of arms, unless perhaps in some occasional instance, such as Evelyn refers to in his 'Diary.' He says: '20th Dec. 1661.—The bishop of Gloucester preached at the abbey at the funeral of the bishop of Hereford, brother to the duke of Albemarle. It was a decent solemnity. There was *a silver mitre* with episcopal robes borne by the herald before the herse, which was followed by the duke his brother, and all the bishops, with divers noblemen.' (Evelyn's *Memoirs*, vol. i., p. 343.) Antiently, the mitre, as an ornament, seems to have descended from bishop to bishop. Among the Cottonian manuscripts is an order, dated 1st July, 4th Hen. VI., for delivering to Archbishop Chichely the mitre which had been worn by his predecessor. That it was an ornament of great expense may be gathered from the circumstance that Archbishop Pecheham's new mitre, in 1288, cost 173*l.* 4*s.* 1*d.* (See Ducarel's *Excerpts from the Lambeth Registers*: *MS. Brit. Mus.*)

As an heraldic ornament the mitre of a bishop is only surrounded by a fillet set with precious stones. The archbishop's mitre issues from a ducal coronet.

MITRE'LLA. [Voluta.]

MITRE'OLA. [Voluta.]

MI'TTIMUS, a legal term applied to certain writs and warrants in which the word *mittimus*, 'We (the king) send,' is expressed or implied.

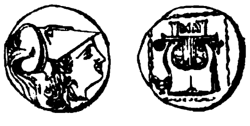
If a record of one court be, for any purpose, required to be transmitted to another, as one court can exercise no direct authority over another, the course is, for a writ to issue out of Chancery, in the king's name, requiring the court in which the record is, to certify the same to the king in Chancery; and when the record is removed into the Court of Chancery by this writ (of *certiorari*), it is sent from the Chancery to the court in which it is wanted by writ of mittimus.

The term is however in more frequent use as applied to the warrant by which magistrates commit and *send* persons charged before them with offences to the proper custody, in order that they may be forthcoming to answer the charge, when ripe for judicial decision. This warrant may be either in the name of the king or in that of the committing magistrate, but the term 'mittimus' is used, even when the latter, which is now the more common course, is adopted.

As to what persons may be committed, the place to which they may be sent, the form of the warrant, &c., see Burns's *Justice*, title 'Criminal Law Commitment,' i.-vii.

MITU, a name for some of the Curassow birds. [Cracidæ, vol. viii., p. 129.]

MITYLE'NE. [Lesbos.]



Coin of Lesbos.

British Museum. Actual size.

MIXTURES, in Pharmacy, signify liquid medicines consisting of several ingredients, either in a state of mechanical suspension in some viscid medium, or in a state of complete solution. In preparing these, care must be taken not to mix in the same prescription substances which exercise an antagonizing action on the body, or which are incompatible, from one ingredient decomposing another. Sometimes however it is the substance resulting from the decomposition of one or more of the constituent articles which is wished, as in the compound mixture of iron, and in this case decomposition of the materials is indispensable.

No greater quantity of a mixture should be prepared at one time than is likely to be used before the compound is spoiled, either by the atmosphere, if the materials are of a vegetable kind, or by the action of the various ingredients on each other.

MNE'MIA. [Ciliograda, vol. vii., p. 165.]

MNEMONICS. [Memory.]

MNEMO'SYNE. [Muses.]

MOAB (מוֹאב), a people descended from Moab, the son of Lot by his elder daughter (*Gen.*, xix. 37), and consequently related to the Ammonites, with whom we find them closely connected in their subsequent history. [Ammonites.] The earliest accounts represent them as dwelling in the country on the east of the Dead Sea and the river Jordan, on both banks of the river Arnon (Wady Modjeb), from which they had driven out the Emim, who were said to be a tribe of giants. (*Deut.*, ii. 11; *Gen.*, xiv. 5.) The plains on the east of the Jordan near its mouth were called from them the Plains of Moab. (*Numb.*, xxii. 1; *Josh.*, xiii. 32; *Deut.*, xxxiv. 1, 8.) Before the invasion of Canaan by the Israelites they had been dispossessed by the Amorites of the country north of the Arnon, which was thenceforth their northern boundary. (*Numb.*, xxi. 13, 26; xxii. 36; *Judges*, xi. 18.) [Amorites.] At the division of Canaan among the tribes of Israel, this tract of country was given to Reuben and Gad.

By the command of God, the Israelites left Moab in undisturbed possession of their country. (*Deut.*, ii. 9; *Judges*, xi. 15, 18; 2 *Chron.*, xx. 10.) But while the Israelites, after conquering the Amorites, were encamped in the plains of Moab, Balak, the king of Moab, sent for the prophet Balaam to curse them. (*Numb.*, xxii.—xxiv.) Balaam found himself compelled by a divine impulse to bless the people whom he meant to curse, but was more successful in seducing them to the licentious worship of Baal-peor by means of the daughters of Moab. (*Numb.*, xxv. 1; xxxi. 16; *Rev.*, ii. 14.) For this offence, and for neglecting to assist the Israelites on their march, the Moabites were excluded from the congregation of God to the tenth generation. (*Deut.*, xxiii. 3, 4; *Nehem.*, xiii. 1, 2.)

In the time of the Judges, Moab, in league with the children of Ammon and Amalek, invaded the land of the Israelites, and ruled over them for eighteen years. They were at last delivered by Ehud, who assassinated Eglon, the king of Moab. (*Judges*, iii. 12-30.) After this time it appears from the book of *Ruth* that there was a period of friendly intercourse between the two nations. Saul warred against Moab (1 *Sam.*, xiv. 47), and David made them tributary to Israel (2 *Sam.*, ii. 8). The tribute which they paid consisted of sheep and lambs. (2 *Kings*, iii. 4.) After the partition of the kingdom, we find Moab subject to the king of Israel, against whom they rebelled after the death of Ahab, in B.C. 897. (2 *Kings*, i. 1; iii. 5; and *Is.*, xvi. 1.) Jehoram, the son of Ahab, assisted by Jehoshaphat, king of Judah, defeated them in a great battle, but failed to subdue them. (2 *Kings*, iii. 6-27.) Soon after this, Moab, with the Ammonites and other nations, invaded Judah, but the invaders quarrelled among themselves and destroyed each other. (2 *Chron.*, xx.) In the reign of Joash, about B.C. 838, the Moabites again made incursions upon Israel. (2 *Kings*, xiii. 20.) It is probable that after the tribes of Reuben and Gad had been carried captive by Tiglath-pileser (about B.C. 740), the Moabites recovered the country they had formerly possessed north of the Arnon, for Isaiah (xv., xvi.) speaks of towns of the Moabites in that district; but from the same prophecy it would appear that they were again driven back over the Arnon by the Assyrians. In common with the other nations on the borders of Palestine, the Moabites were subdued by Nebuchadnezzar, under whom they made war upon Judah. (2 *Kings*, xxiv. 2.) From *Jeremiah*, xxvii., it would appear that near the beginning of the reign of Zedekiah, the Moabites and other neighbouring nations endeavoured to persuade him to revolt from Nebuchadnezzar, but without immediate success, as the rebellion of Zedekiah did not take place till about the ninth year of his reign. (2 *Kings*, xxiv. 20; xxv. 1.) According to Josephus, the Moabites and Ammonites were reduced to subjection by Nebuchadnezzar in the fifth year after the destruction of Jerusalem (*Antiq.*, x. 9, 7). This may have been the event referred to in the prophecies of Ezekiel (xxv. 8-11) and Zephaniah (ii. 8-11). The Moabites are incidentally mentioned in several other passages of the Old Testament and by Josephus. The prophecies contain many threatenings against them. Their name ultimately disappeared in that of the Arabians.

The Moabites were a pastoral people. (2 *Kings*, iii. 4.) Their country was well adapted for rearing cattle, and also produced corn and wine. (*Ruth*, i. 1; *Is.*, xvi. 8-10.) It contained many mountains and fertile valleys, and was well watered by the Arnon, the Zered, and other rivers which fall into the Dead Sea. It is called by Josephus Μωαβῖτις. (*Bell. Jud.*, iii. 3. 3; iv. 8. 2), and corresponds to part of the present district of Kerek. Several cities of Moab are mentioned in the Old Testament. (*Is.*, xv., xvi., &c.) The capital was Ar or Rabbath-Moab (*Deut.*, ii. 9), afterwards called Areopolis. Its ruins, which still retain the name of Rabba, lie about 25 miles south of the Arnon, near a stream which is now called Beni-Hamed. Jerome states that the city was destroyed by an earthquake in his youth. The country of Moab was well peopled, as is proved by the numerous ruins found there. The Moabites were governed by kings (*Numb.*, xxii. 4; *Judges*, iii. 12; 1 *Sam.*, xxii. 3; *Jer.*, xxvii. 3) and inferior princes (*Numb.*, xxii. 8, 14; xxiii. 6). Their religion was the licentious idolatry of Baal-peor and Chemosh (*Numb.*, xxv. 1-4; 2 *Kings*, xxiii. 13). In cases of extreme danger, they offered human sacrifices (2 *Kings*, iii. 27).

(Relandi, *Palestina*; Calmet's *Dictionary*; Winer's *Biblisches Realwörterbuch*; Burckhardt's *Travels in Syria*.)

MOALLAKÂT. [Arabia, p. 219.]

MOBILE. [Alabama.]

MOCARANGUA, or **MONAMATAPA.** [Sofala.]

MOCHA. [Arabia.]

MOCKING BIRD, the vulgar name for that singular songster the *Mimic Thrush* of Latham, *Turdus polyglottus* of Linnæus and authors, *Orpheus polyglottus* of Swainson, and *Mimus polyglottus* of Boie.

Generic Character. [Merulidæ, ante, p. 122.]

Description.—Male. Upper parts of the head, neck, and back, dark brownish ash; and, when new-moulted, a fine light grey; wings and tail nearly black, the first and second rows of coverts tipped with white; primary coverts, in some males wholly white, in others tinged with brown. Three first primaries white from their roots as far as their coverts; white on the next six, extending from an inch to one and three-fourths farther down, descending equally on both sides of the feather; the tail is cuneiform, the two exterior feathers wholly white; the rest, except the middle ones, tipped with white; chin white; sides of the neck, breast, belly, and vent, a brownish-white, much purer in wild birds than in those that have been domesticated; iris of the eye yellowish cream-coloured, inclining to golden; bill black, the base of the lower mandible whitish; legs and feet black and strong.

Female very much resembling the male, but the white is less pure, spreads over only seven or eight of the primaries, does not descend so far, and extends considerably farther down on the broad than on the narrow side of the feathers. The black is also more of a brownish cast.

Young birds with the breast spotted like that of a thrush: *young male* with the white on the wing broader and of greater purity than in the female. (Wilson.)

Habits, Reproduction, &c.—The extraordinary vocal powers of this wonderful song-bird and his lively habits, as recorded by eye and ear witnesses, are so uncommon, that we should think we were reading of some magical bird in a fairy tale, did we not know the fidelity and accuracy of the excellent observers who describe it. Wilson thus portrays this polyglot:—

'The ease, elegance, and rapidity of his movements, the animation of his eye, and the intelligence he displays in listening and laying up lessons from almost every species of the feathered creation within his hearing, are really surprising, and mark the peculiarity of his genius. To these qualities we may add that of a voice, full, strong, musical, and capable of almost every modulation, from the clear mellow tones of the wood-thrush, to the savage scream of the bald eagle. In measure and accent he faithfully follows his originals. In force and sweetness of expression he greatly improves upon them. In his native groves, mounted on the top of a tall bush or half-grown tree, in the dawn of dewy morning, while the woods are already vocal with a multitude of warblers, his admirable song rises pre-eminent over every competitor. The ear can listen to his music alone, to which that of all the others seems a mere accompaniment. Neither is this strain altogether imitative. His own native notes, which are easily distinguishable by such as are well acquainted with those of our various song-birds, are bold and full, and varied seemingly beyond all limits. They consist of short expressions of two, three, or at the most five or six syllables, generally interspersed with imitations, and all of them uttered with great emphasis and rapidity, and continued with undiminished ardour for half an hour or an hour at a time. His expanded wings and tail, glistening with white, and the buoyant gaiety of his action, arrest the eye, as his song most irresistibly does the ear. He sweeps round with enthusiastic ecstacy; he mounts and descends as his song swells and dies away; and, as my friend Mr. Bartram has beautifully expressed it, "He bounds aloft with the celerity of an arrow, as if to recover or recal his very soul, expired in the last elevated strain." While thus exerting himself, a bystander, destitute of sight, would suppose that the whole feathered tribes had assembled together on a trial of skill, each striving to produce his utmost effect, so perfect are his imitations. He many times deceives the sportsman, and sends him in search of birds that perhaps are not within miles of him, but whose notes he exactly imitates; even birds themselves are frequently imposed on by this admirable mimic, and are decoyed by the fancied calls of their mates, or dive with precipitation into the depths of thickets at the scream of what they suppose to be the sparrow-hawk.

'The Mocking Bird loses little of the power and energy of his song by confinement. In his domesticated state, when he commences his career of song, it is impossible to stand by uninterested. He whistles for the dog; Cæsar starts up, wags his tail, and runs to meet his master. He squeaks out like a hurt chicken, and the hen hurries about with hanging wings and bristled feathers, clucking to protect its injured brood. The barking of the dog, the mewing of the cat, the creaking of a passing wheelbarrow, follow with great truth and rapidity. He repeats the tune taught him by his master, though of considerable length, fully and faithfully. He runs over the quiverings of the canary and the clear whistlings of the Virginia nightingale, or red-bird, with such superior execution and effect, that the mortified songsters feel their own inferiority, and become altogether silent, while he seems to triumph in their defeat by redoubling his exertions. This excessive fondness for variety however, in the opinion of some, injures his song. His elevated imitations of the brown thrush are frequently interrupted by the crowing of cocks; and the warblings of the blue-bird, which he exquisitely manages, are mingled with the screaming of swallows or the cackling of hens: amidst the simple melody of the robin we are suddenly surprised by the shrill reiterations of the whip-poor-will, while the notes of the kill-deer, blue-jay, martin, baltimore, and twenty others succeed, with such imposing reality, that we look round for the originals, and discern with astonishment that the solo performer in this singular *concert* is the admirable bird now before us. During this exhibition of his powers, he spreads his wings, expands his tail, and throws himself around the cage in all the ecstacy of enthusiasm, seeming not only to sing, but to dance, keeping time to the measure of his own music. Both in his native and domesticated state, during the solemn stillness of night, as soon as the moon rises in silent majesty, he begins his delightful solo; and serenades us the live-long night with a full display of his vocal powers, making the whole neighbourhood ring with his inimitable medley.'

Audubon is of opinion that in song it is far beyond the nightingale. He pronounces the notes of that bird to be equal to those of a *soubrette* of taste, who, could she study under a Mozart, might perhaps, in time, become very interesting in her way. But he thinks it quite absurd to compare her essays to the finished talent of the Mocking Bird. In confinement its melody, though very beautiful, falls far short, in his judgment, of its 'wood-notes wild.' He describes its imitative powers as amazing, and says that these birds mimic with ease all their brethren of the forests or of the waters, as well as many quadrupeds; but though he has heard that the bird possesses the power of imitating the human voice, he never met with an instance of that mimicry.

The last-mentioned author gives us a most interesting detail of the loves of these charming birds amid the rich scenery where the great Magnolia, with its thousand beautiful flowers, Bignonias, the white-flowered Stuartia, and the golden orange, are intertwined with innumerable vines. 'For awhile,' continues this graphic describer, 'each long day and pleasant night are thus spent; but at a peculiar note of the female he ceases his song, and attends to her wishes. A nest is to be prepared, and the choice of a place in which to lay it is to become a matter of mutual consideration. The orange, the fig, the pear-tree of the gardens, are inspected; the thick briar patches are also visited. They appear to be well-suited for the purpose in view; and so well does the bird know that man is not his most dangerous enemy, that instead of retiring from him, they at length fix their abode in his vicinity, perhaps in the nearest tree to his window. Dried twigs, leaves, grasses, cotton, flax, and other substances are picked up, carried to a forked branch, and there arranged. The female has laid an egg, and the male redoubles his caresses. Five eggs are deposited in due time, when the male, having little more to do than to sing his mate to repose, attunes his pipe anew. Every now and then he spies an insect on the ground, the taste of which he is sure will please his beloved one. He drops upon it, takes it in his bill, beats it against the earth, and flies to the nest to feed and receive the warm thanks of his devoted female.'

The eggs are pale green, blotched and spotted nearly all over with umber brown. The female sits fourteen days.

The enemies of the Mocking Bird are cats, the *Falco Stanleii*, and snakes, especially the black snake, which Wilson describes as the mortal enemy of our songster's eggs and young, and as the object of his especial and deadly vengeance; for the bird rarely leaves his foe, when he has found him, alive. 'Children,' says Audubon, 'seldom destroy the nests of these birds, and the planters generally protect them. So much does this feeling prevail throughout Louisiana, that they will not willingly permit a Mocking Bird to be shot at any time.'

The food of this species consists, according to Wilson, of the berries of the red cedar, myrtle, holly, and many species of Smilax, together with gum-berries, gall-berries, and a profusion of others with which the swampy thickets abound, as well as winged insects, of which it is exceedingly fond.

Geographical Distribution.—'The Mocking Bird,' says Wilson, 'inhabits a very considerable extent of both North and South America, having been traced from the states of New England to Brazil, and also among many of the adjacent islands; much more numerous in those states south than in those north of the river Delaware, being generally migratory in the latter, and resident (at least many of them) in the former. A warm climate and low country, not far from the sea, seem most congenial to their nature; accordingly we find the species less numerous to the west than east of the great range of the Alleghany, in the same parallels of latitude. In the severe winter of 1808-9, I found these birds occasionally from Fredericksburg in Virginia to the southern parts of Georgia.'

Nuttall states that it inhabits the whole continent and the adjacent islands, from Rhode Island to the larger islands of the West Indies, continuing through the equatorial regions, and as far south as Brazil. Nor is it confined to the eastern or Atlantic states; for it is found in the territory (now state) of Arkansas, and more than a thousand miles from the mouth of Red River. Say notices it as breeding at the western sources of the Platte, near the base of the Rocky

Mountains. Bullock saw it on the table-land of Mexico. Mr. Litchfield informed Nuttall that it is commonly heard in Venezuela.

[The Mocking Bird.]

Mr. Darwin (*Journal and Remarks*) notices, in his account of Maldonado, a mocking-bird, *Orpheus Modulator*, called by the inhabitants Calandria, as remarkable for possessing a song far superior to that of any other bird in the country: indeed it was nearly the only bird in South America which he observed to take its stand for the purpose of singing. He compares the song to that of the sedge-warbler, but says that it is more powerful, and that some harsh notes and some very high ones are mingled with a pleasant warbling. It is heard only during spring: at other times its cry is harsh, and far from harmonious. He states that near Maldonado these birds were tame and bold, constantly attending the country-houses in numbers, to pick the meat which was hung up on the posts or walls; but if any other small bird approached, the Calandria drove it away. Mr. Darwin adds, that, on the wide uninhabited plains of Patagonia, another closely allied species, *Orpheus Patagonicus* of D'Orbigny, which frequents the valleys clothed with spiny bushes, is a wilder bird, and has a slightly different tone of voice. (*Voyages of H.M.S. Adventure and Beagle*, vol. iii.)

Mr. Swainson (*Fauna Boreali-Americana*, vol. ii., and *Classification of Birds*, vol. ii.) notices the striking analogy between the Mocking Bird and *Lanius Carolinensis* (the *Loggerheaded Shrike*). Both the birds, he remarks, are typical examples of two distinct groups: they are of the same size, clothed in nearly the same coloured plumage, seek the same kind of food, agree in the structure of their wings and tail (almost in that of their feet), build the same kind of nest and in similar situations, imitate the notes of other birds, eject their unserviceable food in the same manner, and yet, in his opinion, are totally distinct in real affinity.

N.B. The term *Mock-Bird* is sometimes used to designate the Sedge-Bird (*Curruca salicaria* of Fleming, *Sylvia Phragmitis* of Bechstein, *Calamodyta Phragmitis* of Bonaparte; and that of *Mock Nightingale* is sometimes applied to the Black-cap [Black-Cap], and also to the Fauvette, *Curruca hortensis*, Br. and Flem., *Motacilla hortensis*, Gm., *Sylvia hortensis*, Bechst.

MODBURY. [Devonshire.]

MODE, in Antient Music, is the order of the sounds forming what may, in modern language, be called the different scales.

The antients differed exceedingly among themselves in their definitions and on the divisions and names of their modes or keys. Obscure on every musical subject, they are nearly unintelligible on this: they all agree however that a mode is a certain system of sounds, and it appears that this system or succession is in itself nothing but a given diapason, or octave, made up of all the intermediate sounds, according to the genus.

In the earliest Greek music whereof we have any account there were but three modes, of which the key-notes were at the distance of one tone from each other. The lowest of these was called the *Dorian*, the highest the *Lydian*, and the *Phrygian* was placed between the other two. Subsequently, by dividing the tones into semitones, two other modes were produced—the *Ionian* and the *Æolian*, the first of which was placed between the Dorian and Phrygian, and the second between the Phrygian and Lydian. At length, by extending the system above and below, new modes were established, which took their names from the former five, adding the preposition *hyper* (ὑπέρ, *above*) for the higher, and *hypo* (ὑπό, *below*) for the lower. Thus the Lydian mode was followed by the Hyper-Dorian, the Hyper-Ionian, &c., in ascending; and after the Dorian mode followed the Hypo-Lydian, the Hypo-Æolian, &c., in descending. The following table of the fifteen modes, with the modern names of the sounds, is given by Rousseau, from Alypius, who wrote an account of the Greek *Semeiotica*, and is one of the seven authors published by Meibomius:—

Acute. (*High.*)	15	B	Hyper-Lydian.
	14	B♭	Hyper-Æolian.
	13	A	Hyper-Phrygian.
	12	A♭	Hyper-Ionian.
	11	G	Hyper-Dorian, or Mixo-Lydian.
Mean	10	F♯	Lydian.
	9	F	Æolian.
	8	E	Phrygian.
	7	E♭	Ionian.
	6	D	Dorian.
Grave. (*Low.*)	5	C♯	Hypo-Lydian.
	4	C	Hypo-Æolian.
	3	B	Hypo-Phrygian.
	2	B♭	Hypo-Ionian.
	1	A	Hypo-Dorian.

In the *Essai sur la Musique*, by M. Laborde, is a most comprehensive table of the modes, with the Greek musical characters, &c.; and in the *Philosophical Transactions* (vol. li., part 2) will be found a table of the same kind, to 'show the tuning of the lyre in every mode,' by Sir Francis Styles, a most industrious inquirer, and a very learned original writer on the subject.

Of all these modes, Plato rejected some, thinking them capable of operating prejudicially on the manners; and Ptolemy reduced the number to seven; the latter therefore confined all the modes within the compass of an octave, of which the Dorian mode is the centre, so that the Mixo-Lydian was a 4th above, and the Hypo-Dorian a 4th below; the Phrygian a 5th above the Hypo-Dorian; the Hypo-Phrygian a 4th below the Phrygian; and the Lydian a 5th above the Hypo-Phrygian: whence results the following order:—

1	F	Mixo-Lydian.
2	E	Lydian.
3	D	Phrygian.
4	C	Dorian.
5	B	Hypo-Lydian.
6	A	Hypo-Phrygian.
7	G	Hypo-Dorian.

From these seven modes, with the Hypo-mixo-Lydian—added, it is said, by Guido—were formed the eight ecclesiastical modes, or tones of the Catholic Church.

If we really understand the nature of the degrees by which the antients completed their diapason, or octave, in the various modes, many of these modes would be very displeasing to modern ears; but the probability is, that something remains to be explained; and whether any new light will ever break in on the subject, is exceedingly doubtful.

We have considered the modes as only differing in regard to grave and acute, that is, in pitch; but there are other circumstances on which their effect, perhaps, much depended, such as the poetry set to the music, the nature of the accompanying instrument, the rhythm or cadence of the verse, and the peculiar tastes or feelings of the people from whom the chief modes were named, as the Dorian, Phrygian, &c. Fearing that the knowledge of these matters will not much advance beyond the point it has already reached, we cannot indulge the hope that the subject will ever be thoroughly understood. Such seems to be the opinion of nearly all writers on the antient modes, particularly Rousseau, from whom we have freely translated the greater part of this article.

Mode, in modern musical language, signifies the same as Key; but, though a far more convenient term, is very rarely used in that sense in our isles. [Key.]

MODELS, ARCHITECTURAL. Besides the usual delineations upon paper showing the plans and different parts of a building, and their details in elevations, sections, and working drawings [Design; Architecture], a solid representation or miniature facsimile of the proposed edifice is sometimes formed, in order to give a more distinct idea of it than can be obtained from a number of separate drawings by those who are unable to comprehend them perfectly, and combine them together mentally so as to figure to themselves a complete and distinct image of the whole. Models of this kind are variously executed, and more or less finished up, as may be required. Sometimes they are of wood, either coloured or not; and if economy is studied, the capitals of the columns, the cornices, and all other decorative parts are merely blocked out in the rough, the mouldings and ornaments being omitted. But the material now more generally used is plaster of Paris, because columns and other parts that require much carving may be cast in moulds, and afterwards finished up with comparatively very little trouble or expense. Models of this kind are very beautiful, not only on account of the superior neatness of their execution, but their texture and colour also. The pure and dazzling whiteness of the latter is however rather a fault than otherwise, because it prepossesses the eye too much, and shows the building of a pure uniform hue, many degrees whiter than the whitest stone, even before it becomes at all discoloured. It would be better therefore were such glaring whiteness subdued, either by mixing up some colour in the plaster, so as to give it more of a natural stone tint; or else, by washing over the model itself after it is finished. Another material employed for making architectural models is card-board, applied in surfaces of various thicknesses; and although it seems fitted only for very plain buildings, it is capable of being wrought so as to express the most minute and elaborate tracery and other ornaments in Gothic architecture; besides which, models thus formed are said to be less susceptible of injury than those in plaster, and may be more easily coloured to represent the different materials—stone, brick, wood-work, slate, &c. They are however more expensive, being attended with much greater labour, and requiring to be built up, as it were, like the edifice itself. A very elaborate model of Cossey Hall, in Norfolk (executed by Mr. T. Dighton, and now, we believe, in the possession of the Institute of Architects), shows the very great perfection to which that species of modelling has been brought; for the profusely enriched chimney-shafts, the beautiful oriels, and all the other ornamental details of that building (unfortunately still in an unfinished state), are wrought up in the most exquisite and artist-like manner; and the whole is coloured so as to describe the actual materials of the edifice itself.

Models are by no means so generally made use of as they ought to be, on account of their expensiveness; but when a building of great magnitude is to be erected, the cost of a model, although it may be considerable in itself, becomes a mere trifle in the sum-total. Where merely the façade of a building will be exposed to view, a model may be dispensed with, as a simple elevation will answer the purpose perhaps quite as well. But for one that is insulated, or is at all complex, a model becomes desirable: the same again if a façade is composed of many parts or surfaces, some projecting, others retiring, the effect of which cannot else always be so distinctly foreseen as it ought to be, at least not except perspective drawings be made of it from several different distances and points of view; and if there be many of these, they will be hardly less expensive than a model itself. Besides, even when an architect has thoroughly considered all his preparatory drawings, he may still find out something that, if not absolutely faulty, might be considerably improved—something that he had thought would have had a different effect, and which therefore, if detected in the model, can still be remedied.

For showing the internal parts of a building, models are of comparatively little use, since they may be far more distinctly understood by means of plans of the different floors and sections. Indeed, unless a model be made to open, or be so constructed that either one or more of its sides may be removed at pleasure, so as to lay open the interior, the inside of a building can hardly be shown at all in a model. Hence models are very seldom indeed resorted to for such purpose, and then only to show a single large apartment, such as the interior of a church, or something of that sort, whose construction requires to be so explained; for it is hardly necessary to observe that the most accurate and best-executed model cannot in such cases give the effect of the building itself as viewed when we stand *within* it.

After all, useful and satisfactory as models are, they are apt in some degree to mislead unless due precaution be taken to guard against misconceptions. As a miniature representation of a building, more especially if it be beautifully finished up, a model possesses a certain *prettiness* of its own which captivates the eye, and is likely to cause it to overlook the commonplace or trivial character perhaps of the design so shown. Another imperfection attending a model is that it conveys no idea of the situation, but merely shows the building itself, apart from all its accessories, probably its disadvantages, of locality. A model of St. Paul's, for instance, may be viewed in any direction, and from any distance, whereas the building itself can be seen only by looking directly up at it, except from one or two points. It is necessary therefore that any delusion of this kind should be carefully guarded against, at least in an edifice of importance, by an exact plan of the situation, and one or more views, as may be, showing it as it will actually appear when erected.

On the other hand, it is one circumstance greatly in favour of models, that after they have served their first purpose, they have their value as ornamental works of art In fact, *portrait* models of celebrated edifices are frequently introduced as such in libraries and galleries, either as restorations of the original structures, or showing them as dilapidated by time. For those of the last-mentioned kind cork is the material usually made use of, it being well calculated to express of itself the ruggedness and flaws of decayed stone buildings.

MO'DENA, DUCHY OF, a state of North Italy, extending north of the central ridge of the Apennines towards the Po, from which river it is separated by the territory of Guastalla belonging to Parma, and also by a part of the duchy of Mantova, which lies on the south bank of the Po. It is bounded on the west by the duchy of Parma; south-west by the Garfagnana, which lies on the opposite or southern slope of the Apennines, and part of which belongs also to the duke of Modena [Garfagnana]; on the south by Tuscany, and on the east by the Papal State. This, which is the duchy of Modena Proper, must be distinguished from the states belonging to the duke of Modena, which include several districts and principalities south of the Apennines, and extending to the coast of the Mediterranean, namely, Garfagnana Estense, Lunigiana Estense, and the duchy of Massa and Carrara. [Massa; Carrara.]

The administrative divisions are: 1. Province of Modena, which is by far the largest, containing 225,000 inhabitants, and is divided into twenty communes, Modena, Mirandola, Carpi, Finale, Sassuolo, Vignola, Pavullo, San Felice, Nonantola, Montefiorino, Montefestino, Concordia, Guiglia, Montese, Formigine, Spilamberto, Sestola, San Martino in Rio, Fiumalbo, Pieve a Pelago. 2. Province of Reggio, which extends west of that of Modena, and contains 94,000 inhabitants, distributed into twelve communes, namely, Reggio, Correggio, Scandiano, Brescello, Novellara, Montecchio, Castelnuovo ne' Monti, Carpineti, Minozzo, Santo Polo, Castelnuovo di Sotto, Castellaranno. 3. Province of Garfagnana Estense, with 28,000 inhabitants, distributed among fifteen communes, namely, Castelnuovo, Castiglione, Fosciandora, Pieve Fosciana, Villa Collemandina, Camporgiano, Careggine, Giucugnano, Piazza, San Romano, Sillano, Vaglisotto, Molazzana, Trassilico, Vergemoli. 4. Province of Lunigiana, being part of the valley of the Magra, which was called in the middle ages Lunigiana, from the antient town of Luni, long since ruined, the bishops of which had feudal jurisdiction over part of this mountainous and sequestered region, and the Marquises Malaspina over the other. It is now divided between the states of Modena, Sardinia, and Tuscany. The part belonging to Modena, called Lunigiana Estense, consists of ten communes, containing altogether about 12,000 inhabitants. The communes are: Fosdinovo, which is the residence of the delegate or governor of the province, Aulla, Licciana, Villafranca, Tresana, Mulazzo, Rocchetto, Treschietto, Podenzana, Varano. 5. Province of Massa, with two communes, Massa and Carrara, and 20,000 inhabitants.

The greatest length of the whole territory belonging to the duke of Modena, or 'Stati Estensi,' is about 88 miles, from north-east to south-west, from the borders of Ferrara to the sea-coast of Carrara. Its width north of the Apennines varies from 30 to 34 miles, but it is only about ten miles wide in the part south of that ridge and along the sea-coast. The whole area may be reckoned at about 2000 English miles, or about that of the county of Norfolk, and the population was reckoned, by the census of 1828, at 379,000. About one-half of this territory is covered by the chain of the Apennines and its offsets, which slope gradually towards the north; one-third more forms part of the great plain of Lombardy, and is very fertile; and a small but favoured strip extends along the shores of the Mediterranean. Of the mountainous part some valleys are tolerably fertile, but the greater part is either rocky or covered with oak and chestnut trees. The highest summits of the Apennines are, Monte Cimone (7000 feet) and Camporaghena (6500). The snow generally leaves these summits in the month of April. The principal rivers of the Modenese territory, which have their sources in the Apennines and run into the Po, are: 1. The Secchia, which rises in the Apennines of Camporaghena, and flowing through the whole length of the duchy of Modena, passes near the capital, receives many affluents, supplies numerous canals for irrigation, and, after a winding course of nearly 100 miles, enters the Po within the borders of Mantua. 2. The Panaro rises at the foot of Mount Cimone, and running in a parallel direction to the Secchia, waters the eastern part of the duchy, and then enters the territory of Ferrara, where it falls into the Po. Both these rivers are navigable for boats from the neighbourhood of Modena to the Po. 3. The Crostolo rises in one of the lower ridges of the Apennines, passes near Reggio and by Guastalla, below which it enters the Po. The canal Tassoni, which communicates with the Crostolo, is about 14 miles long. In the plain of Modena, Artesian wells have been in use from time immemorial; many of them are of very considerable depth, and the supply of water is abundant. [Artesian Wells.] South of the Apennines the Magra, which rises in the Apennines north of Pontremoli, crosses the Modenese territory of Lunigiana, and enters the sea west of Carrara. Two smaller streams, the Avenza and the Frigido, water the territory of Massa and Carrara. The Serchio is the river of Garfagnana. Two roads cross the central Apennines, and make a communication between the northern and southern divisions of the Modenese states; one road leads from Reggio to Fivizzano and Aulla in the valley of the Magra; another from Modena to Castel Nuovo in the Garfagnana, and from thence to Massa. The chief products of the country are corn, Indian corn, pulse, hemp, oil, wine, silk, and fruits. Polenta, or pudding of Indian corn, flour, beans, and chestnuts in the mountain districts south of the Apennines, are the principal articles of food for the peasantry. Horned cattle and swine are exported in considerable numbers. The other articles of exportation are fruit, silk, corn, brandy, wine, and vinegar. The manufactures of the duchy consist of woollens, silks, gauzes, paper, straw-hats, glass, and pottery. There are abundant sources of petroleum in several parts of the duchy.

The government of Modena is the most absolute in Italy, there being no provincial states of any kind. The present duke, Francis IV. of Este, is the son of Ferdinand, archduke of Austria, and of Maria Beatrice of Este, the last descendant of the houses both of Este and Cibo. For the manner in which the Este obtained the sovereignty of Modena, see Este, House of. The revenue of the state amounts to 6,860,000 francs (about 274,400*l.*)

The judicial establishment consists of two supreme courts, one at Modena, and the other at Massa; and two secondary courts, one at Modena, and the other at Reggio. There are also giusdicenze, or courts of 'première instance,' in every canton or district, each of which embraces several communes. For municipal matters, each commune has its podesta, or sindaco, and a municipal council. The Codice Estense, a compilation made by the later dukes of the house of Este, in the latter part of the eighteenth century, is the law which is in force.

The military consist of a battalion of infantry of the line of eight companies, a battalion of light infantry of six companies, three companies of dragoons, a company of artillery, one of pioneers, and one of veterans. These corps are recruited by voluntary enlistment with bounty money. There are two 'battaglioni urbani,' a kind of civic guard, one at Reggio and the other at Modena, besides a guardia nobile, or body guards, who attend the sovereign and his family. There is a military academy at Modena.

The establishments for public instruction consist of one lyceum at Modena; five colleges for the study of the law and medicine at Modena, Reggio, and Mirandola; three schools of philosophy, at Carpi, Correggio, and Castelnuovo, the chief town of Garfagnana; besides several colleges for boarders kept by the Jesuits and other religious orders. There are five establishments for female education, kept by nuns, four of which are at Modena, one at Reggio, and two at Carpi. For elementary education there are six schools for boys and six for girls, distributed among the various towns; but there is no general system for the rural communes. There are also seven special schools, namely, the academy of the fine arts, the military academy, the institute of cadets, a veterinary school, a school of sculpture at Carrara, and a deaf and dumb school.

For religious purposes the country is divided into four bishoprics, Modena, Reggio, Carpi, and Massa, and 649 parishes. Besides the chapters in each bishop's see, there are six collegiate churches, namely, S. Maria in Pomposa, and S. Consorzio, in the diocese of Modena; S. Prospero, S. Niccolo, and Gualtieri, in the diocese of Reggio; and S. Andrea at Carrara; besides the abbey of Nonantola. There are also ten clerical seminaries, one in each town of the state. The monastic clergy are more numerous in proportion than in most other parts of Italy; there are seventeen convents of men and nine of women. About 3000 Jews reside at Modena, Reggio, and other towns of the duchy.

The principal towns of the states of Modena are—1. Modena. 2. Reggio, the Regium Lepidi of the Romans, a walled town in the midst of a fine and fertile plain, is well built, is a lively place, has several handsome churches, especially the cathedral; a lyceum, which possesses the collection of natural objects that once belonged to Spallanzani; a handsome new theatre; an old castle, in which Ariosto was born; some manufactories of linen and silks; and nearly 20,000 inhabitants. A great fair takes place annually at Reggio in the month of March. Not far from Reggio are the ruins of the famous castle of Canossa, where Gregory VII. received the humiliating homage of the emperor Henry IV. in 1077. 3. Mirandola, once a separate principality belonging to the family of Pico, is an old looking town, in a low unhealthy flat in which rice is grown: it has several churches, and about 4600 inhabitants. 4. Finale on the Panaro, near the borders of Ferrara, has 6000 inhabitants. 5. Correggio, with 2500 inhabitants, was the birth-place of the great painter Antonio Allegri, called il Correggio. 6. Concordia, on the Secchia, has 3000 inhabitants. 7. Carpi, on the high road from Modena to Mantua, has 3000 inhabitants, an old castle, and some manufactories. (Serristori; Neigebaur.)

MO'DENA, The Town of, is situated in 44° 37′ N. lat. and 10° 57′ E. long., in the centre of a wide plain which forms part of the great basin of the Po, and between the rivers Panaro and Secchia, which are here joined by a canal. It is the capital of the Modenese territories, and the residence of the duke. Modena is well built, and has several handsome churches and palaces. Most of the streets have arcades on each side; the principal street, which crosses the town in its length, is handsome. The ducal palace is vast and splendid, of a noble style of architecture, with a handsome court before it, surrounded by a colonnade; it is, in fact, a magnificent princely residence, such as one would not expect to find in the capital of a small duchy. The grand staircase; the principal apartments with their rich furniture; the gallery of paintings by Guido, Guercino, the two Carracci, Garofalo, and other great masters; the valuable library, 'Biblioteca Estense,' which contains 90,000 printed volumes and 3000 MSS., and which has had two illustrious librarians, Muratori and Tiraboschi,—all these render the palace of Modena one of the most interesting in Italy. The fine gardens are open to the public. The cathedral, a Gothic building of the eleventh century, is remarkable chiefly for its lofty square marble tower, called 'La Ghirlandina,' in which is kept the famous bucket, which was the cause of war, in the thirteenth century, between Modena and Bologna, and forms the subject of Tassoni's mock-heroic poem, 'La Secchia Rapita.' The church of S. Agostino contains the tombs of two illustrious Modenese, Sigonio and Muratori. The other remarkable buildings of Modena are, the handsome theatre, the college, the infantry barracks, the hospital, and the old citadel, which is now used as a penitentiary and a workhouse for the prisoners, who are employed in several manufactures. A canal communicating with the Panaro affords a line of boat navigation between Modena and the Po, and by the latter river with Venice and the coast of the Adriatic.

Modena contains 25,000 inhabitants. (Serristori, *Saggio Statistico.*) It lies on the high road from Lombardy to Florence, Rome, and Naples, and is 40 miles south of Mantua, 105 south-east of Milan, 20 north-west of Bologna, and 60 north by west of Florence. Two roads lead from Modena to Florence: one, which is the most frequented, passes by Bologna; the other leads across a wild tract of the Apennines, near Mount Cimone, and descends into the valley of the Arno, by Pistoia. Mutina, which is the antient name of Modena, is said to have been founded by the Etruscans; it afterwards became a Roman colony. It was at Mutina that hostilities first began, after the death of Cæsar, between Antony and the senatorial troops under Decimus Brutus, who shut himself in the town. Two battles were fought under its walls, in the month of April, B.C. 43, in which Antony was defeated, and the two consuls, Hirtius and Pansa, were killed.

In the neighbourhood of Modena is Sassuolo, the ducal country residence and gardens. The fortress of Rubiera, which is the principal stronghold in the duchy, is on the road from Modena to Reggio. (Serristori; Neigebaur; Valéry.)

MODES, *Ecclesiastical* (*Tuoni Ecclesiastici*), or, *Tones of the Church*. In what is called the Gregorian Chant there are eight modes, or tones—four Authentic, and four *Plagal*. [AUTHENTIC; PLAGAL.] The Authentic modes are the Dorian, Phrygian, Lydian, and Mixo-Lydian of the antients, which correspond, according to Dr. Burney, to D and A minor, C and D major, of the moderns. These were chosen by St. Ambrose, about the year 370, for the church of Milan. The Plagal modes are the Hypo-Dorian, Hypo-Phrygian, Hypo-Lydian, and Hypo-mixo-Lydian, corresponding to G and A minor, F and G major, and were added by St. Gregory about 280 years after the adoption of the former. It must be observed, that the Gregorian Chant has its dominant, but takes this name from being the note most often heard; hence it is frequently mentioned in the Gregorian schools as the key-note.

MODILLION (Architecture), an ornamental member in the Corinthian cornice, resembling a small bracket placed horizontally, that is, with its back against the soffit of the part it supports, in which respect it differs from the console, which is placed upright, with its back against the vertical face of the part to which it is attached, and with its larger or convex end uppermost, whereas the larger end of the modillion is placed backwards, and its smaller one in front. Yet though they thus far differ both as to the mode and the purpose of applying them, and also as to their details, in general form the modillion and the console closely resemble each other, the face being composed of a curve of contrary flexure. Modillions are placed beneath the corona of the cornice, and although sometimes omitted out of parsimony, are indispensable to the character of the order, being quite as much distinguishing marks of its entablature as mutules are in the Doric and dentils in the Ionic cornice. They also admit of considerable variety, not only with respect to their design, but also their proportions. Some latitude also is allowed as to the distance at which they are placed from each other. The average or normal distance at which they are placed from each other is at intervals equal to twice their own breadth, but it is sometimes more, sometimes less, according to circumstances, and is in some measure regulated by the distance from the axis of one column to that of the next, because there ought to be a modillion immediately over each column, that is, in a line with the axis of it. This rule however is not very strictly adhered to because the modillions are seldom so large as to render any want of perfect regularity in that respect very apparent. In general the soffit or curved face of the modillions are ornamented with a leaf; sometimes, on the contrary, the whole modillion is very plain, or rather is converted into a block slightly ornamented on its face. Where great richness is desired, dentils are also introduced beneath the modillions, and separated from them by mouldings, as is the case in the Jupiter Stator example.

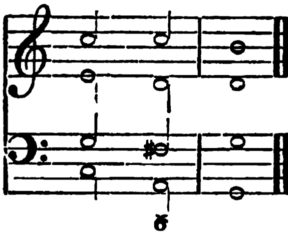
MODI'OLA. [MYTILIDÆ.]

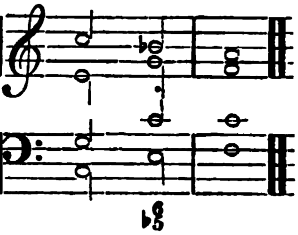
MODULATION, in Music, is a changing of the key, or *mode*, during the progress of a composition. The word is derived from the Latin verb *modulor, to compose or sing in measure,* melody of some sort being inferred.

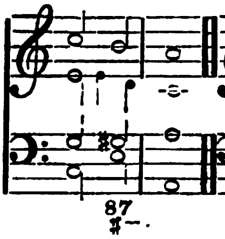
Though it is not quite clear what the antients meant by the term *modulatio*, yet the presumption is that they signified by it the rise and fall of the voice (*accentus*) and the measure of the syllables in recitation and declamation, altogether amounting to a kind of singing; and this we are inclined to think was the boundary, or nearly so, of their proficiency, and what they chiefly aimed at, in the vocal art.

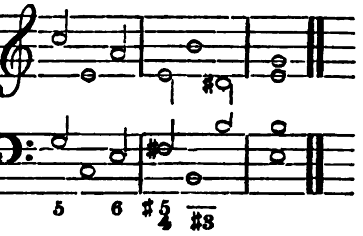
In modern music, Modulation is a most important element, and in proportion to its importance would be the manner of treating it here, were our work a collection of treatises; but limited as we are in space, we must be confined to some general remarks, illustrating these by a few brief examples.

Modulation may be divided into Simple, Chromatic (or extraneous), and Enharmonic. Simple Modulation is a change from a given key to another nearly related to it, namely, its fifth, fourth, relative minor, or relative minor to its fifth; and this modulation, not to be abrupt, is effected by at least one intermediate chord, which must belong to the harmony of the key into which it is intended to pass. Examples in four parts:—

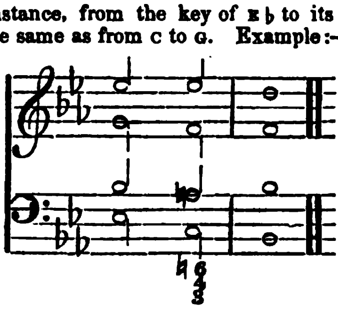

C to G.


C to F.


C to A minor.

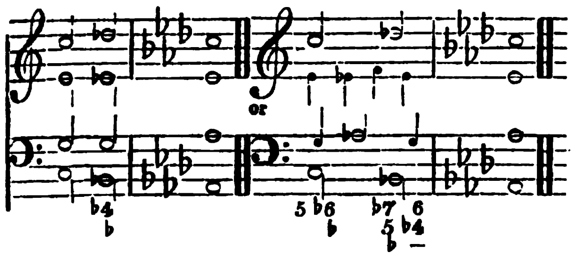

C to E minor.

The close resemblance of the scales of G, F, A minor, and E minor, to the scale of C, renders the modulation easy and natural; hence we have termed it *simple*. And it must now be observed, that the natural major key is here chosen as the diverging point merely on account of its apparent simplicity; any other would have answered the purpose, provided the same relations had been preserved. Thus, for instance, from the key of E♭ to its fifth B♭, is relatively the same as from C to G. Example:—

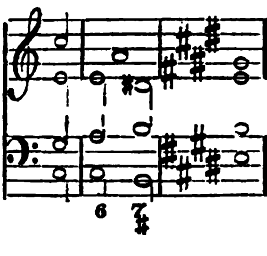


Chromatic Modulation is the change from a given key to some other not analogous to it; *i.e.* to one differing much in scale, and, consequently, in signature. [SIGNATURE.] Examples:—

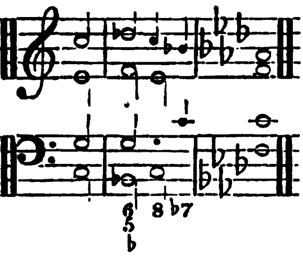
c to A♭.



c to E.

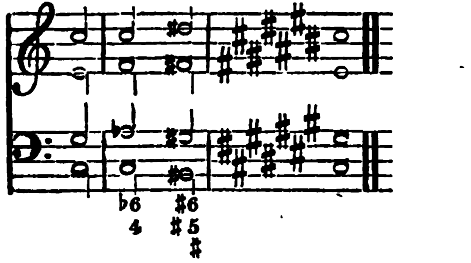


c to F minor.

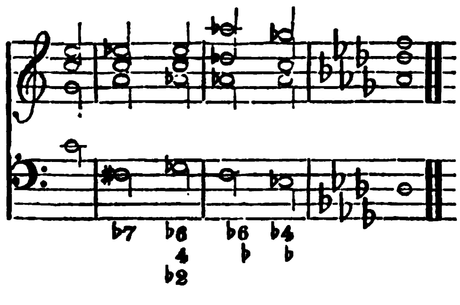


Enharmonic Modulation is the change from a given key to another quite unanalogous, by means of an enharmonic interval,—that is, by the same interval binominously considered; as C and B♯, A♭ and G♯, &c. [ENHARMONIC.] Examples:—

c to C♯.



c to D♭ (from Kirnberger).



In these examples we have endeavoured to show the most direct method of modulating, and, except in one instance, by means the dominant 7th and the diminished 7th, or their inversions. By the intervention of a few additional chords, more elegant effects might have been produced, both as regards harmony and melody. But it must also be remarked that suddenness of transition is often essential to the design of the composer, in which case he takes the shortest road from key to key that the ear will permit.

It will be seen that we entirely differ from those who—perhaps misled by the word *modulatio*, and its interpretation by antient writers—think that modulation may be carried on without any change of key. We are decidedly of opinion, though in opposition to some highly respectable authorities, that *modulation* and *change of key* are identical terms.

MODULES (Architecture), from the Latin *modulus*, as being a lesser measure than the diameter of the column, is employed to signify one half of the latter, or thirty *minutes*. Some writers reckon entirely by *modules* and *minutes*. Thus instead of saying a column is eight or eight and a half diameters high, they would describe its height as being sixteen or seventeen modules.

MŒRIS, Lake. [EGYPT.]

MŒSIA, the name of a province of the Roman empire, extending north of the range of Mount Hæmus, the modern Balkan, as far as the Danube, and eastwards to the Euxine, and corresponding to the present provinces of Servia and Bulgaria. Its boundaries to the west were the rivers Drinus and Savus, which divided it from Pannonia and Illyricum Strabo (vii. 295) says that the old inhabitants of the country were called Mysi, and were a tribe of Thracians, like their eastern neighbours the Getæ, with whom they have been confounded [GETÆ], and that they were the ancestors of the Mysi of Asia Minor. The Romans first invaded their country under Augustus (Dion, cap. 51), and it was afterwards made into a Roman province, and divided into Mœsia Superior, to the west, between the Drinus and the Œscus or modern Isker, and Mœsia Inferior, extending from the Œscus to the Euxine. Being a frontier province of the empire, it was strengthened by a line of stations and fortresses along the south bank of the Danube of which the most important were Axiopolis, Durosteron, Nicopolis ad Istrum, Viminiacum, and Singidunum. In the interior of the country were the towns of Naissus (the modern Nissa), Sardica, Marcianopolis; and on the coast of the Euxine, Odessus or Odyssus, near the modern Varna, Dionysopolis, and Tomi, the place of Ovid's exile and death. A Roman wall was built from the Danube to the Euxine, from Axiopolis to Tomi, as a security against the incursions of the Scythians and Sarmatians, who inhabited the delta of the Danube.

The conquest of Dacia by Trajan removed the frontiers of the empire farther north, beyond Mœsia; but after the loss of that province, about A.D. 250, Mœsia became again a border province, and, as such, exposed to the irruption of the Goths, who, after several attempts, crossed the Danube and occupied Mœsia in the reign of the emperor Valens. The Mœso-Goths, for whom Ulphilas translated the Scriptures, were a branch of Goths settled in Mœsia. Some centuries later the Bulgarians and Sclavonians occupied the country of Mœsia, and formed the kingdoms of Bulgaria and Servia.

MOFFAT. [DUMFRIESSHIRE.]

MOGADORE. [MAROCCO.]

MOGUL EMPIRE is the name commonly given to the empire founded in Hindustan by the successors of Timur, in the sixteenth century. Baber, a descendant of Timur, and a prince of the Jaghatai Turki tribe, after conquering Samarcand, Bokhara, and Cabul, crossed the Indus, and invaded the Penjab. He marched upon Delhi, defeated and killed Sultan Ibrahim Lodi, the Afghan sovereign of Hindustan, took Agra, defeated Rana Sanka, a powerful Hindu prince, extended his conquests to the mouths of the Ganges, and established his Tatar dynasty over those vast regions, 1526-8. As he had many Mongols in his service, and as he was a successor of Timur Beg, who, though a Turki-Tatar himself, and not a Mongol, had re-united for a time the old Mongol empire of Gengis Khan, the dynasty established by Baber in India became known in Europe by the name of the Mogul empire, and the misnomer has perpetuated itself in history. [MONGOLS.]

Baber, after distinguishing himself as a great conqueror, became also a wise administrator, and applied himself to promote the prosperity of his vast dominions. [BABER.] He died in 1530, and was succeeded by his son Humâiûn, a mild and good prince, who however had not the abilities of his father. The Patans, a tribe of Afghans, rose against him, and forced him to emigrate, and a Patan dynasty was established at Delhi. Humâiûn however returned with a fresh force of Turcomans and other Tatars, and re-took Delhi. He died in 1556, and left an unsettled throne to his son Akbar, then a mere youth.

Akbar, by means of his generals, re-took Agra from the Afghans, re-conquered Malwa and Behar, defeated the Uzbek chiefs who had revolted, invaded and conquered Guzerat and Sinde, and consolidated the empire in the house of Timur. For an account of his life see AKBAR. Deviating from the old principle that all the land belonged to the crown, and that the occupiers were yearly tenants Akbar alienated many lands in favour of the actual occupiers, to whom he gave by an edict the right of transferring their property without the necessity of obtaining permission from the crown.

Akbar died in 1605, and was succeeded by his son Jehangire, a good though rather weak prince, who followed his father's steps in his administration.

Jehangire died in 1627, and was succeeded by his son Sultan Kurram, who assumed the name of Shah Jehan. He was an able prince, who extended the limits of the empire south of the Nerbuddah, as far as the frontiers of Golconda and Vizapore.

Shah Jehan was deposed in 1658 by his third son Aurengzebe, whose long reign was the most brilliant period of the dynasty of Timur in India. For particulars see AURENGZEBE.

Aurengzebe died in 1707, and was succeeded by his son Bahadar Shah, who died in 1712, and was succeeded by his son Moaz ul Dien, styled Jehandar Shah, who reigned only eighteen months, and was succeeded by his nephew Firrocksere in 1713.

In 1717 Firrocksere was deposed, and deprived of his sight by two chiefs, Abdullah Khan and Hassan Khan, who raised to the throne Raffeih ul Dirjat, another grandson of Bahadar Shah, but put him to death after three months.

In 1718 Mahummud Shah, son of Jehandar Shah, ascended the throne, and having rid himself of the two rebellious chiefs, gave himself up to indolence and pleasure. In the meantime the Mahrattas had become extremely formidable, and the various khans, or governors of provinces, aspired to independent sovereignty. To crown Mahummud's misfortunes, Nadir Shah, the usurper of Persia, invaded Hindustan and entered Delhi. Mahummud surrendered to him, and was treated with some regard; but the exactions of Nadir's officers having occasioned an insurrection in the city, Nadir gave orders for a general massacre, in which many thousands, without distinction of age and sex, lost their lives, A.D. 1739. Nadir soon after returned to Persia with large plunder, leaving Mahummud on the throne, who formally ceded to him all the provinces north-west of the Indus. The governor of the Deccan, Nizam ul Muluk, usurped the sovereignty of that province, and an adventurer, Aliverdi Khan, likewise usurped Bengal. Mahummud Shah died in 1747, and was succeeded by his son Ahmed Shah.

The reign of Ahmed Shah was still more disturbed than that of his father, by invasions of the Mahrattas, Rohillas, Patans, and other predatory bands, and by the ambition of the various chiefs, or governors of provinces. Ghazi ul Dien, the eldest son of the Nizam ul Muluk, being disappointed of his father's inheritance by his brothers, after several attempts to recover it, died of poison, leaving a son, young Ghazi, who held an office of trust at Delhi under the emperor. He was a brave youth, and fought courageously for his master against various rebels; but Ahmed Shah, becoming jealous, endeavoured to get rid of him. Ghazi, discovering this, marched upon Delhi, took it, and deposed Ahmed Shah, who was at the same time deprived of his sight, in the year 1753. Ghazi then placed on the throne another prince of the blood, who assumed the name of Allumghir, while Ghazi, in fact, ruled the empire with the title of vizier.

Achmet Abdallah, of Herat, who, in the midst of the confusion into which the affairs of Persia had fallen after the death of Nadir Shah, had formed a new empire in Afghanistan, invaded the Penjab, took Lahore, and advanced towards Delhi, A.D. 1757. Ghazi went out to meet him, but was forsaken by part of his troops in consequence of secret orders from Allumghir, who was jealous of the authority of his vizier. Ghazi surrendered to Abdallah, whose favour he won; and when Abdallah left Delhi to return to the north, he left Allumghir as the nominal possessor of the throne, under the control of the vizier. In 1759 Abdallah again advanced into Hindustan, encouraged by Allumghir, who kept a correspondence with him, which being discovered by Ghazi, the latter caused the emperor to be assassinated. He then placed on the throne another prince of the blood, named Shah Jehan. Ghazi was obliged to submit to Abdallah, who entered Delhi, and raised enormous contributions, in consequence of which a revolt having broken out among the inhabitants, a general massacre ensued, and a great part of the town was destroyed by fire, A.D. 1761. Then came a new invasion of the Mahrattas, who entered Delhi after Abdallah's departure, obliged the vizier to escape, deposed Shah Jehan, and raised another puppet prince to the throne. Meantime Shah Allum II., the son of Allumghir, had himself proclaimed emperor at Patna, under the protection of the Soubadhar of Bengal, Suraja al Dowlat. The Soubadhar being defeated by the British forces, Shah Allum came into the hands of the latter, who gave him the town of Allahabad, and part of that province, for his subsistence. After numerous subsequent vicissitudes, Shah Allum died in 1806, a pensioner of England; and with him the empire of the house of Timur, commonly known as the Mogul Empire, may be considered as having terminated, and the British East India Company, after half a century of wars and conquests, succeeded to its splendid inheritance. [HINDUSTAN.]

(Dow, *History of Hindustan, to the death of Akbar, translated from the Persian, with an Appendix, containing the History of the Mogul Empire, from its decline in the reign of Mohammed Shah, to the present time*, London, 1768, Dow, *History of Hindustan, from the death of Akbar to the complete settlement of the Empire under Aurungzebe, with an Inquiry on the State of Bengal*, London, 1772. See also a *Chronological Account of the Connection between England and India*, in the *Companion to the Almanac* for 1832, published under the superintendence of the Society for the Diffusion of Useful Knowledge.)

MOGULBUNDI. [HINDUSTAN, p. 210.]

MOHAMMED, ABUL KASEM IBN ABDOLLAH, was born at Mecca, on the 10th of November, 570, or, according to other authorities, on the 21st of April, 571. His father Abdollah, whose only son he was, belonged to the family of Hashem, the most distinguished branch of the noble tribe of Koreish, which claimed a direct descent from Ismael, the reputed progenitor of the Arabian race, and had acquired a decided superiority over the surrounding tribes. Owing to an active and uninterrupted commerce, the Koreishites were not only renowned for their opulence and refinement, but, being concentrated about the antient place of the common Arabian worship, they were the hereditary guardians of the celebrated Caaba, the custody of which, together with the sacerdotal office, had for a long time been the privilege of the Hashemites, the ancestors of Mohammed. Mohammedan authors have laboured to adorn the birth of their prophet with many miraculous events, such as the Persian sacred fire being suddenly extinguished, and a splendid light having spread over all Arabia; but these and similar embellishments of his life, with a great number of prodigies attributed to him, we may leave to the credulity of his enthusiastic followers. In his early childhood Mohammed lost both his parents; his mother Amina died in his second year, and the child was committed to the care of his aged grandfather Abdol Motaleb, who was then the chief priest of the Caaba. Abdol Motaleb was succeeded by Abu Taleb, the uncle of Mohammed, who now became his guardian, and with whom he made several journeys and mercantile adventures, principally towards Syria, and to the fairs of Damascus, Bagdad, and Basra. In his twentieth year Mohammed took part in an expedition against the predatory tribes which then molested the caravans and pilgrims on their way to Mecca. This wandering kind of life and the practice of warfare animated the youth with an eager desire of adventure and military achievements, and with that spirit of chivalry which may be considered as the germ of his future exertions. To this must be added a strongly marked propensity to solitary retirement and to religious abstraction, originating probably in his early contemplation of the absurd ceremonies and cruel idolatry of his contemporaries which he witnessed at Mecca, and in which he had been compelled to take part by replacing the famous black stone in the wall of the Caaba when the temple happened to be repaired.

A Nestorian monk, the abbot of a monastery at Basra, named Boheira, was the first who observed and appreciated the character of young Mohammed. After having conversed with him on religious subjects, he foretold to his uncle Abu Taleb that great expectations might be conceived of the boy provided he should escape the snares of persecuting Jews, a caution which will be explained in the course of this narrative.

In the twenty-fifth year of his age Mohammed became acquainted with a rich widow Khadija, whom he subsequently married; and during the fifteen following years little more is known of him than that preparatory to his intended mission he frequently retired to the cave of Hera, in the neighbouring mountains, and also made a second journey into Syria and occasional visits to the southern parts of Arabia. During these journeys he gained information at such times and in such degree as circumstances permitted, and he is said to have conversed most familiarly with some learned Jews and Christians, among whom are particularly mentioned a celebrated rabbi, Abdollah Ibn Salaam, and Waraka, the nephew of his wife, who first deserting his native polytheism, and afterwards the Jewish faith, had embraced the Christian religion, and was well acquainted with the Old and New Testament. (Abulfeda, *Annales*, i., 283; Marraccius, *Prodromus* 1, 44.)

In the fortieth year of his age Mohammed assumed the prophetic office, and displayed his views and principles to his own domestic circle. His first efforts were successful, for his wife Khadija, Waraka, Abubeker, his cousin-german Ali ben Abi Taleb, and several other members of the family, readily acknowledged his divine mission, and himself as the apostle of Allah.

After being three years silently employed in the conversion of his nearest friends, he invited the most illustrious men of the family of Hashem to his house, and after having conjured them to leave idolatry for the worship of one God, he publicly proclaimed his calling, and declared that by the command of that one God, revealed to him by the angel Gabriel, he felt compelled to impart to his countrymen the most precious gift, and the only means of their future salvation. Far from being persuaded, the assembly was struck silent with surprise mingled with contempt. The young and enthusiastic Ali alone, throwing himself at the feet of Mohammed, with a solemn vow offered to be his companion, but his father, the mild and sober Abu Taleb, seriously advised the prophet to abstain from his strange and fanatical design. Mohammed replied, that even if the sun should be placed on his right hand and the moon on his left, they should never divert him from his career. Stimulated rather than intimidated by the resistance of his relations, the reformer soon began to frequent the public places of Mecca, and openly to preach the unity of God, calling upon the citizens to repent of their idolatry, exhorting them to devote themselves to the service of a supreme and most merciful Being, and reciting fragments of the Korân or affixing them at the doors of the Caaba. It is reported that he had the honour of thus converting the celebrated poet Lebid, who, struck with the sublime beauty of a passage thus promulgated, declared it far superior to any production of human genius, and willingly joined in the profession of Islam. The people listened to the precepts of the moralist, and though they were enraptured by the force of his eloquence, very few were yet inclined to desert their hereditary and long-cherished ceremonies, and to adopt a spiritual faith the internal evidence of which they were unable to comprehend. Mohammed was repeatedly urged by them to confirm his divine mission by miracles, but he wisely appealed to the internal truth of his doctrine, and expressly declared that wonders and signs would depreciate the merit of faith and aggravate the guilt of infidelity. The only miraculous act which Mohammed professed to have accomplished, and which has been greatly exaggerated by his credulous adherents, is a nocturnal journey from the temple of Mecca to Jerusalem, and thence through the heavens, which he pretended to have performed on an imaginary animal like an ass, called Borak (lightning); but we need scarcely remark that the simple words of the Korân (*Sur.* xvii.) may as well be taken in the allegorical sense of a vision.

In the meantime several of the noblest citizens, such as Abu Obeida, Hamza, an uncle of Mohammed, Othman, and the stern and inflexible Omar, were successively gained by the moderation and influence of Abubeker, with whom, by marrying his only daughter Ayesha, the prophet had become more nearly allied after the death of his wife Khadija. Nevertheless for more than ten years the new faith made little progress within the walls of Mecca, and might have been extinguished in its birth, if the jealous leaders of the Koreishites had not directed their animosity and violence against the whole line of Hashem. Although menaces and persecution, too often repeated to be minutely related here, had compelled the few votaries of Mohammed to retire into Abyssinia, the spirit of party continually kindled the flame of dissension. At last a revolt, which threatened the life of Mohammed, broke out at Mecca, and the prophet took his flight to Yatreb, afterwards known by the name of Medina (Medinat-al nabi), or the city of the prophet. This retreat happened on the 16th of July, 622, and has been adopted as the Mohammedan æra, called Hejra. The citizens of Medina, among whom the seeds of Islam had been sown by some converted pilgrims returning from Mecca, were readily inclined to embrace the cause of the reformer, whom they had often invited by several previous deputations, and to whom they had promised their alliance and protection against his enemies. Accordingly they advanced in procession to meet the banished prophet, invested him with the regal and sacerdotal office, and offered their assistance in propagating by force the tenets of his new religion. From this moment a vast theatre opened to the enthusiasm and ambition of Mohammed. His revelations assumed a much higher claim; he inculcated as a matter of religion and of faith the waging of war against the infidels; and the sword once drawn at the command of Heaven from that time remained unsheathed until the tribes of all Arabia and the adjacent countries had joined in the profession that there is no God but Allah, and that Mohammed is his apostle.

After various enterprises and petty excursions, three great battles were fought with the Koreishites under Abu Sophian, the most implacable foe of Mohammed and of the Hashemitic line, who, after the death of Abu Taleb, had succeeded to the principality of Mecca. A military force of nearly a thousand men had been collected by Abu Sophian, in order to protect a wealthy caravan on its way to Syria, and to attack the daring band of the prophet, who, with only three hundred warriors, awaited them in the valley of Beder, twenty miles from Medina. The Moslems, inflamed with enthusiasm and expectation of booty, furiously assailed the enemy, who, after a short battle were totally defeated and dispersed, leaving a rich spoil to the conquerors. To avenge this disgraceful defeat Abu Sophian advanced in the following year (Hejr. 3) with an army of three thousand men towards Medina, and a bloody action, in which Mohammed was severely wounded, took place near Mount Ohud. The Koreishites were now victorious, but the Moslems soon rallied in the field, and a third war, during which the city of Medina was besieged for twenty days, was terminated by a single combat of the valourous Ali. Surrounded by a number of roving clans secretly favouring the new cause, or at least of a doubtful disposition, the idolaters either wanted strength or courage to protract hostilities, and accordingly an armistice of ten years was agreed upon by both parties. This interval Mohammed employed in converting or subduing the principal Jewish tribes, namely, those of Kainokâo, Koraidha, Nadhir, and Chaibar. (Abulfeda, *Vita Moham.*, p. 67; Pococke, *Specimen Hist. Arabum*, p. 11.)

The castles and towns of the unwarlike Jews were rapidly taken and plundered, and the unhappy people, being unwilling to embrace the religion of the conqueror, were driven out, or persecuted and slaughtered with the utmost cruelty. But the prophet paid dearly for this, as he never entirely recovered from the effects of poison prepared for him by a Jewish female of Chaibar. Thus advancing among the tribes of his native country, the power of the fierce and ambitious apostle increased like an avalanche, and as the Koreishites had been guilty of violating the truce, he proceeded at the head of ten thousand warriors towards Mecca (Hejr. 8). The town surrendered without resistance, and yielding to the victorious banners of Islam, the people unanimously hailed, as the sovereign of Mecca, the prophet whom they had driven from his paternal hearth. Mohammed readily forgave his converted brethren the insults which he had formerly received from them, and after having broken the three hundred and sixty idols round the Caaba, and destroyed every vestige of idolatry, he adorned and consecrated the temple to the worship of God. In doing this he himself set an example of the most earnest prayer and devotion, and strictly fulfilled the religious duties and ceremonies which the pilgrims to the holy shrine had theretofore invariably observed. The conquest of Mecca, and a subsequent prosperous expedition against the hostile fortress of Tayef, were speedily followed by the submission of the idolatrous tribes over all Arabia, and even the petty chiefs of the neighbouring provinces presented gifts or offered their friendship and alliance to the victorious prophet. Intoxicated with ambitious pride, Mohammed now despatched his ambassadors to Khosru Parviz, king of Persia, to Heraclius of Byzantium, and to the king of Abyssinia, solemnly inviting them to the profession of Islam, or threatening them with war. Accordingly an army of three thousand Moslems invaded the eastern territories of Palestine, and although this and a subsequent expedition to the west were only momentary excursions, a number of foreign tribes and cities willingly submitted. This arose principally from the clemency and moderation of the prophet towards the Christians, from whom he claimed only a moderate tribute, and to whom he most liberally granted his protection, security and freedom of trade, and toleration of their worship, and whose conversion to his religion he rather expected than enforced. On this occasion a patent in favour of his Christian subjects, known under the name of 'Testamentum Mohammedis,' was formally published, which, whatever may be thought of its authenticity, is at least in accordance with many passages of the Korân, declaring that 'no force shall be employed in religion; that the prophet is nothing but a teacher and admonisher of the people, who shall not be governed by violence, and that the believers shall leave those who do not believe to the punishment of God, for He is the only arbiter, and will reward every one as he deserves.' (*Sur.* ii., 257; xlv., 14; lxxxviii., 21, &c.) Returning from these military expeditions, and having once more accomplished a solemn pilgrimage to the temple of Mecca, Mohammed retired to Medina, where, to the great consternation of his followers, he died. This event happened, after a severe fever of fourteen days, on the 8th of June, 632, in the sixty-third year of his age. Omar, with many enthusiastic disciples, firmly believed that a prophet could never die; and it required all the authority of the sober and prudent Abubeker to refute so absurd an opinion. 'Is it Mohammed,' he exclaimed to the frantic multitude, 'or the God of Mohammed, whom you worship? The God of Mohammed liveth for ever, but the apostle was a mortal like ourselves, and has experienced the common fate of mortality.'

Having thus rapidly sketched the political life of the Arabian prophet, by whose noble aspirations and intrepid courage the hostile tribes of an immense country were for the first time united in faith and obedience; and before discussing the principles of a religion, which, during the space of a century, displayed its victorious banners over all Arabia, Syria, Asia Minor, Persia, Egypt, and the coasts of Africa, and whose precepts even now are zealously followed from the Ganges to the Atlantic by more than a hundred and twenty millions of people—we feel it necessary to take a short retrospective view of the state of Arabia previous to the introduction of Islam. The aboriginal inhabitants of the peninsula had, from time immemorial, been divided into a great number of free and wandering clans, limited communities, and petty states, whose peculiarities of character, mode of life, and political institutions, as they were mostly dependent upon local circumstances, were for centuries stamped with the same unaltered features, and had been preserved almost unchanged even from the time of the Patriarchs in the book of Genesis. The mountainous table-land of central Arabia, abounding in rich pasturage and fertile valleys, but at the same time intersected and skirted with dreary wastes and sandy plains, was occupied by those roving tribes who, in opposition to the settled inhabitants, are proud of the name of Beduins, or people of the plain. Most of them were addicted to a wandering pastoral life, but from being strongly disposed to war and chivalrous adventures, their peaceable occupations were interrupted, either by conducting a caravan of merchants, or still oftener by assailing and robbing their fellow-tribes. Every tribe was governed by the most aged or worthy Sheikh of that family which had been exalted above its brethren by fortune and heroic deeds, or even by eloquence and poetry. For as the heroic bards were at once the historians and moralists, by whom the vices and virtues of their countrymen were impartially censured or praised, a noble enthusiasm for poetry animated those Arabs, and at an annual fair at Okhad, thirty days were consecrated to poetical emulation, after which the successful poem was written in letters of gold and suspended in the temple of Mecca. Those meetings however formed only a very feeble bond of union among the independent and hostile tribes, who only occasionally, and in times of danger and warfare, submitted to a supreme chief, or Emir of Emirs, and had never yet been united into one body. And the tie was still less binding on those inhabitants who, being collected in flourishing towns and cities on the coasts of the peninsula, and mostly employed in trade and agriculture, were regarded with supreme contempt by the free Beduins, as a weak and degenerate race of slaves. The religious worship of the Arabs chiefly consisted in the adoration of the heavenly luminaries, which were considered as so many tutelar deities of the different tribes; and among which, after the sun and moon, the planet Venus had acquired such peculiar pre-eminence, that even to the pious Moslems Friday ever after remained the sacred day of the week. These deities, with many other images of the personified powers of nature, rudely represented by idols of every variety of shape, were principally gathered round the antient Caaba, or square temple, the Pantheon of Arabian idolatry at Mecca; and their worship was accompanied, not only with the most horrid rites and shocking ceremonies of a degraded paganism, but even with human sacrifices and cruelties of every description. Even children were immolated by some of the ruder clans to the idols; while others, as the Kendites, buried their daughters alive (*Sur.* vi., 137; xvi., 58; lxxxi., 8), and we need scarcely remark, that, except a vague belief of the soul becoming transformed into owls hovering round the grave, there is no indication that the Arabian idolaters believed in a future life and final retribution. (Pococke, *Specimen Historiæ Arabum*, ed. White, 1806.) Among the foreign settlers in Arabia, we pass over in silence the few adherents of Zoroaster, scattered along the Persian gulf, and the Sabæans, on the southern coast of the peninsula, who, even from the time of David and Solomon, stored their rich emporiums of Ophir, Saba, and afterwards Aden, with Indian merchandise, and who, as is clear from many good arguments, were undoubtedly of Hindu origin. The Christian religion had long been established in several parts of Arabia, but the Christianity of the Oriental church, at that time, almost resembled paganism, being associated with monachism and with the worship of martyrs, relics, and images. Among the heretical sectaries, who, absorbed in their monophysitical and other abstruse dogmatical controversies, looked upon each other with the utmost hatred, we find particularly mentioned the Nestorians, Jacobites, Marcionites, and Manichæans, besides some other obscure sects, such as the Collyridians, who, deifying the mother of Christ, and adoring her as the third person in the Trinity, probably gave rise to the Christian tritheism so often dwelt on by the author of the Korân. After the destruction of Jerusalem, the Jews had retired in great numbers to Arabia, where, owing to the loose connection and the jealousy of the aboriginal tribes, they had gained considerable power. Many of them, adopting the fierce manners of the desert, chose a wandering life, connected with all its dangers and adventurous strife, and a poem composed by a Jewish Beduin has been preserved in the Hammâsa, which breathes the true spirit of Arabian chivalry. (*Hammâsa*, p. 49, Freyt.) But in general the Jews were peacefully settled in towns and fortified castles, principally along the coast, or dispersed among the inhabitants of large cities. It was to the Jews of his country that the Arabian reformer first and most eagerly looked for proselytes, and his early predilection in favour of the *possessors of Scripture*, as they are honourably called, might be attested by innumerable passages of the Korân. He not only appeals frequently to their testimony in order to verify the revelations of former times, and consequently the truth of his own divine mission (*Sur.* ii., 134; x., 93; xxvii., 77; xxxii., 25; xlv., 16), but to gratify the Jewish superstition, he even instructed his first disciples to direct their prayers towards the holy shrine of Jerusalem, which was afterwards altered in favour of the Caaba. (*Sur.* ii., 143-146.) But the followers of the Mosaic institution, being then already entangled in their fanciful Talmudic lore, were by no means inclined to accept the more simple and less alluring tenets of Islam, and when the most persuasive summons of the prophet were repeatedly answered by ironical sneers and undisguised contempt, his former friendship was converted into implacable hatred, and the Jews were accordingly stigmatised as the enemies of the Moslems, the murderers of their prophets, as interpolators of sacred Scripture, and, in pretending to be the chosen people of God, as the haughty foes of mankind. (*Sur.* ii., 58, 73; v., 21, 74, 85.)

Nevertheless it is to his Jewish instructors, and particularly to the above-mentioned rabbi, Abdollah Ibn Salaam, that Mohammed was indebted for that ample knowledge of biblical history, and for all those dogmatical legends, fanciful ornaments, and absurd interpretations of Scripture, with which almost every page of his Korân is stamped. (A. Geiger, *Was hat Mohammed aus dem Judenthume aufgenommen?* Bonn, 1833.) This leads us to that singular work, which, from the importance of its contents, has been acknowledged as the fundamental code of civil and criminal law for many millions of mankind; a work which, from the force and sublimity of its style, has been for centuries admired, and has become the model and standard of all Arabic writers, and whose language is even now the vehicle of communication for nations between the Polynesian isles and the Columns of Hercules; a work which is considered by all these nations as the inexhaustible source of their happiness on earth, and as the only means of their eternal bliss and salvation hereafter; a work which, according to pious Moslems, was written before the throne of God with a pen of light on the table of his everlasting decrees, and of which a mere copy was brought down and revealed to Mohammed by the angel Gabriel.

The Korân (*lecture*), or with the Arabic article, Alkorân, commonly called the book, or book of Allah, both in imitation of the rabbinical denominations of the Scripture, namely, Mikra and Khitab, is a collection of all those various fragments which the prophet, during the time of his apostolic office, successively promulgated as so many revelations from heaven. It would be almost impossible to characterise the leading features of the Korân, or even to give a full and clear account of its contents; for the chronological order of the incoherent rhapsodies has been neglected, and we are at a loss either to trace any logical connection between them, or to reconcile the many glaring contradictions in a work which otherwise might have served as an official journal of the progress of Islam. According to the momentary feelings of the prophet, his frame of mind, or the mere suggestions of his fancy, pious meditations and fervent prayers are suddenly interrupted by hortatory speeches and admonitory discourses. Apostrophes of Allah to the listening apostle, and of course to the refractory unbelievers, are interrupted by legendary tales and fabulous traditions of antient Arabic heroes and tribes; and religious customs and ceremonies, enforced with moral sentences and the most energetic recommendations of gratitude, charity, patience, and piety, are occasionally illustrated or strengthened by the examples of the biblical patriarchs and prophets derived from rabbinical authority. Add to this the purity of the language, which is the most refined dialect of Hejaz, and the harmony and copiousness of the style, which in splendid imagery, bold metaphors, and occasional rhyme, rather resembles poetry than prose, and, though sometimes obscure or verging upon tumidity, is generally vigorous and sublime,—and we may readily acquiesce in the judgement of Goethe, that the Korân is a work with whose dulness the reader is at first disgusted, but is afterwards attracted by its charms, and finally ravished irresistibly by its many beauties. The revelations of the Korân had been originally preserved by oral tradition, or handed about in fragments, written on palm-leaves and pieces of parchment by the slave of Mohammed, Said ben Thabet. The scattered leaves were collected into a volume by Abubeker, two years after the death of the prophet; but many apocryphal additions having crept into the collection, an authentic copy was afterwards revised and sanctioned by the Caliph Omar (652). The code is divided into 114 chapters, or *suras*, which are inscribed with the name of Mecca or Medina, where they had been promulgated, and with the number of verses which they contain; but they are mostly arranged according to their length, and without any regard to chronology, the seventy-fourth and ninety-sixth chapters being supposed to have been the first revealed. Among the numerous illustrations of the Korân we may notice the celebrated commentaries of Abul Kasem Mohammed Al-Samachshari, and Nazireddin Al-Beidhavi (in the twelfth and thirteenth centuries), both of whom have endeavoured to reconcile the many discrepancies and contradictions of the work, and to explain its occasional obscurity, mostly by means of that recognised oral tradition which, recording in more than 7000 anecdotes the private life, opinions, discourses, and sentences of the prophet, had been collected by Abu Abdollah Mohammed Al Bochâri in the ninth century. This collection, combined with a previous controversy respecting the exclusive right of Ali or of Abubeker and the two following caliphs to the supreme pontificate and secular sovereignty over the Moslems, gave rise to the great division of the whole Mohammedan community into Shiites, or sectarians, by whom the authority of tradition is rejected, and Sunnites, or orthodox believers. [ABBASIDES.] The first printed edition of the Korân, by Pagninus Brixiensis (Rome, 1530), was burnt by order of the pope; and that of Lud. Marraccius was not allowed to appear unless attended with a *Prodromus ad Refutationem Alcorani*, Padua, 1698, folio. A quarto edition of the text by Abr. Hinkelmann (Hamb., 1694) has been critically revised and reprinted by G. Fluegel (Leipz., 1834). A French version by Savary (1783), carefully corrected by Garcin de Tassy, appeared in 1825. The English translation by G. Sale, accompanied with a learned Preliminary Discourse and Notes, was first published in 1734, and has been often reprinted.

The religious system of Mohammed, designated by the name of Islam, or salvation, is displayed throughout the Korân in single and often-repeated precepts. It consists of two parts; of a dogmatical (or Imân) faith, and a practical (or Dîn) religion. The principal articles of belief are the following:—There is but one God, eternal, omnipotent, most wise, and most merciful; to whom alone obedience and adoration are due, and whose majesty is daily proclaimed by a host of angels above, as well as by his own works around us; he is the author, preserver, and governor of the universe, and the supreme ruler of fate, by whose divine providence and absolute predestination the destinies of mankind have from eternity been decreed. The will of God and his divine law were often and fully declared by the former prophets, Adam, Noah, Abraham, Moses, and Christ, whose authority and station rise in just gradation above each other; but among whom Abraham is the chief prototype of a true believer. 'The patriarch was neither a Jew nor a Christian, for he believed in the unity of God: he was a religious Moslem, and the friend of God, as the Islam is nothing more than the faith of Abraham.' (*Sur.* ii., 134; xvi., 120.) Nor is Isaac to be considered as the beloved son of the patriarch; for it was Ismael, the pious father of the Arabian race, whom God asked for a sacrifice (xix., 55; xxi., 85; xxxvii., 101); and it may be worth remarking that the enthusiastic author of the Korân is often so totally absorbed by his thoughts, and the truth of his assertions so deeply worked on his mind, as to identify his own feelings with those of the biblical characters. Equal veneration and deferential respect are paid to our Saviour: 'Verily, Christ Jesus, the son of Mary, is the apostle of God, and his word, which he conveyed unto Mary, and a spirit proceeding from him, honourable in this world and in the world to come; and one of those who approach near to the presence of God. Yet Jesus was a mere mortal, and not the son of God; his enemies conspired against his life, but a phantom was substituted for him on the cross, while he was translated to heaven' (iii. 54; iv. 156, 159). But, after all, Mohammed is the last and by far the most illustrious apostle; with him, who is the seal of the prophets (xxiii., 40), the divine missions have ceased; and as the Scripture and Gospels have been altered by superstitious Jews and idolatrous Christians, the Korân must be revered as the only genuine revelation by which former religions are corroborated and verified (ii., 89; xlvi., 11). The soul of man is immortal, and at the day of resurrection and the final judgment of mankind every one shall receive the just reward of his virtues, or the punishment due to his evil deeds. Sinners, and particularly unbelievers and idolaters, shall be hurled about in a dark or burning hell; whereas the virtuous and pious Moslems shall be rewarded with everlasting happiness in a paradise, enlivened by heavenly virgins, and abounding with shady groves, clear streams of water, and delicious fruits—the most desirable enjoyments in the sandy deserts of Arabia. But the hope of salvation is not confined to the Moslem, for every man who believes in God and does good works shall be saved.

Besides the most weighty obligation to promote the propagation of Islam, which we have already noticed as incumbent on every Moslem, the first practical duties are, prayers directed towards the temple of Mecca at five appointed hours of the day, fasting during the month of Ramadhan, and alms, to which the fortieth part of a person's property must be appropriated, and which must be bestowed even on foes and on the brute creation. Prayer will carry the Moslem half way to God; fasting will bring him to the door of his palace; but charity and benevolence towards his fellow-creatures, by which the Supreme Being is best worshipped, will gain him admittance. Cleanliness of body and frequent religious ablutions are strongly recommended, and likewise attendance at divine service in the mosques on every Friday; and once in the course of a man's life, if possible, the performance of a holy pilgrimage to the temple of Mecca, the sacred birth-place of Islam. The antient

Arabian custom of circumcision, generally practised in the eighth year, the legislator retained; and in many usages and ceremonies he indulged the prejudices of his countrymen, either by connecting a prevalent superstition with the morals of a purer faith, or by restricting an abusive practice within its just limits. For example, instead of the former polygamy, four wives at most were legally allowed, and the matrimonial rules were more strictly regulated. The Korân enumerates as deadly sins, wilful murder, adultery, calumny, perjury, and false testimony. Usury, gaming, and the use of wine and pork, are strongly forbidden; and it is but doing justice to Mohammed to observe, that every precept enjoined upon his followers had been fully confirmed by his own example, if we except his incontinence with the sex. The prophet married no less than seventeen wives, strangely enough all widows, except Ayesha, the daughter of Abubeker. This sensuality, almost the only stain on his character, can neither be palliated by the natural temperament of the Arabs nor by his hope of posterity and lineal succession, which nevertheless failed, as the four sons of Mohammed died in their infancy. But we hardly need to apologise for the infirmities of a great man (and a great man Mohammed certainly was), who in every respect is described as a perfect model of Arabian virtue, brave and liberal, eloquent and vigorous, noble and simple in all his dealings, and of irreproachable morals. That fraud, cruelty, and injustice were often subservient to the first propagation of Islam, cannot be denied; but a religious enthusiast is compelled to act according to the overpowering suggestions of his imagination, which he easily persuades himself to be the inspirations of Heaven, and according to his own conviction of the importance and justice of his mission. As to this, the prophet repeatedly and in the strongest terms expresses his purpose of uniting and reconciling the hostile tribes of his country by destroying their gross idolatry, and by bestowing on them the most salutary and precious gift of a purer creed, in whose truth and divine origin he himself firmly believed. And indeed it will readily be admitted that the religion of the Korân, by which prayers and alms were substituted for the blood of human victims, and which, instead of hostility and perpetual feuds, breathed a spirit of benevolence and social virtues, has been a real blessing to the Eastern world, and has had a most important influence on its civilization. It is not merely to the conquering sword and to the intrepid courage of the reformer and his successors, but also to the intrinsic merits and attractive features of a system, rich with all the luxuriance of Eastern poetry, and most congenial to an ignorant and sensual generation, that the rapid progress of the Arabian conquests must be attributed, although favoured and promoted by the discord, internal revolutions, and weakness of the neighbouring governments.

(ARABIA, p. 216; and for the further development of Islam, see Adr. Reland, *De Religione Mohammedica*, Utrecht, 1717.)

MOHAMUDGARA. [SANSCRIT LITERATURE.]

MOHAWK, River. [NEW YORK.]

MOHAWKS. [IROQUOIS.]

MOHILEW, or **MOGILEW**, a government of European Russia (in the division called West Russia), lies between 53° 5′ and 55° 10′ N. lat. and 28° 50′ and 32° 40′ E. long. It is bounded on the north by Vitepsk, on the north-east by Smolensk, on the south-east and south by Tschernigow, and on the west by Minsk. The area is 19,300 square miles, and it is divided into twelve circles. It is part of the flat tract of Russia, and contains no mountains, but only hills and the high banks of the rivers. It has fewer lakes, marshes, and low fens than some of the adjoining provinces, for instance, Vitepsk; the soil is not so sandy, and on the whole more productive. The principal river is the Dnieper, which comes from Smolensk and flows first west and then due south. It receives on the left the Swinaja, the Bolotimka, and the Sodscha, which last comes from Smolensk and receives several small rivers; on the right the Dnieper is joined by the Druez and the Beresina, of which latter only the mouth is in this province. Most of the lakes are in the north-west part; there are the Dolgoe, the largest of all, and the Sennoje; the others resemble large ponds.

The climate is drier and milder than in Vitepsk; and apples and pears, which there thrive only in sheltered spots, succeed here without any particular care.

The chief occupations of the inhabitants are agriculture and the breeding of cattle. The soil is equally favourable to both, and if the higher lands produce the finest corn, the low grounds on the banks of the rivers have the most nutritious pastures; but both these branches of rural economy are in a very backward state. Bad harvests sometimes occur, chiefly in consequence of careless cultivation, or of unfavourable seasons, but a general failure of the crops is rare. Rye is the principal bread corn; wheat is grown only on the estates of the nobility. Barley and oats are raised everywhere, and buckwheat in the most sandy soils, where no other kind of grain will grow; it is used in the form of groats, mixed with flour, and the poultry, especially turkeys, are fed with it. Hemp and flax are staple articles and cultivated for exportation. Peas and beans are cultivated almost exclusively on the lands of the nobles. Almost all the landowners have kitchen-gardens and orchards; in the latter all kinds of fruit are cultivated, chiefly however apples and cherries. Hops and poppies are grown in the gardens. The fescue grass (*festuca fluitans*, Linn.), here called manna, is found in the fields and in some parts gathered.* In the forests and low grounds there are prodigious quantities of bilberries. The forests are a great source of wealth to the province; in particular the banks of the Sodscha and the Druez, and the whole circle of Tscherikow, are covered with the finest firs, which are partly felled for the Black Sea fleet, and floated down the Dnieper. The crown forests are however of inconsiderable extent. The pastures are very good, and might maintain a much larger number of cattle than they now do. The horses are small; and the black cattle are not strong, but soon grow fat on good pasture. The wool of the sheep is coarse, but great pains have been taken of late years to improve it by the importation of a foreign breed. Deer and other large game are rather scarce; hares and feathered game of all kinds abound. The fisheries are productive; the Dnieper and Sodscha yield annually above 40,000 poods (a pood is 36 lbs.) of sturgeon and shad, the whole of which is consumed in the province. The chief mineral is bog-iron, which might be a source of great profit, but is not turned to much account. The manufactories are inconsiderable, and a few years ago were confined to some tanneries, glass and iron works, and paper-mills. Of late years, that is, since 1820, great improvement has been made. The trade consists in the exportation of corn, flour, flax, hemp, linseed, timber, cattle, honey, wax, wool, tallow, hides, and some manufactures. The principal trading towns are Mohilew and Mstislawl. The inhabitants, now probably amounting to nearly a million, are for the most part Russniaks or Little Russians, who speak a dialect which is a mixture of Polish and Russian; Great Russians; some Poles, to which nation most of the nobles belong, and Jews, who are pretty numerous. The religion of the majority of the inhabitants is that of the Russian (or not-united) Greek church. Some are of the United Greek church; but Brömsen says (in 1819) that most of them had returned to the not-united Greek church. The Greek churches have an archbishop, to whose diocese Vitepsk also belongs, and who resides at Mohilew; the Roman Catholics are also numerous, and have an archbishop resident at Mohilew. There are a few Lutherans; the Jews are very numerous; they have synagogues and schools in almost all the towns, and have got into their hands almost all the retail business, the sale of brandy, and some of the trades or professions. Gipsies are numerous.

MOHILEW, the capital of the province, is a considerable town, situated in 53° 50′ N. lat. and 30° 25′ E. long., in a pleasant well-cultivated country on the left bank of the Dnieper. It is the residence of the civil and military governors, and of the Greek and the Roman Catholic archbishops. The latter is the superior of all the Roman Catholics in Russia and Poland. The city is surrounded with a decayed rampart, and is divided into four quarters. Many of the streets are broad and paved, and in the centre of the city there is a large square, or rather octagon, surrounded with stone buildings. The public edifices are, an old castle on a hill which commands the town; sixteen Greek churches, of which that of St. Joseph is very magnificent; the two archbishops' palaces; two Greek and two Roman Catholic convents; two synagogues; a Lutheran chapel; and a stone bazaar, two stories high. There are a seminary for Greek priests, a gymnasium, seven schools, six poorhouses, and an infirmary. The tanneries are of considerable importance, and there are some manufactories of iron articles. The adjacent country being very fertile, the inhabitants have extensive gardens, which are a source of great profit. They have very considerable trade, which was formerly chiefly directed to Riga, Königsberg, Memel, and Danzig, but of late years has turned to Odessa. The population has much increased of late years: Stein states it at 12,500, Hassel at 16,000, and Cannabich at 21,800.

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* This species of grass grows in marshes, ditches, on the banks of rivers, and in low damp meadows, and in general grows highest in proportion as it is most under water. The seed is extremely nutritious, and is known by the name of manna groats. In Poland it is even preferred to rice, and so well prepared, that it is exported to Sweden, Prussia, Denmark, Norway, &c. The water-fowl and trout are very fond of the seed. The grass is good nourishment for all kinds of cattle, especially black cattle and sheep.

The other principal towns are, Mstislawl, 5000 inhabitants; Dubrowna, 4000 inhabitants; Skiow, a fortified place, 2500 inhabitants; Orcha, 4000 inhabitants; and Homel, in the lordship of the same name belonging to Count Romanzow, in which there are 90 villages and 20,000 inhabitants. There is in the town a Lancasterian school for 400 peasant children, 200 of whom are boarded and instructed in handicrafts, agriculture, and gardening.

(Schubert, *Das Russische Reich*, 1835; Stein, *Geog. Lexicon;* Hörschelmann, *Geog.* 1833; Hassel, Cannabich, 1836.)

MOHILLA. [Comoro Islands.]

MOHSITE, crystallized titaniate of iron. The primary form is a rhomboid. The crystals occur attached and macled. Cleavage not observable. Fracture conchoidal. Hardness sufficient to scratch glass readily. Brittle. Colour black; streak the same. Lustre metallic. Opaque. Does not obey the magnet. Found in Dauphiny.

MOIDORE. [Money.]

MOISSAC, a town in the south of France, capital of an arrondissement in the department of Tarn et Garonne, in 44° 7′ N. lat. and 1° 5′ E. long., 426 miles from Paris by the road through Orléans, Châteauroux, Limoges, Cahors, and Montauban.

This town is first noticed in the fifth century, when it was taken from the Romans by the Goths, from whom it was shortly after taken by the Franks. It was plundered by the Northmen, and subsequently came into possession of the Albigenses, from whom it was taken by Simon de Montfort. The wars of the English and the religious contests of the sixteenth century completed its ruin. The remains of the antient walls show how far its former extent exceeded its present size.

The town stands on the north bank of the Tarn (which is navigable), about three or four miles above its junction with the Garonne. The houses are tolerably well built, and among the most striking objects are the public fountain and the bridge over the Tarn. The country round the town is very delightful, and produces abundance of corn and wine and of delicious fruits. The population in 1831 was 5950 for the town, or 10,165 for the whole commune; in 1836 it was 10,618 for the commune. There are many mills for grinding flour for exportation to the colonies, and considerable trade is carried on in corn, oil, saffron, wine, and wool. There are eight fairs in the year.

The arrondissement has an area of 340 square miles, and comprehends 49 communes. It is subdivided into six cantons or districts, each under a justice of the peace. The population in 1831 was 62,489; in 1836 it was 62,735.

MOIVRE, DE. [De Moivre.]

MOLA. There are two artists of this name, who were contemporaries, and both studied for a time under Albano. Of these the more celebrated one, Pierfrancesco, was born at Coldre, in the Milanese territory, in 1621, and after receiving his first instructions in art from his father, who was both a painter and architect, he studied successively under Giuseppino, Albano, and Guercino. He attained to great excellence both in design and colouring, and though his chief merit lay in landscape, to which he chiefly applied himself, he also painted history occasionally, and with much ability. His talents obtained for him the patronage of princes and nobles, and among others of Christina of Sweden. His reputation at length caused him to be invited to France, and he was making preparations for proceeding thither at the time of his death, which happened at Rome in 1666. According to other notices of him, the dates both of his birth and death vary from those above given, those assigned being respectively 1609 and 1665; besides which, he is stated to have been born at Lugano.

Gianbattista Mola, who was not at all related to the preceding, but is said to have been of French extraction, was born in 1620. He studied first at Paris under Vouet, and afterwards under Albano, at Bologna. Like his namesake Pierfrancesco, Gianbattista was an excellent landscape painter, and well skilled also in perspective, though in other respects his inferior. He died in 1661.

MOLASSES, the uncrystallized syrup produced in the manufacture of sugar, and which is suffered to drain from the casks into a cistern, in what is called the curing-house, before the sugar is sent away from the plantation. To facilitate the draining, the casks are ranged upright on a frame-work of open joists over the cistern; several holes of about an inch diameter are bored in the bottoms of the casks; and before the newly made sugar is put into the hogsheads, or, as it is called, *potted*, an equal number of plantain-stalks, or sugar-canes from which the juice has been expressed, are placed in each cask, so that the ends protrude through the holes. These stalks or canes must be of an equal length with the cask, and they thus form so many channels or conduits for the passing away of the greater part of the molasses: some will always remain in the hogsheads, and, draining away by slow degrees, will in a great measure be lost during the voyage; but even after the arrival of the sugar in Europe a proportion of molasses, which is less or more according to the good or bad quality of the sugar, remains in the mass.

Nearly all the molasses made in the English sugar colonies was formerly converted into rum by fermentation and distillation on the estates; but the price of that spirit having declined, and improvements having been made in the processes of refining sugar in Europe, whereby a large proportion of West India molasses has been rendered crystallizable, a considerable and continually increasing quantity of molasses is shipped for that purpose. The syrups, which ultimately remain in a liquid form after passing through the processes of a refining-house, whether the same are the produce of Muscovado sugar or of molasses, are sometimes called molasses, but are more generally known as treacle.

The quantity of West India molasses imported and taken for consumption, in each year from 1820 to 1838, has been as follows:—

Years.	Imported. Cwt.	Consumed. Cwt.	Years.	Imported. Cwt.	Consumed. Cwt.
1820	39,991	6,314	1880	250,648	337,588
1821	58,185	57,141	1831	332,876	348,626
1822	76,298	73,367	1832	565,685	566,689
1823	189,968	161,248	1833	717,934	643,886
1824	230,088	239,540	1834	678,382	507,980
1825	355,592	332,454	1835	526,321	622,479
1826	290,504	279,749	1836	528,306	657,082
1827	392,444	412,665	1837	582,293	592,575
1828	510,708	381,761	1838	649,820	527,089
1829	394,432	396,142			

The consumption duty charged on molasses is nine shillings per cwt., or three-eighths of the rate charged on crystalline sugar.

MOLD. [Flintshire.]

MOLDA′VIA, a province of northern Turkey, situated between 45° 25′ and 48° 13′ N. lat., and 26° 10′ and 28° 30′ E. long. It is bounded on the east by the Russian province of Bessarabia, which constituted a part of the principality previously to the peace of 1812, and from which it is separated by the river Pruth; on the south by the Danube and Wallachia, on the west by Transylvania, and on the north by the Buckowine and a part of Gallicia or Austrian Poland. Its greatest length from south to north is about 200 miles, its breadth about 120, and its area about 17,000 square miles. The Danube, which touches only a small part of Moldavia, receives within the limits of the principality the rivers Sireth and Pruth. Branches of the Carpathians extend along the western frontier of Moldavia, and separate the principality from Transylvania. These mountains send out offsets into the interior of Moldavia, which decline in height as they advance to the banks of the Sireth and Pruth, where they terminate in hills covered with vineyards. Moldavia is divided into Upper Moldavia, or Tzara de Suss, which is subdivided into four districts, and Lower Moldavia, or Tzara de Shoss, which is subdivided into nine districts. The climate of Moldavia is much colder in winter than might be expected in a latitude corresponding with the north of Italy: the rivers are generally frozen, and the ground covered with snow for a considerable time. The summers are exceedingly hot. The country is subject to earthquakes, but they are not very violent: the most remarkable was that which occurred on the night of the 3rd of February, 1821. The country possesses much mineral wealth, of which however little advantage has been taken, in consequence of the unsettled state in which the country has been for several centuries. There is an abundance of rock-salt in the vicinity of the Carpathian mountains; there are also some mineral sources; and asphaltum of two kinds, red and black, is found in several parts; a great quantity of saltpetre is also produced, chiefly in the northern part of the principality. The sand of the river Bistritza contains gold, but not in a large quantity. The soil is generally exceedingly fertile, and, notwithstanding a very inferior state of agriculture, produces every kind of grain and vegetable in the greatest abundance. A great number of horses, cattle, and sheep are fed on the rich meadows which Moldavia contains, and the vast forests produce every kind of timber.

Jassy, or *Yassy*, the capital of Moldavia, is situated on the Bachlei, a small muddy stream which flows into the Pruth. It is in 47° 9′ N. lat. and 27° 25′ E. long. It is the residence of the voyvode, and of the principal authorities of the provinces, and is the seat of a Greek archbishop. The palace of the voyvode is on an eminence on the southern side of the town, and is surrounded by an old slight wall, which is a sufficient defence against bands of robbers, but would be small protection from an enemy; this is however nearly all that remains of the former strong fortifications of the town, which were destroyed in 1788. It has been frequently taken by the Russians, but has always been restored on the cessation of hostilities.

Yassi occupies a large space of ground, most of the houses being separated from each other by courts and gardens and plantations of trees. In 1723 it was almost entirely destroyed by fire; in 1772 it was desolated by the plague; in 1822 it was burnt by the Janissaries, when 4700 houses were destroyed; and in 1827 two terrible conflagrations reduced almost the whole town to a ruin. It now presents a melancholy aspect; instead of well-built houses, it consists chiefly of wooden buildings one story high, with wide spaces vacant or filled with ruins. The principal street, which is very broad, is furnished with poor-looking shops on each side; the other streets are narrow and crooked; most of them are laid with rough planks of oak; in the rainy season they are covered with wet mud, and in summer with a thick layer of black dust, which the slightest wind raises in clouds. The present population of Yassy is probably not more than from 15,000 to 20,000. Before the great fires in 1827 its population was 40,000, and it had 43 churches and chapels, 26 convents, one Catholic and one Lutheran church, a hospital, a bazaar, three public baths, and a Wallachian printing-office, the only one in the province. There are not many manufactures, but a considerable commerce is carried on, especially during the fairs which are held there.

Galacz, or *Galatz*, in 45° 23′ N. lat. and 28° 5′ E. long., is situated on the Danube, about three miles east of the junction of the Sireth and ten miles west of the junction of the Pruth with that river, and about eight miles north from Brailoff, which is the chief port of Wallachia. Galatz is the only port of Moldavia, so that it is the place of export and import for the whole province, and is the chief medium of the commerce carried on between Germany and Constantinople. By a law of 1834 the privilege of a free port has been granted to Galatz; and a steam communication having recently been established between Vienna and Constantinople, it is likely to become a general mart for Austrian merchandise, which will be shipped thence to the Levant and the ports of the Black Sea. Galatz is for the most part better built than the other towns of Moldavia, having numerous houses of stone, several Greek churches, a convent, an hospital, and a large bazaar always well filled with merchandise, together with a great number of warehouses for grain and other produce; the streets however are narrow and dirty. Vessels of 300 tons burthen can come close up to the town. In 1833, 193 vessels arrived at Galatz, of which 87 were Russian and 31 Ionian; the rest were Austrian, French, Sardinian, Tuscan, Neapolitan, and Servian. The population is about 12,000.

Fokzany lies on both sides of the Milkov, a small stream which forms the boundary between Moldavia and Wallachia, in 45° 41′ N. lat. and 27° 10′ E. long. It was formerly a large commercial town, but was almost destroyed in 1789, during the war between the Russians and the Turks. It was partly rebuilt afterwards, but was set on fire in 1822. It has still a tolerable trade in hardware. It contains several Greek churches and a convent. The population is about 2000. It is about 45 miles west from Galatz.

The population of Moldavia, according to the census of 1833, amounted to 450,000. It consists chiefly of Wallachians, Jews, Armenians, and gipsies.

The history of Moldavia is closely connected with that of Wallachia, from which it is separated only by a political boundary, having been originally the same country.

Moldavia has been subjected to great devastations by the several hordes which invaded the Byzantine empire, and a great number of its inhabitants, descended from the Roman settlers, retired to the west of the Carpathian mountains, in the present country of Hungary. About the middle of the thirteenth century a colony of the same inhabitants re-occupied the country, under a chieftain called Bogdan, whence it is called by the Turks and the natives Bogdania; whilst the name of Moldavia is derived from a river bearing a similar appellation. There must have been in the above-mentioned colony an admixture of Slavonians, as the name of the chieftain is Slavonic, and signifies Deodatus; and indeed the language of the inhabitants, who call themselves Romans, 'Roomoon,' consists of Latin with an admixture of Slavonic. Divine service is performed in the Slavonic tongue.

From that time the rulers of Moldavia, called *voyvodes* (a Slavonic term which signifies military leader), were often subject to the kings of Hungary, but also frequently asserted their independence, until they submitted to the protection of the Turks in 1536, under the voyvode Roydan, who acted according to the advice of his father Stephen in order to ensure by a voluntary submission privileges which it would have been impossible to obtain if the country had passed under the dominion of the Ottomans by conquest, an event which seemed unavoidable. The sultan granted to Moldavia the same privileges that he had given to Wallachia; the substance of which was, protection to the principality, for which an annual tribute was paid. The voyvodes were to be elected by the principal clergy and the boyars, or nobles, and their election was to be confirmed by the sultan, who was not to interfere in the local administration of the principality, neither were Turks permitted to settle there. The voyvodes had the power of life and death over their own subjects, and even the right to make peace and war, without being accountable to the Sublime Porte. No inhabitant of Moldavia was to be summoned by the Turkish government to Constantinople or any part of the Turkish dominions on any pretext whatever.

These conditions were maintained in the main points. Moldavia was however exposed to several wars which were carried on between Turkey and Poland, as the latter country had an old claim on the principality, which was finally abandoned by the peace of 1621.

In 1711 the Turks abolished the privilege of electing the voyvodes, and nominated to that dignity the Greek princes of the Fanar. [FANARIOTES.] The princes or voyvodes of Moldavia, called also *hospodars*, governed with the assistance of a council, called a divan, composed of twelve members appointed by the prince every year, with the exception of the metropolitan, whose ecclesiastical dignity entitles him to a permanent seat. The laws were administered according to a code framed after that of Justinian. There were a great many offices, several of which were copied from those of the Greek empire. The national army was composed of about 6000 men.

The tribute paid to the Porte was not so oppressive as the monopoly of trade: several articles, as wheat, timber, and cattle, were exported to Constantinople, and bought from the inhabitants at a fixed price which amounted to about one-fourth of the current market-price. As the hospodars were obliged to give considerable presents to the Turkish officers, and as they also sought to enrich themselves, the country was ground down by a most oppressive taxation.

Russia has long wished to possess this principality. With this view, in 1710, Peter the Great made a campaign, which turned out unsuccessful, and he only escaped destruction by the prudence of his wife Catherine, who bribed the grand-vizier in order to obtain a suspension of arms. Moldavia was occupied by the Russians in 1739, under field-marshal Munnich, but was evacuated by the peace of Belgrade. By the tenth article of the treaty of peace concluded between Turkey and Russia, at Koochook Kaynardgee, in 1774, Russia stipulated for several advantages to Moldavia and Wallachia, and to herself for permission to intercede with the Porte in favour of the above-mentioned principalities. The fourth article of the treaty of Yassy, Jan

9, 1792, confirms all the privileges of the two principalities, and exempts the inhabitants from the payment of tribute for two years. By the treaty of Bucharest, 1812, the eastern part of Moldavia, situated on the left bank of the Pruth, was ceded to Russia, the rights and privileges of the two principalities were confirmed, and a release from tribute granted for two years.

The events of the Greek revolution had a fatal influence on Moldavia, which was entered by Prince Ipsilanti at the head of a troop of the Heterists, or Greek patriots; he was defeated and obliged to escape to the Austrian territory, but the Turkish troops, which occupied both the principalities, committed great excesses. This led to many demands on the part of Russia, which were temporarily adjusted by the treaty of Akerman in 1826. At the peace of Adrianople, which followed the war of 1828 and 1829, the prospects of the principalities were much improved by the separate article to that treaty, concluded on the 2nd September, 1829, by which it was stipulated 'that the hospodars should, instead of seven years, as had hitherto been the case, be invested with their dignity for life, except in cases of voluntary abdication or expulsion for crimes.' The same hospodars are to administer the internal government of their provinces, with the assistance of their divan, according to their own pleasure, but without any infraction of the rights guaranteed to the two countries by treaties or hattisherifs (ordinances of the sultan), nor shall their administration be disturbed by any command tending to the violation of those rights. All the fortified points and cities occupied by the Turks on the left bank of the Danube were to be abandoned by them. No Turks were permitted to settle in the principalities, and those who possessed real property there were obliged to sell it in the course of eighteen months. The principalities are relieved from all those contributions of corn, provisions, cattle, and timber, which they were formerly bound to furnish for the supply of Constantinople and the victualling of the fortresses on the Danube. In no case are labourers to be demanded for any forced service. In order to indemnify the Turkish treasury for the losses which may be sustained by the renunciation of those rights, the principalities are bound, independently of the annual tribute formerly paid, to pay yearly a pecuniary compensation, the amount to be hereafter determined. Moreover upon every fresh nomination of the hospodar, in consequence of death, resignation, or deposition, the principality where that event occurs shall be bound to pay to the Sublime Porte a sum equal to the annual tribute of the province. With the exception of these sums, no tribute or present of any kind shall under any pretext whatever be demanded from the hospodars. All this is certainly a great improvement, as the resources of the country were entirely crippled by the vexatious and arbitrary mode in which the products of every kind were appropriated by the Turks. This article, which may be considered as the constitution of the principalities, was proclaimed and put into execution in 1832. (For further particulars see WALLACHIA.)

MOLE. [TALPIDÆ.]

MOLECULARITY. [THEORIES OF MOLECULARITY.]

MOLIE'RE was the name assumed by Jean Baptiste Poquelin, who was born at Paris, on the 15th of January, 1622. His father was a *tapissier*, and also held the office of 'valet-de-chambre-tapissier' to Louis XIII. Young Poquelin was intended for the same trade, and remained in his father's shop till he was fourteen years of age, having been merely taught to read and write. He had a grandfather who was very fond of him, and often took him to the theatre at the Hôtel de Bourgogne: he even expressed a wish that his grandson might become a celebrated actor, and his words made such an impression on the youth, that he gradually became disgusted with his trade. As he returned home from the play one day in a state of melancholy, his father asked the cause, and learned that he desired a superior education. His grandfather joined in his entreaties, and he was sent to the Collège de Clermont, which was under the care of the Jesuits, where he remained till the end of the year 1641.

When his studies both in literature and philosophy were ended, he was obliged to fill his father's office about the king's person, and he attended Louis XIII. in the expedition from which resulted the taking of Perpignan from the Spaniards. After this there is a gap in his biography, and we find him in 1645 performing with a company of citizens in the Faubourg St. Germain, who at first acted for pleasure, but afterwards attempted to combine profit with amusement. At this period he took the name of Moliere. The company was unsuccessful.

Here comes another gap of eight years, and we find him in 1653 playing at Languedoc, whither he had been invited, at the head of a company, by the Prince de Conti, who appreciated his histrionic talents. In this company was Madeleine Béjart, whose daughter subsequently became the wife of Molière. He afterwards went with his company to Lyon, where, in 1653, he produced his first play, 'L'Etourdi,' with such success, that two other companies joined him. This piece is amusing from the variety of situations, which however have the disadvantage of resembling each other too closely. The portrait of the Etourdi shows the beginning of Molière's tendency to sketch character, though character is here subservient to incident. In 1654, having returned to Languedoc, he produced his second piece of 'Le Dépit Amoureux,' which was likewise successful. The Prince de Conti was so pleased with his productions as to make him director of the entertainments which he gave in the province, and even to offer to him the place of secretary. Molière however refused this offer.

After remaining four or five years in Languedoc, the company quitted that province for Grenoble, where they played during the carnival. They then went to Rouen, and finally to Paris, where Molière was introduced to the king, Louis XIV., before whom his company played the tragedy of 'Nicomède,' in 1658, at a theatre erected in the guard-hall of the old Louvre. Molière felt that in tragedy his company was inferior to that of the Hôtel de Bourgogne, and therefore, when the play was ended, he came forward and observed, that they were but faint copies of excellent originals, and hoped that the king would allow them to play one of the little comic pieces which had been successful in the provinces. The king granted the request, and the piece, which was one of those early works of Molière which have not been collected, was played with success. The king wished the company to remain at Paris, gave them the title of 'Troupe de Monsieur,' and allowed them to play, alternately with the Italian comedians, at the theatre called Le Petit Bourbon. In 1660 they removed to the Palais Royal.

In 1658 Molière's early pieces of 'L'Etourdi' and 'Le Dépit Amoureux,' which had been acted with such success in the provinces, were played with great applause at Paris, and in 1659 was produced his celebrated 'Précieuses Ridicules,' which was so successful, that the prices of admission were trebled on the second day of performance, and the piece notwithstanding had a four months' run. With this comedy the fame of Molière may be said to begin; the modern reader may find in it only an ordinary farce, but the Parisian public perceived that the author was a bold and strong portrayer of prevailing characters and manners It is written in prose, and the design is to ridicule those ladies, called *Précieuses*, who indulged in an affected way of talking peculiar to the time. In 1660 Molière produced 'Le Cocu Imaginaire' with great success, though it was not so popular as its predecessors. It is ingeniously constructed, but it is not so much an exhibition of character as the 'Précieuses.' 'Don Garcie de Navarre,' brought out by Molière in 1661, was unsuccessful, and injured his reputation. It is called an heroic comedy, and is a weak, heavy production, scarcely readable. His fame was again raised by the 'Ecole des Maris,' which was produced in the same year with great success. The characters of the two principal personages in this piece resemble those of the brothers in the 'Adelphi' of Terence. An excellent piece followed in the same year, called 'Les Fâcheux,' which perhaps exhibits Molière's peculiar talent more than any of his plays. That talent consisted in the portraying of character; and in proportion as there is more or less of character to draw, does Molière become strong or weak. The object of 'Les Fâcheux' was to exhibit every species of disagreeable person in one short drama, and though the plot is nothing, the different characters of the 'bores' of the period, such as a man who talks of nothing but hunting, a composer, a card-player, a duellist, &c., pass in quick succession, and present a most happy phantasmagoric picture of the times. In 1662 appeared 'L'Ecole des Femmes,' which had no very great success in Paris, although the principal character, Agnes, is the original from which Wycherly has taken his Mrs. Pinchwife, in the 'Country Wife,' subsequently altered by Garrick into the 'Country Girl.' Molière was so indignant at the slight success of this piece, that he wrote another, called 'La Critique de l'Ecole des Femmes,' in which he held up its opponents to public derision. One of the characters, a ridiculous marquis, is supposed to represent the Duc de Feuillade. This 'Critique,' which was played in 1663, was very successful. A little piece entitled 'L'Impromptu de Versailles' was produced the same year, which consists merely of a satirical conversation among the comedians. It is preceded by a 'Remerciement,' or poem of thanks to the king, who had, in the year of its production, granted Molière a pension of a thousand livres. He was greatly esteemed at court, where he held the office which had been filled by his father; and the king is said on one occasion to have sat with him at the same table to shame some of his officers who treated him with haughty coolness. Molière's happiness would have been greater had he not about this time married Armande Béjart, then about 17, whose lively and coquettish disposition kept him in all the agonies of jealousy. To relieve himself from domestic disquietude, he pursued his labours with additional ardour, and wrote 'Le Mariage Forcé,' and 'La Princesse d'Elide,' which were produced in 1664, and Le Féstin de Pierre,' produced in 1665. Of these the first is a mere farce, which exhibits however Molière's aptitude to sketch character in the two little parts of the peripatetic and sceptical philosophers; the second is one of those heavy mixtures of serious comedy and ballet which, however effective they might have been with splendid decorations, do not now repay a reader the trouble of perusing them; and the third is an ill-constructed piece, with a spark of humour here and there, chiefly remarkable for being one of the numerous versions of the story of 'Don Juan,' which is the subject of Mozart's opera, and for certain censures bestowed upon it by the Sieur de Rochemont, who considered it impious. In 1666 the king engaged Molière's company for his own service, granting them a pension of 7000 livres, and they took the title of the 'Troupe du Roi.' A little piece, called 'L'Amour Médecin,' followed up the attack on the medical profession, which Molière had incidentally commenced in the 'Féstin de Pierre.'

His excellent comedy 'Le Misanthrope' was produced in 1666, and is reckoned among his chef-d'œuvres. It abounds in character and correct views of society. In the same year appeared 'Le Médecin malgré lui,' a humorous attack on the physicians, well known to the English by Fielding's version, entitled 'The Mock Doctor.' With respect to the date of the celebrated comedy 'Le Tartuffe,' there is a little difficulty. In collections of Molière's works it is placed at some distance after the 'Misanthrope,' and is dated 1667; but some lines in the 'Misanthrope' appear to allude to a book which the bigots of the day, offended by the 'Tartuffe,' published as Molière's, in order to injure his reputation. The discrepancy has been accounted for by stating that the first three acts of 'Le Tartuffe' were played in 1664, but that the entire piece was not acted till 1677. However this may be, on its very first production the more bigoted part of the community were enraged; and such earnest applications were made to the king, that he ordered the piece to be withdrawn. The representations of Molière induced the king to revoke this order, but Molière did not consider it prudent to perform it at once. About the same period he produced three insignificant little pieces, 'Melicerte' (a mere fragment), 'Pastorale Comique,' and 'Le Sicilien;' and in 1668 appeared his 'Amphitryon,' a clever version of the 'Amphitryon' of Plautus, altered by the addition of a wife to Sosia, and the substitution of a prophecy of the birth of Hercules for his actual birth. The admirable comedy of 'L'Avare' was brought out in the same year,[*] but played at first with little success, owing, it is said, to its having been written in prose, which the audience did not think calculated for pieces of five acts. It is one of Molière's very best pieces; nothing can be better than the character of the miser (who is supposed to be imitated from the Euclio of Plautus's 'Aulularia'), and we cannot refrain from admiration at the boundless ingenuity displayed by the author in placing him in every possible situation adapted to draw him forth. If 'Les Fâcheux' is the prototype of those pieces where the greatest variety of characters is introduced in succession, 'L'Avare' is, on the other hand, the prototype of those which are chiefly occupied in the exhibition of one character in all its phases. The piece was rendered by Fielding as 'The Miser.' Having produced in the same year a successful piece, 'George Dandin, which is a droll little farce, Molière ventured on a second representation of 'Le Tartuffe,' to the great indignation of the bigots. The theatre was crowded to excess, and the piece was just about to begin, when a prohibitory order arrived from parties who held authority during the absence of the king, who was in Flanders. The actors, not having the king's permission in writing, returned the spectators their money, and extinguished the lights. Molière instantly despatched two of his actors to the king, to solicit his protection; and on their return with an order in their favour, the piece was played without interruption. Of the merit of this celebrated comedy, so well known to the English public by the imitation called 'The Hypocrite,' there is no doubt; but whether religious imposture is or is not a fit subject for ridicule on the stage, is a question we leave open to the opinion and feelings of our readers. 'Monsieur de Porceaugnac,' a farce representing the awkwardness of a pompous country-gentleman in a large metropolis, and containing an incidental satire against the physicians, was represented in 1669 with great success, and the famous 'Bourgeois Gentilhomme,' brought out in the following year, was equally fortunate. This, although in five acts, is a farce of the most extravagant kind, and being, as it is called, a comédie-ballet, the author has allowed it at the close to run almost into a pantomime. In construction it is exceedingly loose, and this is the case with all Molière's pieces that go by the name of 'comédie-ballet;' so easy is it to avoid difficult unravellings by the introduction of dances. Several of the pieces named above belong to this class, although they have not been so specified. In spite of its extravagance the 'Bourgeois Gentilhomme' is a favourite piece, and allusions are perhaps more frequently made to it than to any other play of Molière's. The pompous ignorance of the principal character and the pretensions of his several fashionable masters are extremely laughable; but as far as construction goes, it is a mere succession of farcical incidents.

In 1672 Molière produced his 'Femmes Savantes,' one of his best comedies, in which the learned ladies and witlings of the time are admirably satirised. Its success however was at first not very great, the subject being rather too dry and recondite for the public at large. Before the production of this piece he had assisted in composing a 'tragédie-ballet' on the subject of Cupid and Psyche, and had brought out two inferior pieces, 'La Comtesse d'Escarbagnus,' and 'Les Fourberies de Scapin.'

In the year 1672 Molière became reconciled to his wife, with whom he had long been at variance, and at the same time quitted a milk diet, to which he had restricted himself on account of a complaint in the chest, for animal food. This increased his complaint, but he worked hard at the composition of 'Le Malade Imaginaire,' which was produced in 1673, and is one of his most entertaining pieces, and his severest attack on the physicians. On the third day of the representation of this comedy Molière felt the pain in his chest much increased, and his wife, and Baron the actor, endeavoured to dissuade him from playing. Their efforts were vain, and while acting the part of 'Argan,' a convulsion seized him, which he endeavoured to conceal by a laugh. As soon as the piece was over he entered Baron's box, who remarked that he appeared worse than ordinary. His hands were cold, and Baron accompanied him home. Soon after his arrival he began to spit blood, which at length flowed from his mouth in such abundance as to suffocate him. The date of his death is the 17th of February, 1673. The rites of sepulture were at first refused to Molière, but the king prevailed on the archbishop of Paris to allow them, on condition that the ceremony should be celebrated without any pomp. He was accordingly buried by two priests, who accompanied the body without chanting, in the cemetery behind the chapel of St. Joseph, Rue Montmartre. All his friends attended, each bearing a flambeau; and his widow exclaimed, 'What! will they refuse burial to a man who deserves an altar!' Even on the morning of his interment she had been obliged to appease the rage of a bigoted mob which had assembled at her door by flinging out a hundred pistoles. In this country and in the present age it is scarcely possible to read the treatment of Molière's remains without indignation, especially when we find the writers of his life speaking in the highest terms of his goodness of heart and integrity.

Our opinion of Molière has been given in the remarks on particular pieces, and we need only briefly repeat that his strength lies in the delineation of character. His plots are often excessively inartificial and improbable, but in character he is almost unrivalled. He also enters deeply into the humour of a comic situation, though here it is rather difficult to measure his merits by a right standard, as many of his most striking situations are notoriously borrowed from the Italian comedies. On character therefore alone rest his unequivocal pretensions to fame, for even if the idea be borrowed from other writers, still the minute portraying of an individual character, with all its propensities and bearings, requires a master spirit, and if the design be borrowed, the execution must still be original. He has naturally often run into the failing, too common with those who make distinctive character their principal object, of degenerating into caricature; but still, where a personage is made the symbol of a single passion or whim, the omission of the qualifying tints of real life necessarily throws out the single characteristic so prominently, that caricature almost necessarily arises. The personages of Theophrastus and La Bruyère become caricatures, from their representing certain qualities taken abstractedly, instead of a mixture such as is observable in real life.

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[*] According to Grimarest, it had been already played before this, and without success, and the production mentioned above was its second appearance; but this account does not accord with the register of the 'Comédie Française.'

Besides his dramatic works, Molière translated nearly the whole of Lucretius, but all his translation has been lost, except a few lines, which are introduced in the 'Misanthrope.' His works have been so frequently published, and can be so easily procured in every shape and size, that it is almost useless to point out any particular edition. A very good one was however published at Paris in 1838, in which the actors' names are printed after the dramatis personæ, and which thus shows that Molière always played himself the principal comic parts, and also forms a very agreeable illustration to the dramatic history of the times. In this respect it is superior to the more splendid edition recently published with wood-cuts by Johannot.

MOLI'NA, LOUIS, born at Cuença in Castile, entered the order of Jesuits in 1553. He studied at Coimbra, became a learned divine, and taught theology for twenty years in the college of Evora. He died at Madrid in the year 1600. He wrote commentaries upon Thomas Aquinas, and a treatise 'De Justitia et Jure;' but the work which has rendered his name famous as the head of a school of theology is his book 'De Concordia Gratiæ et Liberi Arbitrii,' printed at Lisbon in 1568, with an appendix to it, published after. In this work Molina undertook the task of reconciling the freewill of man with the foreknowledge of God and predestination. He observed that the early fathers who had preceded the heresy of Pelagius had defined predestination as being the foreknowledge of God from all eternity of the use which each individual would make of his freewill; but St. Augustine, who had to oppose the Pelagians, who granted too much to freewill, spoke of predestination in a more absolute and restricted sense. Molina says that man requires grace in order to do good, but that God never fails to grant this grace to those who ask it with fervour. He also asserts that man has it in his power to answer, or not, to the calling of grace.

The opinions of Molina, which were adopted, enlarged, and commented upon by the Jesuits, and strongly opposed by the Dominicans, gave rise to the long disputes concerning grace and freewill. The partisans of Molina were called Molinists, and their antagonists Thomists, from Thomas Aquinas, the favourite divine of the Dominican order. Already in Molina's lifetime his opinions were stigmatised as savouring of Pelagianism. After numerous disputations, Pope Paul V., in 1609, forbade both Jesuits and Dominicans from reviving the controversy. But soon after Jansenius, bishop of Ypres, wrote a book in which he discussed the question concerning grace after the manner of St. Augustine. His book was denounced by the Jesuits, and thus the dispute began afresh between the Molinists and the Jansenists. [JANSENISTS.] Pascal, in his second 'Lettre Provinciale,' gives an account of the state of the controversy in his time. He says that 'the Jesuits pretend that there is a sufficient grace imparted unto all men, and subordinate to their freewill, which can render it active or inactive, while the Jansenists maintain that the only sufficient grace is that which is efficacious, that is to say, which determines the will to act effectively. The Jesuits support the 'sufficient grace,' the Jansenists the 'efficacious grace.'

Molina must not be confounded with *Molinos* (*Michael*), a Spanish clergyman of the seventeenth century, who was the founder of the theory of piety and devotion called Quietism, of which Fénélon and Madame Guyon were distinguished supporters. [FENELON.]

MOLINISTS. [MOLINA.]

MOLLEBART. [BARREN LAND.]

MOLLUSCA. [MALACOLOGY; CONCHOLOGY; CONCHIFERA, and the various articles relating to this class of Invertebrate animals.]

MOLOSSI, a people of antient Epirus, who occupied the southern part of that country along the banks of the river Arachtus, and extended to the shores of the Ambracian Gulf. Their principal town was Ambracia. The Molossi, under their king Alexander, about 320 B.C., gained the preponderance over the rest of Epirus, which they maintained under his successors, of whom Pyrrhus was the most celebrated. [EPIRUS.] After the defeat of Perseus, Paulus Æmilius, the Roman general, ravaged the country of the Molossi, as well as the rest of Epirus, and destroyed their towns. The effects of the devastation which he caused were still visible in the time of Strabo.

MO'LOTHRUS, Mr. Swainson's name for a genus of birds placed by him in the subfamily *Icterinæ*, under the family *Sturnidæ*, with the following

Generic Character.—Bill very short, thick, finch-like, conic, entire; the culmen not flattened, but slightly arched from the base, which is rather elevated. Wings lengthened, pointed; the first quill longest. Tail slightly rounded. Middle toe as long as the tarsus; lateral toes of equal length; hind toe shorter than the tarsus. All the claws rather small, and fully curved.

Example, *Molothrus Pecoris*, Sw. (*Icterus Pecoris*, Temm.; *Emberiza Pecoris*, Wils.; *Fringilla Pecoris*, Gm.).

Description—*Male.*—Head and neck brown, inclining to black; the rest of the plumage shining black, glossy with violet reflections on the breast, and shot with greenish above; irides hazel; legs and claws black.

Female.—Sooty-brown above, pale beneath.

Young.—Like the female, with the breast spotted.

Habits, Food, Reproduction, &c.—This species, which is the *Cow-Pen Bird*, *Cow Blackbird*, *Cow Troopial*, and *Cow Bunting* of the American colonists, leads a wandering life, appearing in the middle and northern States of the Union at the end of March or the beginning of April. The winter is past in the Southern States and warmer parts of the Continent, where they are to be seen with the Red-wings (*Icterus Phœniceus*) and the common blackbirds (*Quiscalus versicolor*) in the ploughed fields, according to Nuttall. They attend on the cattle constantly, like many of the *Sturnidæ*, intent on picking up the insects which are disturbed by the quadrupeds or haunt their droppings, nor do they in the colder weather refuse to hunt for aquatic insects and small mollusks on the margins of ponds, where, according to the author last quoted, they may be seen in the winter season industriously turning over the leaves of water-plants to glean such as may there adhere. But though they, with their associates, are occasionally found in the rice and corn-fields, it seems that their depradations are not co-equal with those of their companions, for the food of the cow-bunting appears to consist chiefly of insects and such food as makes them for the most part independent of the farmer.

The most curious of its habits remains to be told; for this vagabond bird, like our cuckoo, never prepares a nest for itself, but drops its egg in another's nest. As a concomitant to this ordinance they do not pair, but polygamy prevails among the flock without exciting any great jealousy; though now and then there may be a battle, as is usual in such cases, in which the strongest generally prevails. The egg, which is nearly oval, varies in colour: sometimes the ground-colour is white tinged with green and sprinkled with spots of brown, and sometimes pure white with nearly black spots. It is a very little larger than that of the blue-bird. This supposititious egg is, it appears, always hatched before the legitimate ones. Were this not the course of nature, the species would probably perish; for the legitimate nestlings would suffocate the newly-hatched foundling, as the latter actually does suffocate the young of its foster-mother, when they afterwards come into existence.

The favourite nests appear to be those of the Red-eyed and White-eyed Flycatchers, and the Maryland Yellow-throat; those of the Blue-bird, the Indigo Bird, the Chipping Sparrow, the Song Sparrow, the Blue-eyed Yellow Warbler, the Blue-grey Flycatcher, the Golden-crowned

Thrush, and Wilson's Thrush, are however also selected as places of deposit. From the various and interesting accounts of this curious phenomenon we select that of Nuttall, whose personal observations we proceed to lay before the reader. 'When the female is disposed to lay, she appears restless and dejected, and separates from the unregarding flock. Stealing through woods and thickets, she pries into the bushes and brambles for the nest that suits her, into which she darts in the absence of its owner, and in a few minutes is seen to rise on the wing, cheerful and relieved from the anxiety that oppressed her, and proceeds back to the flock she had so reluctantly forsaken. If the egg be deposited in the nest alone, it is uniformly forsaken; but if the nursing parent have any of her own, she immediately begins to sit. The Red-eyed Flycatcher, in whose beautiful basket-like nests I have observed these eggs, proves a very affectionate and assiduous nurse to the uncouth foundling. In one of these, I found an egg of each bird, and the hen already sitting. I took her own egg and left the strange one; she soon returned, and, as if sensible of what had happened, looked with steadfast attention and shifted the egg about, then sat upon it, but soon moved off, again renewed her observation, and it was a considerable time before she seemed willing to take her seat; but at length I left her on the nest. Two or three days after, I found that she had relinquished her attention to the strange egg, and forsaken the premises. Another of these birds however forsook the nest on taking out the Cow-bird's egg, although she had still two of her own left. The only example perhaps to the contrary of deserting the nest when solely occupied by the stray egg, is in the Blue-bird [BLUE-BIRD], who, attached strongly to the breeding-places, in which it often continues for several years, has been known to lay, though with apparent reluctance, after the deposition of the Cow-bird's egg. My friend Mr. C. Pickering found two nests of the Blue-eyed Yellow Warbler, in which had been deposited an egg of a Cow-bird previously to any of their own; and unable to eject it, they had buried it in the bottom of the nest, and built over it an additional story! I also saw, in the summer of 1830, a similar circumstance with the same bird, in which the Cow-bird's egg, though incarcerated, was still visible on the upper edge, but could never have been hatched. At times, I think it probable that they lay in the nests of larger birds, who throw out the egg, or that they drop their eggs on the ground without obtaining a deposit, as I have found an egg of this kind thus exposed and broken. I have also remarked sometimes two of these eggs in the same nest, but in this case one of them commonly proves abortive.' The same author in 1831 saw a hen Red-eyed Flycatcher sitting on two eggs and one of the Cow-bird, and he adds that this species, *Vireo olivaceus*, and (more lately) *Vireosylva olivacea* of Bonaparte, *Muscicapa olivacea*, Linn., appears to be its most usual nurse. He has known this *Vireo* begin her incubation with only an egg of each kind, whilst in other nests he has observed as many as three belonging to the *Vireo*, as well as that of the intruder; and he suggests that, from the largeness of the egg, the nest probably immediately feels full to the incubating bird, so as to induce her to sit directly, when the larger egg, being brought nearer to the body of the nurse than her own, is first hatched, generally, as he believes on the 12th or 13th day. The legitimate eggs are hatched about a day later, are often stifled by the superior size of the stranger, which is affectionately nursed by the poor dupe of a dam, and when the young are dead, are conveyed to a distance by the parent and dropped; but they are never found immediately below the nest, as would be the case, if they were ejected by the young Cow-bird, as is done by the young cuckoo. [CUCULINÆ, vol. viii., pp. 208-9.] 'Indeed,' continues Mr. Nuttall, 'as far as I have had opportunity of observing, the foundling shows no hostility to the natural brood of his nurses, but he nearly absorbs their whole attention, and early displays his characteristic cunning and self-possession. When fully fledged, they quickly desert their foster-parent, and skulk about in the woods, until at length they instinctively join company with those of the same feather, and now becoming more bold, are seen in parties of five or six in the fields and lanes gleaning their accustomed subsistence. They still however appear shy and watchful, and seem too selfish to study anything more than their own security and advantage.' The Cow-bird is but a poor songster. Its flitting migrations are generally made in the night or in the grey of the morning.

Molothrus Pecoris.

a, Male; *b*, female; *c*, young. (Wilson.)

Geographical Distribution.—Besides the localities noted above, this species is also found in Mexico; but, according to Andubon, it is rare and a visitor only in Louisiana. The Prince of Musignano, in his *Geographical and Comparative List*, gives 'America generally' as its locality.

Mr. Darwin (*Journal and Remarks*) states that another species (*Le Troupiale commun* of Azara), of a purplish-black colour, with a metallic lustre, feeds on the plain near Maldonado in large flocks, mingled with other birds. Several, he says, may often be seen standing on the back of a cow or horse. While perched on a hedge, and pluming themselves in the sun, they sometimes attempt to sing, or rather to hiss: 'the noise is very peculiar; it resembles that of bubbles of air passing rapidly from a small orifice under water, so as to produce an acute sound.' Azara states that this bird, like the cuckoo, deposits its eggs in other birds' nests. 'I was several times told by the country people that there was some bird with this habit; and my assistant in collecting, who is a very accurate person, found a nest of the sparrow of the country (a *Zonotrichia*) with one egg in it larger than the others, and of a different colour and shape.' This egg is now in the museum of the Zoological Society of London.

MOLSHEIM. [RHIN BAS.]

MOLTON, SOUTH. [DEVONSHIRE.]

MOLUCCA ISLES, constitute a part of the Indian

Archipelago, and are situated between 5° N. lat. and 9° S. lat., and between 122° and 131° E. long., being dispersed over the sea, which extends from the eastern coast of Celebes to the western coast of Papua or New Guinea. In a more limited sense, the term Molucca Islands is only applied to the islands from which spices are obtained, as Amboyna, Banda, Ceram, &c. Others apply the term only to the northern group, or the islands lying in the Molucca Strait, between Celebes and Gilolo, including the last-mentioned island.

Soil and Surface.—We are very imperfectly acquainted with the natural features of these islands, as the Dutch, who have settlements on several of them, and who keep their sovereigns in a considerable degree of dependence, have always been very anxious to exclude all other Europeans, and have succeeded in doing so, except for a few years during the wars between 1798 and 1814. It is however known that nearly all these islands are mountainous, and that some of them contain peaks which rise to the height of 7000 or 8000 feet. The rocks of which they are composed seem to be mostly of a volcanic nature, and there are at least eight volcanoes still in action. These volcanoes seem to be the southern extremity of that extensive series which commences on the north in the peninsula of Kamtchatka, and continues southwards through the Kurules, Japan, and the Philippines, enclosing the eastern shores of Asia, as it were, with a volcanic barrier. On the other hand, it may be said that the most southern of these volcanoes constitute the eastern extremity of another volcanic barrier, which skirts Eastern Asia on the south, and proceeds from the Moluccas westward through the Lesser Sunda Islands and Java, where it terminates. Like other volcanic countries, the surface of all these islands is very rugged and broken, but their lower parts possess a great degree of fertility; and the coast, which in many parts rises from the water's edge to a considerable elevation with a very steep acclivity, contains a great number of harbours for every kind of vessels. Except where the declivity is too steep, the mountains are covered with forests, consisting of a great variety of trees, many of which are useful as timber or for cabinet-work.

Climate.—As none of these islands are more than 9 degrees from the equator, the climate is hot all the year round, but the heat is not excessive, on account of their comparatively small size and the uninterrupted continuance of the monsoons for at least ten months of the year. The seasons are dependent on these periodical winds. The rainy season begins in October or November, with the north-westerly monsoon; for while the north-east monsoon and fair weather prevail in the Chinese Sea and in the sea between Sumatra and the eastern coasts of Africa, the wind blows from north-west and west in the seas surrounding the Moluccas. Vessels bound to Canton, and arriving at the Sunda Islands during the north-east monsoon, take advantage of this circumstance. Instead of passing through the Sunda Straits and struggling against the wind and current in the Chinese Sea, they sail along the southern coast of Java, and pass through one of the straits which divide the Lesser Sunda Islands from one other into the sea of Banda, or that portion of the Indian Ocean which extends from the islands of Celebes and Flores eastward to New Guinea. Hence they pass between Ceram and Gilolo to the Pacific, and sail along the eastern side of the Philippines and through the strait of Balingtang to Canton. During this wind the rains fall, as in all tropical climates, in torrents, but seldom continue above two or three hours at a time; they generally come down from two to five o'clock in the afternoon or during the night. The annual quantity of rain is very great, but its amount is not known. The rainy season is also the hot season, and the mid-day heat during that time varies between 89° and 95°; the extremes are 77° and 100°, or somewhat more. The rains cease in the end of April or in May, when the wind settles in the south-east, and the weather becomes more temperate. Rains however occur from time to time, and the atmosphere contains considerable moisture. The mid-day heat is a few degrees lower than it is during the rains, and the difference between it and the temperature of the cool nights is greater, but hardly exceeds 12°.

Productions.—The agricultural productions do not differ from those of Java, with the exception of rice, which is not cultivated, but imported, though not in great quantities. The common food of the people is derived from the sago-palms, which grow wild in the forests and are also planted. Fish, wild deer, and hogs are also articles of food. The productions raised for exportation are limited to the clove and nutmeg trees, which are the only two articles that the Moluccas send to Europe. In addition to these articles they send to the markets of China edible birds'-nests, sea-slugs, and shark-fins. A small quantity of gold is also exported, as well as birds of paradise. These beautiful birds visit these islands at certain seasons of the year, coming over from New Guinea and the Aroo Islands, where they breed. The number of articles of export would be much increased if these islands were open to all European vessels, as the fertility of the soil and the climate favour the growth of all tropical products. Even at present they afford several articles, which are neglected, as turtle-shells, mother-of-pearl, honey, bees'-wax, ambergris, sandal-wood, and various kinds of beautiful wood for cabinet furniture. While the English were in possession of the Moluccas, they obtained from them cordage, cables, and timber.

Inhabitants.—These islands, like nearly all those which constitute the Indian Archipelago, are inhabited by two races, the Malays and the Papuas. The Malays are in possession of the coasts, where they cultivate the ground or gain their subsistence by fishing. They are Mohammedan, and among them are many sherifs, or pretended descendants of Mohammed. They seem to have adopted that religion shortly before the arrival of the Portuguese in 1510. Their language contains a great number of foreign words, and Dr. Leyden is of opinion that the Ternate or Molucca language has been an original tongue. The Papuas have been extirpated on the smaller islands, but they still maintain their ground in the mountainous districts of the larger islands. They seem to belong to the same race which inhabits the continent of Australia, New Guinea, and the Andaman Islands, but they do not exhibit that ferocity of character by which the inhabitants of the two last-mentioned countries are distinguished. They are described as an inoffensive race who cultivate the ground.

Division.—The number of islands probably amounts to some hundreds, of which however many are small and uninhabited. They may be divided into three groups: the Gilolo group, or Proper Moluccas; the Ceram group; and the Timor Laut group. The Gilolo group is the most northern, and extends from 2° S. lat. to 3° N. lat., and contains the islands of Gilolo, Morty, Mandioly, Batchian, Ooby, and Mysole, with numerous smaller islands lying between and about them, among which the islands of Ternate and Tidor are the most important. In figure Gilolo resembles Celebes, being composed of four long peninsulas, which are connected near 10° N. lat. Its greatest length from south to north may be 220 or 230 miles, and its surface, on a rough estimate, about 8000 miles, or about that of Wales. Little is known of it, except that the northern and north-eastern peninsulas rise into high mountains, whilst the southern attain only a moderate elevation. It seems to have a considerable population. The northern peninsula is or was subject to the sultan of Ternate, and the southern to the sultan of Tidor; but the two peninsulas projecting towards the east have their own sovereigns. Morty rises with a gentle ascent to a considerable height, and is said to have good harbours. Mandioly and Batchian are separated from one another by a narrow strait, which affords good anchorage. They are of moderate elevation, and are governed by their own sovereign, to whom also the island of Ooby belongs. The last-mentioned island is very little known. The islands of Ternate and Tidor are small, being only from 20 to 30 miles in circuit, but the soil is fertile, and they are very populous. Their sultans possess the greater part of Gilolo, and also several districts on th eastern coast of Celebes. To this group belong two smaller groups lying farther north-west. The eastern group, called the Salibabo Islands, consists of three islands of some extent, Tulour, Salibabo, and Kabruang, and several smaller ones. The island of Salibabo has a good harbour at Leron, in the narrow strait which divides that island from Kabruang. The western group, called the Sangir Islands, consists of a larger island and numerous smaller islands. Sangir Island is about 70 miles long: through its central part runs a ridge of high mountains, which terminates on the north in a volcano, which in 1711 made an eruption accompanied by a dreadful earthquake.

The Ceram group occupies the middle, between 3° and 5° S. lat., and comprehends the two large islands of Ceram and Booroo, and among the smaller ones, which lie to the south of them, the Spice Islands, or Amboyna and Banda Islands. The Chinese export much wood for cabinet-work from Ceram, as well as from Booroo, which is about 75 miles long from east to west, and 38 miles wide. Its surface is also rugged, and rises into high mountains. Respecting the Spice Islands, see AMBOYNA and BANDA.

The Timor Laut group is the most southern and least known. It consists of the large island of Timor Laut and four others of considerable extent, Larat, Little Key, Great Key, and Key Watcla, with several smaller ones. Timor Laut is about 70 miles long and 25 miles wide; but that is nearly all we know of this and the adjacent islands. The island of Aroo [AROO], lying farther east, is also sometimes considered as belonging to the Moluccas.

History.—When the Portuguese were exploring the eastern seas in the beginning of the sixteenth century, they arrived at the Moluccas in 1510, and had hardly begun to form settlements when the vessels of Magalhaens, arrived from the east, and a dispute arose between the Portuguese and Spaniards respecting the possession of the islands, which lasted for several years. The Dutch took these islands from the Portuguese about a hundred years afterwards, and, in order to secure to themselves the exclusive trade in nutmegs, maces, and cloves, they formed numerous small settlements on nearly all of them, by which they kept the petty sovereigns in subjection, and, with their assistance, were enabled to extirpate all the spice-trees in the islands, except Amboyna and Banda, which they subjected entirely to their sway. In 1796 the British took possession of them, and kept them to the peace of Amiens (1801), when they were restored to the Dutch. The British again took possession of them in 1810, and again gave them up to Holland at the treaty of Paris in 1814. Since that time the Dutch have abandoned several of the smaller establishments, but they still maintain several at Ternate, Tidor, and other places.

(Forest's *Voyage to New Guinea and the Moluccas;* Stavorinus's *Voyages to the East Indies;* Delano's *Voyages and Travels;* Crawfurd's *History of the Indian Archipelago;* Count Hogendorp's *Coup d'Œil sur Java, &c.;* and *Description Geogr., Histor., et Commerciale des Java et des autres Isles de l'Archipel Indien.*)

MOLYBDE'NUM, a metal discovered by Scheele, in 1778, in a mineral which resembles and had been confounded with plumbago: he gave it the Greek name of *molybdæna.* This mineral is composed of sulphur and molybdenum; and it has also been met with in other states of combination presently to be mentioned. This substance was however first reduced to its metallic state by Hjelm, another Swedish chemist, and its properties have been since particularly examined by Bucholz and Berzelius.

The metal is obtained from the native sulphuret by reducing it to fine powder and heating it in aqua regia; by this the sulphur is converted into sulphuric acid, and the metal into molybdic acid, which remains in the state of a white powder after being heated to expel the sulphuric acid; when this is very strongly heated with charcoal, it is reduced to the metallic state; or the metal may be procured by passing hydrogen gas at a high temperature over the acid in a porcelain tube. This metal is obtained as a porous mass or in globules, and has not yet been procured in the state of a button or bar. The grains are somewhat crystalline; sometimes they are of a silver-white colour. When obtained by the reduction of the oxide, this metal has not much lustre, but acquires it by burnishing. Its density is 8·6. When long exposed to the air at ordinary temperatures, it appears to tarnish, but the oxidation is superficial. By exposure to air and heat, it is first converted into brown oxide, afterwards it becomes blue, and eventually molybdic acid, which is white. This oxidation does not however take place completely, but only at the surface. Sometimes the metal takes fire at the moment of oxidation. It does not decompose water.

Ores of Molybdenum.—Oxide of molybdenum occurs encrusting the sulphuret of molybdenum, and also between its laminæ in thin layers. Its structure is thin fibrous, earthy, friable, and pulverulent. Colour pale yellow or greenish.

It has been found only in small quantity in Scotland, Norway, and North America. Its composition has not been ascertained.

Molybdic acid also occurs in nature in combination with lead and silver

Sulphuret of Molybdenum, Molybdenite, is the most common mineral of this metal. Occurs crystallized and massive. Primary form a rhomboid. Crystallizes in hexagonal crystals. Cleavage very distinct, perpendicular to the axis. Fracture indistinct. Hardness, scratches talc, is scratched by calcareous spar. Colour lead-grey, and streak the same. Flexible in thin laminæ, but not elastic. Lustre metallic. Opaque. Specific gravity 4·591. Rubbed on paper, it leaves a grey metallic mark, and on porcelain a greenish one *Massive variety* amorphous; structure foliated, granular. When heated by the blow-pipe on charcoal, emits a sulphurous vapour, and leaves a powdery residue. It occurs in various parts of the world—in England, France, Germany, and America; more especially however in Saxony and Bohemia. It contains, according to Bucholz, 60 parts of molybdenum and 40 of sulphur.

Molybdenum combines, as already noticed, with oxygen, and forms two oxides and one acid; but these we have not thought it requisite to describe, any more than its other compounds, for it is not used in any form whatever.

MOLYNEUX, WILLIAM, was born at Dublin, 17th April, 1656. He entered the university of that city in 1671, whence, after taking the degree of B.A., he removed to London, and entered the Middle Temple, where he studied law during three years. On his return to Ireland he married (1678) the daughter of Sir William Domville, the king's attorney-general. The same year his wife was attacked by an affection of the eyes, which increased so rapidly, that in a few months her sight was wholly destroyed. To divert the melancholy thoughts to which his wife's affliction incessantly gave rise, he took to the study of the mathematics. 'This,' he says, 'was the grand pacificum I used; these were the opiates which lulled my troubled thoughts to sleep.' In the mathematics he had probably received some instruction from his father, Captain Samuel Molyneux, who was author of a treatise on gunnery on the principles expounded by Galilei concerning the motion of projectiles. In 1683 he took an active part in the formation of the Dublin Philosophical Society, of which he was first secretary and afterwards president. In 1685 he was appointed by the English government to inspect the fortresses of the Netherlands, and the same year was elected a Fellow of the Royal Society of London. After the dispersion of this Society in 1688, consequent upon the political disturbances of Ireland, brought about by the severities of Tyrconnel's government, he, with many other Protestants, was obliged to take refuge in England; but he returned to Ireland after the battle of Boyne in 1690. In 1692 he sat in the Irish parliament as one of the representatives of the university of Dublin, and at the close of the session was nominated by the government commissioner of forfeitures, with an annual salary of 400*l.*, which appointment however he thought fit to decline, chiefly on account of the bad reputation of the other commissioners named.

His principal work is a treatise on optics, entitled 'Dioptrica Nova,' 4to., London, 1692 and 1709. It was the first work on the subject which had appeared in English, and contained a great many propositions practically useful and clearly demonstrated, for which reasons it continued in request for many years. The revisal of the proof sheets was undertaken by Dr. Halley, who added, in an Appendix, his celebrated theorem for finding the foci of optic glasses. Flamsteed had also assisted in the preparation of the work, and in particular had furnished solutions of three propositions, which Molyneux placed after the solutions given by himself. At this circumstance the astronomer-royal, with whom Molyneux had previously been on terms of intimacy, took such offence, 'that,' says Molyneux, 'he broke his friendship with me, and that with such inveteracy, that I could never after bring him to a reconciliation; so that at last I slighted the friendship of a man of so much ill-nature and irreligion, however ingenious and learned soever.'

Among the many persons of literary eminence with whom he maintained a correspondence, Locke was held by him in particular esteem, and in the last year of his life he came to England for the purpose of visiting that philosopher. He died in Dublin, October 11, 1698.

Besides his 'Dioptrica' and twenty-seven papers on miscellaneous subjects inserted in the 'Philosophical Transactions' between the years 1684 and 1716, he published 'Translation of the Six Metaphysical Dissertations of Des cartes, together with the objections against them by Thomas Hobbes,' London, 1671; 'Sciothericum Telescopicum, or a

New Contrivance for adapting a Telescope to an Horizontal Dial,' 4to., Dublin, 1686; 'Journal of the Three Months' Campaign of His Majesty in Ireland, with a Diary of the Siege of Limerick,' 4to., 1690; 'The Case of Ireland being bound by Acts of Parliament stated,' 8vo., Dublin, 1698-1706-70-76.

(*Account of the Family and Descendants of Sir Thomas Molyneux, Knt.*, Evesham, 1820, 4to.; Hutton's *Mathematical Dictionary; Biographia Britannica.*)

MOMBAÇA, or **MOMBAS**, is a town situated on that part of the eastern coast of Africa which is called the coast of Zanguebar, and in 4° 4′ S. lat. and 39° 38′ E. long. It is built on the eastern side of an island, which occupies the greater portion of a bay, about 5 miles long and 3 miles wide. The island is three miles long by two broad; the two straits which divide it from the continent are hardly half a mile across. The eastern strait constitutes the harbour of the town, which is one of the most perfect in the world. It has good anchorage ground at the entrance, sheltered by an extensive reef on each side; the shore is so steep and rocky, that in many places wharfs are unnecessary. The cliffs surrounding the island are of madrepore, and rise with a steep ascent, so that the whole island is like a huge castle encircled by a moat, over which there is only a single ford at its north-western extremity, and even that is dangerous. The castle, built by the Portuguese in 1635, on a rock of moderate elevation, lies to the south of the town. The town is not large, and consists of the city and the Black Town, which occupies the most northern portion of it. The former, which was once inhabited by the Portuguese, is now inhabited by the Arabs. Some free coloured people and slaves constitute the population of the Black Town. The population is not known, but probably does not exceed 3000 or 4000. Though the Arab inhabitants of this town are poor, they cause their children to be instructed with great care in reading and writing, and in order that they may at the same time acquire a good knowledge of their religion, sentences from the Koran are used as the tasks. The commerce is not considerable, and is mostly in the hands of some Banyans from Hindustan, who, during the favourable monsoon, send a small quantity of ivory and other produce to Bombay, for which they obtain in return East India and English manufactures.

Vasco de Gama visited this port in 1498, and was well received, but nearly fell a sacrifice to the treachery of the inhabitants. It was afterwards taken and burnt by Francisco de Almeida in 1505, but he did not keep possession of it. Twenty-three years later it was taken by Nunho da Cunha, after a stout resistance from the inhabitants, and was again reduced to ashes. It seems, that from that time the Portuguese remained in possession of it for nearly two centuries. It is not known when they lost it, but in 1720 it was in possession of the Imam of Muskat. It appears however that he lost it soon afterwards by a rebellion of the inhabitants. In 1824 the Imam sent a force against it. The Arabs, who inhabit the town and adjacent coast, being aware that they could not resist the Imam, put themselves under the protection of the British, and hoisted the English flag, by which means they have preserved their independence. The Arabs are governed by a sheik, whose office is properly hereditary, but the course of descent has often been interrupted by intrigues and civil dissension.

(Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar.*)

MOMENT OF INERTIA. [MOMENTUM, or MOMENT OF INERTIA.]

MOMENTUM, or **MOMENT**. This word has been used in various senses. It simply means a motion, the word *momen*, from *movimen*, being found in several antient authors. *Momentum* was originally one rapid motion, whence it came to be used for a very short time; whence our word *moment*, which, in common life, means an indivisible instant of time. Thus an effect which requires a single second to produce it would not be properly momentary. But the word has passed into mechanics in its original sense of motion, and is used to signify the amount of an effect of motion, actual or conceivable. Thus we have one use in the article VIRTUAL VELOCITIES, another in LEVER, a third in MOMENTUM OF INERTIA, and a fourth, the most common of all, which we proceed to explain in this article.

The English synonym of this fourth sense is 'quantity of motion,' and we may observe that in this sense it is most usual, in our language, to adopt the Latin form *momentum*, instead of the abbreviation *moment*. It is impossible to give an actual definition of momentum, in simple terms: but the conception is obtained by those who observe that the effects produced by *matter* in *motion* (both notions are necessary) may be augmented either by giving the same motion to more matter, or greater motion to the same matter. Imagine a BALLISTIC PENDULUM, and suppose a bullet of two pounds weight to strike it with a velocity of 100 feet per second. The same oscillation which is thus produced, may, it is found, be produced by a bullet of one pound weight striking with a velocity of 200 feet. The same effect being produced in both cases, though by different quantities of matter and different velocities, there is something which we may assert to be unaltered by the substitution of the smaller bullet with the larger velocity. This something is the momentum, or quantity of motion, a notion of a cause which is asserted to be the same when effects are the same. This mere definition would be useless except in connection with principles observed or deduced, by which it may be applied. That there is a reality in connection with it, all who know the difference between light and heavy, as these words are frequently used, are well aware. A heavy blow, for instance, does not mean a blow with a heavy body: thus the fall of a poker may give a light blow, while that of a book of one-tenth part of its weight may give a heavy one. The difference in these cases is that of momentum.

The velocity remaining the same, the momentum or quantity of motion increases with the mass moved; and the mass remaining the same, the momentum increases proportionally to the velocity communicated. But the peculiar proposition on which the utility of the term and the notion depends is this, that in all mechanical effects produced by matter in motion, a diminution of the mass may be compensated by a proportionate increase of the velocity: that is, M being the number of units of mass, and V of velocity, as long as the product of M and V remains the same, the effect produced is the same. Thus in the preceding instance $M \times V$ is 2×100 in the first case, and 1×200 in the second. And as long as $M \times V = 200$, the same effect will be produced, if the pendulum be supposed so heavy that the addition of M to its mass is not worth considering.

This product, MV, is the measure of the momentum, and is generally called the momentum itself. Here (as in MASS) tacit reference is made to a unit of momentum: the equation

$$\text{Momentum of } M \text{ with velocity } V = M \times V$$

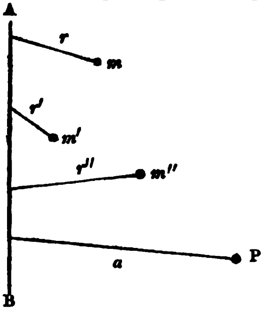
implies that a unit of momentum is that produced by a unit of mass moving with a unit of velocity. But if the unit of mass moving with a unit of velocity should be considered as having the momentum a, the equation should be

$$\text{Momentum of } M \text{ with velocity } V = a \times M \times V.$$

In vol. x., p. 350, where reference is made to this article, for *momentum* or *moving force* read *momentum* or *quantity of motion.*

MOMENTUM, or MOMENT of INERTIA. Let us conceive a system of bodies possessing weight, and immoveably attached to a fixed axis, round which the whole system can turn. It is known from experience, as well as deducible from the laws of motion, that the nearer the bodies are placed to the axis, the more rotatory motion may be communicated by a given force. The *moment of inertia* is a name given to a mathematical function of the masses in the system and of their positions with respect to the axis, on the magnitude of which the rotatory motion produced by a given pressure, acting for a given time, depends. This function is the sum of the products made by multiplying the number of units in each mass by the number of units in the square of its distance from the axis. Thus, if m, m', m'', &c. be the masses of material points situated at the distances r, r', r'', &c. from the axis, the moment of inertia is $mr^2 + m'r'^2 + m''r''^2 +$ &c. If the body be a continuous solid, and if dm be one of the elements of the mass, at a distance r from the axis, the moment of inertia is then $\int r^2 dm$, the integration being made throughout the whole extent of the solid.

Let A B be the axis, and let a pressure be communicated to the system at the point P, and such as would, were a mass P placed there, cause the system which consists of that single mass only to revolve with a velocity v, being at the distance a from the axis. The momentum of this velocity is Pv. Let the system of m, m', and m'', in conse quence of this pressure, begin to revolve with an angular velocity θ (measured in theoretical units [ANGLE]). The consequence is, that m, m', and m'' begin to revolve with velocities $r\theta$, $r'\theta$, and $r''\theta$, and momenta $mr\theta$, $m'r'\theta$, $m''r''\theta$. Now if pressures which would just prevent this motion in the same time as the applied pressure generated it were applied in the opposite direction, the three pressures so applied would counterbalance the pressure at P. But [PRESSURE] the pressures which in the same time produce motions are to one another as the momenta produced, so that if $a.Pv$ represent the pressure at P, those applied in the contrary direction at m, m', and m'', are $a.mr\theta$, $a.m'r'\theta$, and $a.m''r''\theta$. But the first acts perpendicularly at the extremity of the arm a, the others at the arms r, r', and r''. Hence $a.mr\theta \times r + a.m'r'\theta \times r' + a.m''r''\theta \times r''$ must be the same as $a.Pv \times a$, whence it is evident that

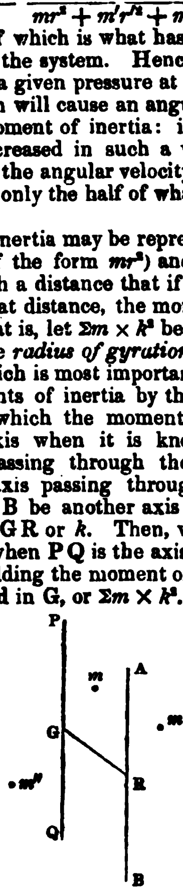


$$\theta = \frac{Pva}{mr^2 + m'r'^2 + m''r''^2}$$

the denominator of which is what has been called the moment of inertia of the system. Hence it follows that the communication of a given pressure at a given distance from the axis of rotation will cause an angular velocity which is inversely as the moment of inertia: if the masses or their distances were increased in such a way as to double the moment of inertia, the angular velocity produced by a given pressure would be only the half of what it would have been before the change.

The moment of inertia may be represented by Σmr^2 (sum of all the terms of the form mr^2) and the whole mass by Σm. Let k be such a distance that if the whole mass were concentrated at that distance, the moment of inertia would not be altered: that is, let $\Sigma m \times k^2$ be $= \Sigma mr^2$. Then k is what was called the *radius of gyration*. [GYRATION.]

The property which is most important in the actual determination of moments of inertia by the integral calculus is one in virtue of which the moment may be found with respect to any axis when it is known with respect to a parallel axis passing through the centre of gravity. Let PQ be an axis passing through G the centre of gravity, and let AB be another axis parallel to PQ and distant from it by GR or k. Then, whatever the moment of inertia may be when PQ is the axis, that with respect to AB is found by adding the moment of inertia of the whole system concentrated in G, or $\Sigma m \times k^2$. That is



M. *of* I. (axis AB) = M. *of* I. (axis PQ) + Mass of system × GR^2

Hence it appears that of all axes parallel to a given axis the moment of inertia is least for that axis which passes through the centre of gravity; so that, *cæteris paribus*, the greatest motion is produced by a given force when the axis passes through the centre of gravity. Of all the axes which pass through the centre of gravity there are three, each at right angles to the other two, which possess remarkable properties, and are called *principal* axes. [ROTATION.]

From what has been said it may easily be supposed that the moment of inertia is as important in the consideration of rotatory motions as the rectangle in mensuration. We shall see a further use of this function in OSCILLATION, and also a practical mode of finding the moment of inertia.

MOMO'RDICA ELATE'RIUM, or Wild Cucumber, an annual plant, of which the fruit, and more particularly the juice surrounding the seeds, are used in medicine. The ripe fruit is about two inches long, roundish, muricate, green, and fleshy; possessing the power of ejecting, along with a mucilaginous greenish juice, the compressed ovate smooth seeds; on which account it is called the squirting cucumber. The juice has an extremely bitter taste, and even in very small quantity acts violently as a hydrogogue cathartic, producing numerous watery stools. It owes its power to an acrid and drastic bitter extractive, to which the name of *Elaterin* has been given. This is soluble in alcohol, æther, and fat oils, but scarcely soluble in water or dilute alkalies or acids, while strong acids destroy it.

The very minute dose which is required of elaterium recommends it in many cases as a remedy in dropsy, especially ascites, but few persons can bear the violence of its action for any considerable time; two or three days should always be allowed to elapse before repeating the dose. It is apt to cause vomiting as well as purging, and a dose of even a quarter of a grain may produce such extreme action as to sink the patient into a state of alarming debility.

It should therefore only be used when milder means have been previously tried without success, and it should be exhibited with great precaution. Surrounding the abdomen with a tight bandage will lessen the disposition to fainting, which is apt to be experienced from the rapid removal of the fluid distending the cavity of the peritoneum.

MOMOT, or MOTMOT. [PRIONITES.]

MOMPAX. [GRANADA, NEW.]

MONA., [ANGLESEY; MAN, ISLE OF.]

MO'NACHA. [MUSCICAPIDÆ.]

MO'NACHISM (from the Greek *μόνος*, alone; whence *μονάζειν*, to live alone; and *μοναχὸς*, a solitary, or a monk). In this its proper and original signification of a solitary, a monk may be considered as only another name for an anachoret, or anchoret (in Greek, *ἀναχωρητὴς*), that is, a person who withdraws from society, a recluse; or for an eremite, corrupted into hermit (in the same way as the old and more correct ethnick has been corrupted into heathen), in Greek, *ἐρημίτης*, that is, a dweller in a desert or solitude.

The practice of retiring from the world for mortification or pious contemplation has been in use from time immemorial in the Brahminical and other religions of the East, and was known even among the Jews long before the birth of Christianity. We need mention only the instance of the prophet Elijah, to whom Catholic writers indeed are fond of referring as the founder of monachism. An example of still more venerable antiquity is afforded by the Nazarites, male and female, described in the sixth chapter of the Book of Numbers, whose 'vow of separation' however lasted only for a certain fixed time.

In the earliest days of Christianity, many of the converts to the new religion, in their ambition to signalise themselves by extraordinary piety, adopted a remarkable severity of life and strictness of religious observance, whence they came to be known by the name of ascetics (in Greek, *ἀσκηταὶ*), that is, literally, exercisers. Another name by which they are sometimes spoken of by the early ecclesiastical writers is Spoudæi (*σπουδαῖοι*), that is, zealots. The connection of these ascetics with the description of persons afterwards called monks has been a subject of much disputation, the admirers and champions of the monastic system in general asserting the identity of the monks and ascetics, and their opponents maintaining that asceticism, as it existed in the primitive church, and monachism, as it sprung up in a later age, were two things wholly distinct. The truth appears to be that the early ascetics were certainly not universally, nor perhaps even generally, monks or solitaries; but still a separation, more or less rigid, from social life was one obvious mode of mortification and devotional abstraction, and one that was undoubtedly practised by some of the ascetics, though most probably without anything resembling the vows and other methodical restrictions which make part of monachism in its mature state. The ascetics themselves, it may be here observed, are commonly derived from the Jewish sect of the Therapeutæ, or Essenians, who inhabited the banks of the lake Mareotis, in the delta of Egypt, and who, having previously cast off much of the antient reverence of their nation for the Mosaic law, had embraced Christianity in great numbers very soon after its promulgation. 'The austere life of the Essenians,' says Gibbon, 'their fasts and excommunications, the community of goods, the love of celibacy, their zeal for martyrdom, and the warmth, though not the purity, of their faith, already offered a very lively image of the primitive discipline.' (*Decline and Fall*, chap. 15.) And in a note, after admitting that Basnage, in his 'Histoire des Juifs,' has demonstrated, in spite of Eusebius and a crowd of modern Catholics, that the Therapeutæ were neither Christians nor monks; he adds, 'It still remains probable that they changed their name, preserved their manners, adopted some new articles of faith, and gradually became the fathers of the Egyptian ascetics.' Afterwards (chap. 37), he seems distinctly to represent the ascetics as the fathers of the monks. 'They,' he says, 'seriously renounced the business and the pleasures of the age; abjured the use of wine, of flesh, and of marriage; chastised their body, mortified their affections, and embraced a life of misery as the price of eternal happiness. In the reign of Constantine (A.D. 306-337) the ascetics fled from a profane and degenerate world to perpetual solitude or religious society. Like the first Christians of Jerusalem, they resigned the use or the property of their temporal possessions; established regular communities of the same sex and a similar disposition; and assumed the names of *hermits*, *monks*, and *anachorets*, expressive of their lonely retreat in a natural or artificial desert.'

It is admitted on all hands that the immediate founders of monachism were two Egyptians, named Paul and Anthony. St. Jerome calls the former the author of that mode of life, the latter its illustrator—'hujus vitæ auctor Paulus, illustrator etiam Antonius.' (Hieron., *Ep.* 22, *ad Eustoch.*, c. 16.) Paul is designated the Thebæan. An account of St. Anthony, as he is styled, and of the progress of the monastic system during his life, which extended from A.D. 251 to A.D. 356, has already been given under his name (ii. 96). We shall only note here that the first monastic community is said to have been established at Phaium, near Aphroditopolis, in the Thebais of Egypt, about the year 305 or 306, that is, after the cessation of the persecutions which had originally driven Anthony, Paul, and others to the deserts. Strictly speaking however this and other monasteries appear to have been founded rather by Anthony's disciples, and in obedience to the spirit which his example had diffused, than directly under his own superintendence.

Of these disciples, the most eminent was Pachomius: if the Decian persecution and Anthony gave rise to monachism, monasteries owe their origin to Pachomius and the peaceful times of Constantine. The antient writer of the 'Acta Pachomii' makes Anthony acknowledge this himself in the following speech to one of the disciples of Pachomius:—'When I first became a monk, there was as yet no monastery in any part of the world where one man was obliged to take care of another, but every one of the antient monks, when the persecution was ended, exercised a monastic life by himself in private. But afterwards your father Pachomius, by the help of God, effected this.' Gibbon has in a few words well sketched the first stage of the progress of the new institution:—'The prolific colonies of monks multiplied with rapid increase on the sands of Libya, upon the rocks of Thebais, and in the cities of the Nile. To the south of Alexandria the mountain and adjacent desert of Nitria were peopled by five thousand anachorets; and the traveller may still investigate the ruins of fifty monasteries which were planted in that barren soil by the disciples of Anthony. In the Upper Thebais the vacant island of Tabenne was occupied by Pachomius and fourteen hundred of his brethren. That holy abbot successively founded nine monasteries of men and one of women, and the festival of Easter sometimes collected fifty thousand religious persons, who followed his angelic rule of discipline.' This is said in allusion to the fable that Pachomius, who survived till the middle of the fourth century, had received his rule by special revelation from an angel. The other most celebrated early propagators of monachism are Hilarion, another disciple of Anthony, who carried the system into Palestine, about A.D. 328; St. Athanasius, bishop of Alexandria, who brought it to Rome, A.D. 340 [ATHANASIUS]; Eustathius, bishop of Sebaste, or Sebastia, by whom it was soon after extended to Armenia and Paphlagonia; St. Basil, who established it in the province of Pontus, A.D. 360 [BASIL]; and St. Martin, bishop of Tours, by whom it was, about A.D. 370, introduced into Gaul, whence it is generally supposed to have been imported into the British Isles by Pelagius, about the beginning of the fifth century.

At first all the communities of monks followed the rule of Pachomius, and therefore they were not distinguished into various orders, as in later times, but took their names from the places where they were established, as the monks of Mount Scethis, of Tabenne, of Nitria, of Canopus, &c. But besides the monks that lived in communities, and who were called from that circumstance *Cœnobitæ*, or sometimes *Synoditæ*, and by the Egyptians, according to St. Jerome, *Sauches*, there were for some ages divers other species, which the ecclesiastical antiquarians have taken much pains to distinguish. Some lived, although in the same district of the wilderness, yet all in separate caves or cells, and without any association or common government, in which case the collection of hermitages was called a *Laura*, according to Epiphanius. Another sort are described by Cassian under the name of *Sarabaitæ*, and were called by the Egyptians *Remboth*, according to St. Jerome, who says that they lived two or three together, without any rule, but each after his own fashion, taking up their abode for the most part in cities and fortified stations (*castellis*). In other respects he gives a very bad account of them: although they were wont to contend with each other, he says, in extraordinary feats of fasting, yet at other times they would indulge to as much excess in riotous festivity; all things about them were affected; loose gloves (manicæ), puffed-out boots (caligæ follicantes), coarse clothes, frequent sighing, much visitation of the young women, violent inveighing against the clergy. In short, concludes Jerome, they are the pests and banes of the church. Another species of these early monks or solitaries were those called Stylitæ, that is, pillar saints (from στύλος, a pillar), the founder of whom was one Simeon, a Syrian shepherd, who having, in A.D. 408, when he was only thirteen years old, left his flocks and joined a monastic community, afterwards withdrew himself to a mountain about 30 or 40 miles east from Antioch, and there, confining himself by a chain within a mandra, or circle of stones, proceeded at last to take up his residence on the top of a pillar, which was gradually raised from the height of nine to that of sixty feet. Simeon Stylites died A.D. 451, after having, it is said, existed for thirty years at the last-mentioned elevation in the air. 'Habit and exercise,' says Gibbon, 'instructed him to maintain his dangerous situation without fear or giddiness, and successively to assume the different postures of devotion. He sometimes prayed in an erect attitude, with his outstretched arms in the form of a cross; but his most familiar practice was that of bending his meagre skeleton from the forehead to the feet; and a curious spectator, after numbering twelve hundred and forty-four repetitions, at length desisted from the endless account.' This strange sort of piety however does not seem to have proved very contagious; among the few pillar saints, besides the contriver of the practice, whose names are recorded, the most famous are; another Simeon, styled the Younger, who is said to have occupied his airy watch-tower for sixty-eight years, and one Alypius, who left the bishopric of Adrianople for this other sort of episcopacy, and, it is affirmed, kept singing psalms and hymns between heaven and earth, at all hours of the day and night, for the full space of threescore years and ten, while a choir of monks and two choirs of virgins, seated on the ground below, lent the aid of their voices to swell the strain. About the beginning, or, as others think, about the middle, of the fifth century, a pious individual, named Alexander, set up a new fashion of monachism at Constantinople, the professors of which received the name of Acœmetæ (in Greek, ἀκοιμηταὶ), that is, the watchers, or the sleepless, from their practice of dividing themselves into three classes, which took the performance of divine service in unbroken succession, so as to keep up a constant sound of devotion throughout the entire round of the twenty-four hours. The Acœmetæ, sometimes called *Studitæ*, from Studius, a Roman nobleman, who became one of their society, and built a famous monastery for them, which, after him, was named *Studium*, were held in great estimation, and became very numerous at Constantinople. Alongside of the Stylitæ may be placed another description of fantastic enthusiasts, the *Βοσκοί*, or Grazing Monks, whose whim it was to live like the beasts of the field, inhabiting no houses, and eating neither bread nor flesh, but roaming about upon the mountains as they continued without ceasing to make the wilderness resound with their hymns and psalms, and when it was time to eat, every man, taking his knife in his hand, and proceeding to cut or dig for himself a dinner of herbs from the ground. Still another sort of old monks is made mention of under the name of *Gyrovagi*, the Vagabond Monks, as the epithet may be translated. St. Benedict describes these as rambling about continually from province to province, getting themselves well entertained for three or four days at every cell they came to, mere slaves to their gluttonous appetites, and in all things worse even than the Sarabaritæ.

From this sketch it is evident that the institution of monachism had arrived at a state of very considerable corruption both in the Eastern and the Western churches, when St. Benedict arose to reform it, in the latter, in the earlier part of the sixth century. [BENEDICT, SAINT, and BENEDICTINE ORDER, vol. iv., p. 213.] It does not appear however that Benedict, in drawing up what is called his Regula Monachorum, or Rule, had any intention of founding a new order of monks; he writes as if he designed it for the use of all the monasteries then existing. In point of fact, from the year 530, or 532, according to others, when he established his first monastery at Monte Casino, till after the commencement of the thirteenth century, when the new mendicant orders made their appearance, all the principal monasteries that were founded throughout Europe were of the Benedictine order. The Carthusians, Cistercians, Grandimontenses, Præmonstratenses, Cluniacs, &c., were all only so many varieties of Benedictines. The historians of monachism indeed reckon up twenty-three subdivisions of this order in all, distinguished only by such local or other specific appellations, and by some slight differences of habit and discipline. The innovations introduced by Benedict were of course longest in penetrating to the more remote corners of Christendom; and perhaps in no other part of Europe were they so long in being generally received as in the British Islands. Bede and others denominate the system which prevailed among the British monks before the arrival of St. Augustin in 597, the apostolic discipline; but it was probably merely the antient rule of Pachomius. It is even disputed whether St. Augustine brought over with him the rule of St. Benedict; and at all events it is tolerably clear that that rule was not universally established in the British churches till its observance was enforced by St. Dunstan and his friend Oswald, in the reign of Edgar, after the middle of the tenth century.

Meanwhile in the Eastern church also monasteries and nunneries had been made the subject of legal regulation by a constitution of Justinian (Nov. 5), addressed to Epiphanius, the archbishop of Constantinople and œcumenic patriarch, in the consulship of Belisarius, A.D. 535. By these enactments no monastery could be founded except the ground was first consecrated by the bishop within whose diocese it was, who was required to put up a cross on the spot. Persons were not permitted to assume the monastic habit till after a three years' probation, and the abbots (ἡγουμένοι) were required, during this time, to examine well into their life, conversation, and fitness for the monastic profession. On being approved, the candidates assumed the dress and tonsure. Both free persons and slaves were alike admissible into monasteries, and were received on the same footing in all respects. A master might claim and take away his slave within the three years, if he could prove that the person was his slave, and had run away for theft or any other offence; but not otherwise. Thus the monasteries became a place of refuge to slaves who had severe masters. The law ordained that the monks should eat together, and should all sleep in a common dormitory, each in his own bed; but an exception was made in favour of those called anachorets and hesuchasts (ἀναχωρηταὶ καὶ ἡσυχασταί), who led a contemplative life in perfection (such is the phrase), and were allowed to have separate cells. It seems that a man could leave his monastery and enter the world again, though it was considered sinful; but as all the property which he had not disposed of before entering the monastery (subject to some provisions for his wife or children, if he had any) became the property of the monastery on his entering it, if he chose to leave it, he could not take with him or recover any part of his property. Celibacy and chastity were required of the monks, though at this time marriage was permitted to certain clerical persons, as singers and readers. Further regulations on the life of monks and nuns are contained in the 134th Novel. A monk was prohibited from entering a female monastery (for one word only is used in these laws for male and female convents), and a nun was prohibited from entering a male monastery, under any pretext whatever. Other regulations to the same general effect of ensuring chastity and the due observance of all monastic duties are prescribed by the legislator.

In the earliest age of the monastic system, the monks were left at liberty as to many things which were afterwards made the subject of strict regulation by the laws either of the state or the church. St. Athanasius, in one of his epistles, speaks of bishops that fast, and monks that eat and drink; bishops that drink no wine, and monks that do; bishops that are not married, and many monks that are the fathers of children. Originally, too, monks were all laymen; and, although it gradually became more and more the common practice for them to take holy orders, it was not till the year 1311 that it was made obligatory upon them to do so by Pope Clement V. Nor was any vow of celibacy or any other particular vow formally taken by the earliest monks on their admission. It appears even that it was not unusual for persons to embrace the monastic life with the intention of only continuing monks for a few years, and for those who had spent some time in a monastery actually to return to the world. We have just seen how the practice as to some of these points came at length to be regulated by the Imperial law.

The word nun, in Greek Νονὶς, in Latin *Nonna*, is said to be of Egyptian origin, and to signify a virgin. Another account is, that the original meaning of the Latin *nonna*, *nonnana*, or *nonnanis*, was a penitent. The Italians still use *nonno* and *nonna* for a grandfather and grandmother. Cyprian and Tertullian, in the latter part of the third century, make mention of virgins dedicating themselves to Christ. Such a practice was indeed a natural mode of self-sacrifice, which had been familiar to all religions. Some of these ecclesiastical or canonical virgins, as they were called, appear already to have formed themselves into communities, similar to those of the monks; but others continued to reside in their fathers' houses. The progress of female monachism however, from the rudeness and laxity of the first form of the institution, to the strict regulation which characterised its maturity, moved on side by side with that of male monachism.

Monasteries are called by the Greek fathers not only Μοναστήρια and Μοναὶ, but also sometimes σεμνεῖα, that is, holy places; ἡγουμενεῖα, the residences of the abbots, styled ἡγουμένοι, or chiefs; μάνδραι, inclosures; and φροντιστήρια, places of reflection or meditation, that being one of the purposes to which they were very early applied. For a general account of the different sorts of religious houses, and of their government, see the articles ABBESS, ABBEY, ABBOT, and CONVENT.

The habits and other peculiarities of the principal orders of monks and nuns are explained under the name of each. It is only necessary to notice here, that the three vows of chastity, poverty, and obedience are taken by all monks and nuns at their admission. All, both male and female, likewise receive the tonsure, like all the ecclesiastics of the Romish church. In all the orders the candidate for admission must first undergo a novitiate, which varies from one to three years. The age at which novices may make profession differs in different countries; but the rule laid down by the council of Trent only requires that the party, whether male or female, should be sixteen. It is scarcely necessary to add, that in the modern constitution of monachism, the vows and status of a professed person, as indeed of all ecclesiastics, are by the law of the Roman church for life and indelible.

The greatest revolution by which the history of monachism has been marked since the establishment of the rule of St. Benedict, was the rise, in the beginning of the thirteenth century, of the Mendicant Friars. Of these an account has already been given under the word FRIARS: and further particulars will be found under the names of the several orders.

The general dissolution of monastic establishments was one of the first consequences of the Reformation in our own and all other countries that separated from the Romish church. There are however a few Protestant monastic establishments in some parts of Germany. Even in some Catholic countries, especially in Germany and France, the number of these establishments has been greatly reduced within the last fifty or sixty years, and the wealth and power of those of them that still exist most materially curtailed. The reform of the German monasteries was begun by the emperor Joseph II.; those of France were all swept away at the commencement of the Revolution; but some of them have been set up again, though with diminished splendour, since the restoration of the Bourbons. Since the relaxation of the penal laws, several Roman Catholic nunneries have been erected in England and Scotland, as well as in Ireland. Monks and nuns of all descriptions still swarm in Italy, and in the countries of South America, lately subject to the Spanish and Portuguese crowns; in Spain and Portugal all monasteries have been suppressed within these few years. Even in modern times we still hear occasionally of the institution of a new order of monks. One, called the Congregation of the Blessed Virgin Mary, was established by the late Pope Leo XII. in 1826. But the most important new order of monks, founded in the Roman Catholic church since the first outbreak of the Reformation, is that of the Jesuits; for an account of which see vol. xiii., p. 110. [MONK.]

(Among the most important works on the subject of monachism are the following: 'Nebridii a Mundelheim Antiquarium Monasticum,' fol., Vien., 1650; 'Philippi Bonanni Ordinum Religiosorum Catalogus,' 3 vols. 4to., Rom. 1706-8; 'Histoire des Ordres Monastiques Religieux et Militaires,' par le Père Hippolyte Hélyot, Par., 8 vols. 4to., 1714, &c.; and nouv. edit., 1792; Crome's 'Pragmat. Geschichte der vornehmsten Mönchsorden,' 10 vols. Leipz., 1774-83; Tanner's 'Notitia Monastica,' fol. 1744; Dugdale's 'Monasticon,' new edit. by Cayley and Ellis, 6 vols. fol., 1812-30; Fosbrooke's 'British Monachism,' 2 vols. 8vo., 1802. See also Thomasin, 'Discipline de l'Eglise,' tom. i.; Bingham's 'Antiquities of the Christian Church,' book vii.; and Gibbon's 'Dec. and Fall of Rom. Emp.,' chap. 37.)

MO'NACO, the Principality of, a small state in the Western Riviera of Genoa. It consists of the small towns of Monaco and Mentone and the village of Roccabruna, with a small territory about five miles in length along the coast, between Nizza and Ventimiglia, and extends inland about three miles. The country is rocky, being on the southern slope of the Maritime Alps, which here approach close to the sea. The town of Monaco is built on a steep naked rock rising above the sea-coast, is fortified, and has about 1000 inhabitants, and a harbour for small vessels. Mentone, farther to the east, lies on the sea-shore in a narrow strip of fertile land, sheltered by the mountains from the north winds, and planted with olive and lemon trees: it has a warm southern climate, and carries on some trade by sea. Mentone has about 4000 inhabitants, and a handsome church. Since the fourteenth century, this little principality has been in possession of the Genoese family of Grimaldi, under the protection of France and of the Genoese republic. The actual prince of Monaco, Onorato V., is a peer of France, and generally lives at Paris, but he acknowledges the king of Sardinia as his 'suzerain,' and the town of Monaco has a Sardinian garrison. He has a palace at Monaco and a handsome villa near Mentone. He draws from his little state a revenue of about 300,000 francs, 12,000*l.* sterling, of which less than one-half supplies the charges of the administration, and the rest is for the use of the prince. (Bertolotti, *Viaggio nella Liguria Marittima.*) The name of Monaco is derived from a temple dedicated to Hercules Monoecus, that is 'solitary,' which stood on the rock where the town now stands. Strabo (iv. 203) places it at the distance of 200 stadia from Antipolis, the modern Antibes.

MONAGHAN, a county in the province of Ulster in Ireland, bounded on the north by the county of Tyrone, from which, toward the north-east, it is separated by the river Blackwater; on the east by the county of Armagh, from which, in one part, it is separated by the river Fane; on the south-east by the county of Louth, on the south by that of Meath, and on the south-west by that of Cavan, from all three of which it is partly or entirely separated by the Lagan, a feeder of the Glyde; and on the west and north-west by the county of Fermanagh. The form of the county is that of an irregular quadrangle. Its greatest dimensions are the diagonals of the quadrangle: one from north by west to south by east, from the banks of the Blackwater to those of the Lagan, 37 miles; the other from west-north-west to east-south-east, from the neighbourhood of Clones to the neighbourhood of Inniskeen, on the Fane, 32 miles. The area of the county was given by Dr. Beaufort (*Memoir of a Map of Ireland*), in 1792, at 450 square English miles, or 288,000 English acres, and by Mr. Wakefield, in 1812 (*Account of Ireland, Statistica. and Political*), at 509 square miles. In the Population Returns for 1831 the area is given, 'from the best authorities extant,' at 277,472 acres; in the 'Map of Ireland' published by the Society for the Diffusion of Useful Knowledge, at 313,682 English or statute acres; and in Lewis's 'Topographical Dictionary of Ireland,' from the Ordnance Survey, at 327,048 statute acres, of which 9236 are unimproved mountain and bog, 6167 under water, and the rest cultivated land. The county is one of the most densely peopled in Ireland, being surpassed only by the counties of Dublin, Armagh, and Down: by the census of 1831 there were 195,536 inhabitants. Monaghan, the assize-town, is situated in the northern part of the county, 68 English miles in a straight line north-north-west of Dublin, or 76 miles by the mail-road through Drogheda, Carrickmacross, and Castle Blayney, in 54° 15′ N. lat. and 6° 57′ or 58′ W. long.

Surface.—'The whole county is hilly, but the hills seem as if scattered in an irregular manner, without forming continued ridges or chains.' (Wakefield.) The principal heights are, Slieve Baugh or Slieve Beagh Mountains, in the north, which define in that part the basin of the Blackwater; and those in the east, which rise about the sources of the Fane, and are connected with the Fews Mountains of Armagh. (Beaufort's *Map.*) Mully Ash hill in this group is 1035 feet high. The Slieve Beagh Mountains form an uninteresting waste along the boundary of this county and Tyrone, and are sterile without being picturesque.

Geological Character.—In the southern part of the county is a small district, extending to Kingscourt in the county of Cavan, occupied by the new red-sandstone or red marl. This formation contains a valuable deposit of gypsum, in which however no workings have yet been commenced for commercial purposes. Immediately adjacent to the red-marl district on the east is a small coal-field. Though many trials have been made to obtain coal, none has yet been found of sufficient value to defray the expense of working; but one bed of 14 inches, another of 12 inches, and several of inferior thickness, have been discovered. The coal-field rests on a small tract of carboniferous limestone, which crops out from beneath it on every side (except where the coal and red-marl districts are contiguous), and is itself insulated in the transition district of the east of Ulster. Carboniferous limestone appears again in that part of the county which lies north-west of a line drawn through Monaghan and Clones. The Slieve Beagh or Slieve Baugh Mountains in this part are composed of the rocks belonging to the Calp series of this formation. These rocks were long considered to belong to the true coal formation; and sanguine but fallacious hopes were long entertained of the discovery of workable beds of coal. This part of the county is comprehended in the great limestone district of the north and middle of Ireland. The yellow sandstone and sandstone conglomerate, which form the lowest members of the limestone series, appear in some places along the northern border.

The rest of the county is occupied by the rocks of the transition formation, which cover an extensive district in the east of Ulster and north of Leinster. These transition rocks consist of grauwacke slate, fissile clay-slate, flint slate, and chlorite slate, with hornblende slate, schistose porphyry, and other metamorphic rocks, where the transition and crystalline formations (granite, &c.) come in contact or approach near each other. Escars, or eskers, which are low steep ridges of alluvial matter, usually composed of clay and limestone gravel, are found in several parts of the county. Those near Tyhallon, not far from Monaghan, are composed entirely of jasper, quartz, agates, and argillaceous sand. (*Irish Railway Commissioners' Second Report;* Lewis, *Top. Dict.*)

Limestone of great variety and excellent quality is quarried; also fine marble, and valuable freestone for building. A fine white sandstone, dug in the Slieve Beagh Mountains, is extensively used for architectural purposes. Ironstone is found, but of inferior quality, and several quarries of slates or flagstones are worked. Lead-ore has been found, and considerable works were erected for smelting it, but they were afterwards abandoned. Some potters' clay is found, and brick earth in nearly all parts of the county. (Lewis's *Top. Dict.*)

Hydrography and Communications.—The northern part of the county belongs to the basin of the Blackwater, the southern to the basins of the Fane and the Glyde, and the western to the basin of the Erne. The Blackwater has about 10 or 12 miles of its course along the north-eastern boundary, and several streams which rise in the Slieve Beagh Mountains fall into it in this part. The Fane rises not far from Castle Blayney, and flows south-east, partly upon and partly within the border of the county, for 12 or 15 miles, before it enters the county of Louth, through which it flows into the Irish Sea. The Glyde rises in the south part of the county, and has a course parallel to the Fane; the Lagan, a feeder of the Glyde, and a much more considerable stream, has about 13 miles of its course along the southern boundary of the county. The Finn is the most important of the streams which flow into the Erne; it rises in the Slieve Beagh Mountains, and has about 20 miles of its course in this county. None of these rivers are navigable. There is one navigable canal, now in progress, the Ulster Canal, which is to unite Lough Neagh with Lough Erne. It commences in the river Blackwater at Charlemont, and crosses the county in a south-west direction near Monaghan and Clones. Its whole length, when finished, will be about 46 miles, of which about 20 will be in this county.

There are several loughs, but all of them small. The principal are, Muckno Lough, near Castle Blayney, in the eastern part of the county, and Inner Lough, on the south-west border, near Rockcorry. Muckno or Barrac Lough is of very irregular form, about 3 miles long from north-west to south-east, and in some parts about a mile wide: it contains a number of small islands. The river Fane runs through it. Lough Inner is about 3 miles long from east to west, exceedingly narrow throughout and of very irregular form. Lough Emy, near Emyvale, and Glas Lough, near the town of Glaslough, in the northern part of the county; Lough Leesborough, between Rockcorry and Newbliss, and Lough Long, near the village of Drum, in the western parts; the White Lough and Corfin Lough, near Ballybay, in the central parts; Lough Egish, or Eglish, Lough Avaghon, and Lough Bawn, near Ballytrain, in the southern part; Lough Ballyhoe (through which the Lagan runs), on the southern border of the county, and Lough Ross, on the eastern border, are next in size to Muckno and Inner.

The principal road is the mail-road from Dublin to Londonderry, which enters the county on the south-east side by two branches, and runs north-north-west through Carrickmacross (at or near which town the branches unite), Castle Blayney, Monaghan, and Emyvale, into the county of Tyrone. This is the only mail-road. A branch road runs from Carrickmacross by Ballybay, and rejoins the main line at Monaghan. Other roads lead from Carrickmacross to Dundalk, from Castle Blayney to Newry and to Armagh, and from Monaghan to Armagh, and by Clones to Cavan. A road from Dublin by Navan (Meath), Kingscourt, and Cootehill (Cavan), passes through Clones on the western side of the county, and joins the Londonderry mail-road at Omagh and Tyrone. The principal traffic is from the port of Dundalk (Louth), on the one hand, to Carrickmacross, and from thence to Shercock and Cootehill, in the county of Cavan; and on the other hand, to Castle Blayney and Monaghan: from the port of Newry (Down), on the one hand, by Castle Blayney, to Ballybay and Newbliss in this county, and to Shercock and Cootehill, in the county of Cavan; and on the other hand, by Newtown Hamilton (Armagh) to Monaghan: and from the port of Belfast (Antrim), by Armagh, to Monaghan, Clones, and Newbliss. The portion of road most frequented by travellers is that from Castle Blayney, where roads from Dublin, Dundalk, and Newry converge, to Monaghan.

Soil; Agriculture; Condition of the People.—The soil of the county varies much, and the variation is partly dependent on the character of the surface; the low lands being generally wet and moory, especially in the north-western parts near the Slieve Beagh Mountains. The central districts, comprehending the baronies of Monaghan, Cremorne, and Dartree or Dartry, are more fertile than any other part of the county; although the southern extremity consists of rich and productive land. The western side has a soil naturally wet, but capable of great improvement by manuring. (Lewis, *Top. Dict.*)

The following particulars from the Reports of the Commissioners for inquiring into the State of the Poor in Ireland' (*Parliamentary Papers for* 1836, vol. xxxiii.) have reference chiefly to the barony of Monaghan, but may be probably extended, without much variation, to the county at large. The soil of the barony is mostly a good loam, upon a firm subsoil of clay mixed with lime, gravel, or sand. In the elevated parts the soil is moory or peaty, with the subsoil frequently clayey. Lime, dung, clay, ashes, and peat are used for manure; lime is dug near Monaghan and Glaslough (barony of Trough)· marling is little practised, but burning the soil is common, though very injurious in most cases. The barony of Monaghan is altogether a tillage district, except some 'rough grazing' in the mountains, on which some young cattle are kept: there is no grazing-land in the district capable of fattening cattle. Sheep are so rare that the assistant commissioners did not see one in the barony, except in gentlemen's demesnes. The farms are too small to admit of keeping them with advantage, and the number has been gradually declining. The average size of farms is 8 to 10 acres; a few farmers, and but a few, in the barony held over 50 and not exceeding 80 acres. The only persons holding above 80 acres are gentlemen who farm their own estates. The size of the farms has diminished with the increase of population; and though the consolidation of the small holdings has been an object of desire with the landowners, little has been done to bring it about, except the insertion in leases of clauses to prevent alienation and sub-letting. About a fourth or fifth of the farm is always left for grazing. Ejections have been resisted by the peasantry when they have taken place from any cause.

Almost the whole county belongs to absentees, and the estates are consequently managed by agents. Farms are not commonly held by lease, and tenancy at will is becoming more common; where leases are granted, they are commonly for one life or for 21 years, formerly they were granted for three lives or 31 years. Middlemen are very rare. The rent of tillage land ranges from 25*s.* to 30*s.* and 32*s.* 6*d.* per Irish acre (121 Irish = 196 English acres), and in some instances it is as high as 40*s.*

The usual rotation of crops on a small farm is, potatoes, wheat or barley, oats (sown with clover), clover, then potatoes again; another not unusual rotation is, potatoes, flax, wheat or barley, oats with clover. The wheat grown is generally red wheat, and it is of inferior quality; this is partly ascribed to its being grown after potatoes, instead of on a naked fallow; partly to the weeds which are allowed to grow up with it; and partly to the want of proper machines for winnowing and screening it. It is not uncommon to thrash in the field, and winnow it in the open air by means of wind alone. The grain is sold in Monaghan market in the bulk: the peasantry keep little of their own grain, some cannot even keep the seed. Flax is grown to a great extent in the county, and is most valuable as a source both of industry and profit, but it is not equal in quality to that of the county of Armagh.

Clover and vetches are grown in abundance, but few turnips or mangel wurzel. Green crops, especially clover, have been increasingly raised of late years. The potato crop is very uncertain; the ground is commonly prepared for it by burning it for manure; the kind of potato cultivated for the peasantry are 'caps,' which will grow on inferior ground and yield a plentiful return. There are few orchards; the farmers do not consider them profitable.

From the want of good pasturage, no cattle are fattened, except a few on the demesnes of the gentry. The cattle of the district are chiefly of the native Irish breed, of a reddish colour with a streak of white along the back. They are mostly brought from Connaught, and are turned out to graze on the mountains. Many of them are housed in winter, but those of the poorer farmers get little hay, only some straw, and the run of the stubble-ground. The breed of cattle has been much improved; the Devon, Durham, and Hereford breeds have been introduced, and a few Ayrshire cows. The native breed has been crossed in several instances with the imported stock. The price of cattle is declining.

The quantity of butter made has much increased from the increased intercourse with England; the supply at Monaghan has trebled of late years. It is chiefly taken to market there, but some of it is sent to Newry. It is considered to be injured in the making by the smoke of the cabins, but increased pains have been taken with it, and it has been much improved. There is no cheese made.

The usual fences are loose stone walls, clay ditches, and some hedges of hawthorns and whins. There is much ground wasted in ditches and headlands.

The population of the county has been stated to be very dense; the number of labourers has increased, and the decline of the linen manufacture, which once furnished them with employment, has left the great majority with little other work than that which they bestow on the small spot of land which they occupy (for the con-acre system is generally prevalent), or such occasional occupation as they may receive. The daily wages of agricultural labourers are estimated, in the 'Appendix to the Third Report of the Commissioners for inquiring into the Condition of the Irish Poor' (*Appendix H.*, part 1, table iii.), at 10*d.* on the average of the year; and the average amount of work obtained by able bodied labourers is only about 180 days in the year, or little more than three days in the week. In this wretched condition they commonly marry early, and without making any provision. They usually pay their rent in work done for the farmer under whom they hold their con-acre and cabin. There is little employment for labourers' wives or children, except that the former earn the merest trifle by spinning, if they can spare the time, or a very few keep poultry; and the latter get a day's work now and then at weeding or looking after the cattle, for which they get about 3*d.* a day without diet, or from 10*s.* to 15*s.* for the summer season. The common food of the labourers is potatoes, which they prefer as constant food to bread or meal. They get a little milk or buttermilk, but very rarely. 'We think as much of a drink of buttermilk,' said a poor woman to the Commissioners, 'as you gentlemen do of the finest breakfast.' Their habitations are wretched cabins, sometimes with one room, it may be of 12 feet square and of 7 or 8 feet high; sometimes of two. The floor is the bare ground, usually dug up and trampled to make it harder; and sometimes, but not often, lime is mingled in with it. The cottages or cabins are thatched with straw, and mostly have chimneys built with sticks and clay, with perhaps an old firkin stuck up as a chimney-pot. The windows are about a foot square, rarely glazed; the doors and shutters usually have iron hinges, latches, bolts, &c. The cottages are without privies, but some have wretched little places for keeping a pig. They are inferior to those in the counties of Armagh and Down. The common fuel is peat or turf, which is used by all classes of the community: if they have not sufficient turf, they make up the deficiency with bushes and brambles.

The peasantry are wretchedly off for clothing. Many of them and their children are obliged to stay away from prayers for want of clothes; they borrow from each other, and some go in the morning and some in the evening.

Few of the women make their own clothes, but since the failure of employment at spinning, they are becoming more skilful with the needle. There are few cottages which do not contain some sort of bedstead, but this frequently contains five or six people; and if the family is very large, some straw is shaken down for a portion of them. Pawning appears to be on the increase, and the people are becoming used to it. 'At first, some years ago,' said a witness to the Commissioners, 'we used to go in the dusk to the pawnbroker's, but now I wouldn't care if all the people on the market-cross saw me. They know it is mighty pressure makes us do it.' Drunkenness has much increased. Retail spirit-shops have been multiplied, and there are a number of shebeen-houses, or unlicensed spirit-shops, which, being in remote places and under no control, are the sources of great immorality. Almost all the cases which come before the magistrates arise out of drunken squabbles; and young people steal flax or potatoes or meal from their parents to pledge them for liquor at the shebeen-houses. The intoxicating liquor in almost exclusive use is whiskey; beer is very little used. The tradesmen about the town, and the farmers who attend the markets, are the chief drunkards; the extreme poverty of the labourers prevents them from drinking.

Emigration has been considerable during the last few years, principally to the United States of America and to the Canadas. A very few persons have gone to Van Diemen's Land or New South Wales. Many farmers have sold their farms and gone, also some tradesmen, and a few labourers; but the emigrants have chiefly been persons of a station in life above that of common labourers, and have emigrated at their own expense. Several of them have been Protestants, and persons of good character and enterprising spirit.

Divisions, Towns, &c.—The county of Monaghan is divided into five baronies, which, with their situation and population, are as follows:—

			Pop. 1831.
Cremorne	.	Central and E.	51,892
Dartree or Dartry		Central and W.	40,135
Farney	.	S.	41,561
Monaghan	.	Central.	42,728
Trough	.	N.	19,220
			195,536

It contains the corporate, assize, and market town of Monaghan, formerly a parliamentary borough; the market and post towns of Carrickmacross, Castle Blayney, Ballybay, Clones, and Newbliss; and the post towns of Emyvale and Glaslough. The principal villages are Ballytrain, Smithsborough, Tydavnet, Scotstown, Scotshouse, Drum, Rockcorry, and Magheracloone.

Monaghan is on the mail-road from Dublin to Londonderry: the distance from Dublin has been already given. The antient boundary of the borough is stated in general terms in the charter to consist of 'the town of Monaghan,' that is, as far as the mere buildings are understood to have extended at the date of the Charter (A.D. 1613); but there is a district extending in every direction about three-quarters of a mile round the town, known by the name of 'The Corporation,' and divided into ten parts or 'townlands.' (*Report of Commissioners of Municipal Boundaries.*) The town itself consists of an irregular assemblage of streets, the three principal of which meet in a square called the Diamond, in the centre of the town. There is another square on the south-east side of the town called Shamble-square. The town contained, in 1831, 540 houses, inhabited by 690 families, forming a population of 3848 persons: there were 16 houses building and 25 uninhabited. In the Reports of the Commissioners of Irish Poor, the number of houses is given at about 900 (*Answers of Rev. John Caulfield to Queries for Parishes in large Towns, Third Report, Appendix C*, part i.), of which about 376 were good houses, 300 middling, and the rest mere cabins. The difference in the number of houses in the two statements is owing probably to the larger space included by Mr. Caulfield under the term 'town.' The population had however much increased in the interval, chiefly from the unwillingness of landlords to allow cottiers on their estates. The rest of the parish contained, in 1831, 1499 houses, inhabited by 1554 families: there were 13 houses building and 82 uninhabited. The population was 8027; giving a total for the town and the rest of the parish of 2039 inhabited houses, 2244 families, and 11,875 persons.

The principal public buildings are the county court house, a handsome modern building in the centre of the town; the county infirmary on the east side of the town, on an open elevated site; the county gaol on the north side; and the diocesan school on the west. There is a large and handsome parish church lately erected in the Gothic style of architecture, two Presbyterian and two Methodist meeting-houses; one Roman Catholic chapel in the town, and two others in other parts of the parish. There are a market-house and a linen-hall. Some antient walls, near the Diamond-square, are said to be the relics of an old monastery built for conventual Franciscans on the site of a former religious house; from one or other of which establishments the town (and from it the county) took the name of Monaghan or Muinechan, 'the monks' town.' There is also an earthen mound marking the site of a castle or fort erected here early in the seventeenth century, by Sir Edward Blayney, who had the military command of the county.

Monaghan has no manufacture: its principal trade is in the agricultural produce of the surrounding districts, which is brought to market here; and in linen, for which it is a considerable mart. The market-days are Monday for linen and for pigs, of which great numbers are slaughtered and sent to Belfast to be cured for exportation; Tuesday for corn, except oats, for which there is a market on Wednesday; and Saturday for oats and potatoes. The corn and potato markets are held in Diamond-square; the meat market in Shamble-square. Considerable quantities of flax, yarn, butter, and provisions of all kinds are sold. There is a fair on the first Monday in each month. The Ulster canal, when completed, will pass close to the town. The poor inhabitants are engaged in occasional labour about the town, but wages are very low, and the earnings of a labourer, if constantly employed, amount only to 8*l.* or 10*l.* in the year. The condition of the poor has been deteriorating for the last fifteen years: they subsist on potatoes, with sometimes a little milk. The tradesmen are better fed. There is a savings' bank, to which the principal contributors are farmers, tradesmen, and servants.

The corporation was created by a charter of 11 James I. (A.D. 1613), and consists of a provost, twelve free burgesses, and an indefinite number of freemen. The borough sent two members to the Irish parliament before the Union. Lord Rossmore, the patron, received 15,000*l.* as a compensation on its disfranchisement. The borough court of record has long fallen into disuse. The quarter-sessions for the division and the assizes for the county are held here; and there are petty sessions held by the county magistrates every week. The town is watched and lighted; and is the chief station of the county constabulary. The living is a rectory and vicarage, in the diocese of Clogher; the tithe composition rent is estimated at 553*l.* 16*s.* 11*d.* per annum; there is a glebe of 38 statute acres, valued at 114*l.* per annum, and a neat glebe-house. The Catholics form about two-thirds of the population. There are ten public schools, with about 1400 children; and seven private schools, in which are about 300 children. There are a dispensary, a mendicity society, and another society for the relief of the poor.

Carrickmacross is in the barony of Farney, in the south part of the county, 51 miles from Dublin on the Londonderry mail-road. It consists of one principal street along the road, and of several smaller streets or lanes leading from it. The number of houses in the town, in 1831, was 524 inhabited (by 555 families), 34 uninhabited, and 4 building; the population was 2979, one-fourth agricultural: the rest of the parish of Carrickmacross contained 1771 houses, inhabited by 1777 families; and 9621 inhabitants: together 2295 inhabited houses, and 12,600 inhabitants. Many of the houses are of respectable appearance. There is a church, a neat but small stone building, with a tower and spire; a Catholic chapel, and a Presbyterian meeting-house. There are two other Catholic chapels in different parts of the parish. Malting, brewing, and distilling are carried on in the town; coarse hats, soap, and candles are manufactured; and a considerable retail business is done. There are corn-markets on Wednesday and Saturday, and a general market on Thursday, at which many pigs are sold. There are quarries of freestone and limestone in the parish, and several lime-kilns near the town. A portion of the county constabulary is stationed here; there are a bridewell, a dispensary, and a mendicity society. There are two schools, one for boys and one for girls, connected with the Board of National Education, and nine other schools, in which the children are taught gratuitously; in these schools from 1400 to 1500 children are instructed. There are besides a number of private schools and hedge schools. The children on the roll of the two national schools amounted, by Mr. Carlile's statement in the Report of the Irish Education Board, July, 1837, to 538 boys and girls. There is a dispensary. The living is a vicarage, the gross yearly revenues of which are 646*l.* 3*s.* 1*d.* composition for tithe; and 252*l.* estimated value of the glebe, which comprehends above 181 statute acres. There is a glebe-house. The inhabitants are almost entirely Catholics.

Castle Blayney is in Muckno parish, in the barony of Cremorne, 62 miles from Dublin on the Londonderry mail-road. The town lies near the western shore of Lough Muckno, and comprehended in 1831, 307 houses, inhabited by 350 families, 2 houses building, and 32 unoccupied: the population was 1828, about one-fourth agricultural. The rest of the parish contained 1470 houses, inhabited by 1495 families, 3 houses building, and 89 uninhabited; with a population of 7888: the total population of the parish was 9716. The town derived its origin and name from a fort built here early in the seventeenth century by Sir Edward Blayney; and consists of three streets meeting in the market-place, in which is a good market-house. Many of the houses are built of stone, and are of respectable appearance. The parish church of Muckno, capable of holding 350 persons, is at Castle Blayney, and there is a Catholic chapel. The linen manufacture was flourishing here formerly. There is a market on Wednesday for yarn and flax, and a fair once a month for live stock; there are markets for corn and butter on Tuesday and Friday. Sessions for the division are held here in a neat sessions-house once a quarter; and petty sessions every fortnight; and a body of the county constabulary is stationed here. There is a small bridewell. The mansion and demesne of Castle Blayney, the seat of Lord Blayney, are near the town. There are a parochial school and a girls' school, supported by Lady Blayney. Besides the Catholic chapel at Castle Blayney, there is another at Orum in the parish, and at different places in the parish there are four meeting-houses for Presbyterians and one for Methodists. The Catholics form half the population, and the Presbyterians above a third. The living of Muckno is a rectory and vicarage, with a gross yearly revenue of nearly 475*l.*, above 436*l.* of which arises from tithe composition, the rest from a glebe of more than 32 statute acres. There is a glebe-house.

Ballybay, or Ballibay, is in Cremorne barony, 64 miles from Dublin, on a road branching from the Londonderry mail-road at Carrickmacross, and rejoining it at Monaghan. The town comprehended in 1831, 382 houses, inhabited by 384 families; and 19 houses uninhabited: the population was 1947: the remainder of the parish comprehended 781 houses, inhabited by 911 families, forming a population of 4738; or for the whole parish 6685: a small part of the parish extends into the barony of Monaghan. The town rose to importance through the linen manufacture, and now contains many respectable and comfortable houses. There are a market-house, a tolerably large church, a Catholic chapel-of-ease, and a handsome Presbyterian meeting-house. The linen manufacture is carried on, and there are markets on Saturday for butter and flax, and on Tuesday and Friday for grain, at all which much business is done. There is a monthly fair, at which large sales of cattle, horses, and pigs take place. Petty sessions are held at irregular intervals, and a party of the county constabulary is stationed in the town. There is a reading society with a library of 1000 volumes. There are in the parish a Catholic chapel (at Ballintrugh) and two Presbyterian meeting-houses, besides those in the town of Ballybay. The Catholics form not quite half of the population of the parish: the Presbyterians less than a third. There are a dispensary, four public schools, with about 260 children, and six hedge-schools, with about 200 children, beside two Sunday-schools.

Clones is in the barony of Dartree, in the western part of the county, 79 miles from Dublin through Navan (Meath) and Kingscourt and Cootehill (Cavan). The town contained in 1831, 386 houses, inhabited by 435 families; forming a population of 2381: there were 39 houses unoccupied and 4 building. The rest of the parish, which extends into Monaghan barony, and into the barony of Clonkelly in the county of Fermanagh, comprehended 3609 houses, inhabited by 3834 families, forming a population of 19,822, or with the town 22,203. Clones was, in antient times, nearly surrounded by water, and an abbey was founded early in the sixth century: from these circumstances the place obtained its name, Cluan Innis, 'the island of retreat;' from whence, by corruption, has been formed, first Cloanish or Clownish, and more recently Clones. The abbey continued till the dissolution under Henry VIII.: there are still some remains of the antient monastic buildings. The more modern houses in the town are slated; but the older ones are covered with thatch. The church was rebuilt in 1824, and is capable of holding 700 persons. There are a large Catholic chapel and a Wesleyan Methodist meeting-house. The market-place is of triangular form, and has in it a market-house, a pump, and an antient stone cross. There is a large brewery in the town; and in other parts of the parish are extensive iron-works for the manufacture of agricultural implements, and several flour-mills. Limestone and good freestone for building are quarried. A market is held weekly on Thursday for yarn and linen, and there are two monthly fairs, one in the town for pigs and live stock, and one at Rosslea, in that part of the parish which is in the county of Fermanagh. Petty sessions are held every fortnight, and a manorial court once a month for the recovery of small debts: a portion of the county constabulary is stationed in the town.

Beside the places of worship mentioned above, there are in the parish two chapels-of-ease, three Roman Catholic chapels, two Presbyterian meeting-houses, and one Wesleyan Methodist meeting-house. There are a number of schools in the parish, aided, if not wholly supported, by subscription, and affording instruction to about 1900 children.

Some of them are in connection with the National Board. Nearly 300 children are under instruction in private schools. There is a dispensary. The living is a rectory and vicarage, of the gross yearly value of 2000*l.* 6*s.* 8*d.*, of which 950*l.* arises from tithe composition, and the rest from a glebe of above 1242 statute acres. There is a glebe-house. By the Romish church the parish is divided into two districts, Clones East and Clones West; each part has two chapels. Near the ruins of the abbey is one of the antient round towers. The internal diameter is 10 feet; and there are resting-places for the joists of five floors. There is a doorway about 4 feet from the ground; and at the top of the tower are large embrasures. There is another round tower in the parish.

Newbliss is in Killeevan parish, in the barony of Dartree, about 5 miles from Clones. It is a small place, containing in 1831 only 85 houses, inhabited by 105 families, making up a population of 497; there were 9 houses unoccupied, and 1 building. The number of houses in the rest of the parish, which extends into the barony of Monaghan, was 1393, inhabited by 1538 families, making up a population of 7764; or, with the town, of 8261. The town consists of a single street of good width: the houses are of respectable appearance. The parish church of Killeevan is nearly midway between Newbliss and Clones: but there is a neat Presbyterian meeting-house in the town. There is a neat market-house: the market is on Saturday, chiefly for pigs and flax; and there is a monthly fair, chiefly for pigs and live stock. There are in the town a dispensary and a school which is maintained by the London Hibernian Society. There are in other parts of the parish a Catholic chapel, six public and four private schools, in which (taken together) above 900 children are taught. The church and Catholic chapels are neat buildings. The living is a rectory and vicarage, with a gross yearly income of 653*l.* 5*s.* 5*d.*, of which 518*l.* 15*s.* 5*d.* is tithe composition; the rest arises from a glebe of about 110 acres: there is a glebe-house.

Emyvale is in the parish of Donagh, in the barony of Trough, in the northern part of the county; it is 91 miles from Dublin and 15 from Monaghan, on the Londonderry mail-road. It contained in 1831, 112 houses, inhabited by 122 families, beside 10 unoccupied, and 1 building: the population was 571. The town consists chiefly of one street, and is on the north bank of a small stream running into the Blackwater. On the bank of the stream is a large flour-mill, and in its bed is a quarry of greenstone. A body of the county constabulary is stationed here.

Glaslough, or Glasslough, is also in the parish of Donagh and barony of Trough, six or seven miles north-east of Monaghan. It is rather larger than Emyvale, containing, in 1831, 153 houses, inhabited by 168 families, and 5 unoccupied houses; the population was 812. The town is on the margin of a beautiful lake (Glas Lough, 'the green lake'), and contains a number of good houses roofed with slate. A large flour-mill, a mill for spinning flax, and a linen factory have been erected; and a weekly market on Friday for corn and flax established. There is a monthly fair for stock and agricultural produce. There is a dispensary. A castle and demesne, the residence of Mrs. Leslie, are near the town. The parish church of Donagh, built half a century ago, and capable of containing 400 persons, is in the town. The parish of Donagh is large, and has a gross population of 11,068. It has two Catholic chapels, a Presbyterian and a Wesleyan meeting-house. The benefice is a vicarage, with a gross yearly revenue of 221*l.*, viz. 155*l.* tithe composition, and the rest the produce of a glebe of above 71 acres.

The villages are all small. Ballytrain, or Bellatrain (in Aughnamullen parish, Cremorne barony), had, in 1831, 42 houses, inhabited by as many families, making a population of 220. It is the station of a body of the constabulary force, and has eight yearly fairs for cattle, sheep, and pigs. It has a small Catholic chapel and a dispensary. In the neighbourhood are several antient forts. Smithsborough owes its name to a person of the name of Smith, who established monthly fairs in the latter part of the last century. It is in Clones parish, and in the barony of Monaghan. In 1831 it had 48 houses, inhabited by 50 families, making a population of 244. There is a Presbyterian meeting-house, a school, and a dispensary. All the fairs except one in the year have been given up. There is a body of the constabulary stationed here. Tydavnet, or Tedavnet, and Scotstown, are in the parish of Tydavnet, in the barony of Monaghan; both are stations of the constabulary, and Scotstown has a dispensary. Tydavnet has five yearly fairs, and Scotstown one every month. Scotshouse is in the parish of Currin, in the barony of Dartree. The parish church, capable of holding 400 persons, is in the village; and a body of the county constabulary is posted there. Drum is also in Currin parish, and in the barony of Dartree. It is near a small lake, Lough Long. It has a monthly fair, a small chapel-of-ease, two Presbyterian meeting-houses, a school, and a dispensary. The population in and about Drum contains a larger proportion than usual of members of the Established church. Rockcorry, though classed by our authorities among villages, is really a small market-town; it consists of a wide street with a neat market-house, and has many houses of respectable appearance. It has a market on Wednesday, and a monthly fair. Petty-sessions are held every fortnight, and a party of police is stationed here. There are neat meeting-houses for Presbyterians and Wesleyan Methodists; and there are an infant-school, a sewing-school, and a dispensary. Magheracloone, or Magheracloony, is in the barony of Farney, a short distance from Carrickmacross. It has a neat modern church.

Divisions for Ecclesiastical and Legal Purposes.—The county is wholly included in the diocese of Clogher, and contains the whole or part of twenty-three parishes, of which only two are united so as to form one benefice. Of the twenty-two benefices, fourteen are rectories and vicarages united, two rectories, and six vicarages. With respect to value, one is of 2000*l.* a year, one 1015*l.*, one 969*l.*, two from 800*l.* to 900*l.*, one 744*l.*, four of from 600*l.* to 700*l.*, one of 551*l.*, six of from 400*l.* to 500*l.*, two of from 300*l.* to 400*l.*, two of from 200*l.* to 300*l.*, and one of 118*l.* There are twenty-two parish-churches and five chapels-of-ease. The churches are smaller than the generality of English churches; one of them (at Monaghan) is however capable of containing 1100 persons: many of them have been erected within the last twenty years. Divine service is commonly performed twice on the Sunday, beside services on holidays. In winter the second service is sometimes discontinued. The consistorial court of the diocese of Clogher is held at Monaghan, where is also the diocesan school.

In the territorial arrangements of the Catholic church the county is included in the Catholic diocese of Clogher, the bishop of which has the cure of the parish of Carrickmacross. There are forty-six Catholic chapels, and twenty-four meeting-houses for Presbyterians (of various classes) and eight for Methodists. The population of the parishes which are wholly or partly in this county is about 208,000, which may be thus distributed: belonging to the Established church 32,000, Catholics 151,000, Presbyterians or other Protestant dissenters 25,000. (*Reports of Commissioners of Public Instruction.*)

For judicial purposes the county is included in the north-east circuit, which comprehends the eastern part of Ulster. The county court-house and county-gaol are at Monaghan, where the assizes are held. Quarter-sessions are held at Monaghan and at Castle Blayney. Petty sessions are held at Monaghan, Clones, Castle Blayney, Ballybay, and Rockcorry. There are bridewells at Castle Blayney and Carrickmacross. The county-gaol is well managed; its good order, economy, and regularity are highly creditable to those who direct it; and there is sufficient accommodation in cells and day-rooms for all the purposes of classification and discipline. The prisoners are all employed, chiefly at stone-breaking; and there is a tread-wheel for those who are sentenced to hard labour. There is an excellent school, and the females are attended to under a qualified matron. The bridewells are small, but clean and orderly, and the management of them is conducted with the greatest regularity. (*Reports of Inspectors of Prisons.—Fifteenth Report.*) The number of persons committed for trial or bailed, in 1836, was 360; of these 158 were for crimes against the person; 27 for housebreaking or other offences against property committed with violence; 63 for offences against property without violence; 50 for malicious offences against property, 2 for uttering base coin, and 60 for other offences. Of the whole number, 288 were convicted, and 72 acquitted or discharged. No execution took place in the year. Of those committed or bailed, 302 were males (14 under sixteen years), and 58 females (1 under sixteen years); 156 could read and write, 116 could read only, and 88 could neither read nor write. The proportion of the number of offenders to the whole population of the county is considerably below the average of Ireland, but above the average of the province of Ulster.

The number of the constabulary force in employment on the 1st of January, 1836, was 4 chief constables or sub-inspectors of the first class, 20 constables, and 116 sub-constables, with 5 horses. The expense of this force for the year 1835 was 5110*l.* 17*s.* 1*d.*, of which 2411*l.* 9*s.* 11*d.* was chargeable against the county. The amount of grand-jury presentments, in 1835, was 17,071*l.* 8*s.* 2*d.*, viz. 810*l.* 1*s.* 3*d.* for new roads, bridges, &c., 7045*l.* 17*s.* 0½*d.* for repairing roads, bridges, &c., 1535*l.* 5*s.* 9½*d.* prisons, 2537*l.* 10*s.* 3½*d.* police establishment, 2367*l.* 15*s.* 5½*d.* salaries of county officers, 1676*l.* 16*s.* 2½*d.* repayment of government advances, 465*l.* 19*s.* 7*d.* public charities, &c., 632*l.* 2*s.* 6½*d.* miscellaneous expenses.

The county is in the district of the Armagh Lunatic Asylum. The county infirmary or hospital is at Monaghan, and there are dispensaries at Ballytrain, Farney, Scotstown, Castleshane, Smithsborough, Ballybay, Clones, Newbliss, Drum, Rockcorry, Monaghan, Carrickmacross, and Glaslough. There were, according to the Return of the Rev. James Carlile (May 3, 1837), in the county 43 schools in connection with the National Board of Education, on the roll of which were 5464 scholars, in attendance 3406; of those whose religious sentiments (or those of their friends) were known, 484 were Protestants and 1689 Catholics.

History and Antiquities.—In the invasion of Ireland by the Anglo-Normans, Henry II., having bestowed all Ulster on John de Courcy when he could conquer it, that chieftain overran various parts (A.D. 1177), and built castles to secure his conquests. Among others he built two in the district now the barony of Farney in this county,[*] and gave them in charge to Macmahon, an Irish chieftain, who had ingratiated himself with him. MacMahon demolished these castles, upon which De Courcy made an inroad into the territory of the chieftain, and drove away a great number of cattle. He was followed and defeated by the natives, who had assembled to the number of 11,000; but in the course of the following night, availing himself of their careless security, he defeated them in turn with fearful slaughter, and secured his booty.

The English dominion in this part of Ireland was very imperfect. In the reign of Henry IV. we find that the district of Ferney was still held by a chieftain of the race of MacMahon, to whom Thomas of Lancaster, son of Henry, granted or confirmed it at a certain rent. The English retained however a castle in the district.

In the reign of Henry V. the MacMahons seem to have risen in arms, for they are noticed among the septs whom Talbot, Lord Furnival, the lord-lieutenant, brought into the king's peace. All he was able to do appears to have been to prevent open rebellion, without extending or strengthening the authority of the English government. Little is known of the subsequent condition of the district, or the events that occurred in it, until the reign of Elizabeth, under whom great progress was made in reducing the country to more complete subjection. In the year 1568 the Irish parliament assembled at Dublin passed an act for dividing into shires that part of the kingdom which had not yet been so arranged, and Monaghan was one of the shires constituted at this time. The country however still remained in an unsettled state, for Sir Henry Sidney, when lord-deputy for the last time, received the submission of MacMahon (A.D. 1575 or 1576). But shortly after, on occasion of a murder committed by MacMahon, the lord-deputy 'marched into MacMahon's country, and burned and otherwise destroyed it.' In 1584 MacMahon again 'submitted' to the lord-deputy, Sir John Perrot, who either divided Ulster into counties, or rendered effectual the division which had been before made, and placed sheriffs, justices of the peace, and other officers in them. The proprietorship of the county still remained in the hands of the chieftain of the MacMahons; but on a charge, true or false, of raising forces to exact the payment of the rents due to him, Hugh Roe MacMahon was tried, and executed at the town of Monaghan (A.D. 1589) by the lord-deputy, Sir William Fitzwilliams, and his lands bestowed on some of his kinsmen and other persons, to hold under a yearly rent. In the troubles excited in following years by the earl of Tyrone, the county was the scene of hostilities, and a portion of the MacMahons appear to have joined Tyrone. The English had a fort at Monaghan. In the settlement of Ulster (A.D. 1608), on the forfeiture of the estates of such as had been engaged in the rebellion of Sir Cahir O'Doherty, Monaghan does not appear to have been included, though the adjacent counties were. The corporation of Monaghan was however one of those erected about this time to strengthen the Protestant and English interests.

In the great rebellion of 1641 Monaghan was one of the counties that early came into the power of the insurgents, and in the course of the subsequent struggle was included in the seat of war; but no events of particular interest occurred within it. In the war of the Revolution of 1688 a sharp conflict took place at Glaslough, in which the Protestants were victorious, though with the loss of their leader, Mr. Anketel, a gentleman of property in the neighbourhood. In the rebellion of 1798 the county appears to have been scarcely if at all disturbed.

(Beaufort's *Map of Ireland and Memoir*; *Second Report of the Irish Railway Commissioners*; *Reports of Commissioners for Inquiring into the state of the Poor in Ireland; and other Parliamentary Papers*; Lewis's *Topographical Dictionary of Ireland*; Wakefield's *Account of Ireland*; Cox's *History of Ireland.*)

MONARCHY, from the Greek *μοναρχία*, a word compounded of *μόν,ος*, 'alone,' and the element *ἄρχ,ω*, 'govern,' and signifying the 'government of a single person.' The word *monarchy* is properly applied to the government of a political community in which one person exercises the sovereign power. [SOVEREIGNTY.] In such cases, and in such cases alone, the government is properly styled a monarchy, and the supreme ruler is properly styled a monarch. Examples of monarchy, properly so called, are afforded by many Oriental governments, both in antient and modern times, by the governments of France and Spain in the last century, and the existing governments of Russia, Austria, and the several states of Italy.

But since monarchs have in many cases borne the honorary title of *βασιλεὺς*,[*] *rex*, *re*, *roi*, *könig*, or *king*, and since persons so styled have, in many states not monarchical, held the highest rank in the government, and derived that rank by inheritance, governments presided over by a person bearing one of the titles just mentioned have usually been called *monarchies*.

The name *monarchy* is however incorrectly applied to a government, unless the king (or person bearing the equivalent title) possesses the entire sovereign power; as was the case with the king of Persia (whom the Greeks called 'the great king,' or simply 'the king'), and in more recent times with King Louis XIV., called by his contemporaries the *Grand Monarque*.

Now a king does not necessarily possess the entire sovereign power; in other words, he is not necessarily a monarch. Thus the king has shared the sovereign power either with a class of nobles, as in the early Greek states (Müller's *Dorians*, b. iii., c. 1), or with a popular body, as in the Roman kingdom, in the feudal kingdoms of the middle ages, and in modern England, France, Holland, and Belgium. The appellation of *monarch* properly implies the possession of the entire sovereign power by the person to whom it is affixed. The title of *king*, on the other hand, does not imply that the king possesses the entire sovereign power. In a state where the king once was a monarch, the kingly office may cease to confer the undivided sovereignty; and it may even dwindle into complete insignificance, and become a merely honorary dignity, as was the case with the *ἄρχων βασιλεὺς* at Athens, and the *rex sacrificulus* at Rome. (Creuzer's *Abriss der Römischen Antiquitäten*, § 133.)

In Sparta there was a *double* line of hereditary kings, who shared the sovereign power with some other magistrates and an assembly of citizens. The government of Sparta has usually been termed a republic, but some antient writers have called it monarchical, on account of its kings; and Polybius applies the same epithet to the Roman republic, on account of its two consuls. (*Philological Museum*, vol. ii., p. 49, 57.)

States which were at one time governed by kings possessing the entire sovereign power, and in which the king has subsequently been compelled to share the sovereign power with a popular body, are usually styled *mixed monarchies* or *limited monarchies*. These expressions mean that the person invested with the kingly office, having once been a monarch, is so no longer; and they may be compared with such expressions as *νᾶες, ἆναες*, which occur in the Greek poets.

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[*] It is not to be assumed that the limits of the antient district and the modern barony exactly coincided.

[*] On the correspondence of *βασιλεὺς* and *rex*, see Gibbon's 'Decline and Fall,' c. 49 (vol. vi., p. 252); and on the etymology of *könig* and *king*, see Donaldson's 'New Cratylus,' p. 417.

Governments are divided into *monarchies* and *republics;* and therefore all governments which are not monarchies are republics. As we have already stated, a monarchy is a government in which one person possesses the entire sovereign power; and consequently a republic is a government in which the sovereign power is shared between several persons. [REPUBLIC.] These definitions of *monarchy* and *republic* however do not agree with existing usage; according to which, the popular though royal governments of England and France, for example, are monarchies (viz. *mixed* or *limited* monarchies), not republics.

The popular usage of the terms in question, to which we have adverted, is mainly owing to three causes. 1. Kings not possessing the entire sovereign power have in many cases succeeded kings who did possess the entire sovereign power; in other words, kings not monarchs have in many cases succeeded kings who were monarchs. 2. Both in royal monarchies and in royal republics, the crown or regal title usually descends by inheritance. 3. Kings who are not monarchs usually affect the state of monarchs properly so called; they intermarry only with persons of monarchical or royal blood, and refuse to intermarry with persons of an inferior degree.

Governments such as those of England and France are included by popular usage, together with republics, in the term 'free or constitutional governments,' as distinguished from pure monarchies, absolute monarchies, or despotisms.

According to the existing phraseology therefore, the use of the two terms in question is as follows:—

Monarchies are of two sorts, viz. *first*, pure, absolute, or unlimited monarchies, that is, monarchies properly so called; and, *secondly*, limited, mixed, or constitutional monarchies, or monarchies improperly so called, that is, republics presided over by a king, or kingly governments where the king is not sovereign.

Republics are states in which several persons share the sovereign power, and in which the person at the head of the governing body does not bear the title of king. Accordingly, Holland with a stadtholder, Venice with a doge, and England with a protector, are called republics, not monarchies. If the head of the Venetian aristocracy had been styled king instead of doge, and if his office had descended by inheritance instead of being conferred by election, Venice would have been called a monarchy, and not a republic. The only exception to this usage of which we are aware occurs in the case of Sparta, which is commonly called a republic, and not a monarchy, although it had hereditary kings. The reason of this exception probably is, that there being *two* lines of kings at Sparta, it was thought too gross an inaccuracy to call its government monarchical; though its government would have been called monarchical, if there had been only one king, in spite of the narrow powers which that king might have possessed.

The comparative advantages of a popular or republican government and of a monarchical government have been stated, with greater or less completeness and candour, by many writers. The best statement of the advantages of monarchy (properly so called), with which we are acquainted, is in Hobbes's 'Leviathan,' part ii., c. 19.

MONAS. [MICROZOARIA.]

MONASSA, Vieillot's name for a genus of Birds (Hermit Birds of Swainson and others). [KINGFISHERS, vol. xiii., p. 227.]

MONASTEREVEN. [KILDARE.]

MONASTERY. [MONACHISM; MONK.]

MONBODDO, JAMES BURNETT, styled LORD (in his quality of one of the judges of the Court of Session), was born in 1714, at the family seat of Monboddo, in Kincardineshire, and after studying at Aberdeen, was sent to the university of Groningen, according to a custom then common in Scotland, where an education either at a Dutch or French university was considered indispensable for young men intended either for the profession of law or for that of physic. Lord Monboddo has himself mentioned that his father, whose eldest son he was, sold part of his estate in order to afford him this advantage. He returned home in 1738, and from that time practised as an advocate at the Scottish bar, till his elevation to the bench in 1767. He is known in the literary world by two learned but paradoxical works: the first entitled 'A Dissertation on the Origin and Progress of Language,' in 6 vols. 8vo., 1774-92; the second entitled 'Antient Metaphysics,' in 6 vols. 4to., 1778, &c. An exclusive and somewhat intolerant admiration of the language, literature, and philosophy of the antient Greeks, some singular notions about men being only a civilised species of monkeys, a preference for the virtues and happiness of the savage state, and a general credulity in favour of the marvellous, are, in addition to very considerable erudition, among the most remarkable peculiarities of these performances. Lord Monboddo however was also esteemed a good lawyer and judge, and his character in all other relations was of the highest respectability. A description of his person and conversation has been given by Boswell in his 'Tour to the Hebrides,' in an account of a visit paid to him by Dr. Johnson at Monboddo (pp. 73-85). In a note Boswell says, 'There were several points of similarity between them; learning, clearness of head, precision of speech, and a love of research on many subjects which people in general do not investigate. Foote paid Lord Monboddo the compliment of saying that he was an Elzevir edition of Johnson.' Some further account of him may be found in Kerr's 'Memoirs of Smellie' the Edinburgh printer (vol. i., pp. 409-415). Smellie, we are told, used to be a frequent visitor at what his lordship called his *learned suppers*. 'In imitation of the antients,' says Smellie's biographer, 'for whom he professed an enthusiastic admiration, Lord Monboddo always made supper his principal meal, and his regular time of entertaining his friends. These learned suppers used to take place once a fortnight during the sitting of the courts; and among the usual guests were the late Dr. Black, Dr. Hutton, Dr. Hope, Dr. Walker, Mr. Smellie, and other men of science and learning, of whom Edinburgh at that time furnished an ample store.' Lord Monboddo died at Edinburgh, in consequence of a paralytic stroke, on the 26th of May, 1799.

MONDE'GO, River. [PORTUGAL.]

MONDOVI', a province of the Sardinian territories, on the north side of the Ligurian Apennines, which separate it from the Western Riviera of Genoa, is bounded on the east by the province of Acqui, on the west by that of Cuneo, and on the north by the provinces of Saluzzo and Alba. The province of Mondovi consists mainly of the basin of the Upper Tanaro, which river has its source near Ormea, at the foot of the Ligurian Apennines, and flows northward by Ceva; it receives the Ellero and Pesio on its left bank, and farther down the Stura, which comes from Coni; the Tanaro then enters the province of Alba, and continues its course towards the Po. The length of the province of Mondovi, from south to north, from the source of the Tanaro to Cherasco, which is at the confluence of the Stura and the Tanaro, is near 40 miles; and its breadth, from the ridge of hills which divide the valley of the Tanaro from that of the Bormida, or province of Acqui, to the limits of the province of Coni, is about 15 miles. The population of the province is stated by Serristori (*Saggio Statistico*) at 118,000. The principal towns are—1. Mondovi, built partly on the bank of the river Ellero, an affluent of the Tanaro, and partly on a hill which rises above it: it is surrounded by walls, has a strong castle, several churches and convents, and 15,700 inhabitants. (*Calendario Sardo.*) Mondovi is a bishop's see, has a clerical seminary and a royal college, and manufactories of silks, woollens, cottons, paper, and hats. The country around is rich in corn, vines, mulberry-trees, and cattle. 2. Cherasco, a regularly built town, at the confluence of the Stura and the Tanaro, a fortified town with a castle, has several churches and convents, a college, two hospitals, and 8300 inhabitants. Silk is the principal produce of its territory. Cherasco has some fine buildings, such as the town-house, the palace of the noble family Salmatoris, and that of Gotti. Several of the churches and private houses are adorned with paintings by Taricco, a native artist. The district of Cherasco is well known for its white truffles, which are reckoned the best in Piedmont, a country renowned for truffles. 3. Ceva, at the foot of the Apennines, has a castle, two churches, a college, silk manufactories and iron-forges, and 3500 inhabitants. 4. Garessio, near the sources of the Tanaro, has 5300 inhabitants. 5. Bene, on the road from Mondovi to Cherasco, has a castle, some good buildings, and 5000 inhabitants. 6. Dogliani, on the road from Ceva to Cherasco with a college and 4000 inhabitants.

It was by Mondovi and the valley of the Tanaro that Bonaparte first penetrated into Italy, in April, 1796.

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MONEY is metal coined for the purposes of commerce, usually stamped with the name and arms of the prince or state that directs it to pass current. In a more enlarged sense, money means any representation of property, whether as coin or in the form of paper—the circulating medium. For money in this latter sense, and for our monetary system, the reader may refer to the articles BANK; BILL OF EXCHANGE; CURRENCY; EXCHANGE; and INTEREST.

The earliest currency of metal has been already treated of under COIN, together with the denominations, as far as they are known, of the different moneys current among the chief nations of antiquity, as well as in our own country. In the latter a more particular account of one or two coins was omitted; the FARTHING for instance, and the GUINEA, both of which have been referred to the present article.

Although FARTHINGS are asserted to have been round coins in the time of some of the later Saxon kings, they usually at that period consisted of the fractions or parts of the penny broken into four. Instances of pennies neatly and accurately cut into halves and quarters occur almost wherever Saxon coins have been discovered. The feorðling, or fourthling, as money, is twice mentioned in the Anglo-Saxon version of the gospels (*Matt.* v. 26; *Luke* xxi. 2).

GUINEA. The unite, as it was called, or twenty-shilling piece, was first coined by King James I. It was continued under King Charles I., and under Cromwell. Snelling (*View of the Gold Coin and Coinage of England*, p. 29), speaking of Charles II.'s coinage of 1662, says, the term twenty-shilling piece is still kept in the indentures; the appellation of *Guinea*, given to it, was because great quantities of them were coined out of gold brought from the Guinea coast by the Royal African Company, which are distinguished by an elephant under the head, some a castle, others without, which was continued under each reign until George I., though but a few are to be seen thus marked, either of him or of Queen Anne. The guinea of Charles II. had not been long in currency before common consent had raised it to twenty-one shillings. About the æra of the Revolution, James II.'s guinea was paid and received at twenty-one shillings and sixpence. In the reign immediately subsequent, the gold money remaining without alteration in weight and fineness, and the silver money growing daily of less value by clipping and counterfeiting, occasioned twenty-five shillings, then twenty-eight shillings, and at last thirty shillings to be given for a guinea; but no sooner was the silver money restored to its first value by the grand recoinage, than the guinea was again reduced, first to twenty-eight shillings, then to twenty-six, and finally to twenty-two shillings, and soon after by common consent was paid and remained as before at 21*s.* 6*d.*, and continued at that price for twenty years after. In 1717 the guinea was reduced to twenty-one shillings, at which it continued till the latter part of the reign of George III., when the coining of guineas ceased, and twenty-shilling pieces were again coined under the name of sovereigns.

Several other coins, ancient and modern, have been already disposed of under ANGEL; AS; AUREUS; BEZANT; BILLON; CROWNS OF THE SUN; DARIC; DENARIUS; DENIER; DRACHMA; LIVRE; and LOUIS D'OR.

We shall now lay before our readers as concise an account as possible of the money which forms the present or has formed the recently existing metallic currency of modern nations, taking them alphabetically:—

Abassi, or *Abassee*, a Persian coin of the value of 5¾*d.*

Abuguelp, or *Albuguelp*, see *Griscio*.

Albert's Dollar is a coin known in Holland, with its half and quarter, at 50, 35, and 12½ stivers. The term is used also as a money of account at Libau and Riga. The intrinsic value of a metallic Albert's Dollar is 4*s.* 4½*d.*

Albus, a small coin and money of account, at Cassel, Cologne, and other places in Germany; the value of the albus was less than ½*d.*

Altmichlic, a Turkish silver coin of 60 paras, value 3*s.*

Asper, a very small Turkish coin and money of account. 120 aspers = 1 piastre.

August d'Or, a gold coin of Saxony, double, single, and half; reckoned at 10, 5, and 2½ rix-dollars. The august of 1754 was worth 16*s.* 2*d.*; that of 1784, 16*s.* 3¾*d.*

Bagattino, a Venetian copper coin, a half soldo.

Bajoccho, or *Soldo*, a copper coin at Rome, Bologna, &c., divided into 12 denarii, or 5 quattrini; worth a trifle more than a halfpenny; there are also double and single bajocchelli, at 4 and 2 bajocchi.

Bajoire, a silver coin of Switzerland, of 3 livres 15 sols current.

Barbone, a silver coin in Lucca, of 12 soldi, half and quarter in proportion. The barbone is worth rather more than 4*d.*

Basarucco, a small tin coin current at Goa on the Malabar coast. These are called bad basaruccos; there are others called good ones, of copper; all the coins of Goa are of the same two descriptions and denominations.

Batzen, a base silver coin in Switzerland, and also in some parts of Germany, as at Augsburg. At Basle, a good batzen is 4 creutzers; a Swiss batzen, 2 sous, or 3⅓ creutzers. Each batzen contains 10 rappen. Silver pieces of 40 and 20 batzen, and base silver pieces of 10 and 5 batzen, were published under the Helvetic republic between 1798 and 1803. The Swiss batzen is nearly 1⅓*d.* English.

Bendiky, a gold coin of Marocco, of the value of 9*s.*

Beslick, a Turkish silver coin worth about 3*s.* 2½*d.*

Bit, or *Bitt*, a small coin in the West Indies, worth 5½*d.*

Blaffert, a small coin at Cologne, worth 4 albuses.

Blankeel, or *Blanquello*, a small coin and money of account in Marocco. It is worth about 1*d.*

Bolognino, a copper coin at Bologna and its neighbourhood, the same with the bajoccho.

Borbi, or *Burbi*, a coin in Egypt, of copper, eight of which go to a medino. Borbies are also current at Tunis.

Borjookes, the name for the glass-beads which pass as small money in Abyssinia.

Cagliareso, a copper coin in Sardinia.

Cahaun, see *Cowries*.

Carlino, a small coin and money of account in the kingdom of Naples and in Sicily: it contains 10 grani, worth 4½*d.* In Piedmont the carlino is a gold coin; coined before 1785 it was of the assayed value of 5*l.* 18*s.* 8*d.*; subsequent to that year, 5*l.* 12*s.* 3*d.* The half, &c. in proportion.

Carolin d'Or, or simply *Carolin*, a gold coin of Bavaria, Hesse-Darmstadt, and Wirtemberg, value 20*s.* 4½*d.*

Cash, a small coin in China, and India beyond the Ganges. It is the only coin used in China. It is not coined but cast. It is composed of 6 parts of copper and 4 of lead; round, marked on one side, and rather raised at the edges, with a square hole in the middle. These pieces are commonly carried like beads on a string or wire. A tale in account of fine silver should be worth 1000 cash, or about 6*s.* 8*d.*; but on account of their convenience for common use, their price is sometimes so much raised that only 750 cash are given for the tale. Cash is sometimes called *Caxa*. In Sumatra cash are small pieces of tin or lead, 2500 of which go to a mace.

Cent, or *Centime*, a money of account in the new system of France, and a coin in the United States of North America. In France the centime is the hundredth part of the franc. In the money of the United States the cent is the hundredth part of a dollar, and contains 208 grains of copper. Half cents are coined in the same proportion.

Chayé, a small silver coin of Persia, of the value of 2½*d.*

Commassee, a small copper coin, containing a little silver, made use of at Betelfagui, or Betlefackee, in Arabia.

Copang, or *Coban*. The old copangs weigh 371 Dutch asen, or 275 English grains, and the gold is said to be 22 carats fine; this would give 2*l.* 4*s.* 7*d.* sterling for the value of the old copang; but it must be observed that the Japanese coins are reckoned at Madras only 87 touch, which is 20⅞ carats, and this reduces the value of the old copang to 2*l.* 1*s.* 10*d.* sterling. The new copangs weigh 180 English grains, and the gold is about 16 carats fine, which gives their value 21*s.* 3*d.* sterling.

Copeck, see *Kopek*.

Coronilla, or *Veinten de Oro*, a Spanish coin of gold, of the value of 4*s.* 0½*d.*

Cowries. Kelly, under 'Calcutta in Bengal,' says, 'Accounts are sometimes kept in the inferior departments of business in cowries, a species of small sea-shells, which, as long as they remain unbroken, are used as money in small payments; and 2560 cowries are generally reckoned for a current rupee; but they have intermediate divisions, thus 4 cowries make 1 gunda; 20 gundas, 1 punn; 4 punns, 1 anna; 4 annas, 1 cahaun; and 4 cahauns, 1 current rupee; but the last proportion is variable. Cowries are also used for money at Scindy on the Malabar coast, at Siam on the farther peninsula, and in Guinea, where 2000 of these shells are called a macuta.

Coz, a small Persian coin, in copper· 10 cozbaugues or coz make a shahee.

Crazia, a small silver coin in Tuscany.

Crimbal, a small coin in the West India Islands, called also *Isle du Vent Bits*, which pass for 7½*d*. currency.

Crown. In England, Henry VIII. was the first king who coined a crown in gold. He afterwards, as has been already noticed, struck some patterns for a crown in silver; but Edward VI. was the first who coined the silver crown and half-crown for currency. From Elizabeth to William IV. the silver crown and half-crown have been struck in every reign. The croone, or crown, was formerly a coin of the Netherlands; those after 1755 were estimated at 2 florins 14 stivers of exchange, or 3 florins 3 stivers current. It was also a coin of Denmark; double, single, and half-crowns were reckoned at 8, 4, and 2 marks crown money, or 8 marks 8 skillings, 4 marks 4 skillings, and 2 marks 2 skillings current.

Crusado, a coin in Portugal, both in gold and silver. Of the gold crusados there are two kinds, the old crusado coined at 400 rees, the new crusado at 480 rees; the silver crusado, also of 480 rees, has its half, quarter, and eighth. The value of the old crusado was 2*s*. 5*d*.; of the new, both gold and silver, 2*s*. 7*d*.

Daalder, a Dutch silver coin, or 30-stiver piece, worth in sterling 2*s*. 6½*d*.

Daezajie, a silver coin of Persia, of the value of 5 mamoodis, worth about 15*d*.

Decime, a money of account and coin in the Revolutionary system of France. Ten decimes make the franc, or 100 centimes. Copper pieces of one and two decimes are still current.

Denaro, a money of account in most parts of Italy.

Denier. [DENIER.] It was the 240th part of the livre, or French pound.

Denushka, a Russian copper coin, half a kopek.

Dime, a money of account and silver coin in America, is the tenth part of a dollar. There are also half dimes; both coined in 1796, worth 5½*d*. and 2¾*d*.

Dittobolo, a copper coin in the Ionian Islands, the double of the obolo or cent. The cent is worth ¼*d*. nearly.

Diwani, or *Para*, a money of Abyssinia.

Dobra, or *Dobraon*, a Portuguese gold coin. Kelly says the old dobra coined before 1722 at 20,000 rees has since become worth 24,000; the dobra struck since 1722 is of 12,800 rees. There is also a half-dobra of 6400 rees, likewise called a Joanese. The sterling value of the later dobra, according to the mint price of gold in England at 3*l*. 17*s*. 10½*d*. per ounce, is 3*l*. 11*s*. 0¾*d*.

Dog, a small coin of 1½*d*. Leeward currency, used in the French West India Islands, called also the noir.

Doit, or *Duyt*, a small Dutch copper coin, the eighth part of a stiver, in value half a farthing.

Dollar. The dollar of the United States of North America, weighing 416 grains of standard silver, is valued at 4*s*. 4*d*. English. It has on the edge 'ONE DOLLAR OR UNIT HUNDRED CENTS:' and has its divisions of half and quarter. By an act of 1837 the silver dollar of the United States is required to contain 412½ grains of standard silver of which one-tenth is alloy; which is now the proportion in all coins of the United States, whether of silver or gold. The Spanish dollar of the old sort, before a new coinage took place in 1772, was of the sterling value of 4*s*. 4½*d*. Till then there were dollars of two denominations, the Mexican and the Sevillan dollar. That which is at present generally circulated as the Spanish dollar is really of the sterling value of 4*s*. 3½*d*. It passes in Spain for 20 reals vellon. The rix-dollar of the north of Europe is termed *Thaler* by the Germans; *Pezza* is the Italian and *Piastre* the Turkish dollar. See *Rix-dollar*.

Doodee and *Half Doodee*, copper pieces of 10 and 5 cash, current at Madras. They are struck in England.

Doppia, or *Pistole*, an Italian gold coin of which the value varies in different states. Kelly says, among the prices current at Genoa, July 20, 1807, the Roman doppia was at 20 lire 14 soldi; Parma, ditto, 26 lire 14 soldi; Piedmont, ditto, old, 35 lire 8 soldi; ditto, new, 34 lire 15 soldi. At Milan the value of the doppia was fixed by an imperial edict in 1786 at 25 lire 3 soldi correnti. Its English value about 15*s*. 7*d*. sterling. In the Piedmontese territory the older doppia has been long out of currency. The present is of 24 lire; the half, &c. in proportion. The old Piedmontese doppia of 1741 to 1785 was of the value of 1*l*. 3*s*. 9*d*. sterling; that after 1785, 1*l*. 2*s*. 7½*d*. The Parma doppia of 1787 was worth 17*s*. 7½*d*.; that of 1796, 16*s*. 10½*d*.

Doppietta, or gold scudo, a coin of Sardinia of 5 lire.

Doreea, a coin and money of account in Bombay; the coin is of copper with a mixture of tin or lead.

Doubla, a silver coin of Tunis, valued at 24 aspers.

Doubloon, a Spanish gold coin, the antient value of which was changed in the coinage which took place in 1772, when the former pieces were called in. The old doubloon was of the value of 3*l*. 6*s*. 5½*d*.; that of 1772, 3*l*. 5*s*. 10*d*. The double and the half of each in proportion.

Ducat, Dutch, a gold coin, of the value of 5 guilders 2 stivers. English value 8*s*. 9*d*.

Ducat, German, also a gold coin, the rate of coinage of which, although each state has its own ducats, is nearly the same all over Germany. Kelly says, according to the mint price of gold in England, as already stated, the ducat of Bavaria is worth 9*s*. 4¼*d*.; of Brunswick, 9*s*. 2*d*.; of Cologne, 9*s*. 3¾*d*.; Denmark, 9*s*. 3½*d*.; Frankfort, 9*s*. 4½*d*.; Hamburg, 9*s*. 4½*d*.; Hanover, 9*s*. 5¼*d*.; Hesse-Darmstadt, 9*s*. 5*d*.; Mannheim, 9*s*. 4¼*d*.; Nürnberg, 9*s*. 3¼*d*.; Prussia of 1748, 9*s*. 4½*d*.; of 1787, 9*s*. 3¾*d*.; Treves, 9*s*. 3¾*d*.; Wirtemberg, 9*s*. 2¼*d*.; Würzburg, 9*s*. 3¾*d*.

Ducat, Russian, originally worth 2½ rubles; the double 4½; but in 1764 their value was raised, the double ducat to 5 rubles 60 kopeks, and the single to 2 rubles 80 kopeks. Kelly rates the sterling value of the Russian ducat of 1751 at 9*s*. 1⅓*d*.; of 1763 at 9*s*. 3¾*d*.; and that of 1796 at 9*s*. 5*d*. This also had its double and half. According to the table of Russian moneys given in Leigh's 'Guide to Moscow,' 12mo., London, 1835, the gold ducat of Russia at present goes for 8*s*. 4*d*.

Ducat, Swedish, of gold, of the value of one rix-dollar 46 skillings, of the sterling value of 9*s*. 2½*d*.

Ducat, the Italian, is a silver coin and money of account at Naples, Venice, and other places, value in sterling nearly 3*s*. 6*d*. The Venetian silver ducats of a former time varied both in weight and fineness. In weight from 13 dwt. 18 gr. to 14 dwt. 19 gr.

Ducatello, an Egyptian silver coin, current at Alexandria, for 10 medini.

Ducatone, or *Giustina*, a silver coin of Venice, of 11 lire, worth 4*s*. 6½*d*.

Ducatoon, a Dutch silver coin, at 63 stivers, or a little more; English value 5*s*. 5¾*d*.

Dudu, called by the English *Dubs*, a copper coin in use in the Mysore country and at Pondicherry; in the latter place 20 of them are reckoned to a fanam.

Eagle, an American gold coin, of the value of 10 dollars, or units. Its intrinsic value in English gold was nearly 2*l*. 3*s*. 8*d*. None however have been coined at the American mint for many years. By an act of 1792 the eagle was to be of the standard weight of 270 gr., viz. 247½ gr. of fine metal and 22½ gr. alloy. By an act of 1837, when coined it is to be of 258 gr. standard weight, viz. 232⅕ fine metal and 25⅘ alloy. The half and quarter eagle in proportion.

Ecu, a silver coin in the old system of France, and also at Geneva and other places in Switzerland. In France it was of 6 livres; and the *Petit Ecu*, or half-crown, of 3 livres. The ecu, or patagon, of Geneva was worth 3 livres or 10½ florins. Those coined in 1796 were of the English value of 4*s*. 9*d*.

Escalin. The escalin, or shilling, was formerly a base silver coin in the Netherlands, at 6 stivers of exchange, or 7 stivers current. Of the English value of 6*d*., and its double in proportion.

Escudo, a Spanish gold coin, of 40 reals vellon.

Fanam, a small coin in the East Indies, both of gold and silver. The gold ones are only of 7 11/12 carats fine, and are alloyed chiefly with silver; 24 of these are reckoned for an old Negapatam pagoda, which went for 8*s*. The silver fanam of Bombay is worth about 4¾*d*.; that of Pondicherry 3⅛*d*.

Faruki, a gold coin of Mysore, struck by Tippoo Saib, of the value sterling of 7*s*. 11*d*. A variety of the pagoda.

Filippo, or *Philip*, an old silver coin of Milan, worth about 4*s*. 8¼*d*.

Florin, a money of account and silver coin in Holland, Belgium, and Germany, called also gulden and gülden, and, by corruption, gilder or guilder. The florin of Holland and Bavaria is worth about 1*s*. 8¼*d*.; the heavy (or *münz*) gulden of Austria is worth about 2*s*.

Florin is also a gold coin at Hanover and in other parts of Germany, though chiefly current in the countries on the banks of the Rhine; passing generally for 2 rix-dollars current. Assay value about 6*s.* 11*d.*

Forli, a small copper coin of Egypt.

Fouang, a silver coin of Siam, estimated at 800 cowries.

Franc, a money of account and silver coin in the new system of France, and still more recently introduced into Belgium, with its double, quintuple, and lower proportions. Of the value of rather more than 9½*d.* It weighs 77·17 grains, and contains 69·453 grains of pure silver. The French franc and livre were formerly synonymous, but in the coinage of 1795 the franc was made too heavy, and its value was accordingly raised 1¼*d.* per cent; thus 80 francs = 81 livres. A Swiss franc, containing 10 batzen, is equal to 1½ French franc, nearly 1*s.* 2*d.*

Francescone, a silver coin in Tuscany, of 10 paoli or 6⅔ lire; its value in sterling was 4*s.* 6*d.*

Frederick, or *Frederick d'Or*, a gold coin in Prussia, worth 16*s.* 3¾*d.* There are also double and half Fredericks.

Fyrke, a money of account and copper coin in Denmark; the half skilling.

Gall, the only coin of Cambodia, a small piece of silver, with characters on one side only; worth about 4*d.* sterling.

Ganza, a small coin in some parts of India beyond the Ganges, a mixture of copper, lead, and tin; worth usually about 1½*d.* sterling.

Genovina, a coin of Genoa, both in gold and silver. Before the year 1790 the Genovine d'oro were coined at 100 lire; halves, quarters, and eighths in proportion. The Genovine of full weight in silver were at 9 lire 10 soldi; light Genovine, weighing 32½ denari, were at 9 lire. In 1790 a new coinage took place, consisting of gold Genovine at 96 lire; halves, quarters, and eighths, at 48, 24, and 12 lire; and silver scudi or Genovine at 8 lire; halves, quarters, and eighths in proportion. Genoa being united to France in 1804, the French coins were introduced there, but the Genoese coins were still allowed to circulate, and the coinage of them to continue. The assay value of the Genovina of 100 lire was 3*l.* 9*s.* 9*d.* sterling; that of the Genovina of 1790, 3*l.* 3*s.* 4*d.*

George d'Or, of Hanover, at 4⅔ rix-dollars in cash, or 5 rix-dollars gold value. Of the value of 16*s.* 4½*d.*

Gilder, or *Guilder*, see *Florin.*

Giulio, a small coin of base silver, in Italy; half a lira.

Giustina, see *Ducatone.*

Gourde, the name given to the Spanish dollar in the islands of Martinique, St. Lucia, Guadaloupe, &c.

Grieven, or *Grievener*, a small Russian silver coin, worth about 6*d.*

Griscio, or *Albuguelp*, an Egyptian silver coin, of 30 Medini.

Groat. [COIN.]

Groschen, Good (*Gut*), a small coin and money of account in Prussia, Hanover, and other parts of Germany. A good groschen is 3 matthiers; a marien-groschen 2 matthiers: the former worth 1½*d.* English, the latter 1¹⁄₁₂*d.*

Grossetti, coins of Ragusa, of base silver, reckoned of the same value as the paras of Constantinople.

Grote, a small coin and money of account at Bremen: 24 grotes make ⅓ of a specie rix-dollar.

Guilder, see *Florin.*

Gulden, see *Florin.*

Haser Denarie, a silver coin of Persia, of 10 mamoodis.

Imperial, a Russian gold coin, of 40 rubles; it has its half. The English mint value of the imperial coined before 1763 has been given at 2*l.* 1*s.* 6*d.*; the imperials of 1763 and 1772, at 1*l.* 12*s.* 9½*d.*; the half-imperial of 1780, at 15*s.* 4*d.*; the imperial of 1801, at 1*l.* 12*s.* 2½*d.* The present value is 33*s.* 4*d.*, and of the half 16*s.* 8*d.*

Joanese, Johanes, or *Joe*, a Portuguese gold coin, of 6400 rees, of the value of 1*l.* 15*s.* 11½*d.*

Itchebo, or *Itjib*, the smallest of gold coins of Japan, valued at about 15 mas.

Kaisergroschen, a money of account and base silver coin in Bohemia and some parts of Germany. In Bohemia the kaisergroschen is sometimes called böhmen. In Bavaria it is of the value of 3 and sometimes 4 kreutzers.

Kodama, a little globular piece of silver, bearing the figure of a Japanese deity, with several letters.

Kopek, or *Copeck*, a money of account and copper coin in Russia, answering to a penny English. There are pieces of 10, 5, 2, 1, ½, and ¼ kopeks; likewise of 25, 20, 15, 10, and 5 kopeks in silver, answering to 10*d.*, 8*d.*, 6*d.*, 4*d.*, and 2*d.*

Kreutzer, *Creutzer*, or *Cruitzer*, a small copper coin and money of account in many parts of Germany, worth ⅓ of a penny. 60 kreutzers go to a silver florin of Holland or Bavaria.

Larin, an old coin and money of account in Persia and Arabia, of 2½ mamoodis. It consists of a silver wire, about half an inch in length, doubled up, and flattened on one side to receive the impressions of some characters.

Leopoldone, a silver coin of Tuscany, similar to the francescone; that of 1790 was of the assay value of 4*s.* 5¾*d.*

Liard, a small French copper coin in the old system of France, of the value of 3 deniers.

Lira, a silver coin of Italy, particularly at Milan and Venice. At Milan it was to weigh 4 denari, or ⅙ of an ounce. Pieces of 1½, 1, and ½ lira were coined at Venice in 1802, consisting (in Austrian money) of 18, 12, and 6 kreutzers, which contained only ½ of fine silver. This money was called *moneta di nuovo stampo.* The lira of Milan is stated by Kelly to be of the assay value of 7½*d.*; the lira of Venice, 2¼*d.* and 2½*d.*

Lirazza, base silver pieces, current at Venice, of 30, 20, 15, 10, and 5 soldi.

Livornina, an old silver coin of Leghorn, value 4*s.* 5¼*d.*

Louis, a gold coin of Malta, double, single, and half, coined by the grand-master Rohan, at 20, 10, and 5 scudi copper or current money. The value of the double louis in sterling was 1*l.* 18*s.* 1¼*d.*; of the louis, 19*s.* 1¼*d.*; and the half louis, 9*s.* 7¾*d.*

Louis blanc, the name for the old ecus of silver coined in France before 1726, at the rate of 9 pieces to the mark of 10 deniers 22 grains fine.

Lowen Dollar, or *Lyon Dollar*, an old Dutch silver coin at 42 stivers or a little more. It was ¾ of the ducatoon.

Mace, a small gold coin in Sumatra, weighing 9 grains, and worth about 14*d.* sterling.

Madonnina, a silver coin of Genoa, of 20 soldi. There were formerly double and half madonnine, of 40 and 10 soldi. The double madonnina was of the value of 1*s.* 4½*d.*

Mahbub, a gold coin, the only one which is struck at Tunis, called also sultanin, valued at 4½ piastres, with half and quarter.

Mamoodi, or *Mamoudi*, a money of account and silver coin of Persia. The mamoodi of Gombroon contains ⅝ silver and ⅜ copper, and is worth nearly 3*d.* The mamoodi of Bassora is worth about 5¼*d.*

Mark. [COIN.]

Mark, a silver coin in Hamburg. There is also a double mark, or 32-schillings piece. The mark is worth 1*s.* 2¾*d.*

Matthier, a copper coin of Brunswick, equal to 4 pfennigs or 8 hellers.

Max d'Or, or *Maximilian*, a gold coin of Bavaria, value 13*s.* 7½*d.*

Medin, or *Medino*, a coin and money of account in Egypt. Kelly says, at Cairo 40 medini are valued at 1*s.* 7½*d.*

Mirliton, an old French gold coin.

Moco, a small silver coin in the West Indies, which consists of a round piece cut out of the centre of the Spanish dollar. It is sometimes ¼ and sometimes ⅛ of the dollar.

Mohur, a coin of gold in the East Indies. The mohur or gold rupee of the emperor Shah Allum, 1770, was of the value of 1*l.* 13*s.* 0¾*d.*; the mohur of the same, 1787, 1*l.* 13*s.* 4½*d.*; the sicca gold mohur of Bengal, of 1789, 1*l.* 13*s.* 7*d.*; the old Bombay mohur, 1*l.* 10*s.* 1*d.*; Surat mohur of the latest coinage, 1*l.* 9*s.* 2¼*d.*; Tippoo's gold rupee, 1*l.* 12*s.* 1¾*d.*; mohur of the Dutch East India Company, 1783, 1*l.* 12*s.* 1½*d.*; ditto, 1797, 1*l.* 10*s.* 10½*d.* Some of these had halves and quarters in proportion.

Moidore, or *Lisbonnine*, an old gold coin of Portugal, of the value of 1*l.* 6*s.* 11½*d.* sterling. It had its half, &c. in proportion.

Murajola, a small silver coin used at Bologna, double and single, of 4 and 2 soldi.

Napoleon, a gold coin in the new system of France, the successor of the louis-d'or, of the value of 20 francs. The value is 15*s.* 10*d.*; and of its double, or 40-franc piece, 1*l.* 11*s.* 8*d.* The napoleon weighs 99·564 grains, and contains 89·61 grains of pure gold.

Noble. [COIN.]

Noir, see *Dog.*

Oban, the largest gold coin of Japan, three times the value of the copang.

Onza, a Sicilian coin of the value of 30 tari, each taro being subdivided into 20 grani. Its value is about 10*s.* 3¼*d.*

Ore, a money of account and copper coin in Sweden.

Osella, a silver medal rather than a coin of Venice, formerly distributed by the government. Kelly says however they have been circulated at 3 lire 18 soldi. He gives the value in sterling at 1*s*. 7¾*d*.

Pagoda, a gold coin on the Coromandel coast, in the East Indies. Kelly enumerates several kinds, with the assay value of each annexed, viz. the star pagoda of the value of 7*s*. 5¼*d*.; old Arcot pagoda, 7*s*. 2*d*.; new Arcot pagoda, 5*s*. 8¾*d*.; Onore pagoda, 7*s*. 10*d*.; Mangalore pagoda, 7*s*. 10¾*d*.; pagoda with a crescent and one figure, 7*s*. 6*d*.; pagoda of Pondicherry, 6*s*. 5*d*.; Hyderee hoon, or pagoda, 7*s*. 8*d*.; Sultannee hoon, or pagoda, 8*s*. 5*d*.; Tippoo's farufei, 7*s*. 11¼*d*.

Paolo, a small silver coin at Florence, Rome, and other places in Italy, with its double, half, and quarter. The value of the paolo is 5¼*d*.

Papetta, a small silver coin of Rome, value 10¼*d*.

Para, a small Turkish coin, of the value of three aspers. 40 paras = 1 piastre.

Pardo, or *Fardao*, a silver coin and money of account at Goa; as a coin it is worth four good tangas, equal to 2*s*. 6*d*. sterling. There are pardo-xeraphins of five good tangas: a xeraphin is worth 3*s*. 1½*d*.

Pataca, a silver coin of Brazil, of 600 and 640 rees, current only in that country. Kelly gives the sterling value of two or three sorts: the old pataca of Brazil of 640 rees, 3*s*. 1½*d*.; pataca of 600 rees, 1755, 2*s*. 10½*d*.; ditto of 640 rees, 1768, 2*s*. 10¾*d*.; ditto of 640 rees, 1801 (half, quarter, &c., in proportion), 3*s*. 0½*d*.

Patagon, or *Patacon*, called also *Ecu*, a silver coin in Switzerland, and also at Liège. In Switzerland its value is 3 livres 6 sous, or 33 batzen. At Liège it is worth 4*s*. 4*d*.; at Berne, 4*s*. 9½*d*.

Peceta, a Spanish silver coin: the old Mexican peceta of two Mexican reals, 1736, was of the value in sterling of 1*s*. 1*d*.; the peceta of two reals of plate, 1721, and the peceta of two reals of new plate, 1775, 10*d*.; Mexican peceta, 1774, 1*s*. 0¾*d*.

Penny, English. [COIN.]

Perpero, a silver coin of Ragusa, of 12 grossetti.

Pfennig, a Prussian coin, worth one-tenth of an English penny.

Piastre, a money of account and a silver coin in Turkey and the Levant; it is in fact the Turkish dollar. The piastre of Mustapha III., 1757, was of the sterling value of 1*s*. 10½*d*.; the piastre of Abdul-Hamed, 1773, 1*s*. 8½*d*.; another of the same period, 1*s*. 10¼*d*.; the piastre of Selim, 1801, 1*s*. 1¼*d*.; the piastre of Crim Tartary, 1778, 1*s*. 0¾*d*.; piastre of Tunis, 1787, 1*s*. 1½*d*.; the piastre of Smyrna, of 1808, 12½*d*.

Pice, a money of account and a copper coin in the East Indies, the latter a mixture of tin and lead, current at Bombay.

Piece of Eight, the Spanish dollar; also a money of account in what used to be the Danish West India Islands.

Pistereen, or *Piastrine*, the name given in the West Indies to the Spanish pecetas. Kelly says pistereens, or two-bit-pieces, which are Spanish pecetas, pass for 1*s*. 3*d*. currency, and are worth 10¾*d*. sterling. He adds, English shillings and sixpences occasionally pass here for pistereens and bits.

Pistole, German. Under this name are included the old Saxon August d'Or, Prussian Frederick d'Or, Brunswick Carl d'Or, Hanoverian George d'Or, Danish Holstein Christian d'Or, and the pistoles of Hesse, the palatinate, Hildesheim, and Mecklenburg, all reckoned at 5 rix-dollars current. Kelly says 35 pieces of each of these sorts of money are to weigh a Cologne mark of fine silver. An allowance is however generally made for deficiency in weight and fineness, and they are current in most places as long as 35¾ pieces weigh a Cologne mark of gold, 21¾ carats fine; they are then called passier pistoles.

Pistole, Italian, see *Doppia*.

Pistole, Spanish, see *Doubloon*.

Pistole, Swiss. The old pistole of Geneva was of 11 livres 10 sols; the later pistole, coined after 1752, 10 livres current or 35 florins, with double and triple pistoles in proportion. By a law of the diet of the Helvetic Confederacy of 1804, such of the cantons as wished to have them were to regulate the coinage in such a manner that the franc might contain 8¼ Swiss grains of fine gold. The sterling value of the old pistole of Geneva, according to Kelly, was 16*s*. 4½*d*.; of the new or later pistole, 14*s* 2*d*. The pistole of Lucerne, as well as that of the Helvetic Republic of 1800, was worth 18*s*. 9*d*.; that of Soleure, 18*s*. 10¾*d*.

Pities, small coins in the Isle of Java, the only money of the natives, containing four parts of lead and one of tin: 25 of these pass for two doits, or duyts.

Placket, or *Plaquette*, a silver coin in the Netherlands, of 3½ stivers current. Old pieces of this denomination pass for 2½ stivers. Value in sterling 2¾*d*.

Plates, the denomination given to certain large copper coins, formerly used in Sweden. Kelly says, 'The large copper pieces of the value of 4, 3, 2, 1, ¾, and ½ silver dahler, or 12, 9, 6, 3, 2¼, and 1½ koppar dahler, weighing 7⅓, 5⅓, 3⅝, 2⅝, 1⅞, 1⅓, and ⅝ lb. of the victualie or common weight, are no longer considered as a legal coin, but as a sort of merchandise, which every one is at liberty to sell or export after paying the duty on exportation. These in general, but more particularly the 2-dahler pieces, are called plates.'

Plott, a silver coin formerly used in Sweden, ⅓ of the rix-dollar, of the value of 1*s*. 6*d*. sterling.

Poltin, Poltina, Popoltin, Russian silver coins, of 50 and 25 kopeks, the half and quarter ruble. The poltin of the empress Anne was of the value of 1*s*. 9*d*.; that of Elizabeth, 1*s*. 10*d*.; of Catharine II., 1*s*. 7¼*d*.; of Paul, 1*s*. 7½*d*.; of Alexander, 1*s*. 7*d*. The halves in proportion.

Polturat, a coin of Hungary, which, with the groschels and pfennigs, sometimes contains a little silver, and sometimes consists entirely of copper.

Polushka, a copper coin of Russia, a quarter kopek.

Quadruple, the doubloon of 8 escudos, or quadruple pistole of Spain. Its value in English gold coin has been stated to be 3*l*. 4*s*. 0½*d*.

Quattrino, a copper coin in Italy, of 4 denari di lira. At Rome 5 quattrini make 1 paolo.

Ragusina, see *Talaro*.

Rathspræsentger, a silver coin of Aix-la-Chapelle, double, single, and half, of 32, 16, and 8 marks, value 1*s*. 4¼*d*., 8*d*., and 4*d*.

Ree, a Portuguese money of account. The gold milree (or piece of 1000 rees) which was coined for the African colonies in 1755 was of the value of 3*s*. 2½*d*.; but the milree is generally valued at about 5*s*.

Real. There are three small Spanish silver coins called reals, namely, the real of Mexican plate, the real of provincial plate, and the real vellon; the two former are worth about 5*d*., the real vellon 2¾*d*. sterling.

Rix-dollar (a corruption of the German *Reichsthaler*), a money of account and silver coin in Holland, Germany, Denmark, and Sweden. At Amsterdam a rix-dollar is worth 2½ gilders, 50 stivers, or 800 pfennings, equal to 8*s*. 4*d*. Flemish. In Germany the rix-dollar is worth 2 florins. The assay varies, but the general value, English, is 4*s*. 2*d*. In 1813 a new monetary system was introduced into Denmark. Two of the new rigsbank dollars equal one of the old specie dollars; and the new dollar is divided into 6 marks of 16 skillings each; its value is about 2*s*. 3¼*d*.

Roubbie, a Turkish gold coin, the third of the sequin, which is called mahbub.

Roup, a Turkish silver coin of 10 paras.

Ruble, or *Rouble*, a money of account, and a platinum and silver coin in Russia. The platinum coins are a six-rouble piece, value 18*s*. 6*d*., and a three-rouble piece, of 9*s*. 3*d*. Of the silver roubles, there is the old rouble, before 1763, worth 3*s*. 6*d*.; the new rouble, since 1763, worth 3*s*. 1*d*.; with the halves of each in the same proportions.

Rundstyck, a Swedish money of account and copper coin, of 1 ore koppar; there are also half-rundstycken.

Rupee, a money of account and silver coin in the East Indies. The coins, which were formerly struck at the Calcutta mint, were sicca rupees, also called silver rupees, and gold mohurs, sometimes called gold rupees; 16 of the former, by regulation, were to pass for one of the latter. The silver rupee had its half. Kelly says, 'The old Bombay rupee was the same as that formerly coined at Surat under the Mogul: it weighed 178·314 English grains, and contained 1·24 per cent of alloy. By an agreement of the English government with the nabob of Surat, the rupees coined by both were to circulate at an equal value; and they mutually pledged themselves to keep up the coin to its exact standard of weight and fineness. The nabob's rupees however were soon after found to contain 10, 12, and even 15 per cent of alloy, in consequence of which, most of the Bombay rupees were melted down and re-coined at Surat: the coinage of silver in the Bombay mint was suspended for twenty years, and the Surat rupees were the only ones seen in circulation. At length, in 1800, the Company ordered the Surat rupee to be struck at Bombay, and since that period the rupees of both places have been kept at an equal value, weighing 179 English grains, and valued at 2*s.* 3*d.* In the Company's financial accounts submitted to parliament, the Bombay rupee is reckoned at this value, and there it bears a batta of 16 per cent. against current rupees.' Kelly, 'Universal Cambist,' 2nd edit., 4to. 1821, vol. i., p. 170, gives a large list of rupees, with their assay and value in sterling, varying from 1*s.* 10*d.* to 2*s.* 0¾*d.* The rupee of Persia is a piece of 10 mamoodies.

Ruspono, a gold coin of Tuscany, a piece of 3 sequins, weighing 8 denari 21 grani, Florence weight, and passing for 40 lire or 60 paoli. Value in sterling, 1*l.* 8*s.* 5½*d.*

Ryder, or *Ruyder*, called also *Standpenning*, a gold coin of Holland. By a regulation of 1749, its value was fixed at 14 florins. Value, 1*l.* 4*s.* 10*d.*

Ryksort, a Danish silver coin at 24 skillings.

Schilling, or *Skilling*, also called *shilling* and *escalin*, a money of account and copper or base silver coin in several parts of Germany, at 12 pfennigs.

Schuit, a silver ingot used as money in Japan. It is of the value of 1*l.* 5*s.* 3*d.*

Scudino, a gold coin of Modena, of 9 lire.

Scudo, a money of account and a silver coin in many parts of Italy, at Sicily, and Malta. The scudo of Rome is worth 4*s.* 4*d.*

Sechsling, a copper coin of Hamburg, of 6 pfennigs.

Sennis, or *Cashes*, are small pieces of iron, copper, or brass, having a square hole in the middle, through which, as in China, they are strung on a wire or thread in various numbers, 600 of the smallest being reckoned for a tale.

Sequin, or *Zecchin*, *Italian*, called also *Gigliato*, a gold coin of Venice, Genoa, Rome, Milan, Piedmont, and Tuscany, of the average value of 9*s.* 5*d.*

Sequin, or *Checqueen*, *Turkish*; the gold coins of Turkey are the sequin funducli, with halves and quarters; the double sequin, or yermeebeeshlik, the misseir, and the rubich. There are other sequins beside the above, which bear different names, and their values also vary according to the periods of their coinage.

Sesthalf, or 5½-stiver piece, a base silver coin in Holland, or base shilling; value 5½*d.*

Shahee, or *Shatree*, a Persian silver coin, the half of the mamoodi.

Shilling, English silver coin, weighs 87·27 grains, and contains 80·727 grains of pure silver.

Shoe of gold, an ingot used as money in China. The name is English. Kelly, speaking of China (vol. i., p. 67), says, 'Gold is not considered as money, but as merchandise; it is sold in regular ingots of a determined weight, which the English call *shoes* of gold; the largest of these weigh 10 tales each, and the gold is reckoned 94 touch, though it may be only 92 or 93.'

Sixpence, English silver coin, half a shilling.

Skilling, see *Schilling*.

Slant, a copper coin of Sweden, single and double, of 1 and 2 ore silver, or 3 and 6 ore koppar.

Soldo, a small copper coin of Italy. There are half soldi, and quattrini, the fifth part of a soldo.

Sou, or *Sol*, a money of account and copper coin in France and Switzerland. Everywhere of 12 deniers.

Souverain or *Severin*, a gold coin, chiefly coined in the Netherlands when subject to Austria. Its value was 13*s.* 10*d.*

Sovereign, English gold coin, weighs 123·274 grains, and contains 113·001 grains of pure gold.

Stambouly, a Constantinopolitan coin, current at Bassora for 20½ mamoodies.

Stiver, a money of account and copper coin in Holland and the Netherlands, containing 2 groots Flemish, or 8 duyts, or doits.

Stooter, a small Dutch silver coin, at 2½ stivers.

Sware, or *Schware*, a money of account and copper coin of Bremen. The smallest piece there current.

Syfert, a copper coin of Embden, at 5 wittens; 108 go to the rix-dollar.

Talaro, a silver coin of Tuscany, Ragusa, and Venice; at Ragusa it is or was the highest silver coin, worth 3*s.* 1½*d.* sterling; it had also the names of vislino and Ragusina.

Tale, see *Cash.*

Taro, a money of account and copper coin of Naples, Sicily, and Malta, of the value of 4*d.*; 12 go to the scudo, or Sicilian dollar. There are pieces of 4 and 2 tari.

Testone or *Testoon*, a silver coin in Italy, and also in Portugal. In Italy the testone of Bologna is rated at 30 soldi; at Parma the testone is of 6 lire 6 soldi; at Rome of 6 paoli. Kelly gives the sterling value at a little more than 1*s.* 3*d.* The assay value of the Portugal testoon he gives at something more than 6*d.* See *Vintem.*

Thaler, the ordinary name in Germany for the rix-dollar.

Veinten de Oro, see *Coronilla.*

Vintem. At Lisbon there are silver Portuguese coins current of 6 vintems, or 120 rees. At Rio de Janeiro in Brazil there are vintems of copper also current for 20 rees; with half and quarter vintems, and two-vintem pieces.

Xeraphin, see *Pardo.*

Zlot, a Polish coin, worth nominally 15 kopeks, but passing current for 60 kopeks. It is worth 9*d.* English.

Zolotta, or *Izelotta*, a Turkish silver coin, of 30 paras.

In the above enumeration moneys of account have been only noticed where they were represented by real coin. There are numerous others which are not so represented. For these our space will only allow us to refer to the general index and Commercial Dictionary appended to Kelly's 'Universal Cambist,' a work to which the present article is greatly indebted.

It is worthy of observation, says Kelly, that the progress of metals as representatives of property seems to have kept pace with the increase of wealth and commerce. Thus iron, brass, and copper first answered the purposes of money. Silver next succeeded; after which gold was adopted; but the great increase of business in modern times has rendered even the precious metals insufficient as a circulating medium. Paper therefore has been substituted in various ways; and it is generally found more convenient and manageable than specie. Where credit cannot be given, the precious metals are necessary; but where well founded credit exists paper is greatly preferable; it is exempt from most of the imperfections and disorders of coins, and in many other respects it greatly facilitates the operations of trade and commerce.

Moneys of account may be considered with respect to coins as weights and measures with respect to goods, or as a mathematical scale with respect to maps, lines, or other geometrical figures. Thus they serve as standards of the value both of merchandise and of the precious metals themselves. It should however be remarked that moneys of account, though they are uniform as a scale of divisions and proportions, yet they fluctuate in their intrinsic value with the fluctuation of the coins which they measure or represent.

There is great inconvenience in the present system of money reckoning and the coins of most people, and particularly when we have to change money of one nation into its equivalent in the money of another nation. It is also very inconvenient and tedious to add large sums, such as pounds, shillings, and pence, in the money of our own country. In the United States of North America, the advantages arising from the dollar being the money of account, and being divided into 100 equal parts or cents, are very obvious. A slight inspection of such questions as occur in the common arithmetic books of that country will show the great facilities which this monetary system offers for all mercantile transactions. An ingenious correspondent has observed that it would be easy to bring our own system of coins to a decimal standard. We should only require a double shilling to be coined, and then we might say ten shillings make one pound. If a double penny of silver were coined, of the value of one-tenth of this double shilling, we might then say ten pennies make one shilling. With a small alteration of the copper farthing, we might say ten farthings, or ten dimes (tenths), make one penny. There would thus be no number of a denomination less than a pound that would exceed *nine*. The table of English money would then run thus:—

			Old money.
10 dimes	make	1 penny . .	2½*d.* nearly
10 pennies	„	1 shilling .	2*s.*
10 shillings	„	1 pound . .	20*s.*

(Snelling's *View of Coins at this time current through Europe*, 8vo., Lond., 1766; Marsden's *Numismata Orientalia Illustrata*, 4to., Lond., 1823-5; Kelly's *Universal*

Cambist, 2 vols. 4to., Lond., 1831; *Münz-Cabinet; Le Cabinet de Monnaies du Voyageur et du Negotiant*, publié par Engelmann père et fils, à Mulhouse, 8vo., 1835; Tucker's *Theory of Money and Banks investigated*, 8vo., Boston, 1839; *Guides* and *Handbooks* of the different countries of Europe, &c.)

MONFERRATO is the old name of a large district of northern Italy, which extends from the southern bank of the Po to the Ligurian Apennines. During the middle ages it was a distinct principality, with the title of Marquisate, but is now merged in the territories of the Sardinian monarchy. Many parallel offsets branch off in a northern direction, from the Ligurian Apennines to the southern bank of the Tanaro, and the intervening valleys are watered by numerous streams, the Stura, the Gesso, the Borbio, the Pesio, the Ellero, the Tanaro, the Belbo, the two Bormide, the Erro, and the Orba, all of which join the Tanaro above Alessandria, below which town the Tanaro enters the Po. North of the Tanaro another range of hills, parallel with the course of the Po, runs from the mount of Superga, opposite to Turin, to the town of Casale, and divides the valley of the Upper Po from that of the Tanaro. The greater part of this hilly region, on both sides of the Tanaro, went by the name of Monferrato, and was divided into High Monferrato, south of the Tanaro, towards the Ligurian Apennines, and Lower Monferrato, extending from the Tanaro to the banks of the Po. The principal towns of Lower Monferrato were Alessandria, Asti, Casale, and Valenza; those of Upper Monferrato were Mondovi, Acqui, and Alba. It is altogether a favoured region, rich in corn, wine, fruit, silk, and cattle. The wines of Monferrato are the best in northern Italy; the muscat of Asti is particularly esteemed. The peasantry of this district have the character of being high-spirited, lively, and industrious; their national dance, which is called Monferratina, and by corruption Monfredina, is well known all over Italy, and is a favourite in large and especially rural dancing parties.

Some pretend that the name of Monferrato is a corruption of 'Mons ferax,' a fertile mountain or range of hills. (Alberti, *Descrizione di tutta Italia*.) The house of Monferrato is said to have descended from the imperial family of Saxony in the tenth or eleventh century, when they obtained this marquisate as a fief of the empire. Several marquises of this dynasty distinguished themselves in the wars of the crusades, and they intermarried with the Baldwins and the Lusignani, kings of Jerusalem, and also with the Palæologi, emperors of Constantinople, a branch of which last family inherited the marquisate of Monferrato and governed it till the time of Charles V., when, their male line becoming extinct, it was succeeded by the Gonzaga of Mantua, who were the next heirs in the female line. At the death of Francesco Gonzaga, in 1612, who left no male issue, the duke of Savoy advanced a claim to the inheritance of Monferrato, on the plea of former intermarriages between his ancestors and the former Palæologi dynasty of Monferrato. This was the cause of long and tedious war between the brother of the late duke of Mantua and the duke of Savoy, in which quarrel Spain and France interfered, and afterwards became principals. At last, by the peace of Cherasco, in 1630, part of Monferrato was given to the duke of Savoy, and the rest remained with the duke of Mantua. During the war of the Spanish succession, when the last duke Gonzaga was deprived of Mantua, the whole of Monferrato was given to the duke of Savoy. [GONZAGA.] It is now divided into the administrative provinces of Acqui, Alba, Alessandria, Asti, Casale, and Mondovi. The name of Monferrato is still used however in Piedmont to designate the whole tract of country.

MONGAULT, NICOLAS HUBERT DE, born at Paris in 1674, studied under the fathers of the congregation of the Oratory, and afterwards became preceptor to the duke of Chartres, son of the duke of Orleans the regent, by whose interest he obtained several offices under government. He became a member of the French Academy in 1718. Mongault died at Paris in 1746. He made a French translation of Herodian (Paris, 1745), and also a very good translation of Cicero's letters to Atticus (Paris, 1738), with numerous and useful notes. Both these works, and the last especially, are among the best translations from the classics which the French language possesses.

MONGE, GASPARD, born at Beaune, in 1746, died at Paris, July 28, 1818. Being one of the members expelled from the Institute at the Restoration, no *éloge* of him appears in the memoirs* of that body. Immediately however after his death, two accounts, if not more, were published, one by M. Brisson, 'Notice Historique sur Gaspard Monge,' Paris, 1818; the other by M. Charles Dupin, 'Essai Historique sur les services, &c. de Gaspard Monge,' Paris, 1819. We have drawn the materials of the following account from the latter.

The father of Monge was, we suppose, a thriving inn or hotel keeper, 'possesseur d'une opulente hôtellerie, and Madame Roland styles him 'maçon parvenu.' Of his education little is said, nor is much to be expected, when we find him 'employed at the age of sixteen, in the college of Lyon, to teach the natural philosophy which he had come there to learn the year before.' The clergy who superintended the establishment used all means of persuasion to induce their young pupil to enter the church, but the construction of a plan of his native town brought him at this time under the notice of a colonel of engineers, who procured for him and persuaded him to accept an appointment in the college of engineers at Mezières, where he remained till 1780, when he was appointed professor-adjoint with Bossut, in teaching hydrodynamics at the Louvre. During his stay at Mezières, observing that all the operations connected with the construction of plans of fortification (such as the French call *défilemens*) were conducted by long arithmetical processes, he substituted a geometrical method, which the commandant at first refused even to look at, so short was the time in which it could be practised: it was however received with avidity when further inspected, and Monge, continuing his investigations, soon generalised the methods employed into that great alphabet of the application of geometry to the arts which is now called descriptive geometry. Such however was the system of the French schools before the Revolution, that the officers who had been trained in this application were strictly forbidden to communicate its methods even to those who were engaged in other branches of the public service. Monge himself, in 1780, conversing with his pupils Lacroix and Gayvernon, was obliged to say, 'All that I have here done by calculation, I could have done with the ruler and compass, but I am not allowed to reveal these secrets to you.' But M. Lacroix, whose name is now too well known to require further mention, set himself to examine how this could be, detected the processes employed, and published them in 1795, under the title of 'Complémens de Géométrie.' The method was published by Monge himself, first in the form in which the shorthand writers took them down from the instructions given at the Normal school (an III., or 1794-95), and again (an VII., 1798-99) also in the collected edition of the 'Leçons de l'Ecole Normale,' 1800; and finally in the well known work 'Géométrie Descriptive' (fourth edition, 1820), which, in simplicity, style, and choice of details in a subject which might easily have been overloaded with them, stands second to no elementary work whatever. Monge was unrivalled in the communication of instruction, and in the interest which he could excite in the minds of his pupils: M. Dupin relates, that in his walks with them in the neighbourhood of Mezières, both professor and pupils would walk through the brooks without the least attention to where they were going, all intent on the subject upon which he was conversing.

In 1780 he was elected of the Academy of Sciences, and in 1783 he succeeded Bezout as examiner of the naval aspirants: he then quitted Mezières entirely, at which place, since his partial removal to Paris, he had hitherto been occupied during half of the year. For his new pupils he wrote his treatise on Statics ('Traité élémentaire de Statique,' first edition, 1786; fifth edition, 1810); a short and purely synthetical treatise, which is even yet, we think, the best introduction from geometry to that subject. He was forbidden (in instructions from Borda) to employ any other method · and though Dupin cites this in excuse, we must take the liberty of thinking that the mathematical taste for which Monge was so conspicuous would secure his ready acquiescence in the restriction, considering the class of pupils for whom he was to write; if indeed, which is very likely, it was not suggested by himself.

When the wars occasioned by the Revolution were on the point of breaking out, Monge was appointed minister of marine. If we were writing his political life, we should have to look for information elsewhere than from M. Dupin, who simply states the appointment, touches on the misfortunes which happened at sea during his administration, commencing the whole with an indignant denial of Monge having been concerned in any of the cruelties of the period. From this we are to suppose that he has been charged with some participation in them, which, though unlikely from his general character, should be matter of special examination to those of his own country who may hereafter write his life. He quitted this post without remaining long in it, and became busily engaged in the operations for the equipment of the army. The enormous exertions which were made and the singularity of the crisis are well known: war had been declared, twelve hundred thousand soldiers were to be called into the field, and the steel which was to form their bayonets had not yet left the ore, nor was the saltpetre which was to give them powder manufactured. Many articles for which France had hitherto depended on foreign countries were unattainable, and the raw material was to be procured, the methods of working it in some cases even invented, in all to be described and taught; while the enemy was almost upon the frontiers. M. Biot, in his 'Essai sur l'Histoire general des Sciences pendant la Révolution Française,' Paris, 1803, has given a summary of what was done: he does not appear to go too far in saying that the means of procuring iron, steel, saltpetre, gunpowder, and weapons, were *created* during the reign of terror. And while the ordinary manufactures were deprived of their materials and of their workmen, all the branches of engineering were also at a stand, from those who could by any process be converted into military men being required for the army. The schools of instruction in these branches had been shut up; and in such a state was the hope of future public officers when, in great part by the exertions of Monge, the Normal and Polytechnic schools were established: the first for the exigencies of the moment, to accelerate the formation of a supply of good teachers; the second for the permanent means of formation of every department of engineers. Monge himself taught in both. Considering the present state of theoretical instruction in France, we may form an idea of the improvement which has taken place from the computation of Vauban, who estimated that one-sixth of the expense of fortified places in that country was incurred in providing and instructing proper persons to superintend the constructions.

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* Since the article CARNOT was written, his éloge has, we believe, been read, though it is not yet printed. Doubtless that of Monge will follow in time.

Monge accompanied the army in the invasion of Italy, and was largely concerned in those wholesale robberies for which restitution was made in 1815. These however must be charged on the general: while to the commission, of which Monge was one, must be allotted the merit not only of having safely conveyed enormous pictures and statues to Paris, but of having repaired the ravage of time and carelessness. In some instances pictures painted on wood were planed at the back until the design was shown, and the remainder was then fixed upon another tablet. Monge also accompanied the expedition to Egypt, and to him, with Berthollet and Fourier, all the scientific fruit of that undertaking are due, not only as the collectors, but even as the manual defenders of what they had gained. On the occasion of a revolt at Cairo, in which the communication was cut off between the house of the Egyptian Institute and the military power, the savans, headed by Monge and Berthollet, defended their premises until assistance arrived. During this expedition a strong friendship grew up between Monge and the future emperor, which made the former a zealous partisan of the latter to the end of his career. The consequence of this attachment was, that Monge was among those who were expelled from the Institute at the final restoration of Louis XVIII. This, and the destruction of the Ecole Polytechnique (since revived), are placed by Dupin among the causes of his death, which took place, as before stated, July 28, 1818.

Besides the works already mentioned, we have the 'Description de l'art de fabriquer les Canons,' Paris, an II., and 'Feuilles d'Analyse appliquée à la Géométrie,' an III. The latter work in the subsequent editions was called 'Application d'Analyse à la Géométrie' (fourth edition, 1809).

There is also a large number of memoirs in the 'Mémoires de Turin,' 'Mémoires des Savans Etrangers,' 'Mémoires de l'Académie des Sciences,' 'Journal de l'Ecole Polytechnique,' 'Correspondance Polytechnique,' 'Annales de Chimie,' and 'Description de l'Egypte.'

The science of descriptive geometry, with its numerous applications to the description of machines, to perspective, architecture, fortification, &c. &c., might be explained at length, but not with much profit to the general reader. [GEOMETRY, vol. xi., p. 156.] Of its remarkable results on pure mathematics we have spoken in the place just cited. The analytical discoveries of Monge are hardly less remarkable. He first applied the differential calculus to the general theory of surfaces, in doing which he enlarged the bounds of that science materially, and added many useful theorems, giving to the consideration of the calculus of three variables all that illustration and clearness which his predecessors had, by means of plane geometry, imparted to the less difficult case of two variables. In this field however he had predecessors and rivals; in that of geometry, such as he made it, he had neither the one nor the other. Since the time of Euclid and Archimedes, that science had received no such accession as he furnished; and the epoch, which will be known by the name of Monge, will divide its history.

MONGHIR. [HINDUSTAN, p. 218.]

MONGO'LIA (the Country of the Mongols) comprehends a vast extent of country in the interior of Asia, between 38° and 53° N. lat. and 84° and 124° E. long. Its length from east to west exceeds 1700 miles, and its width, from north to south, between 100° and 110° E. long., 1000 miles; but towards both extremities of its length it narrows to 600 miles. Its area may amount to between 1,200,000 and 1,300,000 square miles. On the north it borders on Siberia, on the east on Mandshooria, on the south on Proper China, and on the west on the Chinese province of Kansu (which once formed a part of Mongolia, and has only been dismembered from it in modern times), and on Songaria, or the Chinese government of Thianshan Pelu.

This country is often called Tartary even by modern writers, and not without some degree of propriety, as the Tata or Tatar properly constituted, at the time of Gengis Khan, a very powerful tribe of the Mongols, distinguished by their valour and military achievements. But the European writers of the middle ages applied that term to some of the tribes of the Turkis, which belong to the Caucasian race, and this use has become common. [MONGOLS.]

The middle portion of Mongolia is occupied by the Great Gobi (Ta-Gobi), which stretches across the country south-west and north-east from the boundary-line of the province of Kansu to the Dalai Nor, near the boundary of Da-uria, with an average width of about 200 miles. The Gobi is the worst part of the country, the surface being covered with sand or small stones, and the vegetation being very scanty and occurring only in single spots. [GOBI.] Vast tracts of it are level, but, at great distances from one another, there are hills of moderate elevation. The whole region is destitute of trees, and the water, which is only found at some distance below the surface, is brackish South-east of the Gobi extends a more elevated and uneven country, which terminates in a mountain-range of considerable elevation.

This range begins on the south, near the most southern point of Mongolia, not far from the banks of the river Hoang-ho, about 38° N. lat., and extends northward along that river for nearly 400 miles. It is covered with wood, and called Alashan, or Ho-lang Shan. Near 42° N. lat. it turns abruptly to the east, forming nearly a right angle, and it is then called Inshan by the Chinese, and Onghian Oöla by the Mongols. In this direction the chain continues, between 41° and 42° N. lat., about 600 miles, when it again turns north, though less abruptly, and proceeds in a north by east direction from 42° to 55° N. lat. under the name of Khing-khan Oöla. Little is known respecting the width and elevation of this extensive range. The highest portion seems to be at the point where it turns northward, and where a peak, called Petsha, rises far above the snow-line, and is supposed to attain a height of more than 15,000 feet above the sea. The country which skirts this range along its western and northern base, and extends from it to a distance of between 50 and 100 miles, has a broken surface, the hills rising to some height above the valleys and small plains. It is not deficient in water; but trees occur only in isolated tracts. As its elevation above the Gobi is considerable, and probably not less than 5000 feet above the sea-level, and as it is also much exposed to the cold winds which blow with great force over the desert, it is nearly unfit for agriculture, and only used as pasture-ground for horses, cattle, and sheep.

South of the Inshan Mountains the country exhibits fertile valleys and mountains, partly wooded, as far west as the place where the Hoang-ho river turns southward: this fertile tract is included in the Chinese provinces of Pe-tche-li and Shan-si. But the tract farther west, which is surrounded by the great northern bend of the Hoang-ho, partakes strongly of the features of the Gobi, and forms part of Mongolia: it is called the country of the Ordes, taking its name from a Mongolian tribe which belongs to the great division of the Tshakhar Mongols. This whole tract is covered with hills composed of loose sand, mostly without water, and entirely destitute of trees. But the numerous depressions contain extensive meadows, with rich grass and bushes. The attempts to cultivate some parts of it have not proved successful, and accordingly it is abandoned to the Mongols and their herds; but in order to prevent them from plundering the adjacent agricultural districts of the neighbouring provinces of Shen-si and Kan-si, the great Chinese wall was built across the peninsula from east to west from Pao-tsheou to Nin-ghia.

That part of Mongolia which is to the east of the Khing-khan Oöla, and extends nearly to the shores of Hoang-Hai, or the Yellow Sea, from which it is only divided by a narrow fertile tract belonging to the province of Leao-tong, is called Kortshin. This name is properly only applied to the tract north of the river Sira Muren, or Leao-ho, which resembles the country of the Ordes, except that it is less intersected by sand-hills. A great portion of it seems to be of inferior fertility; but south of the river Sira Muren the country contains numerous meadows clothed with rich grass, and agriculture has been introduced here by the Chinese, who send to this country their criminals who are condemned to transportation. The greater part of it however serves only as pasture-ground. This was the condition of the country above a hundred years ago, when it was visited by Europeans. It would seem however that agriculture must have greatly extended since that time, as it is a known fact that great quantities of grain, especially wheat, are exported from the province of Leao-tong to Peking and Shanghae. The most southern district of this country is traversed by an offset of the Khing-khan Mountains, which offset branches off from the principal range near the peak of Petsha, and extends in a south-eastern direction to the Hoang-hai, where it forms the high, rocky, and mountainous shores along the western side of the gulf of Leao-tong north of the mouth of the river Lan-ho. The declivities of this range are abundantly watered, but the northern side is bare and destitute of wood; whilst the southern is overgrown with pine, fir, oak, lime, walnut, and other trees, and is the haunt of numerous wild animals, among which are tigers and leopards. It constitutes the most extensive hunting-ground of the Chinese emperor, and contains the royal palace of Ichol, which was visited by Lord Macartney and described by Sir George Staunton. The tract on both sides of the Lan-ho is an agricultural country of great fertility and well cultivated. Though included within the boundary of Mongolia, it is inhabited by Chinese, and is very populous. Besides several small towns, it contains the large town of Quan-tshing.

The country which extends along the north-western side of the Ta-Gobi is nearly unknown, with the exception of the eastern part, which is traversed by the caravan road from Kiachta in Siberia to Khalgan in China. Here too the surface of the country is frequently broken by hills and isolated ridges; but the intervening level tracts contain rich pasture-ground. It is mostly well watered, but wood is scarce. In advancing northward the hills grow higher, and the valleys or intervening level tracts become narrower, till near the boundary-line between Mongolia and Siberia the country rises into mountains, which run in a continuous chain, and are that portion of the Altai Mountains which is known under the name of Khing-khan Oöla. [ALTAI MOUNTAINS.] The width of this mountainous and uneven country, which lies between Siberia and the Ta-Gobi, seems on an average to be about 150 miles. In it originate the river Selenga and its numerous upper branches, of which a short account is given in ALTAI MOUNTAINS, vol. i., p. 399. Here also rise the Kerlon and the Onon, two large rivers, which by their union form the Amur. [AMUR, vol. i., p. 477.] This country, which is rich, when compared with other portions of Mongolia, belongs to the high-priest of the Buddhists, who resides in the neighbourhood of the town of Urga, and is called Kootookhtu. It forms a separate government of the Chinese empire, and its general governor, called *vang*, or *kiun-vang*, as well as the lieutenant, called *amban*, reside in the town of Urga, or Oergo. This town is built in a small plain; but though sheltered by mountains against the northern winds, the climate is too cold to permit the most common vegetables to be raised, which are accordingly brought to it from Mai-mat-shin, a place two degrees farther north. Its population does not exceed 7000, of which 5000 are said to be lamas, or persons belonging to the ecclesiastical establishment of the Kootookhtu; but it is a place of considerable traffic, being a depôt for the goods intended for the trade with Siberia, and also for those Chinese productions and manufactures which are consumed in the parts of Mongolia farther to the west. Many of the Mongolian princes, whose tribes wander about in the Ta-Gobi and the adjacent countries, are obliged to reside in this town, in order that their views may be known to the Chinese governor, who is a Mandshoo, and commonly a relation of the emperor. Here also is the supreme court, called Yamoun, for the administration of justice in that part of Mongolia which is inhabited by the Khalkas. This place may in fact be called the capital of Eastern Mongolia. The small town of Mai-mat-shin is on the very boundary-line of Siberia, and less than a mile from Kiachta. [KIACHTA, vol. xiii., p. 209.]

The western portion of Mongolia, extending from 84° to 96° E. long., between Siberia and the most western extremity of the province of Kan-su, has never been visited by Europeans; and all our knowledge about it is derived from the geography of the Chinese empire, the Tay-tsing-hoei-tien, and the maps annexed to it. Though a great number of localities are indicated on it, we are unable to form any idea of the natural features of the country and its fitness for sustaining a population. Its western part is traversed by a mountain range, which near its western extremity is connected with the Altai mountains, not far from the eastern banks of the Irtish river, a great branch of the Obi. This range, the Ektag Oöla, is commonly called on our maps the Great Altai. It seems to rise to a considerable elevation, but to disappear about 94° E. long.; for farther east only isolated mountain masses or short ranges occur in the desert. That portion of Mongolia which lies south of this range seems to partake largely of the nature of the Gobi, extending mostly in extensive sterile plains. The great number of rivers which, descending from the southern declivity of the Ektag Oöla, join the Irtish before it reaches the lake of Zaizan, seem to indicate that a tract of fertile country extends along the northern banks of that river. The Irtish is the largest river in this country, and probably runs 160 miles before it falls into lake Zaizan. Another large river, the Ooroongoo, falls into lake Kisilbash, which has no outlet. The country between the Ektag Oöla and the principal chain of the Altai mountains appears to be traversed by several subordinate ridges running east and west. Though it is much better watered than any other part of Mongolia, the greatest part of it is a desert, especially towards the east, but towards the west the tracts of pasture are more extensive and less interrupted by sandy districts. In this part there are several extensive lakes, all of which receive considerable rivers without having any outlet. The most northern is the Upsa Nor, which receives from the east a considerable river, the Tes, besides several smaller ones. The Yeke Aral Nor, to the south-south-west of the Upsa Nor, is the receptacle of the Djabekan, a river whose course can hardly be less than 500 miles. In this part Mongolia extends to the north of the Altai mountains, comprehending the country in which the upper branches of the Yenesei have their origin and course. The mountain range which divides the last-mentioned tract from the lake Upsa Nor and the river Tes is called the Tangnoo-Oöla.

This part of Mongolia is divided into two governments, the government of Kobdo and that of Uliassutai, the boundary-line between them running near 92° E. long. The capital of the former is Kobdo, not far from the northern extremity of lake Yeke Aral Nor: the capital of the latter is Uliassutai, situated on the river Iro, an affluent of the Djabekan. The latter place is stated to contain 2000 houses, and to be regularly built. Caravans pass from it to Urga and to China, and its commerce seems to be considerable. Nothing is known of Kobdo. A general, appointed by the Chinese emperor, resides in each town, a Mandshoo by birth, who has under his inspection the Mongol inhabitants of the country; he unites in his person the military and civil authority.

As the whole surface of Mongolia, with the exception of the deep depression of the Ta-Gobi, is more than 3000 feet elevated above the sea-level, and as it stretches out in vast plains, to which the comparatively low ranges of mountains along its northern border cannot afford shelter against the northern and north-eastern winds, the climate is much colder than in that part of Siberia which extends along the base of the Altai range west of lake Baikal. No month in the year is free from snow, and even frost, though the heat in summer is nearly insupportable, on account of the want of trees and the sandy surface of the country. Sudden and great changes in the temperature are of frequent occurrence. It is however remarkable that the numerous herds which pasture on this plain find subsistence all the year round: even after a fall of snow the grass is seen above it, and serves to nourish the animals. This evidently shows that the quantity of snow which falls is comparatively small, and much less than that which annually covers the northern countries of Europe or of North America. This fact is a proof of the great dryness of the air; and to this want of moisture the unfitness of the soil for agricultural purposes, even where it is not composed of sand or stones, is mainly to be attributed. A little millet is grown in a few sheltered places between high hills, which attract the moisture. Rain is rare, except near the great ranges of mountains, especially about Urga. Timkowsky observed that in the months of October and November the thermometer descended to + 10°, 0°, and − 10°, and in Urga, in January, it varied between − 30° and − 70°. Gales of wind are frequent, and, especially in the Gobi, blow with great force, and frequently for many days together.

The wealth of the Mongols consists in their numerous herds of camels, horses, and sheep. Cattle are only numerous on the more hilly tracts, especially towards the boundary of China; there are none in the Gobi. Asses and mules are only found in the vicinity of China. Wild animals are numerous, especially hares, antelopes, dshiggetais or wild asses, deer, foxes, sables, squirrels, and marmots. Water-fowl are plentiful on the numerous lakes and swampy tracts. In some places the desert is covered with small stones, among which several kinds of precious stones occur, as chalcedony, agate, onyx, jade, carnelian, &c., which are collected by the Chinese.

Inhabitants.—The inhabitants are called Mongols, and constitute the principal stock of a nation which is widely diffused over the extensive table-lands of central Asia.

This nation is divided into two great divisions, the Eastern or Proper Mongols, and the Western Mongols, or Calmucks. Of the latter an account is given under CALMUCKS. All the tribes belonging to this nation have, from time immemorial, led a nomadic life, and subsisted on the produce of their herds, without attempting to cultivate the ground; a circumstance which must be attributed to the countries they inhabit being entirely unfit for agriculture, with the exception of very small tracts.

The Proper Mongols inhabit that portion of Central Asia which is bounded by a line beginning at the most northern extremity of lake Baikal, and thence extending west-south-west to the northern extremity of lake Balcash, and thence running east-south-east to the banks of the river Hoang-ho, where the range of the Alashan rises near the town of Ning-hia. From this place it follows the great wall of the Chinese empire, almost in all its extent, and from its eastern extremity it runs north-eastward to the junction of the rivers Nonni and Songari in Mandshooria, whence it returns to the northern extremity of lake Baikal. The whole country encompassed by this line is in possession of the Proper Mongols, with the exception of some plains between the Ektag Altai and lake Balcash, which are occupied by Calmuck tribes. There are however Mongols also in other parts of Asia, especially in the country about the sources of the Hoang-ho, and about lake Kookoonor, and in the western parts of Tibet, where they are called Khor-Katshi Mongols. But our information about these last-named branches of the great nation is extremely scanty, as those countries have never been visited by Europeans. All the Mongols speak the same language, and admit that they all belong to the same nation, and have a common origin.

The Proper Mongols are divided into three great nations, the Tshakhar, Khalkhas, and Sunnit. The Tshakhar inhabit the best part of Mongolia, being in possession of the tract which skirts the great Chinese wall on the north, and extends to the Ta-Gobi, a distance of from 150 to 200 miles from the wall. They obtained the full confidence of the court of Peking by yielding to the sway of the Mandshoo, before they had made any considerable progress in the conquest of China. The Khalkha or Khalkhas Mongols occupy the northern part of Mongolia, along the southern boundary of Siberia. They voluntarily submitted to the Chinese emperor, to avoid destruction in their unsuccessful war with the Oelöth Kalmucks in 1688. The Sunnit occupy the country between the Tshakhar and Khalkhas, or that part of Mongolia through which the Ta-Gobi extends. They are less numerous and powerful than their neighbours, and less esteemed by the Chinese. They submitted to the Mandshoo, when the Tshakhar joined them in 1634.

Nomadic nations have generally no literature; indeed their mode of life prevents them from having one that has originated with themselves. The Arabs and Mongols however have a literature, and they owe it to having conquered nations who had advanced much further in civilization than themselves; the Arabs to the Persians, and the Mongols to the Chinese. But as the Arabs preserved their dominion over the conquered nations for many centuries, their literature acquired a great degree of originality and extent, while that of the Mongols, who were masters of China only for a century, consists chiefly of translations of Chinese books, and a few original historical works, especially the history of their great hero, Gengis Khan. We are however very imperfectly acquainted with their literary compositions. The court of Peking takes great care to maintain a love for literature among the higher classes of the Mongols, as one of the surest means of diverting the thoughts of their princes from ambitious enterprises and from disturbing the peace of the country.

The whole nation is divided into twenty-six tribes, called *aïmak.* Each of these divisions has an hereditary prince, except the Khalkhas, who constitute one aïmak, but are governed by four hereditary princes, called *khan.* All four claim a descent from Gengis Khan. Each aïmak has its territory, in which it wanders about with its herds. The order of society resembles the feudal system, and the noblemen are called *taidshis.* The Mandshoo have introduced among them a military division, according to which the whole nation forms 135 banners, each of which is subdivided into regiments and companies. Each Mongol is bound to serve as a horseman from his eighteenth to his sixtieth year. The Mongols are governed by the decrees of the Li-fan-yuen, or Tribunal of Foreign Affairs, which has instituted for them a civil government, resident at Urga, and two military governments, at Uliassutai and Kobdo. All their princes are obliged to pay a fixed tribute as a token of their dependency, but it is small, and they receive ten times its amount back in presents, given to them as a remuneration for their services and fidelity. A few receive even a fixed salary. Some of their princes also are always married to a princess of the imperial blood, and thus are more closely attached to the interests of the emperor. By these means the court of Peking keeps the unruly and warlike temper of this nation in subjection, in which it is powerfully supported by the indelible hatred which the Mongols bear to the Chinese. It is therefore probable that if the Chinese should rise in rebellion against the Mandshoo, their present masters, the latter would be supported by all the Mongols in maintaining their present ground.

According to a rough estimate, it is thought that this nation, after having lived in peace for more than a century, can bring to the field 500,000 warriors; and as each male is a warrior, it is presumed that the whole population does not much exceed two millions.

(Timkowsky, *Voyage à Peking*, &c.; Pallas's *Travels through Russia;* Klaproth's *Asia Polyglotta;* Staunton's *Account of an Embassy to China;* M'Leod's *Narrative of a Voyage to the Yellow Sea;* Ritter's *Erdkunde von Asien,* i. and ii.)

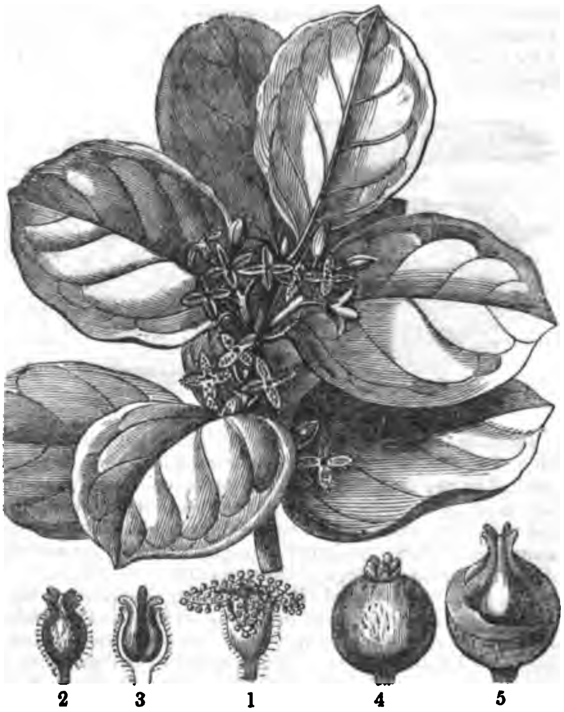
MONGOLS and TARTARS have been so constantly confounded by former writers, that even in modern times, although the vague denominations of Great Mongolia and Tartary have disappeared from our maps, much confusion still prevails about the history and geography of these two nations, who are however distinguished from each other by a strongly-marked physical and moral character. The vast plateaus and plains of Central Asia are occupied by four great branches of the human species, by the Tunguse and Tibetan races, and the innumerable Mongol and Tartar, or, more properly speaking, Turktribes. The last-mentioned people, whose number may be estimated at nearly three millions, are widely scattered, from the shores of the Caspian Sea to the Russian provinces of Kasan and Astrachan, and to the inhospitable tracts of Siberia, and even beyond that mountain range, the southern declivities of which are principally inhabited by the Turkomans, or those Turki tribes from whom the European Turks, or Osmanlis, are descended. Some of the northern clans, and particularly those which are subject to the Russian government, have settled in towns and villages, and have engaged in trade, cattle-breeding, and agriculture. On the south side of Mount Caucasus numerous Tartar tribes, who travel in summer towards the hills, and in winter descend with their flocks to the warmer regions of the plains, live alternately in tents and moveable habitations; but the greater part of them resemble in many respects the Arabian Beduins, have no fixed residence, wander over an immense extent of country, and lead a roving pastoral life, being occasionally engaged in hostile excursions and predatory quarrels. Personally they are a noble and intrepid race, and though animated by fierce passions and addicted to plunder and robbery, they are nevertheless careful observers of the duties of hospitality, and rarely shed blood, unless strongly provoked. (Leyden's learned *Introduction to the Memoirs of Baber*, London, 1826.) With the exception of the religion of Mohammed, there is no common tie among the numerous independent clans, which are distinguished by the Turkish denomination of hordes or encampments, such as the Nogai, Usbek, Kirgise, and Turkoman hordes. But they are all distinguished by the same striking features of the finely-formed and light-coloured Caucasian family to which they belong; whereas the Mongols are characterised by a short stature, dark yellow colour, flat nose, strong cheek-bones, large and prominent ears, and by the almost complete absence of beard. The Mongol race, which is far more numerous than the Tartar, is dispersed over almost all the eastern countries of Asia; but it is to the restless hordes of middle Asia, and to the Buriates, Bashkirs, Kalmuks, and other roving tribes, that the name of Mongols is chiefly restricted. Addicted to the same nomadic manner of life, and equally fond of horse and cattle breeding with the Tartars, they wander in quest of pasturage over their boundless plains, carrying with them their whole stock of property, and even their houses, which are placed upon wheels and drawn by oxen. Thus they leave scarcely a trace of their former residence in the places which they abandon. Contending for temporary pasture-grounds, or propelled by urgent necessity, those innumerable crowds of Mongols, though naturally fainthearted and cowardly, have often invaded the neighbouring countries.

The Scythians of old, who devastated, in the sixth century before Christ, the provinces of Media and Persia, even as far as the frontiers of Palestine, were undoubtedly Mongols (Herodot., i. 103; iv. 23; *Jeremiah*, v. 15; vi. 1; vii. 3), who afterwards, under the name of Huns and under the command of the fierce Attila, made considerable progress into Europe, ravaging the country like a host of hungry locusts, and conquering rather by their overwhelming numbers than by any regular warfare. (Ammianus Marcell., xxxi. 2; Jornandes, *De Rebus Goth.*, 35.) The Huns appear even on an antient Indian inscription (*Asiatic Researches*, i. 131); but the 'White Huns' mentioned by Cosmas Indicopleustes are probably Turki tribes, or those Scythians (Sâkas) whom King Vikramâditya expelled from India in the fifty-sixth year before our æra. The distinctive names of Mongols and Tartars did not become known until after the conquests of Gengis Khan, who honoured his Mongols with the pompous title of *Koekae Monghoel*, or 'celestial people;' whereas the conquered Turki hordes were called tributaries, or *Tatars*, as the word should be more correctly written. Although the main body of the soldiers, as well as the immediate successors of Gengis Khan, were decidedly Mongols, it is from that time that the name of the more courageous and spirited Tartars has been indiscriminately and arbitrarily applied to those Asiatic conquerors. (F. F. Schmidt, *Forschungen im Gebiete der Geschichte der Mongolen*, pp. 5, 39, 50.) Gengis Khan, born in 1163, became the chief of a petty Mongol clan in the thirteenth year of his age, and having first overcome the neighbouring hordes, he soon united the numerous wandering tribes into a conquering nation, and successively subdued the greatest part of Asia. His son Oktai followed him under the title of Great Khan, and was equally successful. In their expeditions to the west the Mongol armies, or, properly speaking, their hosts of robbers, advanced even to Hungary and Silesia; so that after the dreadful battle of Wahlstadt (A.D. 1241) the Mongol empire extended from the northern provinces of China to the frontiers of Poland and Germany. The Mongols (Khalkhas), under their khan Kublai, conquered all China, and remained in possession of that country for a century. In the course of the thirteenth century this vast empire gradually split into several independent sovereignties, till it was once more united, and even considerably enlarged in the direction of Hindustan, by that bloody conqueror of the Djaggatai Turki race, the famous Timur Begh, or Tamerlan, after whose brilliant career (1335-1405), the Mongol empire slowly dissolved. In the year 1519 a lineal descendant of Timur, Zehireddin Mohammed Baber, founded a new monarchy in Hindustan, erroneously called the Mogul empire. Being himself of Turki origin, Baber not only wrote his interesting 'Memoirs' in the purest Turki dialect, but often censures in the strongest terms the depravity, perfidy, venal character, and cowardice of the Mongols.

For the further history of the Mongol and Tartar tribes, see Abulghasi Behadurkhan, *Historia Mongolorum et Tatarorum*, Casan, 1825; Hüllmann, *Geschichte der Mongolen*, Berlin, 1796.

MONGOOSE, or **MONGOOZ**, one of the names of a species of Macauco, *Lemur Mongoz*, Linn.

MONIMIA'CEÆ constitute a little-known natural order of plants, whose most striking distinction consists in the flowers being naked and collected together into involucra, some male and some female; the male involucra having their inner surface thickly covered with numerous stamens; the female including several carpels, each of which has a single ovule in its interior. The species are very few in number, and in all cases are South American woody plants, shrubs, or trees, with fragrant aromatic secretions. Their real affinity is unsettled; if the prevailing opinion as to their structure is correct, they must be regarded as near allies of Urticaceæ; but if what is now called the involucre should be shown to be a calyx, as it was considered, till Brown suggested the contrary, they will take their station near Lauraceæ, with which their aromatic qualities assimilate them



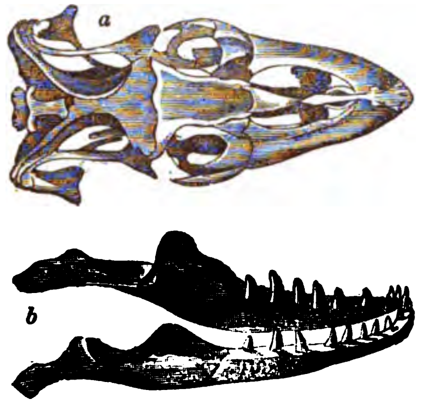
Monimia rotundifolia.

1, a male involucre; 2, a female involucre; 3, the last cut open to show the carpels; 4, a ripe fruit; 5, a view of the ripe carpels contained in the latter, the involucrum being partly cut away.

MO'NITORS, the name given to some Lacertian Reptiles, in consequence of the supposed warning given by them of the vicinity of crocodiles. The warning of these *Monitory Lizards* was said to be a hissing or whistling; but the better opinion is, that they obtained credit for this monition solely from the accident of their haunts, which are for the most part in the neighbourhood of the waters, and consequently bring them sometimes into company with the destructive and gigantic reptiles above mentioned.

The *Monitors* have teeth in both jaws, but none on the palate. Cuvier divides them into two groups [LACERTIADÆ], and Fitzinger into three, under the names of *Tupinambis*, *Varanus*, and *Psammosaurus*. Mr. Gray makes the *Monitoridæ* the second section of his *Leptoglossæ*, or Slender-tongued Lizards. (*Zool. Proc.*, 1837.) The true Monitors are protected by small and numerous scales on the head, the limbs, under the belly, and round the tail, which is carinated above, the keel being formed by a double row of projecting scales. Thighs without any row of pores.

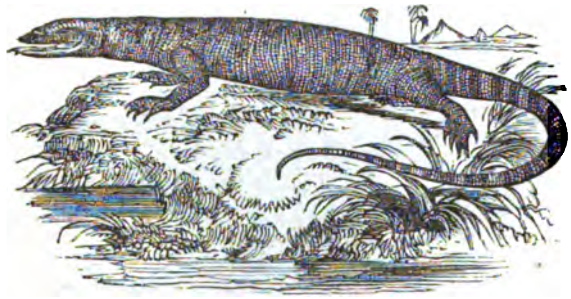
Geographical Distribution.—The Old Continent.



a, skull of Monitor Niloticus, seen from above; *b*, under-jaw of same.

The Monitor of the Nile (*Lacerta Nilotica*, Linn., *Tupinambis Niloticus*, Geoff., *Ouaran* of the Arabs) will serve as an example of these Lizards.

Description.—The teeth of this species are conical and strong, and the posterior ones become rounded with age. The colour is brown, with paler and deeper dots, forming ocellated compartments, which become rings on the tail and obscure stripes on the limbs. The tail, which is rounded at its base, is carinated above, though not strongly, nearly throughout. Length from five to six feet.



Monitor Niloticus.

Locality.—Egypt; where the modern Egyptians have a fable that the animal is a young crocodile which has been hatched on dry land—as indeed all young crocodiles are—but they mean, we suppose, to convey the idea that it is a dwindled and neglected offspring. The species is to be found on the monuments of the antient Egyptians, probably on account of its devouring the eggs of the crocodile.

The great fossil Lizard [MEGALOSAURUS] appears to have partaken of the structure of the Monitors and the Crocodiles. The *Mosasaurus* was also very nearly allied to the Monitory Lizards. [MOSASAURUS.] An account of the dissection, by Mr. Martin, of a *Monitor* that died at the Gardens of the Zoological Society in the Regent's Park, in 1831, will be found in the Proceedings of the Society for that year.

MONK. In England, before the Reformation, a person who 'entered and professed in religion,' as the phrase was, from that time was considered, for all legal purposes, to be dead. Littleton (§ 200) says, 'When a man entreth into religion and is professed, he is dead in the law, and his son or next cousin (consanguineus) incontinent shall inherit him, as well as though he were dead indeed. And when he entreth into religion, he may make his testament and his executors; and they may have an action of debt due to him before his entry into religion, or any other action that executors may have, as if he were dead indeed. And if that he make no executors when he entreth into religion, then the ordinary may commit the administration of his goods to others, as if he were dead indeed.' It was a consequence of this legal notion of a civil death, that if a lease was made to a man for the life of another person, and this other person professed in religion, the lease determined; and for this reason such a lease was always made for the *natural* life of any person on the continuance of whose life the lease was to depend; and this phraseology is still maintained in legal instruments. (Co. 2, *Rep.* 48.)

All Regulars, that is, those who vowed obedience, chastity, and poverty, entered some house of religion, where they professed. Bare admittance into such a house was an entry into religion; but the person was not professed till the year of probation was expired, and he had taken the habit of his order and made the vows above mentioned.

By the 27 Hen. VIII., c. 28, all monasteries, priories, and other religious houses of monks, canons, and nuns, of whatever habit, rule, or order, not having lands, rents, or other hereditaments above the value of 200*l.* per annum, and all their manors and lands, were given to the king and his heirs for ever. The act declared that the king should have and enjoy, according to the act, the actual and real possession of such religious houses as were comprehended within it, and might give, grant, or dispose of them at his will and pleasure, to the honour of God and the wealth of the realm. The act of the 31st Henry VIII., c. 13, was still more comprehensive. By the 1st Ed. VI., c. 14 (which recites the 37th Henry VIII., c. 4), all colleges, free chapels, and chantries, and all manors, lands, or hereditaments belonging to them, or which had been given or assigned to the finding of any priest, or of any anniversary or obit, or any light or lamp, to have continuance for ever, were given to the king and his heirs and successors.

It should be observed that these acts did not affect ecclesiastical bodies or persons, simply as such; that is, they did not affect the secular clergy, such as archbishops, bishops, deans and chapters, prebendaries, archdeacons, parsons, and vicars; but only the regular clergy. It was decided in the archbishop of Canterbury's case (Co. 2, *Rep.* 48), that no ecclesiastical house, unless it was also religious, was within the act of 31 Henry VIII. These acts however completely put an end to all the houses of regular clergy within the realm; and on the occasion of carrying into effect the statute of Edward VI., a great many grammar-schools and other charities which did not come within the provisions of the act were also suppressed. 'This act,' says Strype, 'was soon after grossly abused, as the act in the former king's reign for dissolving religious houses was. For though the public good was pretended thereby (and intended too, I hope) yet private men, in truth, had most of the benefit, and the king and commonwealth, the state of learning, and the condition of the poor, left as they were before or worse.' (Strype's *Ecclesiastical Memoirs*, ii. 101-103, 423, and iii. 461, where there is a catalogue of King Edward's free grammar-schools, which were endowed for the most part out of the charity lands given to the king by the said act for this and other like purposes.)

MONK, GEORGE, Duke of Albemarle, second son of Sir Thomas Monk of Potheridge, in the parish of Merton, in Devonshire, was born on the 6th of December, 1608. His father's estate was much encumbered, and his circumstances so distressed, that when Charles I. visited Plymouth to inspect the equipment of a Spanish expedition, he was afraid of joining the gentlemen of the county who were desirous of assembling round the king, on account of the menaces of a creditor who threatened to arrest him. George Monk was despatched to offer the under-sheriff money to delay the execution of the warrant. 'The under-sheriff accepted the money, promised what was asked, and a few days after, paid doubtless on the other side, caused Sir Thomas to be publicly arrested in the midst of the gentlemen assembled on the king's way.' (*Memoirs of Monk*, by M. Guizot, translation, p. 5.) This circumstance had an immediate influence on young Monk's life: he dealt so violently with the treacherous under-sheriff, that it became prudent for him to leave England. Sir Richard Greenville his relative, was on the point of sailing on a cruise before Cadiz, and he embarked with him as a volunteer. Upon the failure of this expedition, he enlisted during the following year in the equally unsuccessful attempt on the Isle of Rhé. Soon after his return from the Isle of Rhé he entered the service of Holland: 'Germany and the Low Countries were at this period the resort of those young Englishmen whose taste or the state of whose fortunes drove them to the profession of arms. He returned to England about the thirtieth year of his age, when the first Scotch war began, enlisted in the king's army, and obtained the rank of lieutenant-colonel in Lord Newport's regiment.' (Skinner's *Life of Monk.*) The conduct of the war, and the manner in which it was concluded, made him discontented and inclined to emigrate to Madagascar; but he abandoned the scheme, and was appointed colonel of Lord Leicester's troops sent to quell the Irish rebellion (1642). In the irregular warfare that followed he had considerable success, his power being augmented by the devoted attachment of his troops: there was not, it was said, a soldier ever so sick or so ill shod, who would not make an effort to follow George Monk. When the civil war began, these troops were recalled, and Monk, being suspected of favouring the parliament, was sent under a strong military guard to Bristol. Lord Hawley, the governor of the town, passed him on parole to the king; and the king, satisfied with his professions, permitted him to rejoin his troops, which had reached England, and were engaged in the siege of Nantwich. At Nantwich he was defeated by Fairfax (January, 1644), was taken prisoner, and, after some delay, confined in the Tower of London. During the two years that he suffered the miseries of imprisonment aggravated by excessive poverty, events pursued their course; the king became a prisoner, and the civil war ceased. His known abilities made him now desirable as a partisan. The parliament actively strove to gain him, and at length, overcome by persuasion and gifts of money (Clarendon, vii. 382), he forsook his party, which was no longer in a condition in which he could serve it, and 'quitted his prison to serve the parliament, leaving in the Tower the royalists, his companions in adversity, who never ceased to flatter themselves that he would prove one day useful to the king in England.' (Guizot, 39.)

Monk was now sent to Ireland to command in Ulster, where he served his new masters greatly to their satisfaction, leaving only one cause for censure, a league with the rebel O'Neill. He had gained the confidence of Cromwell, who determined, on account of his military talents, to make him general of the ordnance, and to provide him a regiment with which he might accompany him in the meditated Scotch campaign. In this service Monk distinguished himself at Dunbar, and was left by Cromwell with 6000 men to complete the reduction of Scotland. It is in this campaign that he is accused of having in cold blood put to death the governor of Dundee and 800 of the garrison. After a short residence at Bath for the benefit of his health, he returned to Scotland (1652) with other commissioners to promote the union of the two nations. Fresh and novel services were soon required of him. He was associated with Blake and Dean in the command of the fleet which was engaged in the war against Holland. Two engagements took place, in both of which the English were victorious: Van Tromp, the Dutch admiral, was killed, and his fleet damaged and dispersed. After being rewarded with many honours at the hands of Cromwell and the parliament, he resumed the command in Scotland, where fresh troubles had broken out.

Before we proceed further with the account of Monk's public acts we must mention some occurrences in his private history, by which his condition was immediately affected. These are, the death of his father, which occurred before his imprisonment; the subsequent death of his elder brother without male heirs; his succession to the family estates, which he soon relieved from their embarrassments; and his marriage. When this last event took place it is difficult to ascertain, but it was not acknowledged until 1653, though asserted to have been previously solemnised. His wife was Anne Clarges, the sister of Dr. Thomas Clarges, a physician, a vulgar imperious woman who had previously cohabited with him. 'She was a woman,' says Lord Clarendon (who must however be pointed out as Monk's assiduous detractor), 'Nihil muliebre præter corpus gerens;' a person 'of the lowest extraction, without either wit or beauty.' (*Hist. Rebel.*, vii. 383.) The pressing solicitations of the lady, and the probable or actual birth of a child, gained Monk's consent to the union.

It was in April, 1654, after all these circumstances connected with his private history had taken place, that Monk, under the orders of the Protector, marched northwards with the most restless and fanatical portion of the army. He had to contend with Lord Middleton, with whom the royalists had risen in the Highlands, and the people generally, who were discontented and ready for rebellion. His vigilance and activity were remarkable.

'The country submitted; the army did not quit it, till it had, by means of a certain number of garrisons, secured the payment of taxes, which the Highlanders had hitherto thought they could refuse with impunity; and order was established in those sanctuaries of plunder, with such effect, that the owner of a strayed horse, it is said, recovered it in the country by means of a crier.' (Guizot, p. 80.) In the autumn he returned to Edinburgh. For five years his residence was at Dalkeith, where he was 'ever engaged in business, or in his planting, which he loved as an amusement and occupation; he gave access to every one; listened to everything; had a language for all conditions, all ranks, and all parties; kept himself well informed on all subjects; and ascertaining what he might have to fear or to promote, directed by his own personal knowledge the numerous spies whose reports never missed his ears or hands.' Monk, who was (1655) one of the commissioners for the government of Scotland, now stood in a very curious position: for though he was the agent and confidant of Cromwell, he was also the hope and favourite of the royalists. It was always his care in advocating the cause of one party to give as little offence as possible to that to which he was opposed. That he might not commit himself, he was silent when speaking was not absolutely necessary; when he was forced to speak, he did so with caution and artful duplicity A letter which the king wrote to him expressive of confidence, Monk forwarded to Cromwell; but notwithstanding this apparent devotion, the Protector feared him, and used various expedients for neutralising his power. (Guizot, translator's note, p. 91.) After Oliver Cromwell's death, when Richard Cromwell was proclaimed Protector in Edinburgh, many exclaimed, in allusion to Monk, 'Why not rather "Old George?"' but Monk would neither assume the power nor attach himself to any party. The new Protector's friends offered him 20,000*l.* a year for his support; but, avaricious as he was, he would make no engagement: his policy was to render himself an object of importance to all parties, and through his duplicity he succeeded in being treated with by all. When at length circumstances compelled him to act, he declared for the parliament against the army, and decided upon marching to London. There were many, even at the time when he thus declared himself, who altogether discredited his sincerity, and believed him to be at heart a royalist, seeking to restore the king as soon as it might be done with safety: and there is reason to suppose that he had already determined to promote the Restoration. We give Mr. Hallam's opinion on this point. (*Const. Hist.*, ii. 384.)

'I incline, upon the whole, to believe that Monk, not accustomed to respect the Rump parliament, and incapable, both by his temperament and by the course of his life, of any enthusiasm for the name of liberty, had satisfied himself as to the expediency of the king's restoration from the time that the Cromwells had sunk below his power to assist them; though his projects were still subservient to his own security, which he was resolved not to forfeit by any premature declaration or unsuccessful enterprise.' The power of Lambert and the army was now rapidly demolished. Fairfax, the city of London, the fleet, and the governor of Portsmouth, all declared against them, and Monk's party gained the ascendency in Ireland. Every office and every command Monk filled with friends whom he could trust; it was observed that many of these persons were royalists, yet Monk still persevered in protesting for the parliament and a commonwealth. The expectation of the Restoration was somewhat general, but, if there were any, the number was small who suspected through whose agency it would be brought to pass.

When Monk arrived in London he was lodged in the apartments of the prince of Wales. He addressed the parliament, was invited to occupy his place there, was made a member of the council of state, and charged with the executive power. With his usual address, he continued to use the power of his army as a means of awing parliament, and the assertion of duty owed to the parliament as a means of controlling his army. At length the 'Rump' became so unpopular, and the cries for a free parliament so loud, that the city of London refused the payment of taxes. Monk obeyed an order from the parliament to march into the city and subdue it: but his subservience to them did not last long. He sent them a letter, 'probably the harshest ever received by that parliament, so used to insults' (Guizot, 205), ordering them immediately to fill up the vacant seats, fixing a time for their dissolution, and the 6th of May for the election of a new and free parliament. The restored members appointed him general of the forces of England, Scotland, and Ireland; and the republicans, as a last resource, listened to his continued protestations against the king, the House of Lords, and the bishops, and allied themselves to him. Every day his personal power increased; he was offered the protectorate, which he declined; continuing the line of conduct he had always followed, 'that is to say, steadfast in varying his language according to the individual—he gave no handle to any definite opinions with respect to himself.' The expectation of the Restoration daily increased, and some indications in the conduct of Monk, who was gradually dismissing persons and removing objects that might prove obnoxious to the king, showed plainly that the event was not far distant.

At length the farce was brought to a close. Monk received Sir John Greenville, the king's messenger, and having read the despatches, and agreed to his return, directed the manner in which he wished it to be brought about. The king, by Monk's advice, went from Brussels to Breda, and Sir John Greenville, on the 1st of May, returned with letters to the new parliament drawn up as Monk desired, and the king was immediately acknowledged and proclaimed. On the 23rd of May, Monk received him on the beach at Dover, was embraced by him, and addressed with great affection. He had a grant of money, together with many offices and titles, of which the principal was the duke of Albemarle. (Guizot, 281.)

After the restoration Monk resided principally in London, with his wife, who was the laughing-stock of the court, and gave general disgust. (Pepys, iii., 75, &c.) In 1664 Monk presided at the Admiralty. In 1665, when, on account of the plague, the court left London, he governed the city, braved all danger, and, as far as he was able, provided for all exigencies and quelled all confusion. In 1666 he commanded the fleet with Prince Rupert, engaged the Dutch, and gained credit for his courage. On his return his health failed, and he died of dropsy on the 3rd of January, 1670. He was buried in Westminster Abbey, in Henry VII.'s chapel: the king attended the funeral. He was succeeded in his titles by Christopher his son, who married Lady Elizabeth Cavendish, granddaughter of the duke of Newcastle, and died childless.

Monk had considerable capacity for civil as well as military government: the former he proved in Scotland, the latter in all his campaigns. He had the faculty of gaining the good-will and confidence of the troops and sailors that he commanded, with whom no man was more popular than 'Old George.' He had a remarkable power of advancing his fortunes with the prevailing party, without giving offence to those that might supplant them. He was silent and cautious, shrewd and phlegmatic: he was profoundly skilled in dissimulation, ever dissembling, treacherous, and false. 'He was a man capable of great things,' says M. Guizot, 'though he had no greatness of soul.'

(Guizot's *Memoirs of Monk*, ably edited by Mr. Stuart Wortley; Skinner's *Life of Monk;* Maseres' *Tracts;* Pepys's and Evelyn's *Memoirs;* Hallam's *Const. Hist.*)

MONKEY, the name usually applied to those forms among the *Simiadæ* which possess a tail.

MONMOUTH, Duke of. [CHARLES II.; JAMES II.]

MONMOUTH, the capital town of the county of the same name, is situated at the confluence of the Wye and Munnow, in the hundred of Skenfrith, about 129 miles west-north-west of London. The population amounted in 1831 to 4916.

The town is comprehended in the parish of St. Mary's, from which a portion called St. Thomas's has of late years been separated for ecclesiastical purposes, and appropriated to the antient church of that name.

From the coincidence of the position of Monmouth with that called 'Blestium' in the antient Itineraries, it is generally supposed to be the site of that station. From historical record it appears that Monmouth in early times was occupied by the Saxons, who fortified it to maintain their conquests between the Severn and the Wye, and to prevent the incursions of the Welsh. The town has been surrounded by walls and a moat on the sides which are not protected by the river; four gates, the moat, and portions of the walls existed in Leland's time; one gate still remains; the walls have been entirely demolished, and only a small part of the moat can be traced. The ruins of the castle, which stands on an eminence above the Munnow, are from some situations concealed by more modern buildings. It is said by Camden to have been constructed by John of Monmouth, in the reign of Henry III., which may be in substance correct, although, in the account of Herefordshire given in Domesday Book, a castle at Monmouth is mentioned to have been then held for the king by William Fitz-Baderon. A list of the successive proprietors is given by Mr. Coxe (*Hist. Mon.*, p. 305): it was the favourite residence of John of Gaunt, of his son Henry Bolingbroke, afterwards Henry IV.; and the birth-place of Henry V., who was thence called Harry of Monmouth. The castle of Monmouth, as a parcel of the duchy of Lancaster, was inherited by Henry VI. Edward IV., in the fifth year of his reign, granted it to William lord Herbert, who afterwards became the earl of Pembroke; but it again reverted to the crown, and was possessed by Henry VII. and several of his successors. At what time it was alienated from the duchy of Lancaster and became private property has not been precisely ascertained. The duke of Beaufort is the present proprietor.

The borough is divided into the four following wards: Castle Bailey, Wye-bridge, Munnow Street, and Over Munnow. The bulk of the population resides within its limits. There are four charters of incorporation, all of which are considered as governing charters. They were granted—the first by Edward VI., in 1550; the second by Philip and Mary, in 1557; the third by James I., in 1606; and the fourth by Charles II., in 1666. The mayor and capital burgesses are the governing body; the mayor, two bailiffs, and the recorder are magistrates for the borough.

The market is held every Saturday and the first Wednesday in each month; and there are four annual fairs; these fairs are for agricultural produce. There is no manufacture carried on here. Formerly Monmouth was celebrated for its caps, which were worn by a large portion of the population of England and Wales. Fuller, in his 'Worthies,' gives an account both of the caps and the number of persons employed in making them. Statutes were framed for the protection and encouragement of this handicraft: in the 13th of Eliz. it was enacted that these caps should be worn on sabbaths and holydays by all persons (some of worship and quality excepted), on pain of forfeiting ten groats. Shakspere mentions this article of clothing. In Henry V. (act iv., sc. 7) Fluellen says, 'The Welshmen did goot service, in a garden where leeks did grow, wearing leeks in their Monmouth caps.' An inn called the Monmouth Cap stands on the borders of the county, halfway between Abergavenny and Hereford.

MONMOUTHSHIRE, a maritime English county bordering on South Wales, is bounded on the north by Herefordshire, from which it is for the most part separated by the river Munnow; on the east by Gloucestershire and the river Wye; on the south by the Bristol Channel and the æstuary of the rivers Severn and Wye; on the west by the Ffwddog, a detached portion of Herefordshire, by Brecknockshire, and Glamorganshire. From the latter county it is divided by the river Rumney. The parish of Welsh Bicknor, a detached portion of this county, bounded by Herefordshire and the river Wye, is situated north-west of Monmouth, between that town and Ross.

Its greatest length, from a point in the Black Mountains on the north, to the mouth of the river Rumney on the south, is about twenty-eight miles. Its greatest breadth, from the Bute and Rumney iron-works on the west, to Hadnock Wood on the east, about thirty-four miles. The area is 496 square miles, or 317,440 acres. In 1831 the gross population amounted to 98,130, being an average of about 198 persons to a square mile; on comparing this amount with the similar average in each of the contiguous counties, we find, with one exception, the population of Monmouthshire to be the most dense. The population of Gloucestershire is about 307 to a square mile, Herefordshire 122, Glamorganshire 160, and Brecknockshire 63.

In extent of surface Monmouthshire is exceeded by thirty-five English and seven Welsh counties; in amount of population by thirty-six counties in England and none in Wales.

Surface.—With the exception of the southern portion, Monmouthshire is generally a hilly country. In the hundred of Wentloog a long chain, commencing with Bedwelty mountain, runs nearly unbroken to the Curtain mountain in the parish of Machen. In the same hundred is Mynydd-y-Llan, and a second range of hills immediately to the west of the river Ebbw. In the hundred of Abergavenny are the Blorenge, the picturesque Skyrrid and Sugar-loaf, a portion of the Black Mountains, and the wild elevations in the parishes of Aberystruth and Llanhileth, and to the west and north of Pontypool. The Graig forms the principal height in the hundred of Skenfrith. These are the chief though by no means the only elevations; as we have before said, a large portion of the county is irregularly hilly: the southern district must be excepted. In Caldicot and Wentloog are large tracts of land called the 'Levels' of the hundreds in which they are situated, varying from place to place in appearance and productiveness, and protected from the inroads of the sea by mounds or stone walls of many miles in length. From Caldicot Level rises the hill of Goldcliff, for an account of which we refer to the *Archæologia*, vol. v., p. 61.

The length of the coast-line from the mouth of the Wye to the mouth of the Rumney is about twenty miles; a portion of this length bounds the æstuary of the Severn, and the rest the Bristol Channel.

Rivers.—The principal rivers in this county are the Wye, the Usk, the Rumney, the Ebbw, and the Munnow.

The Wye first waters Monmouthshire at the detached portion, the parish of Welsh Bicknor, of which it forms the western and southern boundary; thence it flows a circuitous course between the counties of Hereford and Gloucester, until it reaches Hadnock Wood, in the parish of English Newton, where for a short space it divides Herefordshire and Monmouthshire; it then enters the latter county, and flowing close to the town of Monmouth, at Redbrook it again becomes the boundary of the county, and continues to be so down to its mouth. Throughout the whole of this length the Wye is navigable for barges, and sea-going vessels of considerable size work their way up to the bridge at Chepstow, whence steam-packets also ply to Bristol. The tide, which rushes with great impetuosity through the narrow entrance of this river, flows as far as Tintern; the spring-tides rise at Chepstow-bridge more fifty feet. It is the portion of this river bordering Monmouthshire that is most frequently visited by tourists; and the whole extent from Monmouth to Chepstow, whether seen from the water itself, or from the turnpike-road which follows the banks of the river, is a landscape of very remarkable beauty. The abbey of Tintern, the view from the Windcliff, and the approach to Chepstow, are the most striking features; the last is seen only from the river and the walks at Piercefield, for the road leaves the river at some distance from the town.

The Usk enters Monmouthshire about three miles west of Abergavenny, flows in the vicinity of that town, thence through the middle of the county by the towns of Usk, Caerleon, and Newport, where is the lowest bridge, until it reaches the Bristol Channel.

The Rumney first reaches Monmouthshire at its most western point, and flowing in a south-south-east direction, forms its boundary with Glamorganshire, until it falls into the Bristol Channel.

The Ebbw enters the county on the west-north-west, follows a course nearly parallel to the Rumney, and falls into the æstuary of the Usk below Newport.

The Munnow becomes the boundary of this county about a mile south of the village of Clodock in Herefordshire, separates it from that county for a considerable distance, then enters Monmouthshire about three miles north-north-west of Monmouth, passes that borough, and falls into the Wye. In addition to these rivers may be mentioned the Sirhowy, which falls into the Ebbw, the Trothy, and the Honddu, which join the Munnow, and Afon Llwyd, which falls into the Usk near Caerleon. There is good fishing in all these streams.

The want of a navigable river in the western and north-western parts of Monmouthshire, where extensive coal and iron works are carried on, has led to the formation of two important canals, communicating with the Usk at Newport. The principal canal runs north-west from Newport, has a branch to the neighbourhood of Pontypool, which it leaves to the west, runs in a north direction within a mile and a half of Abergavenny, whence it is continued to Brecknock by the vale of Usk: the whole length is between 45 and 50 miles. The second important canal is the 'Crumlin Canal,' which branches from the former between Newport and Malpas, and unites it with the village from which it is named, situated in the mining district west-south-west of Pontypool. In connection with these canals are many railroads—some private, and some formed by companies—having several inclined planes and tunnels of great length, on which iron and coal are conveyed from the various works.

The principal roads are, that from Chepstow by Caerwent to Newport, and thence to Cardiff, which is travelled by the Bristol and Cardiff mail; that from Chepstow to Monmouth, and so to Hereford, which is travelled by the Bristol and Hereford mail; and that from Ross through Monmouth, Raglan, and Abergavenny, to Brecon and Caermarthen, which is travelled by the Caermarthen and Gloucester and London mail.

Climate.—The climate of Monmouthshire varies greatly according to the elevation of the surface. In the vales of Wye and Usk, and many of the southern parishes, the crops are much earlier than in the northern and western portions of the county, where the narrow unsheltered valleys are swept by the winds, and subject to frequent rain, which is attracted by the neighbouring mountains. The population is generally healthy, and the average duration of life is longer than in most parts of the island.

Geology.—That part of Monmouthshire which lies east of a line drawn from Abergavenny to Newport, and prolonged thence to the Bristol Channel, is composed of the old red-sandstone formation, which is largely developed in the neighbouring counties of Hereford and Brecknock. At Chepstow, a tongue of carboniferous limestone, from the coal-basin of the forest of Dean, runs into Monmouthshire, and is bordered on the south by a strip of new red-sandstone, which forms the shore of the Severn. Close to Usk the strata of the old red-sandstone have been pierced by the underlying rocks (the Caradoc sandstone, Wenlock limestone, and Ludlow rocks of Murchison), which form an oblong district in the midst of the old red-sandstone formation.

That part of Monmouthshire which lies to the west of the line which we have described above, consists, for the most part, of the coal-measures of the South Welsh coal-field, skirted by a narrow band of carboniferous limestone. The geology of this county is fully described in the recent splendid work of Mr. Murchison, entitled 'The Silurian System,' London, 1839, 2 vols. 4to. (See chap. 12, 13, 14, and 15, and particularly chap. 23, on the Usk valley of elevation. For a description of the carboniferous system of Monmouthshire, see also a memoir by Dr. Buckland and Mr. Conybeare, in the *Geological Transactions*, second series, vol. i., p. 210 316.)

Agriculture.—The agriculture of this county varies according to the districts. In the mountainous portion on the north-west little wheat is grown; oats and barley form the principal grain crops. The Glamorganshire breed of cattle and small hill sheep prevail, the system of farming being very similar to that generally practised in the hilly parts of South Wales. In the fertile vale of Usk, the vale of Wye, and the northern and eastern districts generally, the agriculture is very similar to that of Herefordshire. Short-horned cattle have been introduced at Tredegar by Sir Charles Morgan, but they have not extended widely, and the Herefordshire breed is prevalent. Orchards are seen in favourable situations; the hills are also frequently covered with oak-coppice. The southern district, bordering the Bristol Channel, consists of an alluvial tract, in which three qualities of soil are found, a black and sterile peat, and a light and a heavier clayey loam; the lightest of these soils is productive either as pasture or meadow or under tillage.

Political Divisions.—Monmouthshire is divided into the six following hundreds: Abergavenny, Caldecot, Raglan, Skenfrith, Usk, and Wentloog; which contain 123 parishes, and eight market-towns. 1. Abergavenny is situated in the hundred of the same name, near the banks of the Usk, in the northern portion of the county. It is distant from London 145 miles, from Monmouth 16, and from Hereford 24. The market, which is considerable on account of the neighbouring iron and coal works, is held on Tuesday and Saturday. [ABERGAVENNY.] 2. Caerleon, in the south of the hundred of Usk, stands upon the right bank of the river, from which that hundred takes its name, about five miles north-east of Newport. In consequence of its neighbourhood to the thriving port of Newport, its trade has diminished, and the place become of little importance. The market, which is inconsiderable, is held on Thursday. 3. Chepstow is beautifully situated in the hundred of Caldecot, near the mouth of the Wye. It is distant from London 133 miles, from Newport 16, and from Monmouth 16. [Chepstow.] 4. Monmouth. 5. Newport holds an important situation near the mouth of the Usk, in the hundred of Wentloog. In association with the boroughs of Monmouth and Usk, it returns one member to parliament. The governing charter was granted in the twenty-first year of James I.; the mayor and thirteen aldermen form the governing body; of the aldermen, who are elected for life, the two seniors are magistrates for the borough. The limits of the borough, which formerly did not comprise the whole mass of the population, were extended at the time of the Reform Act. The town is well lighted and supplied with water, but indifferently paved and cleansed. It was once surrounded by walls, of which no vestiges remain. Three gates are mentioned by Leland to have existed in his time; the sites of two of these may still be traced. The castle, the remains of which have been converted into a brewery, was probably built by Robert, Earl of Gloucester and Bristol, the natural son of Henry I. (Coxe's *Monmouthshire,* i., p. 50.) During the present century this town has progressively and rapidly increased in wealth and population. The population of Newport and St. Woollos was, in 1831, males, 3500; females, 3562: total 7062.

The port of Newport comprises the whole of the river Usk between Caerleon and a line drawn from Redwick Pill on the Severn, to the mouth of the Rumney river. The port dues are, for every sloop under 20 tons, 4*d.*; for every sloop above 20 tons, 8*d.*; for a schooner or brig, 2*s.*; for a ship or bark, 3*s.*

The exports consist principally of coal, iron, bark, and oak timber; the importations, of foreign timber and Irish provisions. The number of vessels engaged in foreign, bears a very small proportion to the number engaged in coasting trade. The export of coals, which in 1800 was 18,375 tons, in 1833 amounted to 470,339 tons. The following table shows the amount of trade carried on in this port.

	Vessels cleared in.	Vessels cleared out.
1825	910	6285
1832	1030	7909
1834	1134	7588
1837	1393	7482

The gross amount of customs-duty received in 1834 was 5578*l.*; in 1835, 6709*l.*; in 1836, 11,183*l.*

Much inconvenience has hitherto been experienced on account of the insufficient accommodation of this port; vessels lying and being laden in the mud. A company has lately (1838) been formed for the purpose of building docks, which will tend to facilitate and increase trade. Newport is distant from London 149 miles, from Chepstow 16, from Cardiff 12. Markets are held on Wednesday and Saturday.

6. Pontypool, a thriving town on the southern border of the hundred of Abergavenny, stands on the Afon Llwyd, immediately to the east of the wild mountainous district in which many of the principal collieries and iron-works are situated. Pontypool is distant from Usk 7 miles, from Newport 9, and from London 148. The market is on Saturday. 7. Tredegar is situated in the parish of Bedwelty, in the upper division of the hundred of Wentloog. The activity of the neighbouring mining district has caused so rapid an increase of the population, that it has been found desirable to erect a market-house here, and to hold a market every Saturday. Many houses have lately been built, and a town formed here; there is a church, and places of worship for Wesleyans and Baptists. Tredegar is 21 miles from Newport, and 12 miles from Abergavenny. 8. Usk is situated in the hundred and on the river of the same name; it is a borough, contributing with Monmouth and Newport to the election of a member of parliament. The lord of the manor of Usk is also lord of the borough, in which capacity he appoints the recorder. There are within the borough a portreeve (nominated and elected annually by the burgesses), a recorder, two bailiffs, and an indefinite number of burgesses. Usk is distant from Monmouth 12 miles, and from London 141 miles.

Caerwent, a Roman station of considerable importance, and afterwards a town, has now become an inconsiderable village. An account of such of its antiquities as are worthy of notice is given in the *Archæologia,* and in Coxe's *Monmouthshire,* vol. i., p. 24.

Minerals and Mining Industry.—The important minerals in this county are coal, limestone, and iron-stone. The South Welsh coal-field, as it is generally called, occupies a western portion of this county.

There are 12 beds of coal, varying from three to nine feet thick, and whose aggregate thickness is about 95 feet; the principal strata lie at a considerable depth, but as the district is intersected with deep valleys, the expense of sinking shafts is avoided, levels being driven into the side of the hills. These levels form the ingress and egress to the mines, and are furnished with iron-roads for greater facility of transit. The coal may be divided into two kinds, furnace-coal and stone-coal. For an analysis of them, and general information respecting this coal-field, see Coal. Limestone, which skirts the coal-field, and is likewise found, as we have stated in our remarks on the geology of this county, in the neighbourhood of Chepstow, is burnt extensively for building purposes and manure, and is used in large quantities in the manufacture of iron. Being broken into small pieces, that it may mix more intimately with the mine and coke, it becomes a flux, combines with the clayey portion of the ore, and forms with it a fusible compound which runs off below in a slag or cinder. In the selection of limestone for this purpose, those beds are preferred which contain the smallest proportion of magnesia. It is reckoned that about a ton of limestone is required for the manufacture of every ton of iron.

The iron-stone of this district is an argillaceous ore, occurring sometimes in strata, sometimes in detached lumps or balls; the proportion of iron contained in it varies from 18 to 55 per cent.: from 30 to 35 per cent. may be considered not a bad average throughout a work. Carbonic acid and clay enter largely into the composition of the ore; and water, sulphur, silex, and perhaps a little arsenic, complete the list of ingredients. The iron-works of Monmouthshire and South Wales are comprised in a range of country of about 25 miles from one extremity to the other, stretching in the direction of north-west and south-east. The works at Hirwain in Brecknockshire, and Aberdare in Glamorganshire, form the extreme points to the westward. Then comes Merthyr Tidvil with its important works, the focus, as it were, of the manufacture; and from Merthyr there is a continued line of furnaces formed by the works at Dowlais, Romney, Tredegar, Howey, Beaufort, Nant-y-Glo, Blaenafon, the Varteg, Abersychan, and Pontypool, which terminates the mineral range in that direction. Such is the demand for iron at this time (1839), that all available furnaces are in blast, and many new ones in course of erection. Under the head Iron will be found an account of the iron manufacture in Monmouthshire and South Wales, and a more detailed account in the valuable number of the *Library of Useful Knowledge,* entitled 'Manufacture of Iron,' from which these remarks have been extracted. See also a prize essay *On the Mineral Basin of South Wales,* by Mr. Booker (London, and Cardiff).

Political and Ecclesiastical Divisions.—Monmouthshire is divided into four deaneries, Abergavenny, Netherwent, Newport, and Usk. It is in the province of Canterbury, and, with the exception of four parishes, in the diocese of Llandaff. The parish of St. Mary's, Monmouth, is in the diocese of Hereford; those of Cwmyoy, Oldcastle, and Llanthony, in the diocese of St. David's. The benefices are generally of very small value, the greater proportion producing annually less than 120*l.*; the principal are—

		£	Patron.
Abergavenny, Vicarage		451	C. K. Tynte, Esq.
Llangibby, Rectory		477	W. A. Williams, Esq.
Llanover with Mamhilad and Trevethen chapelries	Vicarage,	591	Chapter of Llandaff.
Llanvair-Kilgidin, Rectory		395	Sir Charles Morgan.
Mitchel Troy with Cwmcarvan	Rectory.	398	Duke of Beaufort.
Portscwit with St. Pierre and Sudbrook	Rectories.	432	Charles Lewis, Esq.
Trelleck with Penalt	Vicarage.	430	The King as Duke of Cornwall

The churches are generally very small and frequently of Norman architecture, of which Malpas offers a good specimen.

Two members of parliament are returned for the county; the polling-places are, Monmouth, Abergavenny, Usk, Newport, and the Rock Inn in the Parish of Bedwelty: Monmouth is the place of election. The assizes are held at Monmouth by the judges on the Oxford circuit, in their route from Hereford to Gloucester. The quarter-sessions are held alternately at Monmouth and at Usk. Poor-law Unions have been formed, and workhouses altered or erected at Abergavenny, Chepstow, Monmouth, Newport, and Pontypool. The principal gentlemen's residences are, Tredegar, Llanover, Troy, Pontypool Park, Piercefield, Llantilio Cressenny, Clytha, Llanwern, Coldbrook, and Llanvihangel Crucoory, a gloomy but beautiful place, having one broad avenue of old Scotch firs in front, and a second of very fine Spanish chesnuts at the back, with the Skyrrid, whence the prospect is magnificent, rising, as it were, out of the grounds.

History and Antiquities.—Monmouthshire at the time of the Roman invasion was occupied by the Silures, who made the then important town of Caerwent their capital. The Silures remained unmolested by the Romans until England was subdued, and successfully resisted their arms until the reign of Vespasian, when they were conquered by Julius Frontinus; from this time the Romans occupied their country, until A.D. 408, a period of 330 years. The history of this district during a period immediately subsequent to the departure of the Romans is uncertain and obscure; in the legends that exist, Monmouthshire is often a conspicuous scene, its sovereigns Uther Pendragon and Arthur [ARTHUR] are marvellously extolled, and Caerleon is mentioned as a place of great splendour and importance. During the establishment of the Heptarchy, the Saxons and the Welsh princes were continually in a state of warfare; the Saxons drove back their adversaries and confined them within the narrower limits which now form the boundaries of Wales and Monmouthshire, and compelled them to pay tribute. Wales was now divided into three principalities, Gwynedd, Powisland, and Deheubarth. Monmouthshire, once within the limits of Deheubarth, afterwards formed at some times a separate district under the name of Gwent, at others was comprehended in Morganwg, or the kingdom of Glamorgan. The petty princes who shared Monmouthshire were generally tributary to the kings of Glamorgan, but withheld their tribute whenever these kings were not in a condition to enforce the payment. Occasionally they aimed at independence: a savage attempt to obtain freedom is recorded to have taken place in 983. They were also bold enough to resist the English kings. Alfred, we find, made preparations to subdue Caerleon, and Canute entered Gwent in 1034, and defeated the prince of South Wales. It is a subject of dispute whether Monmouthshire was ever wholly conquered by the Saxons; but as they occupied Monmouth, Chepstow, and Caerleon, and Harold built a castle at Portscuitt, it may be conceived that, if the whole district was not actually in their power, it could not have failed to have been speedily overcome. The Normans, after their invasion of England, could spare no troops for the conquest of Wales; they therefore invited the barons to make incursions at their own expense, and rewarded them with the gift of the lands which they subdued. They held these lands by feudal tenure under the crown, built castles upon them for themselves and towns for their followers. The sites of about 25 castles have been traced in Monmouthshire alone. 'These lands,' says Enderlie, 'being holden, per baroniam, with full power to administer justice unto their tenants, were invested with divers privileges, franchises, and immunities, so that the writs of ordinary justices out of the king's courts were not current among them. But in case of strife between two barons' marchers, concerning their territories or confines, for want of a superior they had recourse to the king, their supreme lord, and justice was administered to them in the superior courts of the realm.' Such was the wretched state of feudal jurisprudence in Monmouthshire, as well as in the other marches of Wales, till Henry VIII., in the 27th year of his reign, abolished the government of the lords marches, divided Wales into twelve shires, and annexed Monmouthshire to England. Monmouthshire however was not wholly freed from the dominion of the Welsh until a later period of our history; it was not annexed to the Oxford circuit until the reign of Charles II., and remained partly under the authority of the lords marchers' court, which was not abolished until 1689.

The following are among the most important historical events which took place in the county of which we treat. Henry II. seized and garrisoned the town and castle of Caerleon, in his progress to Ireland, in 1171. In a subsequent year it was wrested from him by Jorwerth ap Owain. Henry III. made two expeditions against the castle of Grosmont, which had in earlier times belonged to the families of Breos and Cantilupe: having taken it, he conveyed it to Hubert de Burgh, but again seized it, and afterwards annexed it to the duchy of Lancaster. Owen Glendwr [GLENDWR] was defeated at Usk and at Grosmont in 1405. There is a tradition that this chieftain, after he was subdued, disguised himself as a shepherd, assumed the name of John of Kent, resided with his daughter, married into the antient family of Scudamore of Kentchurch, about a mile distant from Grosmont, that he died here, and was buried in Grosmont church. Usk Castle was frequently an object of attack, and the town and country surrounding it were many times laid waste. Chepstow Castle was considered an important fortress during the Rebellion: the king retained it till 1645; it was then taken and retaken; afterwards Cromwell marched against it in person, and compelled a surrender. Martin the regicide, after a confinement of twenty years, died here. He does not appear to have been rigorously treated. Raglan Castle, after a long resistance, was surrendered to Sir Thomas Fairfax, who besieged it in person in 1646.

The importance of the position of Monmouthshire has caused its occupiers at all early periods to fortify it to the best of their power. We find consequently many Roman encampments, and castles of different dates of architecture. The encampments, which are very numerous, have been laid down by Mr. Coxe on the map published with his history: they are dispersed pretty generally over the county, but are more frequent in the neighbourhood of Newport than in other parts. Two Roman roads traversed the county: the Via Julia, extending from the mouth of the Severn to Caerwent, Caerleon, and onwards to Neath; and Akeman Street, running eastwards from Caerwent over the rivers Wye and Severn to Cirencester. The stations which antiquaries have acknowledged to be Roman are, Isca Silurum (Caerleon), Venta Silurum (Caerwent), and Gobannium (Abergavenny). Horsley has fixed the stations Burrium and Blestium at Usk and Monmouth, but the correctness of his assertion cannot be ascertained. The following is an alphabetical list of the principal castles; in some instances great portion of the original building remains, in others demolition and decay have been extensive or complete:—Abergavenny, Caerleon, Caldecot, Castel Glâs, Chepstow, Dinham, Grosmont, Llanfair, Llangibby, Llanvaches, Llanvair, Monmouth, Newport, Pencoed, Penhow, Raglan, Skenfrith, Striguil, Usk, and White Castle.

Very antient dwelling-houses are seen at St. Pierre, Moin's Court, Pencoed, Machen, Werndee, and Treowen. St. Julians, now altered, was formerly the residence of Lord Herbert of Cherbury.

The principal ecclesiastical antiquities of this country are Tintern and Llanthony abbeys. The well-known ruins of Tintern Abbey are situated on the right bank of the Wye, about nine miles below Monmouth. The roof and tower of the building have fallen, but the greater part of the rest of the abbey remains in tolerable preservation. Its style is a transition from early English to Decorated; 'so that in beauty of composition' (says Mr. Rickman) 'and delicacy of execution, it yields to few edifices in the kingdom.' The abbey was founded in 1131 for Cistercian monks, by Walter de Clare, and dedicated to St. Mary. The building of the church was commenced by Roger de Bigod, earl of Norfolk; the abbots and monks first celebrated mass within it in 1268. The site was granted in the 28th of Henry VIII., to Henry, the second earl of Worcester, and the whole is now the property of the duke of Beaufort. Llanthony Abbey stands at the foot of the Black Mountain, in the Vale of Ewias, a portion of the northern promontory of the hundred of Abergavenny. The abbey, built like a cathedral, was in the shape of a Roman cross, and, though of small dimensions, was well proportioned. The building is of the twelfth century, an earlier date than that of Tintern, and in a style of transition from Norman to early English architecture. Through neglect only a small portion of the building remains; and unless increased care is taken of it, it will not be long before this portion falls to the ground. An account of the foundation and history of Llanthony, written in Latin by a monk of the abbey, may be found in Dugdale's 'Monasticon:' it is translated by Atkyns in the 'History of Gloucestershire.' The site was granted to Richard Arnold at the dissolution of monasteries, and by a purchase of Auditor Harley became a part of the possessions of the earl of Oxford.

In addition to Tintern and Llanthony, Tanner mentions the following religious houses (*Monmouthsh.*, in *Notit. Monas.*):—

Abergavenny .	A priory, which remained until the general suppression.
Bassaleg . .	A Benedictine priory.
Caerleon . .	A Cistercian abbot and monks.
Goldcliff . .	A priory, founded in 1113, and afterwards united to Tewkesbury. It was granted to Eton College in the 29th of Henry VI. The college was deprived of it, but subsequently regained possession.
Gracedieu . .	A small Cistercian abbey.
St. Kynemark or Kinmercy .	A priory, in existence before A.D. 1291.
Llankywan, or Llangwin .	Near Grosmont, a cell of Black Monks, subordinate to the abbey of Lira, in Normandy.
Llantarnam .	A Cistercian abbey.
Malpas . .	Near Caerleon, a cell of Cluniac Monks, to the priory of Montacute, in Somersetshire.
Monmouth . .	A priory of Black Monks, who came from Anjou in the reign of Henry I.; also two hospitals, one dedicated to St. John, the other to the Holy Trinity.
Newport . .	Situated 'by the key beneath the bridge' was a house, probably of Friars Preachers, for such was granted in the 35th of Henry VIII.
Strigil . .	An alien priory of Benedictines to the abbey of Corneille, in Normandy.
Usk . . .	An old hospital and a priory.

About two miles south of Chepstow may be seen the remains of Mathern, formerly the episcopal residence of the bishops of Llandaff. The palace, now converted into a farm-house, was built by different bishops in the fifteenth and sixteenth centuries. The last bishop who resided here died in 1706 Three druidical stones of considerable size are standing near the village of Trelleck, and several more may be seen in that vicinity.

(*Corporation and Boundary Reports*; Coxe's *Hist. of Monmouthsh.*; *Manufac. of Iron*; *Archæologia*; &c.)

The Welsh language still prevails in the hilly district bordering on Brecknock and Glamorganshire.

STATISTICS.

Population.—Monmouthshire is chiefly a mining county, and the extensive workings carried on for obtaining its valuable products of iron and coal have produced a remarkable increase of population in the south-west part of the county since the commencement of the present century. The parishes of Aberystwith, St. Woollos Newport, Mynyddystwyn, and Bedwelty, which contained less than 6000 inhabitants in 1801, were, in 1831, reckoned to contain 21,600; of these the male inhabitants are chiefly employed in the pits and mines, and in removing the coals and iron-ore. The process of forging the iron and otherwise preparing it for further purposes had, in 1831, created manufacturers to the number of 2000 at Trevethan and Pontypool; at Upper-Lanover 380, at Aberystwith 250, at Lanwenarth 84, at Monmouth 80, and 50 or 60 in other places. The preparation of tin employs 300 men at Panteague, Lower Lanvrechra, and Rogerstone. Iron-wire is manufactured at Chapel Hill by 60 men; the preparation of colours from lead and sugar of lead employs 76 men at Moryddmaen, and the manufacture of japanned tin is not quite extinct at Usk.

Of 26,910 males twenty years of age and upwards, 3293 are employed in the manufactures specified above; 7636 are engaged in agricultural pursuits, and 7173 are employed as labourers in labour not agricultural. In 1811 Monmouthshire ranked the nineteenth in the list of agricultural counties, but in 1831 it was as low down as the thirty-first in the list.

The following table exhibits a summary of the population, &c., of every hundred, as taken in 1831.

HUNDREDS, CITIES, OR BOROUGHS.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Abergavenny .	5,815	6,057	33	333	1091	3179	1787	16,500	14,318	30,818	8,849
Caldicot . .	2,222	2,393	13	98	955	1051	387	5,758	5,591	11,349	2,852
Ragland . .	1,575	1,652	14	101	903	399	350	4,095	3,842	7,937	2,046
Skenfreth . .	815	877	3	29	579	148	150	2,022	1,928	3,950	1,106
Usk . . .	1,864	2,004	20	167	822	640	542	4,907	4,777	9,684	2,588
Wentlloog . .	5,427	5,764	72	230	1126	2594	2044	15,477	13,999	29,476	8,193
Monmouth . .	894	1,164	15	29	138	615	411	2,336	2,580	4,916	1,276
Totals . .	18,612	19,911	170	987	5614	8626	5671	51,095	47,035	98,130	26,910

The population of Monmouthshire, at each of the four following periods, was:—

	Males.	Females.	Total.	Inc. per cent.
1801	22,173	23,409	45,582	. .
1811	30,987	31,140	62,127	36·29
1821	37,278	35,555	71,833	15·62
1831	51,095	47,035	98,130	36·60

showing an increase between the first and last periods of 52,548, or more than 115 per cent. on the whole population, being 58 per cent. beyond the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the four dates of—

		£.		s.	d.	
1801	were	18,283,	being	8	0	for each inhabitant.
1811	..	28,247	„	9	1	„
1821	..	26,040	„	7	3	„
1831	..	26,613	„	5	5	„

The sum expended for the same purpose for the year ending March, 1838, was 18,302*l.*; and assuming that the population had increased from 1831 to 1838 in the same rat of progression as in the ten years preceding 1831, the above sum gives an average of 3*s.* for each inhabitant. These averages are below those for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending 25th March, 1833, was 37,824*l.* 4*s.*, and was levied upon the various descriptions of property as follows:—

On land . .	£27,806	4*s.*
Dwelling-houses .	6,998	3
Mills, factories, &c. .	1,030	2
Manorial profits, navigation, &c.	1,989	15
Total	£37,824	4

The amount expended was—

For the relief of the poor . .	£28,958	19*s.*
In suits of law, removal of paupers, &c.	1,868	12
For other purposes . .	7,203	10
Total money expended	£38,031	1

In the returns made up for subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 37,706*l.* 13*s.*, 32,669*l.* 5*s.*, 31,191*l.* 14*s.* (not specified in 1837), and 28,711*l.* respectively: and the expenditure of each year was as follows:—

	1834.	1835.	1836.		1837.	1838.
	£.	£.	£.	*s.*	£	£
For the relief of the poor	27,626	23,803	22,376	16	19,487	18,302
In suits of law, removal of paupers, &c. .	2,557	1,325	1,020	15	996	468
Payments towards the county-rate . .	7,219	5,551	5,984	14	not given.	7,128
For all other purposes		2,856	2,471	11	1,375	1,949
Total money expended	£37,402	33,537	31,853	16		27,847

The saving effected in the sum expended in 1838, as compared with that expended in 1834, was therefore 9555*l.* 15*s.*, or about 25½ per cent.; and the sum expended for the relief of the poor in 1838 was less than that in 1834 by 9324*l.*, or about 33¾ per cent.

The number of turnpike trusts in Monmouthshire, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 11; the number of miles of road under their charge was 315. The annual income arising from tolls and parish compositions in lieu of statute-duty in 1835 was 31,962*l.* 7*s.*, and the annual expenditure in the same year was as follows:—

	£.	*s.*	*d.*
Manual labour . .	3,113	15	0
Team labour and carriage of materials	760	16	0
Materials for surface repairs .	1,330	7	0
Land purchased . .	157	0	0
Damages done in obtaining materials	69	8	0
Tradesmen's bills . .	885	2	0
Salaries of treasurer, clerk, and surveyor	1,094	3	0
Law charges . . .	341	15	0
Interest of debt . . .	3,363	3	0
Improvements . . .	2,908	11	0
Debt paid off . . .	685	16	0
Incidental expenses . .	262	17	0
Estimated value of statute duty performed . . .	599	10	0
Total expenditure	£16,572	3	0

The county expenditure in 1834, exclusive of that for the relief of the poor, was 4940*l.* 17*s.*, disbursed as follows:—

	£.	*s.*	*d.*
Bridges, building, repairs, &c.	263	14	0
Gaols, houses of correction, &c., and maintaining prisoners, &c .	1,794	10	0
Shire-halls and courts of justice, building, repairing, &c. .	66	16	0
Prosecutions . . .	1,129	19	0
Clerk of the peace . .	319	17	0
Conveyance of prisoners before trial	211	14	0
„ of transports .	118	15	0
Vagrants, apprehending and conveying	49	18	0
Constables, high and special .	44	19	0
Coroner . . .	147	8	0
Debt, payment of, principal and interest	475	0	0
Miscellaneous . . .	318	7	0
Total expenditure	£4,940	17	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 282, 412, and 741 respectively, making an average of 40 annually in the first period, of 59 in the second period, and of 106 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 60, 53, and 48 respectively. Among the persons charged with offences there were committed for—

	1831.	1832.	1833.
Felonies . .	51	48	43
Misdemeanors .	9	5	5

The total number of committals in each of the same years was 64, 56, and 52 respectively.

	1831.	1832.	1833.
The number convicted was	42	37	28
Acquitted . .	29	10	15
Discharged by proclamation	12	8	3

There were 197 persons charged in 1837 with crimes at the assizes and sessions in Monmouthshire. Of these 10 were charged with offences against the person, 4 of which were common assaults; 24 were charged with offences against property committed with violence; 145 with offences against property committed without violence; not any were charged with malicious offences; 8 for forgery and uttering counterfeit coin; 7 for riot, and 3 for keeping disorderly houses. Of the whole number committed 131 were convicted, 37 were acquitted, 3 were not prosecuted, and no bill was found against 26. Of those convicted 5 were transported for life, 5 for fifteen, 7 for ten, and 6 for seven years; 1 was imprisoned for three years, 5 were imprisoned for two years or above one year, 22 for one year or above six months, and 77 for six months or under; 3 were fined. Of the whole number of offenders 156 were males, and 41 females; 57 could neither read nor write, 116 could read and write imperfectly, 10 could read and write well, not any had been instructed beyond reading and writing, and the degree of instruction of the remaining 5 could not be ascertained.

The number of persons registered in 1837 to vote for county members was 4347. Of these 2466 were freeholders, 418 leaseholders, 339 copyholders, 1100 occupying tenants, 13 trustees, 11 mortgagees: being one in 23 of the whole population, and one in 6 of the male population twenty years and upwards, as taken in 1831. There was no contest at the last general election for the representation of this county.

Monmouthshire contains 5 savings' banks: the number of depositors and amount of deposits on the 20th November, in each of the following years, were as under:—

	1832.	1833.	1834.	1835.
Number of depositors . .	1,534	1,435	1,896	1,964
Amount of deposits .	£39,894	£36,910	£47,166	£49,221

The various sums placed in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	1,169	£8,069	1,258	£8,663	1,396	£9,468
„ 50	657	19,408	708	20,751	759	22,746
„ 100	224	15,349	242	16,321	255	17,249
„ 150	55	6,653	65	7,692	73	8,784
„ 200	17	2,805	20	3,294	20	3,486
Above . 200	3	748	2	563	2	582
	2,125	53,032	2,295	57,284	2,505	62,315

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835.

	Schools.	Scholars.	Total.
Infant schools . . .	9		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		64	
Females . .		78	
Sex not specified .		46	
		—	168
Daily schools . . .	196		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		2,689	
Females . .		2,277	
Sex not specified .		1,511	
		—	6,477
Schools . .	205		
Total of children under daily instruction . . .			6,645
Sunday-schools . .	160		

Number of children at such schools; ages from 4 to 16 years:—

Males	5,157	
Females	4,881	
Sex not specified	2,507	
		12,545

Assuming that the population between the ages of 2 and 15 years has increased in the same proportion as the whole of the population since 1821, and that the whole population has increased in the same ratio since 1831 as in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 thus found residing in Monmouthshire in 1833 was about 35,000. Seventeen Sunday-schools are returned from places where no other school exists, and the children (685 in number) who are instructed therein cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Eleven schools, containing 547 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created; at several of the Sunday-schools a few are receiving instruction who are upwards of 20 years of age. Making allowance for these two causes therefore, we may perhaps fairly estimate that little more than one-third of the children between the ages of 2 and 15 years are under instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	—	—	2	104	7	64	—	—
Daily Schools	17	793	10	643	146	3,573	23	1,468
Sunday Schools	2	222	151	12,029	1	17	6	277
Total.....	19	1,015	163	12,776	154	3,654	29	1,745

The schools established by Dissenters, included in the above statement, are—

			Scholars.
Infant schools	—		—
Daily schools	6	containing	136
Sunday-schools	91		9,396

The schools established since 1818 are—

			Scholars.
Infant and other daily schools	114	containing	3,305
Sunday-schools	146		12,122

Sixteen boarding-schools are included in the number of daily schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists.

Lending libraries of books are attached to 8 schools in this county.

MONO'CEROS. [ENTOMOSTOMATA, vol. ix., p. 458.]

MONO'CEROS (the Unicorn), a constellation of Hevelius, surrounded by Hydra, Canis Major, Orion, and Canis Minor. Its principal stars are as follows:—

Character.	No. in Catalogue of		Magnitude.	Character.	No. in Catalogue of		Magnitude.
	Flamsteed. (Piazzi.)	Astron. Society.			Flamsteed. (Piazzi.)	Astron. Society.	
A^2	2	744	6	*i*	17	839	5
	3	751	6	*k*	18	840	5
D^2	4	765	6	*s*	19	873	5
a	5	781	4½		20	884	6
	7	788	6	*m*	22	887	4½
b	8	794	4		25	938	6
	10	806	6	*n*	26	944	6
e	12	812	6½	*p*	28	983	5
f	13	813	5		29	994	6
g	14	819	5½	*q*	30	1027	6
h	15	827	5½		(82)	793	6
	16	837	6		(95)	1041	6

MONOCHORD (μόνος, *one*, and χορδή, a *string*), an instrument of one string, used by really scientific musicians, for the purpose of ascertaining and demonstrating the relative proportions of musical sounds. It is composed of a board, or rule, divided and subdivided into various parts, and of a string distended between two bridges, one of which is placed at each end of the rule. There should also be a moveable bridge applicable to the graduated line, in order to stop the string at the distances required, leaving both hands of the operator at liberty; but this is not indispensable. The invention of the Monochord is attributed to Pythagoras, and Ptolemy measured and proved all his intervals by it. Guido also, in his *Micrologus*, strongly recommends the use of this instrument, and gives ample directions for its division, according to his system, for a translation of which we refer the reader to Hawkins's *History*, i. 449. In Dr. Crotch's *Elements of Musical Composition* will be found a simple and cheap method of constructing a Monochord, with plain rules for dividing it for common practical purposes.

MONOCONDYLÆA, M. D'Orbigny's name for a subgenus of *Unionidæ*, which he describes as equivalve, inequilateral, sub-rotund or angulated with a hinge formed of a large, obtuse, round, cardinal tooth in each valve, but without lateral teeth. Example, *Monocondylæa Paraguayana*, D'Orbigny.

MONOCOTYLE'DONS are those plants which are now more commonly called Endogens. [ENDOGENS.] They derive their name from their seed having generally only one cotyledon; but there are exceptions to this, as in wheat, which possesses a second cotyledon in a rudimentary state. Usually the single cotyledon of these plants rolls up, enclosing the radicle and plumula, so that the embryo appears to be a cylinder with no interruption to the continuity of its surface; but there are many deviations from this, the most striking of which are those of grasses and aquatic Monocotyledons.

MONO'CULUS. [BINOCULUS, vol. iv., p. 410.] N. B. The figure is erroneously placed upside down.

MO'NODON, the Linnean name for the *Narwhal*.

MONODONTA (or rather MONODON), Lamarck's name for a genus of *Trochidæ*, the columella of which terminates abruptly in a tooth or notch. It is the *Odontis* of Sowerby. [TROCHIDÆ.]

MONOGRAM, a cipher or character formed by an interlacing of letters, intended as an abbreviation of a name, formerly much used. Monograms are of very antient date. They are not uncommon upon Greek coins, especially those of Macedonia and Sicily. They likewise occur upon the coins of the Seleucidæ, and are found upon many of the family coins of Rome, though not upon those of the Roman emperors till a late period.

The monogram of Jesus Christ, ☧, upon the coins of Constantine the Great, is well known. It was continued frequently by his successors, even as low down as Alexander Comnenus and Theodorus Lascaris, and was also placed at one period upon the Roman labarum.

Montfaucon, in his 'Palæographia Græca,' p. 144, has given a small plate of monograms used on coins, and, in antient manuscripts, to represent the names of Greek cities. Such will also be found in Schlæger, 'Comment. de Numo Alex. M.,' tab. 3; and in Froelich, 'Annal. Reg. Syr.,' tab. 20. Dr. Charles Combe, in the 'Museum Hunterianum,' 4to., Lond., 1782, plates 63 and 64, has given no less than four hundred and twenty monograms which occur upon the coins of Greek states and cities: others will be found in tabb. xiv., xv. of the 'Veterum Populorum et Regum Numi qui in Museo Britannico asservantur,' 4to., London, 1814.

The conjunction of two, three, or four letters together is not uncommon in Greek and Roman inscriptions. Many of those of the Roman time will be found in Gerrard's 'Siglarium Romanum,' 4to., Lond., 1792. Père Menestrier has preserved those of many of the popes. Ducange, in his 'Glossary,' has given tables of those of the popes, emperors, and kings of France. Monograms appear upon almost all the coins of the kings of France of the second race, that is, from A.D. 751 to 987. (Le Blanc, *Traité Historique des Monnoyes de France*, pp. 87-144.) Eginhard gives as a reason for Charlemagne's using a monogram upon his coins, that he could not write; and Le Blanc adds that a great many bishops did the same for the same reason, which is absurd, as at that period it was the fashion o

Europe generally. They appear upon our own Saxon coins, and especially upon those of Alfred.

Bartsch, in his 'Le Peintre Graveur,' has given tables of the monograms used by the German and Italian engravers. The French artists rarely used monograms. The most extensive information however on this class of monograms will be found in the best edition of Brulliot's 'Dictionnaire des Monogrammes, Marques figurées, Lettres initiales, Noms abrégés, &c., avec lesquels les Peintres, Dessinateurs, Graveurs, et Sculpteurs ont désigné leurs Noms,' 2 tom. 4to., Munich, 1832.

MONOI'CA, M. de Blainville's name for his second subclass of the class *Paracephalophora*. [Malacology, vol. xiv., p. 323.]

MONO'LEPIS, a genus of macrurous crustaceans intermediate between *Porcellana* and *Megalopa*, established by M. Say.

MONOMA'NIA. [Insanity.]

MONOMYA'RIA, Lamarck's name for his second order of *Conchifera*, consisting of those conchifers which have but one principal muscular impression in each valve of the shell. [Conchifera, vol. vii., pp. 431, 433; Malacology, vol. xiv., p. 319.]

MONONGAHELA. [Mississippi, River.]

MONO'PHORUS. [Salpidæ.]

MONOPHYLLUS. [Cheiroptera, vol. vii., p. 23.]

MONOPHYSITES. [Eutychians.]

MONOPLEUROBRANCHIA'TA, M. de Blainville's name for his third order of *Paracephalophora Monoica*. [Malacology, vol. xiv., p. 323.]

MONO'POLY, from the Greek *monopólia* (*μονοπωλία*), which occurs in Aristotle's *Politick* (i. 11), where it is used simply in the sense of a man buying up the whole of a commodity so as to be the sole holder of it, and to have the power of selling it at his own price. When the word monopolium was used by Tiberius in addressing the Roman senate (Suet., *Tib.*, c. 71), he thought an apology necessary for introducing a new word. The word however soon came into common use. The term monopoly, which literally signifies *single* or *sole selling*, is used in a constitution of Zeno (*Cod.*, iv. 59) in the sense in which it is used by Aristotle, and in the sense of what our law understands by fore stalling, engrossing, regrating; to which we may add combining to keep up prices. Zeno declares that no person shall exercise a monopoly of clothing, fish, or any other thing adapted for food or use. He gives no definition of monopoly. The term however must be explained from the context, from which it appears to signify any means by which a person gets or attempts to get the whole of any commodity into his possession for the purpose of enhancing the price. In the same Constitution he forbids all combination among dealers to raise the prices of any commodity. Zeno's punishment for monopoly was confiscation of the goods of the offender and perpetual exile.

A monopoly, according to the English law, is defined by Coke (3 *Inst.*, 181, c. 85, 'against monopolists,' &c.) to be 'an institution or allowance by the king, by his grant, commission, or otherwise, to any person or persons, bodies politic or corporate, of or for the sole buying, selling, making, working or using of any thing, whereby any person or persons, bodies politic or corporate, are sought to be restrained of any freedom or liberty that they had before, or hindered in their lawful trade.' In *Le Case de Monopolies* (11 *Co.*, 86, *b*) it is said that every monopoly has three inseparable incidents—the raising of the price, the deterioration of the commodity, and the impoverishment of artificers and others. It appears that these inseparable incidents were considered as tests by which a grant savouring of monopoly might be tried.

Every royal grant or letters patent tending to a monopoly as thus defined and explained, was void. The crown however could by letters patent grant and create exclusive privileges of buying and selling when such grant was of general use, or when the grant was to an individual who had introduced into the country something new and useful. This prerogative of the crown was often abused, and by none more than by Elizabeth, who granted many patents of monopolies for the purpose of raising money. As an instance of this, Elizabeth had granted to a certain person the sole making, importing, and selling of playing cards, which grant was declared void by the judges. (*Le Case de Monopolies.*)

It seems then that the word monopoly was never used in English law, except when there was a royal grant authorising some one or more persons only to deal in or sell a certain commodity or article.

By the act of 21 Jac. I., c. 3, all monopolies and all commissions, grants, licences, charters, and letters patent to any person or body politic or corporate, of or for the sole buying, selling, making, working, or using of any thing, or of any other monopolies, &c., are declared contrary to the laws of the realm and utterly void and of none effect.

By the sixth section of the same statute the above provisions do not extend to letters patent and grants of privilege thereafter to be granted for fourteen years or under, of the sole working or making of any new manufacture to the true and first inventor thereof, which others at the time of making such letters patent and grants shall not use, so as also such letters patent be not contrary to the law or mischievous to the state, or generally inconvenient. This section is the foundation of the present law as to patents for inventions. [Patents.]

Copyright and patents are now generally placed among monopolies by legal writers, but not correctly. The original legal sense of the term monopoly has been already explained; and the power of the crown to grant patents is now limited and defined, as well as the several formalities to be observed in obtaining them. Any patent not obtained in due form is void; and the term monopoly, as above explained, has legally ceased to exist.

There is still a vulgar and common use of the term monopoly, which is incorrect, inasmuch as it has not the sense which monopoly had.

If a number of individuals were to unite for the purpose of producing any particular article or commodity, and if they should succeed in selling such article very extensively, and almost solely, such individuals in popular language would be said to have a monopoly. Now, as these individuals have no advantages given them by the law over other persons, it is clear they can only sell more of their commodity than other persons by producing the commodity cheaper and better. Such so-called monopoly then is neither the old legal monopoly, nor does it rest on any legal privilege. There would however be no objection to calling it a monopoly in the antient sense of that term, if the word were not now used in a bad or unfavourable sense, which probably dates from the time when real monopolies were granted by the crown, and were very injurious to the nation. Between a monopoly as it once existed, and a monopoly as it is now vulgarly understood, there is this difference—the former was only derived from a grant of the crown, and was often injurious to all persons except the patentee; that which is now vulgarly called a monopoly is nothing more than the power which an individual or a set of individuals acquire, by means of capital and skill, of offering something to everybody cheaper and better than they had it before, and it is therefore an advantage both to the so-called monopolists and to everybody else.

The case of a number of persons combining to produce and sell, or to buy and sell, a thing, has been taken, as being one which is the most striking and oppressive kind of monopoly, in the vulgar sense of that term. An individual however may, in this sense, become a monopolist: as if a man should buy up all the tallow in Russia, and so make candles as dear as he pleased; or (to take a case which would appear a still greater act of monopoly, as being more sensibly felt) as if a man should buy all the corn in a country, and so make bread as dear as he pleased. Without discussing the question as to the advantages and disadvantages to a nation of this kind of monopoly, it is enough to put it upon those who disapprove of such wholesale buying, to say how far, and to what amount, they will allow a man to use his capital and exercise his commercial skill; for it is incumbent on those who would deprive a man of such liberty to say exactly how far such liberty should go.[*] Further, if such persons wish to be exact in their language, they should use another word than monopoly, which had once a particular meaning, as above explained, and signified a different thing from that which they call a monopoly. And if they will apply this word monopoly to a person or persons who, by industry and skill, and the judicious employment of capital, make and sell or buy and sell much more of a thing than anybody else, they should consider whether—inasmuch as buying and selling are free to all, and as all people wish to buy as cheap as they can and as good as they can—they will apply this word in an invidious sense to any person or persons who can only command customers because the customers like to go to them, or because the customers can get the thing nowhere else, owing to no other persons having provided themselves with the commodity for sale.

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[*] At Athens there was a law which limited the amount of corn that a man could buy. (Lysias, *κατὰ τῶν σιτοπωλῶν*.)

That kind of monopoly or sole-selling or dealing which is given by the law of copyright, and by patents, is in effect a kind of property created by law for the benefit of an author or inventor, and which he could not effectually acquire or secure without the aid of the law. It is not however a monopoly in any sense in which that term has ever been used. Whether it is profitable or injurious to the community is a question that concerns legislation.

MONOSYLLABLE. [Syllable.]

MONOTHALA'MIA, Lamarck's name for his second division of *Cephalopoda*, including one genus only, viz. *Argonauta*. [Cephalopoda, vol. vi., p. 426; Malacology, vol. xiv., p. 321.]

MONOTHELITES. [Eutychians.]

MONOTIGMA, Mr. Gray's name for a genus of turbinated shells allied to *Turritella*.

MONOTREMES, M. Geoffroy's name for certain edentate mammals which have but one external aperture for the passage of the semen, the urine, and the other excrements.

The organs of generation of these extraordinary animals present, as might be anticipated, singular anomalies. The different canals terminate in the urethra, which last opens into the cloaca. Their intromittent male organ lies hid, when in repose, in a sheath which opens by means of a hole towards the bottom of the cloaca. Their uterus merely consists of two canals which open separately, and each of them by a double orifice into the urethra, which is large, and, as in the male, has its exit in the cloaca. It was for a long time doubted whether these animals were oviparous or viviparous, but there is now every reason for believing that the young are excluded from the body of the parent alive. Though they have no pouch, they still possess the supernumerary bones which exist in the *Marsupialia*, and are described in the article which treats of the last-named animals. In other parts of their osseous structure they are remarkable for possessing a sort of clavicle, placed more forward than the ordinary clavicle, and analogous to the *os furcatorius*, furciform bone, or merry-thought in birds: the coracoid bone also reaches the sternum. The eyes are very small, and there is no external concha to the ear. Two genera only are known, *Echidna* and *Ornithorhynchus*. [Echidna; Ornithorhynchus.]

MONOTROPA'CEÆ are a small natural order of monopetalous exogenous plants, parasitical upon the roots of other species, and covered with brown scales instead of leaves. They resemble Orobanchaceæ, from which they differ in their regular flowers and multilocular ovary. In natural classifications they are usually placed in the neighbourhood of Ericaceæ, on account of their flowers being monopetalous with hypogynous stamens. Monotropa hypopithys, found in fir woods, is the only European species.

MONRO, ALEXANDER, M.D., was born in 1697. He was a pupil of Cheselden, and afterwards studied at Paris, and under Boerhaave at Leyden. In 1718 he returned to Edinburgh, where his father practised as a surgeon, and in the following year was appointed Professor of Anatomy to the Company of Surgeons. He soon after, in conjunction with Dr. Alston, commenced giving public lectures on anatomy, and thus laid the foundation of a school of medicine in Edinburgh, which was soon after attached to the university. It was also at the suggestion and under the direction of Dr. Monro that the Royal Infirmary of Edinburgh was established, in which he delivered clinical lectures on surgery, Dr. Rutherford at the same time lecturing on medicine. In 1759 he resigned the lectureship on anatomy to his son, from whom it has since descended to his grandson; but he retained his clinical lectureship till within a short period of his death in 1767. He was a fellow of the Royal Society of London, and a member of the Royal Academy of Surgery in Paris; and it is chiefly to his talents as a lecturer that the Medical School of Edinburgh first owed the celebrity which it has since always enjoyed.

The greater part of Dr. Monro's writings are contained in the Transactions of different scientific societies, especially in those published by a Society of which he was the founder, under the titles of 'Medical Essays and Observations,' and 'Essays Physical and Literary.' The work by which he is chiefly known is his 'Osteology,' which was first published in 1726, and which has been since reprinted in a great variety of forms, and with various additions, both in this country and on the Continent. His complete works were published by his son, in one volume 4to., in 1781.

MONROE, JAMES, was born in the county of Westmoreland, Virginia, on the 16th of March, 1751, of a Scotch family. Nothing is known of his early life; but he seems to have soon shown great decision of character, having entered the army as a volunteer at the age of sixteen. In 1777, in the retreat through the Jerseys, he was wounded at Trenton. He was then a lieutenant, and on his recovery was made an aid to Lord Stirling with the rank of major. Just before the close of the war, he was appointed colonel on the recommendation of General Washington. He then went to the college of William and Mary in Virginia, where he studied law; and soon after represented his native county in the legislature; and was also appointed to the council of state. In 1788 he was a member of the Virginia Convention, and was opposed to the adoption of the constitution. After it came into operation, he became a candidate for a seat in the house of representatives, in opposition to Mr. Madison, and lost his election. He was however soon after chosen a senator of the United States by the state of Virginia, and after continuing in that body about three years, he was appointed by General Washington minister to France in the place of Mr. Gouverneur Morris, who had become unacceptable to the ruling party in that country. It was thought that a well known member of the party friendly to the French revolution might be able to restore that confidence between the two countries which was already diminished by the supposed leaning of Hamilton and his party towards Great Britain.

He accordingly endeavoured to fulfil this object of his mission, and, as some thought, at too great sacrifice of the rights and interests of his own country. Such was the opinion of the administration, especially after the avowed change of policy by France in consequence of Mr. Jay's treaty, and he was accordingly recalled in August, 1796. It was considered by the Opposition, French, or Democratic party, for it was called by all these names, that he had been sacrificed for his attachment to liberal principles, and as the majority in Virginia belonged to this party, he was appointed governor of that state in 1798-9. He held the office for three years. In 1802 he was appointed minister to France, and, in conjunction with Mr. R. R. Livingston, who was already in Paris and engaged in negotiating the purchase of New Orleans, he succeeded in effecting the purchase of Louisiana. From France he went to Spain, and thence to Great Britain, as minister, where, with his adjunct Mr. Pinckney, he concluded a treaty in 1807, which Mr. Jefferson, disapproving, refused to lay before the senate. Mr. Monroe returned home in 1808, much dissatisfied that the treaty, which had been with great difficulty effected, had been received with so little respect, and that his return had been delayed, as he supposed, for the purpose of preventing his competition with Mr. Madison for the presidency. He was accordingly supported by the opposition in Virginia, and great efforts were made to enlist the popular sympathies in his favour; but all these efforts failed, and he obtained no votes in his own state or elsewhere. By means of Mr. Jefferson a reconciliation was brought about, and Mr. Monroe was then made secretary of state, in which office he continued until he was chosen president, in 1816, by 128 votes against 34. So prudent and conciliatory had been his conduct, and so little had the course of public affairs interfered with his popularity, that he was elected unanimously, with the exception of a single vote. After his term of office expired, he lived a short time in Loudon county, in Virginia, where he accepted the office of justice of the peace. He was also a visitor of the university of Virginia. Towards the close of his life he removed to New York, where he died on the 4th of July, 1831. He left two daughters, Mrs. Hay and Mrs. Gouverneur, who resided in New York, in which he had married while member of Congress in 1790.

Mr. Monroe was not endowed with any shining qualities, but he had great prudence, united to great firmness, great regard to reputation, sound though slow judgment, and unwearied perseverance. He never could have attained the dignity of the presidency independent of his intimacy and political connection with Mr. Jefferson; but it is nc small praise to have profited as he did by these favourable circumstances, and there has seldom been so striking an example of what steadiness of purpose and untiring perseverance can accomplish. His manners were mild and amiable, but, considering the society he had always kept, he was strangely awkward in almost all that he said and did: he used odd inappropriate expressions, and often said what might have been better omitted. But all this was only in minor matters; he generally acted wisely and sagaciously. He had unusual success in making friends, and though his kindness and courtesy would in most people have appeared insincere, it always seemed to come from the heart with him, and without doubt he really possessed much of the benevolence which he appeared to feel. He was even a worse manager of money matters than Mr. Jefferson. He was always in debt, and always in want of money; but by the grants which he obtained from Congress, and an inheritance derived from an uncle, he left to his daughters a competent fortune. (*Communication from Virginia.*)

MONRO'VIA. [MASSURADA, CAPE.]

MONS, the capital of the province of Hainault, is situated in 50° 27′ N. lat. and 3° 59′ E. long., on the river Trouille, by which the city is divided into unequal parts. It is one of the strongest fortified towns in Belgium, the works having been greatly improved since 1818: its form is that of a polygon flanked with fourteen bastions. It is supposed that Mons occupies the site of the Roman station which was so bravely defended by Quintus Cicero, brother of the orator, against the attacks of the Eburones, Nervii, and other Gallic tribes. Having fallen to ruin, it was fortified anew about the year 456, in the wars of Merovæus, but was abandoned in 473, and, with the country about it, was uninhabited for nearly two centuries. About the year 653 a hermitage, and then a chapel, dedicated to St. Peter, were built on the spot; and some time after, Alberic, count of Hainault, having rebuilt one of the towers, and surrounded it with a wall, made it his place of residence, a circumstance which attracted many other inhabitants. The town from this time went on increasing, and in 804 Charlemagne made it the capital of Hainault. Towards the end of the tenth century Mons sustained a siege against Hugh Capet, and about fifty years later was again invested by Baldwin of Flanders. In 1093, and again in 1112, great part of the city was destroyed by fire; and towards the middle of the twelfth century it suffered greatly from the plague. Count Baldwin IV., who then reigned, did much to repair these disasters, and thus gained the well-merited title of the Restorer. Under his successor Baldwin V., the citizens, having repulsed the count of Brabant, obtained various privileges, among which was that of arming and organising themselves for the defence of the city. In 1290 the city was enlarged, and new walls, enclosing a greater area, were built. In the war which Jacqueline of Bavaria, countess of Hainault, sustained with the duke of Burgundy, Mons, after an obstinate resistance, fell into his hands in 1436. From that time till the middle of the sixteenth century the history of the city offers little worthy of remark, except the appearance at various periods of the plague, which committed great ravages. Under the reign of Charles V. Mons attained the highest degree of prosperity; and such was the extent of the woollen manufacture carried on, that at the hour when the workmen left their labour the streets were too narrow for the traffic, and the passing of carriages through them was forbidden. Manufactures of hardware were also pursued, and there were several streets wholly inhabited by goldsmiths. This state of prosperity was cut short by the exactions of the duke of Alva in 1569, which caused the inhabitants to revolt, and they for some time maintained themselves under Count Lewis of Nassau; but one of the gates of the city having been treacherously given up to the duke of Alva, the count capitulated, against the wish of the people, who declared their readiness to fight to the last extremity, and to perish in the ruins of the city rather than surrender. According to the terms of the capitulation, the garrison, and such of the inhabitants as desired it, were allowed to retire from the city. Of those who remained a great part were executed at the stake or on the scaffold. Mons was quiet under the rule of the archdukes of Austria, but its commerce and its splendor passed away with the manufacturers, and the loss of its workmen and artists. In 1678 Mons was invested by the French under marshal Luxemburg, but the siege was raised in consequence of the treaty of Nimeguen. In 1691 the city was again assailed by Lewis XIV., and was defended with the greatest bravery until the walls were altogether destroyed, and nearly all the houses were in ruins. In this memorable siege there were discharged against the ramparts 57,673 balls; 5750 shells were thrown into the town; sometimes, in a single night, as many as 1000 red-hot shot were discharged, and the besiegers expended throughout the attack 597,800 pounds of gunpowder. Mons remained in possession of the French until the peace of Ryswick. They occupied it again in 1701, and were besieged in 1709 by Prince Eugene and the duke of Marlborough, to whom the town capitulated twenty-four days after the opening of the trenches. By the treaty of Utrecht, Mons was restored to Austria: it was taken again by the French in 1746, and reverted to Austria once more in 1748. It was taken by the French under Dumourier in 1792. In 1794 it was declared part of France, and was the capital of the department of Jemappe until 1814.

Mons is entered by five gates. It contains 76 streets, besides a great number of lanes. The former are for the most part wide, clean, and well paved. There are 3684 houses, with a population of 23,231.

The church of St. Wandru, which is built on the site of the hermitage already mentioned, is a remarkable specimen of Gothic architecture, and one of the finest ornaments of the city. The present building, the first stone of which was laid in 1460, was preceded by several which were successively destroyed by fire. The church as it now stands was built by degrees and at long intervals, so that it was not finished until 1589. It is in truth still incomplete; the tower, which, according to the plan, should have surmounted the portal, has not been erected for want of sufficient funds. There are several other churches in Mons, but only one—that dedicated to St. Elizabeth—which is at all remarkable: it is surmounted by a rich cupola. The other buildings of note in the city are:—the town-hall, built in 1440; the tower of the castle, built in 1662; the Palace of Justice; the college; the military hospital; the arsenal; and the theatre, which will hold a thousand persons.

Among the manufactories of Mons are sugar and salt refineries, soap and starch works, oil-crushing-mills, saw-mills, and flour-mills. Woollen and cotton manufactures, cutlery, pins, gloves, and various minor articles are also made there. It is the residence of many rich proprietors, and is the centre of a very active trade in coals, flax, hemp, grain of various kinds, mill-stones, horses, and cattle.

Mons contains a tribunal of *première instance*, and of commerce, and is the residence of the governor of the province and the provincial commandant.

The Mons and Condé canal, which connects those two places, is supplied with water from the river Haine, which passes close by the town. It runs in a westerly direction, and enters France in the arrondissement of Valenciennes, in the department du Nord. It has seven locks, five of which are in Hainault and two in France. Its construction was begun by the French in 1807, and finished in 1814. The number of boats that passed through this canal in 1816 was 3287; and in each year since the number appears to have gone on increasing. In 1828 there were 6009 boats, of which 3603 were loaded with coal for consumption in France.

(*Dictionnaire Géographique de la Province de Hainault*, par Dr. Meisser; *Annuaire de l'Observatoire de Bruxelles.*)

MONSOON (in French *mousson*), is a term applied to the periodical winds of the Indian Ocean, and, according to Marsden, is a corruption of the word *mooseem*, which, both in Arabic and Malay, signifies a year. These winds have from the earliest times attracted the attention of the navigator, as, by taking advantage of their regular blowing, an easy and speedy voyage may be calculated upon with certainty; whilst, by opposing their force, the voyage is rendered laborious, slow, and uncertain.

The Indian Ocean is open towards the south, and no considerable island occurs between the meridian of Madagascar and that of the western shores of Australia, as far south as the sea has been navigated (70° S.); on the west is Africa, on the north Arabia, Beloochistan, and Hindustan, and on the east India without the Ganges, the Indian Archipelago, and Australia. The monsoons however prevail also in the seas between Australia and China; and these seas are considered as a portion of the Indian Ocean.

The southern part of the Indian Ocean, or that which lies between the western coast of Australia and the island of Madagascar, has the regular south-east trade-wind, which extends southward to between 28° and 30° S. lat., but its northern border varies between 12° and 3° S. lat., approaching nearer to the equator when the sun is in the northern hemisphere. Cook found it, in February, between 10° and 12°; Basil Hall, in June, near 7°; Nicholson, in August, at 3¼°; and Carteret, in October, at some distance south of Java.

The monsoons do not begin immediately north of the northern border of the trade-wind, but are separated from it by a region which corresponds with the region of calms in the Atlantic. [ATLANTIC OCEAN, vol. iii., p. 26.] Though calms occur in this region of the Indian Ocean also, they are not regular, and are frequently interrupted by winds, which, when the sun is in the northern hemisphere, generally blow between south-west and north-west, and, in the other six months, between south-east and north-east. They are usually called the north-west and north-east monsoons, but not with propriety, as they do not coincide with the proper monsoons in time, nor do they seem to be connected with them in any way.

The region of the proper monsoons lies to the north of this region, and they blow with the greatest force and with most regularity between the eastern coast of Africa and Hindustan. When the sun is in the southern hemisphere a north-east wind, and when it is in the northern hemisphere a south-west wind blows over this sea. When the sun passes the equator the winds are variable, and accompanied with gales, hurricanes, thunder-storms, and calms; but it is observed, that as soon as one of the monsoons ceases, the clouds in the upper regions of the atmosphere take the direction of the opposite monsoon, though it is not till three or four weeks afterwards that this monsoon becomes prevalent on the surface of the sea.

The north-east monsoon blows from November to March. It extends one or two degrees south of the equator. It becomes regular near the coasts of Africa sooner than in the middle of the sea, and near the equator sooner than in the vicinity of the coasts of Arabia. It blows with most regularity and force in the month of January, and especially in the most northern angle of the sea, between the island of Socotra and Bombay. This monsoon is not accompanied with rain on the eastern coast of the sea, but it brings rain to the eastern coast of Africa, where the rainy season falls between the beginning of November and the end of March. It may be laid down as a certain fact that neither of the monsoons brings rain by itself, but only when it reaches a coast after having passed over a wide extent of sea.

The south-west monsoon does not extend south of the equator, but usually begins a short distance north of it. It blows from the latter end of April to the middle of October. Along the coast of Africa, where it rather proceeds from the south, it appears at the end of March; but along the coast of Malabar, not before the middle of April: it ceases however sooner in the former than in the latter region. It is also observed that the south-west monsoon sets in sooner on the coast of Malabar than on that of Canara and Concan. At Anjengo (in 8° 30′ N. lat.) it makes its appearance on the 12th of April, and at Bombay on the 15th of April, so that it proceeds a degree farther northward in the course of three days. It reaches the coast of Arabia still later. On the sea it is a serene wind of moderate force; but when it approaches the coast of Hindustan, the atmosphere becomes overcharged with moisture, and the rain descends in torrents, but more abundantly on the southern than on the northern coast. Near Tellicherry the annual quantity of rain amounts to 116 inches, but at Bombay it does not exceed 63 inches. It was formerly supposed that the south-west monsoon was arrested by the Western Ghauts, but a better acquaintance with the table-land of Deccan has shown that the greatest quantity of rain descends on it during the south-west monsoon, and with a wind blowing from south-west. It has latterly been observed that its effects extend to the coast of Coromandel, where, during its prevalence, a few showers fall. But the farther this monsoon advances into the continent, the smaller is the quantity of rain which it causes. Northward its effects extend over the table-land of Malwa, the low country along the course of the Indus, and even to the coast of Beloochistan, as far as the Straits of Ormuz.

Both monsoons occur in the Bay of Bengal, but there they are somewhat modified and less regular. The north-east monsoon does not set in regularly before the beginning of December, when it blows from north-north-east and east-north-east. In January and February it is irregular, and frequently turns to the south-east; and in March it ceases entirely in the centre of the sea, and blows faintly in the north-eastern parts, with long intervals of calms. Though the north-east monsoon only becomes regular in December, it is preceded by heavy squalls and winds in the southern parts, especially along the coast of Coromandel; and it is during these squalls that this part of Hindustan is fertilised by abundant rains, which however are less plentiful than those brought to the coast of Malabar by the south-west monsoon. The mean annual quantity of rain at Madras does not exceed 46 inches. The south-west monsoon is more regular in its strength, but not in its direction, as it blows frequently from the south, and even from south-east, especially near the mouth of the Ganges. Little rain falls during this wind on the west coast of the Gulf of Bengal; but rain is abundant in the countries which enclose it on the north, in which direction it extends to the foot and declivities of the Himalaya mountains, and as far as the place where the Ganges issues from the range; but here too the quantity decreases as it advances inland. The mean annual quantity of rain at Calcutta is nearly 72 inches, and at Benares 46½ inches. The quantity of rain which, during this monsoon, descends on the eastern coast of the bay, is still larger, especially towards its northern recess, in Chittagong and Aracan, where, according to a rough estimate, founded on partial observations, it amounts annually to 200 inches.

The monsoons are subject to much greater variation to the east of the Bay of Bengal. In the Chinese Sea and the Sooloo Sea the wind is south-south-east when the sun is in the northern hemisphere, but it does not blow with regular force, being sometimes interrupted by high winds. It brings rain to all the countries which surround the sea on the north and east. In the southern provinces of China, in the Philippine Islands, and in the Sooloo Islands, the rainy season commences in the beginning of May, and terminates in September and October. The rains, though rather abundant, when compared with those which fall in the countries without the tropics, are much inferior in quantity to the rains in Bengal and Chittagong. It is remarkable that these rains extend to the countries surrounding the Gulf of Tonkin. The monsoon blows in these seas from north-north-west when the sun is in the southern hemisphere; but it is still less regular in its force, though more so than in the Bay of Bengal. It brings rain to the countries on the west and south of the sea, and especially to the coast of Cochin China Proper and the northern shores of Borneo, where the rains commence at the end of October and continue until March. They are more abundant than those which fall during the opposite monsoon on the northern and eastern shores of the Chinese Sea.

Along the equator, and about one or two degrees from it, it appears that the winds are subject to frequent changes; and it is also observed that the islands situated within these limits have frequent showers nearly every day in the year.

In the Java Sea and the southern parts of the straits which lead from that sea to the Chinese Sea, the wind generally blows from the west when the sun is in the southern hemisphere, and from the east when it is in the northern hemisphere; but it turns frequently to the north-west and south-east, which is also the case with the winds in the sea south of Java, and between the Lesser Sunda Islands and Australia. The westerly winds bring rain to these islands, but not in such abundance, as the south-west monsoon carries them to Malabar. During the easterly winds the air is generally dry, but sometimes there are heavy showers. In these islands neither season has that decided permanent character which distinguishes it on the continent of India, and the rains are far from being so violent. But the northern coast of Australia partakes more of the character of the season of the continent of India. The rains indeed do not seem to come down with such violence; not a drop falls during June, July, August, and September, which is also sometimes the case in Java and the Lesser Sunda Islands.

The direction of the monsoons in the vicinity of the land is frequently changed by the direction of the coast, especially when a mountain-range extends along the shores. The most remarkable instance of this phenomenon is observed on the south-western coast of the island of Sumatra. The south-west monsoon is felt at Atcheen Head, its most northern point; but, being opposed by the range of high mountains running along the south-western coast, it is changed into a north-west wind, which blows as far south as 1° N. lat. South of the equator the wind is not south-west, but south-east, and may be considered as the trade-wind, which, as already observed, extends as far north as 3° S. lat. when the sun is in the northern hemisphere. During this period that part of the island which lies north of the equator has its rainy season, whilst the southern districts have dry weather. When the sun is in the northern hemisphere the southern portion has abundant rains, with frequent thunder-storms; and the northern enjoys a serene sky. In that season of the year the wind blows in the southern part from north-west, and is that wind which is generally called the north-west monsoon; but the northern districts are under the influence of the north-east monsoon. [SUMATRA.]

It is not easy to explain the origin of these periodical winds. It is admitted on all hands that they are only a modification of the trade-winds, produced by the peculiar form of the countries lying within and around the Indian Ocean. This modification, it is said, is produced by the difference of temperature to which the high table-lands of Asia and Africa are subject during the two great divisions of the year. When the sun is in the northern hemisphere the heat causes such a rarefaction of the atmosphere on the table-land of Asia as to make the air flow rapidly from the colder region near the equator to that quarter; and this is the south-west monsoon. When, on the contrary, the sun, during its stay in the southern hemisphere, heats the air on the table-land of southern Africa, the contrary effect takes place, and that is the north-east monsoon. This explanation however is hardly satisfactory. It is a fact that on the high table-lands the air is always in a state of rarefaction, compared with that of low countries, and that the summer-heat is never such as to cause a degree of rarefaction sufficient to produce a motion in the air from the lower countries towards the table-lands. Besides this, the Himalaya mountains, with their immensely high masses, lie in the line in which the south-west monsoon blows, and its effects are not observed to be sensible in the higher part of that range. The table-lands of Beloochistan and Arabia cannot be considered as affecting the direction of the wind, for in that case the wind would rather blow from the south-east than from the south-west. We think therefore that the cause of this modification of the trade-wind must be sought for in less remote localities. As for the north-east monsoon, we are inclined to consider it entirely as a continuation of the north-east trade-wind, which is only interrupted by the two peninsulas stretching southward into the Indian Ocean; and this interruption is the cause why it is commonly less constant and regular than the trade-wind itself. The question therefore is only why this trade-wind is interrupted by a wind blowing in an opposite direction when the sun is in the northern hemisphere. In this part of the year the trade-wind in the northern hemisphere retires thirteen degrees from the equator. [ATLANTIC OCEAN, vol. iii., p. 27.] If this fact is applied to the Indian Ocean, only the most northern recesses of the three gulfs, the Arabian Sea, the Bay of Bengal, and the Chinese Sea, would fall within its limits, and the remainder would be within the region of calms. In such a state of indifference a less powerful agency may produce a great effect. The south-east trade-wind, which, when the sun is on the north of the equator, extends to the vicinity of the equator, is prevented by the elevated table-land of Africa from proceeding in its direction, and is therefore diverted from its course. It follows the winding of the coast to the north-east; but as the coast of Africa, as well as that of Arabia, is skirted by very high mountains, it finds no way to escape in a western direction. It would however probably not acquire that degree of constancy and force by which it is characterised, if it did not blow towards a country in which a considerable rarefaction of the air is produced by the sun's approaching to the northern tropic. This is the Indian Desert, called Thurr, in which the heat in summer rises to an excessive degree, on account of its small elevation above the sea, its sandy soil, and the almost complete want of vegetation. The vacuum produced by this heat gives strength and constancy to the south-west monsoon, and carries it to the very base of the Himalaya mountains, though the desert itself does not partake of the fertilising rains which this monsoon brings to all the coasts whose mountains oppose its progress. This, we think, is sufficient to explain the south-west monsoon in the Araban Sea, where it is most constant and regular.

The south-east trade-wind, not extending to the north of the equator, cannot be considered as contributing to produce the south-west monsoon in the Bay of Bengal; and this wind therefore seems to owe its existence merely to the rarefaction of the air produced by the summer-heat in the wide plain of the Ganges; but as this plain is partly covered with trees (Sunderbund and Tarai) and nearly everywhere with vegetation, the effect of the heat on the temperature of the air is less regular; and thus it may be explained that the south-west monsoon in this sea is less regular and constant. The vegetation which covers the Gangetic Plain is probably also the reason why the rains brought by the monsoon are distributed over its whole extent, whilst it passes over the dry sands of the Thurr almost without letting a single shower fall.

The origin of the south monsoon in the Chinese Sea is more difficult to explain. The great plains of Siam and Camboja, the mountain-range of Cochin China, which extends along the shores of the sea from south to north, and the plains of Tonquin, probably contribute largely to it; but we are too imperfectly acquainted with the extent and nature of these plains to be able to form a correct opinion on this point. That this south monsoon extends to the island of Formosa can hardly be adduced as an objection to this explanation, when it is considered that the north-east trade-wind retires to the most northern corner of the Chinese Sea, and is there very feeble and irregular.

As for the monsoons of the Java Sea and of the seas between the Lesser Sunda Islands and Australia, they seem to owe their origin principally to the changes of temperature which occur in the countries lying along the northern coast of Australia, of which we have no information at all.

(Forrest on 'Monsoons,' in *Journey to the Mergui Archipelago;* and Capper on *Winds and Monsoons*.)

MONSTER, an individual in whom one or more of the organs or parts of the body present some congenital malformation, in consequence of which the affected being differs more or less in appearance and internal structure from other animals of the same species or sex.

The term monstrosity is often applied to those anomalies only which are apparent externally, and which produce more or less deformity; but, in a scientific point of view, it includes every variation, either external or internal, in any organ, from its most general or natural conformation; and it is in the latter sense that we shall here treat of it.

Monsters were formerly regarded as sports or prodigies of nature, and these ignorant notions, with respect to their true character, continued prevalent among all classes of people until the commencement of the last century, and are even now held by the uninformed. By the physiologist however the study of the various anomalies of organization in man and animals is now viewed as a branch of natural science. Accurate anatomical examination of numerous monsters, and a minute acquaintance with embryology and comparative anatomy, have shown that the formation of these different imperfect beings is governed by the same laws which preside over the formation of perfect individuals; the only difference being, that the process of development in the former cases has been perverted or arrested in its course during the growth of the embryo.

1. *Classification of Monsters.*—In consequence of the immense number and variety of forms of monstrosity (there being scarcely any part in any species of animal which has not been observed to depart from its usual form and structure), it becomes absolutely necessary to arrange them according to some system. Though the necessity of a classification is generally admitted, authors greatly differ in the methods which they have adopted; some basing their arrangements upon the forms or peculiarities of the monsters themselves, and others upon the theoretical ideas which they may hold concerning the causes which produce them. The system most generally followed is that which was proposed by Buffon, and which has been adopted with some modifications by Blumenbach and Meckel. Buffon formed three classes: in the first he included all those cases in which the parts of the body are increased in number, constituting monsters by excess; the second contained those beings in whom fewer than the usual number of organs are

met with, or monsters by default; and in the third he placed the various irregularities in size, relative situation, and structure of parts, which so often occur. The classification proposed by Meckel (*De Duplic. Monst. Comment.*, p. 2), differs from that of Buffon in the addition of a fourth class, including the different forms of hermaphrodism only. The simplest classification of monsters, being that which excludes all theory as to their causes, is to distribute them according to some simple and obvious characters, either depending on the degree of unnatural change, or the region or system of organs affected; and such is the kind of classification which we shall adopt in the present article.

Monsters may be first divided into simple and compound, the first of which only contain the elements of a single individual, while in compound monsters the constituent parts of two or more beings are united. Simple monsters may be again distributed into three classes, which, though not all distinguished from each other by any precise characters, are yet sufficiently distinct for purposes of arrangement.

In the first of these classes may be included those congenital varieties of conformation which are simple and uncomplicated, only affecting one organ or system of organs, and in most cases not interfering greatly with the performance of any vital function.

The second class, on the contrary, contains all those cases in which the degree of malformation is so extensive as to produce great alteration in the anatomical and physiological relations of organs, as well as, in most cases, serious external deformity and disturbance of the vital processes. M. Isidore Geoffroy St. Hilaire (*Hist. des Anomalies*, tom. 1, p. 79) is of opinion that the term monster should be confined to these more complex cases, and thinks that all the other kinds of malformation, with the exception of the compound monsters, should be simply denominated anomalies, but this distinction is arbitrary and inconvenient; indeed, in dividing this class from the previous one, it is exceedingly difficult to say where one begins and the other leaves off; and, consequently, to know in which of them to arrange many cases.

The third class may be very clearly defined, for all the malformations which it includes affect one system of organs, namely, those of generation. The monsters in this group are denominated hermaphrodites, the sex being imperfectly developed, and both sexes, or some of their characters, being present in one individual.

An immense number and variety of anomalies are included in the first class, which may be again subdivided into orders, according to whether the malformation affects the size, form, or structure of organs, or produces an alteration in the mode of arrangement and connection, or even in the number of parts. It is often found however, that two or more of these varieties of malformation exist together in the same monster; thus in CRETINS and idiots, both the size and form of the skull and brain are frequently altered; and in club-foot we find a great change both in the form, structure, and position (or arrangement) of the affected limb. Simple alterations in the size or form of parts are so common, that no other examples of them need be adduced, but some very interesting changes in the intimate structure of the tissues of the body have been met with; and particularly that peculiar absence of the colouring matter of the skin which characterises the state called albinism. A description of this curious anomaly has been given in the article ALBINO, and we shall only here state that its origin must be accounted for by simple arrest of the process of development. M. I. Geoffroy St. Hilaire says (*Hist. des Anom.*, tom. i., p. 319), 'The pigment,' or colouring matter of the skin, 'is wanting in the fœtus up to a very advanced period of intra-uterine life, and even in black or dark people the integument remains, for some time after birth, of the same colour as in the children of fair men. We can easily conceive therefore that the skin may stop in the series of its stages of development, before the period when, in the natural order of formation, the pigment is deposited in the mucous layer, and consequently it will remain uncoloured. The colouring matter of the skin and hairs, the iris and the choroid, may thus be deficient in an individual (independently of any pathological alteration), in the same manner as any organ or part of an organ may be wanting from arrest of development.' 'If any doubts remain regarding this explanation, they are removed by the circumstance that the absence of pigment is not the only condition of fœtal life which is preserved in albinism. We know that the fœtus, during the latter part of pregnancy, has the skin covered with down; and this down is frequently preserved in albinos, particularly in those which are met with on the isthmus of Panama. Lastly, the persistence of the membrana pupillaris in some of these cases beyond the ordinary term of its existence, is another equally evident proof of arrest of development.'

Many curious anomalies in the position and connection of parts have been met with, and it has been observed that organs are subject to changes of position in proportion as they are loosely connected with the surrounding parts at an early period of development. The walls of the abdominal and thoracic cavities are thus much less subject to alterations in the position of their component parts than the organs which are loosely contained within them. The viscera have been found removed from one part of their natural cavity to another, or transported into a neighbouring cavity, as from the abdomen to the chest; and some of the organs may protrude externally, when the malformation receives the name of a congenital hernia. But of all these anomalies the most curious is that in which the viscera are generally inverted, all the thoracic and abdominal organs presenting exactly an opposite arrangement to that which constitutes their natural state; the liver, cœcum, three-lobed lung, and all those parts usually found on the right side, being transposed to the left; while the heart, spleen, sigmoid flexure of the colon, &c., are found on the right. It is the peculiar characteristic of this monstrosity, that though the actual situation of the viscera is changed, their relative situation and connections are preserved as in the natural state; and consequently their different functions are not in any way disturbed. In most, if not all, of those individuals in whom this transposition of organs has been observed, the existence of the anomaly has not even been suspected during life, which, as in the celebrated case communicated by Méry to the Academy of Sciences (of an invalid soldier, aged 72), may be prolonged to its ordinary term. The causes of this malformation are exceedingly obscure, but it seems probable that general change of position of all the viscera depends on some original alteration in the situation of one important organ, as the heart or liver; for we know that many organs are connected by their functions, or by the medium of large blood-vessels, in such a manner as to acquire a certain relative situation to each other, which also becomes necessary to preserve the general shape of the animal. Accordingly we find that when any important viscus is changed in its situation, other viscera are affected in a similar manner. In the earlier periods of the evolution of the fœtus, several of those organs which afterwards incline to one side are naturally placed in the centre of the body, or in the median line: this is the case with both the heart and liver. The knowledge of this fact enables us to understand more readily how these parts may at a subsequent period incline to the opposite side to that on which they are usually found; though we are unable to explain the mode in which they change the direction of all the other abdominal and thoracic viscera.

Together with the alterations of connection, we must place those cases in which, from arrest of development, different organs, naturally entire, are apparently divided into two or more portions, as in HARE-LIP and Spina bifida. The latter of these malformations consists in a division or fissure of the posterior part of the rings of the vertebræ, either in one region of the back (as is most common), or throughout the whole spine. The mode in which the production of these and many other anomalies of the same nature can be explained by arrest of development, is by a knowledge of the method by which parts are formed. It has been observed in some organs (and the same thing is supposed by analogy to take place in almost all), that the growth goes on from the circumference towards the centre, and that the lateral parts of any single organ are developed before the central parts, and thus, at an early stage of fœtal life, hare-lip and spinal fissure are natural conditions of the embryo. If the process of development becomes arrested by any accidental cause, these states will become permanent, and the child will be malformed.

We have shown that arrest of development may produce unnatural separation of parts, and it may also occasion the closure or connection of parts naturally open or separate. Thus we frequently meet with deficiency of one or more of the orifices which open on the surface of the body, and particularly of the anus. In this case the intestinal canal may be perfect, and its orifice only closed by a membranous fold, or it may be very incomplete, and terminate in a cul-de-sac at a greater or less distance from the situation of its natural outlet. This anomaly is easily explained by the mode of formation of the alimentary canal, which is originally a prolongation of the intestinal vesicle, which gives rise in one direction to the stomach and upper part of the digestive tube, and in the opposite direction to the inferior or descending part of the intestines. The formation of either of these portions may be arrested in any part of its course (the canal terminating in a blind extremity), though the large intestines, as the colon or rectum, are most commonly the seat of this anomaly, which, on account of the serious interference which it occasions in the functions of nutrition, speedily destroys the life of the child, unless it can be removed by surgical art.

Monsters sometimes present irregularities in the number of parts which they possess, being either furnished with supernumerary organs or exhibiting some deficiency. An order of monsters thus composed of deviations from the natural number of parts seems to be clearly distinguished from all others; but if we carefully examine the different cases which it comprises, we shall find that a great many of them may be arranged together with cases belonging to other orders of monstrosity, being in fact referrible to some alterations of volume or change of connection in the affected parts. Thus when an organ is apparently deficient, it is often possible to detect the rudiments of it by a careful dissection, and therefore, though much diminished in size, it still exists. In the same manner when supernumerary parts are added to any organ, anatomical examination will sometimes show that there is no real formation of new parts, but only an increased development of those structures which commonly remain in a rudimentary state. In many cases also the deficiency or addition of organs, as supernumerary fingers or toes, and *vice versâ*, may be explained by the complete division of one part into two, or the intimate union of two or more parts.

The development of supernumerary mammæ is one of the most frequent anomalies of this kind which occur in the human subject. There is commonly only the addition of one extra gland in these cases, making three breasts, but both four and five have been occasionally seen. When four exist, they are generally arranged symmetrically two on each side of the chest. When three or five are present, the odd one may be placed laterally beneath one of the others or in the median line: when in the latter situation, it has been remarked that it is generally small and rudimentary, which may be owing to the mode of distribution of the mammary arteries which run parallel down the sides of the chest. A very remarkable but rare anomaly in man is the existence of a mamma in the inguinal region; one or two authentic cases of this kind are recorded. (*Journal Gen. de Médecine*, tom. 100, p. 57.) The only theory which explains these anomalies is that which Geoffroy St. Hilaire has denominated the 'law of unity of organic composition.' This naturalist supposes that the whole animal kingdom is formed upon a common type, the organs of different animals in the earliest states of the embryo being all similar, but during their development assuming different forms in different animals; some parts being highly developed in one species, and remaining in a rudimentary state in others. Almost all the mammalia have several mammary glands disposed in two parallel series; and though two are only naturally developed in man, yet we may suppose that the elements of others have existed at an early period, which become developed in these anomalous cases by excess or irregularity of the formative process. The bones, muscles, vessels, viscera, and other organs, have all been frequently observed to present alterations in the number of their parts. Many cases are related by authors of an increase or diminution in the number of the cavities of the heart; three ventricles have been met with (Chemineau, *Hist. de l'Acad. des Sciences*, 1699); absence of both the auricles has been observed (Turner, *Journal Gen. de Médecine*, tom. 96); and many anatomists have described hearts which were furnished with only a single auricle and ventricle, as in fishes: cases are even related in which two distinct hearts have been found in the same individual, but their authenticity must be doubted. An unnatural number of teeth has often been observed. Arnold (*Obs. Physic. Medic.*, p. 69) mentions a case in which there existed 8 incisor, 4 canine, and 24 molar teeth, in each jaw; making together 72. The truth of this case may well be suspected, though many instances of the presence of several supernumerary teeth have been recorded by other authors.

The second class of simple monsters, comprising the various forms of extensive malformation, contains an immense number of different cases. Some monsters, though greatly altered both in form and structure, are yet capable of living for a considerable time after birth; others, on the contrary, are entirely destitute of the power of supporting an independent vitality, and may be so imperfectly formed that the symmetry of the body is lost, and nothing remains but an irregular shapeless mass. Malformation often affects only one region of the body in monsters, the other parts remaining comparatively natural: thus the limbs are frequently very much altered in structure and appearance, and may be even entirely deficient, in cases where the head and trunk preserve almost their regular form. Monsters have been seen in whom the hands or feet were alone developed and inserted immediately upon the trunk. From a fancied resemblance between the state of the limbs in these monsters and their natural state in the seal and other amphibious animals, the name *Phocomeles* has been applied to them. M. Duméril (*Bull. de la Soc. Philomathique*, tom. iii., art. xi.) has described a man who was affected with this anomaly, and who died in Paris about the year 1800, at the age of 62. His body was carefully examined after death, when all four limbs were found alike deficient: the two clavicles were very short and thick; the humeri and bones of the forearm did not exist at all, but the hands were articulated by the bones of the wrist immediately to the scapula. In the abdominal limbs the head of the femur and the trochanters were found on both sides, and a rudimentary tibia existed which was articulated with the foot, but had no connection with the short thigh-bone. The hands and feet have sometimes been found wanting in cases where the whole or part of the arms and legs were developed, which terminated in a rounded extremity or stump; and lastly, one or more of the limbs in man and different animals have been found entirely deficient. In another family of monsters, denominated *Symeles*, or Sirens, the two thoracic or abdominal limbs are fused together into a single member: thus the two legs have been seen united into one, and furnished with either a double or single foot, or terminating in a point or stump. These monsters are generally malformed in some other respects, and mostly die soon after birth.

The trunk may be the principal seat of malformation, while the head and limbs only slightly participate in it. In monsters of this kind eventration has generally been found, accompanied with other anomalies. Eventration consists in imperfect development of the walls of the abdomen, and consequently protrusion of the greater part of the viscera, which form a large tumour in front of the abdomen, which is only covered by a thin and delicate membrane, consisting of the dilated base of the umbilical cord. This anomaly may be solely confined to the abdomen, or it may also implicate the thoracic viscera: thus if the eventration occupies the upper part of the abdomen, the sternum may be divided by a fissure, or may even be completely wanting, so that hernial displacement of the heart will take place. Where the sternum and chest are implicated, the diaphragm is also imperfect, being partly wanting or divided. (I. Geoff. St. Hilaire, *Hist. des Anom.*, t. xi., p. 283.) When the eventration occupies the inferior regions of the abdomen, the urinary and genital organs are often imperfectly developed, as well as in some cases one or both of the abdominal limbs.

Extroversion of the bladder is one of the best known anomalies of this class. In this malformation there is both displacement and imperfect development of the bladder itself, as well as of part of the walls of the abdomen, the front wall of the bladder is deficient, and the mucous membrane of its posterior side is retroverted, forming a soft, red, projecting tumour above the symphysis pubis. On the surface of this tumour, towards the lower part, two apertures may be observed, from which the urine is constantly trickling: these are the orifices of the ureters. Extroversion of the bladder does not seriously impede the performance of any of the vital functions, and therefore is not incompatible with prolonged life; but the more complicated forms of eventration are necessarily fatal.

In both the preceding families of monsters the head is slightly if at all deformed; but many instances have been met with in which the head and face are the parts most extensively altered, though it has been observed, that whenever serious malformation of the cerebral organs take place, some other parts of the body participate in the anomaly. The brain has often been found imperfectly developed, and situated wholly or partly without the cranial cavity, the walls of which were incomplete. In these monsters, which have been named *Exencephali*, the brain may protrude through an opening in the posterior or occipital region of the skull, or in the anterior or frontal region. This hernial displacement of the brain is often complicated with eventration or spinal fissure. The brain in some cases has been found entirely deficient, and the vault of the cranium absent, a bright red-coloured tumour composed entirely of vessels lying on the base of the skull, and partly occupying the place of the brain: in a few monsters of this kind the vertebral canal has been seen widely open, and the spinal marrow also deficient, the vascular tumour sometimes existing and sometimes not.

The face in some monsters is the principal seat of anomaly, and no form of monstrosity has attracted more attention than that denominated *Cyclopia*, in which, from atrophy of the nasal organs, the eyes approach and unite in the median line. In some of these beings, which have also been called *Cyclocephali* by Geoffroy St. Hilaire, the two eyes are placed very close together, but still remain distinct, the bony parts of the nose being entirely atrophied, but the soft and tegumentary parts remaining in the form of a proboscis, or trunk, situated above the orbits, which, though closely in contact, are not blended together. In others only one orbital cavity has been found, containing a double eye, the component parts of which are sometimes so blended together, that only a few traces of duplicity remain; thus the cornea, pupil, and crystalline lens have been found quite single in these cases. (St. Hilaire, *Histoire, &c.*, t. ii., p. 387.) None of these single-eyed monsters have ever been known to live for more than an hour or two after birth, and their speedy death must be accounted for by the imperfect state of the brain, which constantly accompanies this anomaly. Malformation of the head is sometimes carried to such an extent, that the natural structure becomes completely lost, and a mere shapeless mass remains; and lastly, in those monsters to whom the denomination of *Acephalous* is correctly and should be exclusively applied, the head is entirely deficient, no external vestiges of it remaining. In these very imperfect beings other parts of the body always participate in the malformation; the symmetry of the form is lost, one or both of the superior extremities are generally deficient, and many of the thoracic and abdominal viscera wanting: the heart and lungs have been found absent in most cases; and some writers have remarked that the heart is never found in acephalous fœtuses, but the testimony of many observers has proved that this is incorrect. (St. Hilaire, *Hist.*, tom. ii., p. 507.) M. Serres has related a curious case (*Bull. de la Soc. Méd. d'Emulation*, Sept., 1821), in which an acephalous fœtus was furnished with a simple tubular heart resembling the dorsal vessel of insects, into which the principal vascular trunks opened. This case is peculiarly interesting, since we know by the researches of embryology that the heart first appears in the embryo in the shape of a long tubular pouch, which ordinarily transient state had doubtless become permanent in the above monster by arrest of the process of development.

Some of the irregular shapeless masses generally called moles, consisting of different organic parts, as teeth, bones, hair, skin, &c., which are occasionally found in the uterus or ovaries, must be considered as the imperfect products of conception, and therefore arranged among single monsters. But we must distinguish these cases from others which often very closely resemble them, in which tumours of a similar kind have been found in the ovaries of virgins, and even of girls before puberty, the occurrence of which must be explained in quite a different manner, either by the action of some morbid process in the system, or by the theory of monstrosity by inclusion, which supposes that the elements of one being have been originally enclosed in the body of another, where they have remained in an imperfectly developed state.

The last class of simple monsters includes the various forms of hermaphrodism. An hermaphrodite was defined by the antients as an individual capable of fulfilling by turns the reproductive functions of both sexes, or at least one who simultaneously possessed both the male and female organs fully developed; such a being however is not only unknown among the authentic details of anomalies, but is physically impossible in man and the higher orders of animals without extensive alteration in the connections of the bones and other parts of the pelvis. The signification of the term hermaphrodism is now much extended, and it is used to designate an individual who possesses any mixture of the characters of the two sexes. An immense variety of these malformations of the generative organs has been observed; but in most cases the malformed being belongs essentially to one or the other sex, and is only related to the opposite sex by some few characters. The two families of male and female hermaphrodites have been thus formed, which include a great proportion of the cases which have been met with. In both of these forms of anomaly, by a careful investigation during life, or dissection after death, it will be found that all these beings are essentially male or female.

In a few cases of what have been denominated neuter and mixed hermaphrodism, the organs belonging to the opposite sexes seem to have been so blended together in the same individual, that the being could not be referred to one sex rather than the other, but these instances are very rare. A most curious instance of this description is given by Schrele, a German anatomist. (*Med.-Chir. prakt. Archiv. von Baden, &c.*, t. i., 1804.)

The mode of origin of hermaphrodism is very obscure, though the first mentioned forms of this anomaly may most probably be referred to some arrest or excess in the process of development, since in the early stages of embryonic life a very close resemblance exists between the generative organs in both sexes.

We now come to those curious and interesting anomalies in which the component parts of two or more distinct beings are united in one individual, forming a compound monster. The two subjects composing a double being may possess an equal degree of perfection, or be very dissimilar in size and structure, one appearing as a mere parasitical appendage of the other: thus two individuals nearly perfect and distinct may cohere together by one region only of the body, or an apparently single trunk may be furnished with two heads or four arms; the multiplication of one or more of the extremities constitutes in fact the first degree of double monstrosity. In some cases every limb is doubled, and the individual then has eight extremities; in others there is only one supernumerary extremity, which, in some cases, has been observed single at its origin and doubled or tripled towards its termination, as when two or three feet are attached to the same leg. (Andral, *Anat. Pathol.*, vol. i.) It has been observed that in whatever manner or degree two beings are joined together, they are always united by corresponding aspects of the body, that is to say, side to side, face to face, or back to back: each part and each organ in the one corresponds to the same part or organ in the other; every vessel, nerve, or muscle situated in the line of union joins itself to the corresponding vessel, nerve, or muscle in the other subject, in the same manner as the two primitive halves of any single organ, which, according to M. Serres's theory of eccentric development are originally separate, unite by the progress of development.

We have already said that the two subjects composing a double monster may be both nearly perfect and distinct, only adhering together by one region of the body. Beings of this description are sometimes capable of supporting an independent vitality for a considerable number of years, though they are mostly destroyed during parturition, their structure occasioning great difficulty to the process of delivery. One of the most remarkable cases of complete double monstrosity was that of the double female who was born in Hungary in 1701, and christened by the two names of Helen and Judith. This monster was shown about for seven years in almost all the countries of Europe, and lived to the age of twenty-two years. The two individuals, which were each quite perfect, except at the point of union, were here placed back to back, and united by the buttocks and part of the loins. The external organs of generation offered evident signs of duplicity, though there only existed a single vulva, which was placed inferiorly and hidden between the four thighs; the vagina was at first single, but soon divided into two distinct canals, which led to separate uteri. The two intestinal canals likewise terminated in a common anus, and the vertebral columns were united at their extremities. The aortæ and venæ cavæ communicated at their lower part, and thus established a large and direct communication between the two hearts, producing an intimate relation of life and functions between the two beings. Whenever one was ill the other felt so too, and participated in her sister's disease; it was therefore predicted that the death of one would necessarily destroy the other, which proved to be true. Judith, at the age of twenty-two years, was attacked with disease of the lungs and brain, of which she died. Helen, who, at the commencement of her sister's attack, was in perfect health, soon became ill, and both expired at almost the same instant.

The junction of two fœtuses may take place by almost any region of the body; thus they have been seen attached to each other by the crown of the head, both being placed in a straight line (Villeneuve, *Description d'une Monstruosité, &c.*, 4to., Paris, 1831); by the anterior portion of the thorax, or abdomen, or by part of the front of both, as occurred in the well-known double monster which was exhibited in London in 1829-30, and denominated the Siamese twins. In this instance the two brothers were only furnished with a single umbilicus. Two varieties have been observed in the mode of junction wherever situated; in one the attachment is superficial, being effected only by the skin and bones; in the other it is more deeply seated, the cavities of the body at the point of union communicating in the two individuals, or being in fact converted into one; thus, the chests being united, the sternum may be altogether deficient; and the thoracic cavities thrown into communication, in which case the viscera frequently present some anomalies in form and arrangement. Sometimes there are two hearts, which are perfectly distinct, and enclosed in separate pericardia; sometimes the hearts, though both well formed, are contained in one common pericardium, in which they may be either distinct from each other, or superficially joined at some point. In other cases two hearts are found, but both in a very imperfect state; lastly, there may be only one heart presenting several vices of conformation, as three or four ventricles, or one of the two ordinary ventricles unusually large, and partly divided by a septum. In other cases of this description the heart has been found single and well formed, but the large vessels have been all double, so that two aortas sprung from the left ventricle, &c.

In some instances of double monstrosity the component individuals are distinct and separate at their lower halves, but more or less intimately united at the upper part of their bodies, so that they appear to have a double body and single head. In others, on the contrary, there are two distinct heads, and the upper part of the body is double, while the pelvis and inferior extremities are nearly or quite single. In some cases belonging to the former of these divisions the separation of the bodies is only complete inferiorly, all the parts above the umbilicus manifesting a tendency to coalesce: in others the separation is perfect as high as the neck. In all these instances however the head and upper part of the body, although apparently single, almost invariably present on dissection some supernumerary parts, which clearly indicate their double origin. Those compound monsters which are furnished with two heads and a single body offer numerous varieties; the head may be double, but not distinctly divided, there being two faces, more or less perfectly formed, placed side by side, and separated by a longitudinal division; each face is generally provided with a pair of eyes, but sometimes there are only three, one being placed in the median line and formed by the union of two together, as in cases of Cyclopia. The two heads may be completely double, but the body and extremities single. Lastly, the heads and upper halves of the bodies may be separate, there being four upper extremities, while the monster is only single by the pelvis and lower extremities. A human monster of the last kind, which lived to be nine months old, excited great interest in Paris in 1829; it was a double female, and denominated Rita-Christina. It was born in Sardinia, and was brought to Paris to be publicly exhibited. It was carefully examined after death, and a detailed account of its structure has been given by M. Serres, in his *Recherches d'Anatomie Transcendante, &c.* The two vertebral columns were found quite distinct in their whole length, and a rudimentary pelvis separated them inferiorly: another fully developed pelvis was found in its natural position, which supported two well formed abdominal limbs. There existed a single bladder, uterus, and rectum, which were common to the two subjects, but behind these organs were found rudimentary traces of others. There were two distinct hearts, and all the other thoracic and most of the abdominal viscera were double.

A singular and unique case is recorded by Sir E. Home (*Philos. Trans.*, vol. lxxx., p. 296, and vol. lxxxix., p. 28; also in *Lectures on Comparative Anatomy*, t iii., p. 334), of a fœtus with an accessory head, which was implanted by its summit on to the crown of the natural head. The body of this child was well formed in every respect, having no supernumerary parts, and the principal head was quite natural in appearance, except in the parietal region, where its integuments were continued into those of the accessory head. The latter was placed in an entirely inverted position, the neck, which terminated in a round tumour, being directed upwards and a little backwards. This monstrous child, which was born in Bengal in 1783, lived to be four years old, and then only died from the bite of a serpent. In this case, which must be included with those of double monstrosity, we must suppose that the body and limbs belonging to the accessory head had become completely atrophied, but it is exceedingly curious how this remaining part continued to live solely by means of vascular and nervous communication with the principal individual, and without any separate umbilical cord or special organs of nutrition.

The last variety of monstrosity which we shall mention is that by inclusion. In these cases fragments of one fœtus have been found contained in the interior of another. A case of this kind is recorded by M. Dupuytren (*Bull. de la Faculté de Médecine*, vol. i.), who found a cyst in the transverse mesocolon of a boy thirteen years of age, containing an organised mass, which, when carefully examined, presented traces of the brain, spinal marrow, nerves, muscles, and most of the bones of a fœtus, but no vestiges of the organs of digestion, respiration, or circulation. Similar substances have been found in various situations in other subjects, and there is no doubt of their nature; though the mode in which the germ of one fœtus has become included in the body of another is at present entirely unknown.

Compound monsters, formed by the union of more than two distinct individuals, are exceedingly rare, and very few authentic cases of such anomaly are on record.

None of the different theories which have been proposed in explanation of the mode of origin of single monsters throw any light on the causes of compound monstrosity. It is very difficult to decide whether the germs have been originally double, or whether two or more have become united during the progress of development. The latter is the most general opinion; and the most probable idea respecting their mode of union is, that two ova become adherent whenever they are contained within the same membranes, and opposed to each other by corresponding aspects of the body.

2. *Predisposing and exciting Causes of Monstrosity.*—Of these little is known; for while the influences determining the phenomena of normal development are hidden from us, those presiding over irregular formation must necessarily be involved in darkness. In the article FŒTUS it is stated that the organs of the embryo are generally considered to be successively developed, and not evolved from originally pre-existing elements: the notion therefore that the germ of the future embryo is ever originally monstrous previous to impregnation must be abandoned, and the causes giving rise to the various forms of congenital malformation must be sought for in some accidental influences disturbing or arresting the process of development in the embryo. Direct evidence has been afforded by experiment that the natural stages of formation may be so altered in the embryo of the chick during incubation by external injury. Geoffroy St. Hilaire injured several eggs in which the process of incubation had commenced, and had been going on naturally for several days. He shook some of them violently, he perforated the shell of others in different places with a sharp instrument, or kept them in a vertical position, upon either the large or small end, during the whole time of hatching; again, in some he covered part of the shell with wax, or a varnish impervious to the air. The constant effect of these injuries was the production of a very considerable number of anomalies, either simple or complicated, among which may be mentioned *cyclopia* and other malformations of the face and head, eventration, and spinal fissure. In no instance was any case of double monstrosity met with, which might, *à priori*, have been supposed; a double monster being composed of two distinct embryos, the germs of which must have previously existed in the same egg. (*Mémoires du Muséum* tom. xiii., p. 289; also *Journal Complément. des Sci. Méd.* tom. xxxiv.)

The younger St. Hilaire repeated these experiments in a different manner, altering the structure of eggs previous to the commencement of incubation, and not during the course of this process, as had been done by his father. His experiments were attended with quite a different result: the more violent disturbing influences destroyed the vitality of the embryo altogether; others, less active, produced general retardation or arrest of the process of development of the whole body; but in no instance was malformation of any one region or part effected. (*Hist. des Anom.*, tom. iii., p. 503.) These experiments confirm the opinion that anomalies involving a single individual must principally be referred to the influence of some disturbing causes occurring during the process of development. In some instances the birth of a monster has undoubtedly followed an accident received by the mother during the early months of gestation, such as a fall, a violent blow on the abdomen, or some long-continued mental impression or anxiety. The influence of such causes is however much weaker than has been supposed; for how many examples occur every day of women producing well-formed children who have been suffering under violent moral emotions, or who have received serious accidents during pregnancy. It is unnecessary to bring forward any arguments to refute the antient superstitious notions of the vast influence which the imagination of the mother was supposed to exert over the formation of the fœtus. It is no longer supposed, except by the ignorant, that any object which has been seen or longed for by the parent can be depicted on the body of the child; and in most cases where the child has been supposed to have been deformed through the influence of any such cause, if the date of the impression received by the mother be carefully ascertained, it will be found that the organ supposed to be altered or marked by such impression must have been nearly or fully developed at the time that it was received, and therefore could be in no way affected.

Another very generally admitted cause for some malformations is the occurrence of disease in the fœtus itself, and there is no doubt but that some cases of *anencephalia* and other malformations of the brain and spinal chord must be referred to dropsical disease occurring in the interior of the skull and spine of the embryo; but in the majority of cases this explanation is inadmissible, and supported by no proofs. Many other hypotheses have been proposed to account for the production of monsters, as adhesions between the fœtus and its investing membranes; modifications in the quantity and quality of the nutriment received by the embryo; pressure made on the fœtus by tumours attached to the parietes of the uterus, &c. It is unnecessary to enter into the consideration of these causes; for, after all, we can only arrive at the conclusion that the development of the embryo in anomalous cases has been diverted from its natural course, or arrested by some accidental cause, which, whether taking its origin in the fœtus itself, or acting secondarily on the embryo, is involved in obscurity.

Though the occurrence of accidental causes acting during the process of development will account for most of the phenomena of monstrosity, yet it will not account for all. It has been observed that some malformations are hereditary, are transmitted from fathers to children; and since all influence of the father on the child must cease with the act of fecundation, these anomalies must be dated from the moment of conception.

3. *Laws of Monstrosity.*—From extended observation it has been found that all the forms and varieties which monstrosity presents are apparently under the control of certain fixed laws; or, in other words, there appear to be a number of general facts which are applicable to all cases of malformation. Some of these facts it is necessary to be acquainted with, since, by a knowledge of them, we may often be enabled to distinguish (when reading or hearing descriptions of monsters, or looking at figures in old works) those anomalous cases which may really have existed, from others which are only the fanciful and absurd productions of a fertile imagination. To one of these laws we have already alluded, for instance, the fact that union between two individuals forming a double monster always takes place by corresponding parts of the body; and we shall now briefly mention several others.

Monstrosity, however complicated and extensive, is never carried to such a degree as to remove the animal affected with it out of the series of natural beings in which it has been originally placed; no entire being nor organ has ever been met with so deformed that the species to which it belonged could not be recognised. Again, in the most extensively deformed monsters the relative connections between different organs are never so completely altered that it becomes impossible to distinguish them by the position which they occupy. Thus the heart has never been found in the cranium, nor the lungs in the pelvis.

Anomalies are more frequent in proportion as they do not affect vital organs nor interfere with any important functions. Thus we very commonly meet with irregularities in the course of blood-vessels, since it signifies little through what channels the blood is conveyed, so that it arrives at the organ which it is destined to supply. It has also been found that the parts most liable to vary are those which are the latest in attaining their complete evolution; and this fact may very readily be explained, for if the process of development be disturbed or arrested by any cause during the course of fœtal life, those organs which are already nearly or fully formed at the time of the occurrence of such disturbing influence will be little or not at all altered, while on the contrary complete suppression or a very marked alteration may be effected in other parts whose formation has not commenced or is very imperfect. This fact has been explained in another manner, by supposing that different organs are subordinate in their formation one to another, one being produced by another whose development preceded it. Thus the suppression of any part will not influence those which have been previously formed, while it must necessarily lead to the complete absence of all those which ought to have followed it in the order of development.

A kind of compensation or balancing has sometimes been observed between different organs in monsters; excess of development in one part being accompanied with a corresponding arrest of formation in some other organ. Thus an individual having several supernumerary fingers or toes on one hand frequently has the opposite limb furnished with fewer than the usual number, and monsters deprived of the brain have been observed to have the face unusually large. Many other applications have been made of this law of compensation, as it has been termed by Geoffroy St. Hilaire.

It has been said that the left side of the body is more frequently deformed than the right, and that a greater number of monsters belong to the female than to the male sex, which last fact Meckel explains by the theory that the generative organs are in both sexes originally female, and that many monsters remain of that sex by arrest of development, who, if naturally formed, would have been males.

For further information upon the subject of monstrosity the reader may particularly consult Haller's treatise *De Monstris;* Meckel's *Manual of Pathological Anatomy* (German); Geoffroy St. Hilaire's *Anatomie Philosophique;* and his son Isidore Geoffroy St. Hilaire's *Histoire des Anomalies.*

MONSTRELET, ENGUERRAND DE, a celebrated French chronicle writer, lived in the fifteenth century. His quotations from Livy, Sallust, and Vegetius lead to the opinion that he must have had a tolerable acquaintance with Latin literature. M. Dacier supposes that either from bodily weakness or a predominant taste for study, he altogether abstained from the profession of arms, which at the time when he lived was almost essential to the character of a gentleman. The same author is also of opinion that he belonged to neither of the factions of Armagnac or Burgundy, nor indeed acted in any of the events of his time, but was a quiet spectator of the circumstances which he has recorded. In all his work Monstrelet only once alludes to himself, where he describes the capture of the Maid of Orleans before Compiègne (livre ii., chap. 86), and then he merely tells us that he was present at the interview between the *Pucelle* and the duke of Burgundy, and almost implies that he was not present at the skirmish in which the capture was made. He had on this occasion (says Dacier) accompanied the Duke Philip perhaps as historian. The rest of his life he passed in the city of Cambrai, where he held several offices, being bailiff of the chapter of Cambrai, provost of the city, and bailiff of Wallaincourt. He died in the middle of the year 1453.

The first book of the Chronicles of Monstrelet begins with the year 1400, and ends with the year 1422; the second concludes with 1444. The early editions contain a third and fourth book, which are both rejected by M. Buchon, a modern editor; the latter for the obvious reason that the events which it records did not take place till after the death of the chronicler, and the former on the authority of M. Coney, who declares that Monstrelet stopped at 1444, as well as from the result of certain critical investigations on the part of M. Buchon himself.

Monstrelet is greatly commended for his minuteness of detail, his fidelity, and the extended view he takes in his 'Chronicles;' for, like Froissart, his predecessor, he does not confine himself to France alone, but gives all the circumstances relative to the affairs of the other countries of Europe which were within the compass of his knowledge. His principal object was to give a history of the wars of his time, and of the persons engaged in them, but he adds much valuable information, both political and ecclesiastical.

In France there are several manuscripts of Monstrelet. The first printed edition is a quarto, dated 1512, which was followed by four others, the last dated 1603, all containing the additional books rejected by Buchon, who however praises the third edition (1572) for its beauty. The new edition by Buchon was published in 1836, and forms part of a series of the 'Panthéon Littéraire,' in which it is designed to give all the principal chronicles of France. In 1808 an English version of Monstrelet was published by Mr. Johnes, the translator of Froissart.

MONT DE MARSAN. [LANDES.]

MONT DE PIE'TE' (MONTE DI PIETA', in Italian), a benevolent institution which originated in Italy in the fifteenth century, the object of which was to lend money to necessitous people at a moderate interest. The Jews, who were the great money-lenders in that age, exacted an enormous interest, and as much as 20*l.* to 25*l.* per cent. The Papal government and other Italian governments established a kind of bank, which lent money upon pledges, for a fixed term, at a low rate of interest, intended chiefly to defray the unavoidable expenses of the establishment; at the expiration of which term, if the capital lent and interest were not repaid, the pledges were sold, and the surplus money, after paying the debt incurred, was restored to the owners In most instances however the term might be renewed by merely paying the interest. The difference between these establishments and those of the ordinary pawnbrokers seems to have been that they were intended mainly for the benefit of the borrowers, and not for the profit of the lenders, and that every reasonable facility was afforded to the former. The administration of the Monte di Pietà was therefore conducted upon economical and strictly equitable principles, and it was under the inspection of the government as a public benevolent institution. This at least was the original principle, although it may occasionally have been deviated from in after-times, in consequence of the cupidity or necessities of the governments themselves. In times when capital was more scarce or less generally diffused than it is now, and when loans of money were difficult to be got, the Monte di Pietà was a most useful institution. Leo X., some say Paul III., sanctioned the first establishment of a Monte di Pietà at Rome, which was under the direction of a society of wealthy persons, who, having contributed the necessary funds, lent upon pledges small sums not exceeding thirty Roman scudi, a little more than six pounds sterling, to each person. The money was lent for a term of eighteen months. The establishment was under the inspection of the treasurer of the Apostolic Chamber. Large storehouses were annexed to the office, which stood in the district della Regola, near the banks of the Tiber. (Richard, *Description de l'Italie*, vol. v.) Other establishments of a similar nature existed at Milan, Florence, Naples, and most other towns of Italy. That of Padua is one of the oldest on record, having been established in 1491, when the Jewish banks, which lent at usurious interest, were shut up. (Scardeoni, *De Antiquitate Urbis Patavii.*)

This institution was introduced into other countries, especially into the Netherlands, and Monts de Piété were established at Brussels, Antwerp, Ghent, and other places. In Spain there were also similar establishments at Madrid and some other large towns, but in no country were they so generally spread as in Italy, the original country of benevolent institutions during the middle ages.

When the French under Bonaparte invaded Italy in 1796-7, they plundered the Monti di Pietà of Milan, Modena, Parma, and most other towns. At Rome, Pope Pius VI., being pressed by the French to pay an enormous sum for war contributions, was obliged to seize upon the richer pledges in the Monte di Pietà, for the repayment of which he gave bonds; but these bonds lost all value in the subsequent invasion of Rome by the French in 1798. The Monti di Pietà have been re-established in most Italian cities.

The Monti Frumentarii, in several parts of Italy, are storehouses of corn, which is lent to poor cultivators on the same principle as money is by the Monti di Pietà. [BRESCIA.]

MONT D'OR. [PUY DE DÔME.]

MONT LOUIS. [PYRENEES ORIENTALES.]

MONT LUCON. [ALLIER.]

MONTAGNA, Dr. Leach's name for a genus of Macrurous crustaceans allied to *Callianassa.*

MONTAGU, LADY MARY WORTLEY, by birth Lady Mary Pierrepoint, was the eldest daughter of Evelyn earl of Kingston (afterwards marquis of Dorchester, finally duke of Kingston), by his wife the lady Mary Fielding, daughter of William earl of Denbigh, and was born at her father's seat of Thoresby in Nottinghamshire, about the year 1690. Displaying great attractions of person as well as sprightliness of mind from her earliest years, she was the favourite and pride of her father, who, having lost his wife in 1694, and continuing a widower, introduced his daughter to society, and made her preside at his table, almost before she had well outgrown her childhood. It does not appear however that there is any truth in the common account of his taking pains to have her talents cultivated by a learned education. What Latin she knew she seems to have acquired of her own accord; and there is no reason to suppose that she ever studied Greek, a translation made by her, when a girl, of the 'Encheiridion' of Epictetus, which has been referred to as a proof of her knowledge of that language, having been in fact made from the Latin. She was at least however an eager reader of whatever fell in her way in her mother-tongue. In August, 1712, without the consent of her father, with whose views in regard to a settlement his proposed son-in-law had refused to comply, Lady Mary married Edward Wortley Montagu, Esq., eldest son of the Hon. Sydney Montagu, and grandson of the first earl of Sandwich. Her letters to Mr. Montagu before their marriage, which have been published entire for the first time in the late complete edition of her works by her great grandson, the present Lord Wharncliffe, prove that she had already attained much of that sharpness both of style and thought for which her writings are remarkable, as well as a maturity of judgment far beyond her years. Soon after the accession of George I., Mr. Wortley, who had been for some years in parliament, obtained a seat at the Treasury Board, of which his cousin Charles Montagu, earl of Halifax, had been appointed first commissioner; and from this time Lady Mary resided principally in London, where her wit and beauty immediately acquired her a brilliant reputation. Her husband had long been on terms of intimate friendship with Addison and other eminent literary men of the day, and in that society she moved with the same lustre as in the circles of rank and fashion. In 1716, Mr. Wortley Montagu was appointed ambassador to the Porte; and in August of that year he set out for Constantinople, accompanied by his wife. They remained abroad till October, 1718, and it was during this absence from her native country that Lady Mary addressed to her sister, the countess of Mar, Mr. Pope, and other male and female friends, the celebrated Letters upon which her fame principally rests. The picture of Eastern life and manners given in these letters is admitted by all who have since visited the Levant to be in general as correct as it is clear, lively, and striking; and they abound not only in wit and humour, but in a depth and sagacity of remark, conveyed in a style at once flowing and forcible, such as has rarely proceeded from a female pen. Although they were not given to the world during her lifetime, they were evidently written with a view to publication; copies of all of them were preserved by Lady Mary, and some time before her death she presented two complete transcripts of them, the one, in her own handwriting, to the Rev. Benjamin Sowden, minister at Rotterdam, 'to be disposed of as he thinks proper;' the other, in a different hand, to Mr. Molesworth. Both these copies were procured immediately after her death by her daughter, Lady Bute, the first-mentioned having been purchased for the sum of 500*l.*; but it appeared that a transcript had been previously taken (as Mr. Sowden affirmed, without his knowledge), and from this the Letters were published, in three volumes 12mo., in 1763, the editor, it is said, having been the notorious Captain Cleland. A fourth volume appeared in 1767, composed of letters of which no manuscript is known to exist, but of the authenticity of which no doubt was ever entertained by Lady Mary's family. As they originally appeared, the Letters were introduced by a 'Preface by a Lady,' dated 1724, and signed M. A., which now turns out to have been written by a person once of considerable literary reputation, Mrs. Mary Astell, the Madonella of the Tatler (see Nos. 32 and 63), who was a particular friend of Lady Mary, and who had drawn up the said preface after perusing the Letters in manuscript. The authenticity of the Letters was not considered to be conclusively established till the publication of the first collected edition of Lady Mary's works in 1803, in five volumes 12mo., 'by permission, from her genuine papers,' by Mr. Dallaway, who prefixed to the whole a Life of her ladyship, of very little merit in every respect. A second edition of this publication appeared in 1817, containing some additional letters; but its value has been since entirely superseded by the publication of 'The Letters and Works of Lady Mary Wortley Montagu,' edited by her great-grandson, Lord Wharncliffe, 3 vols. 8vo., London, 1836, and again in 1837. Besides presenting the letters formerly printed in a much more correct shape, this publication contains several letters and other pieces which had not before been given to the world; but it derives its chief value and interest from a new Life of Lady Mary, modestly entitled 'Biographical Anecdotes' (understood to be from the pen of Lady Louisa Stuart, the only surviving daughter of her daughter Lady Bute), which is as able and spirited as anything Lady Mary herself ever wrote, and must be considered as one of the gems of our literature.

Lady Mary's visit to Turkey, besides producing the Letters, is famous for having been followed by the introduction, through her means, into this country, and thence into the rest of Europe, of the practice of inoculation for the small-pox. [INOCULATION.] Of the next twenty years of her life, which she passed in England, the most memorable incident is her quarrel with Pope, an affair which is involved in considerable mystery, but in which it appears probable that the vanity of the poet was really more to blame than the levity of the lady. During this interval also she composed a considerable quantity of verse, which was handed about in society, and some of which got into print; but she had not much of the poetical temperament, and her rhymes, though not without sprightliness, contained nothing which could ensure them a long life. Among those of her performances in this line of greatest pretension were six satirical sketches, entitled 'Town Eclogues,' which have been often printed; others of her poetical pieces, or that have been generally attributed to her, are in so free a style, as to make it necessary to exclude them from the modern editions of her works. For reasons, the nature of which is not well known, she again left England in 1739, but this time without her husband, from whom however she seems to have parted on very good terms, although they never met again. She directed her course to Italy, where she lived first on the shores of the lake of Iseo, and afterwards at Venice, till 1761, when she was prevailed upon, by the solicitations of her daughter, to return to England. She only survived her return to her native country a few months, dying of a cancer in the breast, on the 21st August, 1762. Besides a son, the subject of the next article, she left a daughter, Mary, who had been married in 1736 to John, third earl of Bute (George III.'s celebrated minister), and who died in 1794.

MONTAGU, EDWARD WORTLEY, son of Edward Wortley Montagu, Esq., and his wife Lady Mary, the subject of the preceding article, was born in 1713, at Wharncliffe, in Yorkshire. His niece, Lady Louisa Stuart, in her biographical sketch of his mother, describes him as 'betraying from the beginning that surest symptom of moral (or mental) disease, an habitual disregard of truth, accompanied by a fertile ready invention never at fault.' When very young he was sent to Westminster school, from which he repeatedly ran away, till at last making his escape altogether from his friends, or abandoned by them as irreclaimable, he gave himself up to the lowest vices, and after going through a variety of adventures, hired himself for a cabin-boy in a ship sailing to Spain, where he was after some time discovered by the British consul at Cadiz, and once more restored to his family. He was then sent to travel on the Continent in charge of a private tutor, and it was while abroad that he published his first work, a tract entitled 'Reflections on the Rise and Fall of Antient Republics.' His literary labours however still left him leisure for pursuits of a very different kind; and while at Paris he got involved in a dispute with a Jew, which subjected him to a criminal prosecution. We presume it was after he returned to England that, while still under age, he married, as we are told by his niece, a woman of very low degree, considerably older than himself, whom he forsook in a few weeks, and never saw again. His wife, who gave him no ground for divorcing her, lived nearly as long as himself; but nevertheless, it is added, several other ladies successively passed by his name, some of whom were married to him, others possibly not; the last of them, at any rate, had, like himself, been married before to a person who was still alive.

Notwithstanding all this profligacy and disregard of reputation, Mr. Montagu, having procured a seat in the House of Commons, retained it for two parliaments, till at last his extravagant expenditure involved him in such pecuniary embarrassments that he deemed it expedient once more to go abroad. He never returned to England, but proceeding first to Italy, made himself remarkable there by becoming a convert to popery, and then transferring himself to Egypt, excited a still greater sensation by turning Mohammedan. The rest of his life he spent in the Levant, having in the mean time been disinherited by his father and mother; but he was on his way back to England when his death took place at Padua in 1776. Besides his early tract he wrote another entitled 'An Examination into the Causes of Earthquakes;' and he also contributed some papers to the 'Philosophical Transactions.' His niece concludes her account of him as follows:—'He was said to have had a handsome person, plausible manners, and a liveliness of parts which report magnified into great talents; but whether he did really possess these may be doubted. Thus much is certain;—Mr. Wortley and Lady Mary (neither of them an incompetent judge) were far from thinking highly of their son's abilities and understanding. His irregular conduct was imputed by them rather to weakness of character than to "the flash and outbreak of a fiery spirit" conscious of its own powers; and from first to last they held him utterly incapable of pursuing any object or course whatever, praiseworthy or blameable, with that firmness and consistency of purpose which perhaps belongs as necessarily to the great wicked man as to the eminently good one. They would have passed upon him the sentence of the patriarch on his first-born—"Unstable as water, thou shalt not excel!"'

Niebuhr, in the lately published volume of his Travels (Hamburg, 1837), tells a curious anecdote about Montagu marrying another man's wife in Egypt; and states some other facts which throw light on the character of this eccentric man, who seems to have had more ability than his family gave him credit for. The dislike between the father and son appears to have been mutual.

MONTAIGNE, MICHEL, LORD OF, born in 1533, was a younger son of a nobleman whose estate, from which he took his name, was situated in the province of Perigord, near the river Dordogne. His father, an eccentric blunt feudal baron, placed him under the care of a German tutor, who did not speak French, and the intercourse between tutor and pupil was carried on entirely in Latin; and even his parents made it a rule always to address him in that language, of which they knew a sufficient number of words for common purposes. The attendants were enjoined to follow the same practice. 'They all became Latinized,' says Montaigne himself; 'and even the villagers in the neighbourhood learnt words in that language, some of which took root in the country, and became of common use among the people.' Thus without the aid of scholastic teaching, Montaigne spoke Latin long before he could speak French, which he was afterwards obliged to learn like a foreign language. He studied Greek in the same manner, by way of pastime rather than as a task. He was afterwards sent to the college of Guienne at Bordeaux; and at the age of thirteen he had completed his college education. He then studied the law, and in 1554 he was made 'conseiller,' or judge, in the parliament of Bordeaux. He repaired several times to court, and enjoyed the favour of Henri II., by whom, or, as some say, by Charles IX., he was made a gentleman of the king's chamber and a knight of the order of St. Michel.

When he was thirty-three years of age Montaigne married Françoise de la Chassaigne, in order, as he says, to please his friends rather than himself, for he was not inclined to a married life. He however lived on good terms with his wife till his death. He had only one daughter by his marriage. He managed his own estate, on which he generally resided, and from which he derived an income of about 6000 livres.

In 1569 Montaigne translated into French a Latin work of Raymond de Sebonde or Sebon, a Spanish divine, on 'Natural Theology.' France was at that time desolated by civil and religious war, and Montaigne, disapproving of the conduct of the court towards the Protestants, and yet being by education a Catholic, and by principle and disposition loyal to the king, was glad to live in retirement, and take no part in public affairs except by exhorting both parties to moderation and mutual charity. By this conduct he became, as might be expected, obnoxious to both sides. The massacre of St. Bartholomew plunged him into a deep melancholy, for he detested cruelty and the shedding of blood. It was about this dismal epoch of 1572 that he began to write his 'Essais,' which were published in March, 1580, and met with great success.

With the view of restoring his health, which was not good, Montaigne undertook a journey to Germany, Switzerland, and lastly to Italy. At Rome he was well received by several cardinals and other persons of distinction, and was introduced to pope Gregory XIII., and received the freedom of the city of Rome by a bull of the pope, of which he appears to have been very proud. Montaigne was delighted with Rome; he there found himself at home among those scenes and monuments which were connected with his earliest studies and first impressions of his boyish years. He wrote a journal of his tour, evidently not intended for publication, but the MS., being discovered after nearly two centuries in an old chest in the château of his family, was published in 1774, under the title of 'Journal du Voyage de Michel de Montaigne en Italie, par la Suisse et l'Allemagne, en 1580-1.' It is one of the earliest descriptions of Italy written in a modern language.

While he was abroad he was elected mayor of Bordeaux by the votes of the citizens, an honour which he would have declined had not the king, Henri III., insisted upon his accepting the office. At the expiration of two years Montaigne was re-elected for an equal period. On his retiring from office he returned to his patrimonial estate. The war of the League was then raging in the country, and Montaigne had some difficulty in saving his family and property from the violence of the contending factions.

At this time the plague also broke out in his neighbourhood (in 1586), and obliged him to leave his residence and wander about various parts of the country. He was at Paris in 1588, busy about a new edition of 'Essays.' It appears from De Thou's account that about this time Montaigne was employed in negotiations with a view to conclude a peace between Henri of Navarre, afterwards Henri IV., and the duke of Guise. At Paris he became acquainted with Mademoiselle de Gournay, a young lady who had conceived a kind of sentimental affection for him from reading his book. Attended by her mother she visited him, and introduced herself to him, and from that time he called her his 'fille d'alliance,' or adopted daughter, a title which she retained for the rest of her life, as she never married. Montaigne was then fifty-five years of age. This attachment, which, though warm and reciprocal, has every appearance of having been of a purely Platonic nature, is one of the remarkable incidents of Montaigne's life. At the time of his death Mademoiselle de Gournay and her mother crossed one half of France, notwithstanding the civil troubles and the insecurity of the roads, to repair to Montaigne's residence and mingle their tears with those of his widow and daughter.

On his return from Paris in the latter part of 1588, Montaigne stopped at Blois with De Thou, Pasquier, and other friends. The States-General were then assembled in that city, in which the duke de Guise and his brother the cardinal were treacherously murdered, on the 23rd and 24th of December of that year. Montaigne had long foreseen that the civil dissensions could only terminate with the death of one of the great party leaders. He had also said to De Thou that Henri of Navarre was inclined to adopt the Catholic faith, but that he was afraid of being forsaken by his party; and that on the other side Guise himself would not have been averse from embracing the Protestant religion, if he could thereby have promoted his ambitious views. After the catastrophe Montaigne returned to his château.

In the following year he became acquainted with Pierre Charron, a theological writer of considerable reputation, and formed an intimate friendship with him. Charron, in his book 'De la Sagesse,' borrowed many ideas from Montaigne's 'Essays.' Montaigne by his will empowered Charron to assume the coat of arms of his family, as he himself had no male issue.

Montaigne's health was in a declining state for a considerable time before his death; he was afflicted with the gravel and the colic, and he obstinately refused to consult medical men, of whom he had generally an indifferent opinion. In September, 1592, he fell ill of a malignant quinsy, which kept him speechless for three days, during which he had recourse to his pen to signify to his wife his last wishes. He also requested that several gentlemen of the neighbourhood should be invited, in order that he might take leave of them. When they were all assembled in his room, a priest said mass, and at the elevation of the host, Montaigne half raised himself up in his bed, with his hands joined together as in prayer, and in that attitude he expired, on the 13th of September, 1592, in the sixtieth year of his age. His body was buried at Bordeaux in the church of the Feuillans, where his widow erected a monument to him.

Montaigne's 'Essais' have been the subject of much conflicting criticism. If we consider the age and the intellectual condition of the country in which the author lived, we must consider them a very extraordinary production, not so much on account of the learning contained in the work, although that is very considerable, as for the clear good sense, philosophical spirit, and frank liberal tone which pervade its pages, as well as for the attractive simplicity of the language. Literature was then at a very low ebb in France, the language was hardly formed, the country was distracted by feudal turbulence, ignorant fanaticism, deadly intolerance, and civil factions, and yet in the midst of all this a country gentleman living in a remote province, himself belonging to the then rude, fierce, feudal aristocracy, composed a work full of moral maxims and precepts, conceived in the spirit of the antient philosophers of Greece and Rome, and founded on a system of natural ethics, on the beauty of virtue and of justice, and on the lessons of history; and this book was read with avidity amidst the turmoil of factions, the din of civil war, and the cries of persecution and murder.

The morality of the 'Essais' has been called, and not unreasonably, though not correctly in the expression, a pagan morality: it is not founded on the faith and the hopes of Christianity, and its principles are in many respects widely different from those of the Gospel. Montaigne was a sceptic, but not a determined infidel; his philosophy is in a great measure that of Seneca and other antient writers, whose books were the first that were put into his hands when a child. Accordingly, Pascal, Nicole, and other Christian moralists, while they do justice to Montaigne's talents and the many good sentiments contained in his work, are very severe upon his ethics taken as a system. A living moralist of our own time, Professor Vinet of Basle, has given a fair analysis of the spirit of Montaigne's ethics. (*Essais de Philosophie Morale et de Morale Religieuse suivis de quelques Essais de Critique Littéraire*, par A. Vinet, Paris, 1828.) In the 54th chapter of the 1st book of the 'Essais,' Montaigne, after distinguishing two sorts of ignorance, the one which precedes all instruction, and the other which follows partial instruction, goes on to say, 'that men of simple minds, devoid of curiosity and of learning, are Christians through reverence and obedience; that minds of middle growth and moderate capacities are most prone to doubt and error; but that higher intellects, more clear-sighted and better grounded in science, form a superior class of believers, who, through long and religious investigations, arrive at the fountain of light of the Scriptures, and feel the mysterious and divine meaning of our ecclesiastical doctrines. And we see some who reach this last stage through the second, with marvellous fruit and confirmation, and who, having attained the extreme boundary of Christian intelligence, enjoy their success with modesty and thanksgiving; unlike those men of another stamp, who, in order to clear themselves of the suspicions arising from their past errors, become violent, indiscreet, unjust, and throw discredit on the cause which they pretend to serve.' And a few lines after, he modestly places himself in the second class, namely, of those who, disdaining the first state of uninformed simplicity, have not yet attained the third and last exalted stage, 'and who,' he says, 'are thereby rendered inept, importunate, and troublesome to society. But I, for my part, endeavour, as much as I can, to fall back upon my first and natural condition, from which I have idly attempted to depart.' In his chapter on prayers (b. i., 56), he recommends the use of the Lord's prayer in terms evidently sincere; and in the 'Journal of his Travels,' which was not intended for publication, he manifests Christian sentiments in several places.

Montaigne has been censured for several licentious and some cynical passages in his 'Essais.' This licentiousness however appears to be rather in the expressions than in the meaning of the author. He spoke plainly of things which are not alluded to in a more refined state of society, but he did so evidently without bad intentions, and only followed the common usage of his time. Montaigne combats most earnestly the malignant feelings frequent in man, injustice, oppression, inhumanity, uncharitableness; cruelty he detests, his whole nature was averse from it. His chapters on pedantry, on the education of children, on the administration of justice, and especially of criminal justice, are remarkably good. He also throws considerable light on the state of manners and society in France in his time.

The 'Essais' have gone through many editions: that of Paris, 3 vols. 4to., 1725, is the most complete. Vernier published, in 1810, 'Notices et Observations pour faciliter la Lecture des Essais de Montaigne,' 2 vols. 8vo., Paris. It is a useful commentary.

MONTANISTS, or CATAPHRYGIANS, a sect of Christians, which arose in Phrygia about 171 A.D. (Eusebius, *Chron.*, p. 170; and *Ecc. Hist.*, v. 3.) They were called Montanists from their leader Montanus, and Cataphrygians or Phrygians from the country in which they first appeared.

Of the personal history of Montanus little is known. He is said to have been born at Ardaba, a village in Mysia, and to have been only a recent convert when he first made pretensions to the character of a prophet. (Euseb., *Hist. Ecc.*, v. 16.) His principal associates were two prophetesses, named Prisca or Priscilla, and Maximilla. According to some of the antient writers, Montanus was believed by his followers to be the Paraclete, or Holy Spirit. Probably this is an exaggeration, but it is certain that he claimed divine inspiration for himself and his associates. They delivered their prophecies in an ecstasy, and their example seems to have introduced into the church the practice of appealing to visions in favour of opinions and actions, of which practice Cyprian and others availed themselves to a great extent. (Middleton's *Free Enquiry*, p. 98, &c.) Tertullian, who belonged to this sect, informs us that these revelations related only to points of discipline, and neither affected the doctrines of religion nor superseded the authority of Scripture. The doctrines of Montanus agreed in general with those of the Catholic church, but some of his followers appear to have embraced the Sabellian heresy. The Montanists were chiefly distinguished from other Christians by the austerity of their manners and the strictness of their discipline. They condemned second marriages, and practised fasts. They maintained that all flight from persecution was unlawful, and that the church had no power to forgive great sins committed after baptism. They held the doctrine of the personal reign of Christ on earth at the Millennium. They are accused by some of the early writers of celebrating mysteries attended by deeds of cruelty and lewdness, but it appears quite certain that these charges are unfounded.

The Montanists were warmly opposed by the writers of the Catholic party, though they were once countenanced for a short time by a bishop of Rome, whose name is unknown, but who is supposed by some to have been Victor. Tertullian wrote several works in defence of their opinions. [TERTULLIAN.]

The sect was numerous, and lasted a considerable time. They still existed in the time of Augustin and Jerome, the latter of whom wrote against them.

(Eusebius, *Hist. Ecc.*; Epiphanius, *De Hæresiis*; Tertullian's *Works*; Lardner's *History of Heretics*, chap. xix; Mosheim's *Ecc. Hist.*; Neander's *Kirchengeschichte*.)

MONTA'NUS, A'RIAS. [ARIAS MONTANUS.]

MONTARGIS. [LOIRET.]

MONTAUBAN, a town in the south of France, capital of the department of Tarn et Garonne, situated on the river Tarn just below the junction of the little river Tescou, in 44° 1′ N. lat. and 1° 21′ E. long.; 336 miles in a direct line south by west of Paris, or 408 miles by the road through Orléans, Châteauroux, Limoges, and Cahors.

The town was founded in A.D. 1144 by Count Alphonse of Toulouse. In the religious contests of the sixteenth century it was fortified by the Huguenot party, and resisted the attack of the Catholics, who besieged it under Monluc, A.D. 1580. In the following century, being still in the hands of the same party, it resisted the attack of Louis XIII., A.D. 1621, and did not submit until after the siege and capture of Rochelle, A.D. 1629. Its fortifications were soon after destroyed. It suffered much from the dragoonings of Louis XIV., but is still one of the chief seats of the reformed religion in France.

The town is in a pleasant situation, partly upon a gentle slope. It is a handsome place, and is considered healthy. The gates of the town are in general of an elegant architecture; the streets are well laid out and clean, and the houses, which are of brick, are in general well built. There is a handsome square in the centre of the town, with a piazza of two tiers of arches, ornamented with Doric pilasters. The centre of the square is laid out as a public garden. There are besides two handsome public walks, with a raised terrace between them, from which there is a fine view of the Pyrenees, distant 130 or 140 miles. There is a fine cathedral erected at a very early period. The other public buildings are worthy of notice, especially the town-hall and the bishop's palace. There is a bridge built of brick over the Tarn, which is here navigable, and runs through the town, dividing it into two parts. There are numerous villas round the town.

The population in 1831 was 18,255 for the town, or 25,460 for the whole commune; in 1836 it was 23,865 for the commune. There are a considerable number of manufactories of common woollen cloth, kerseymere, serge and other woollen goods, silk stockings and broad silks, starch, and cards for dressing woollen goods: there are also soap-houses, potteries, brandy distilleries, tan-yards, and dye-houses. It is a great mart for corn and for common woollens. There are five fairs in the year, three of which continue for eight days each. The navigation of the Tarn and the Garonne affords ready communication with Bordeaux. The town has a theatre, a public library of 10,000 volumes, baths, and excellent inns. The surrounding country abounds with excellent fruit, fish, poultry, and ortolans. The 'pâtés de foie gras' of this place are considered equal to those of Toulouse, and the wines of Montbartier, Fau, Aussas or Aussac, and Auviller, obtained from the vineyards round the neighbouring town of Castel-Sarrazin, are excellent. Literature is cultivated, and the town has produced some writers of considerable repute.

There are a subordinate court of justice, a commercial court, several fiscal or administrative government offices, and societies for the promotion or direction of manufactures and agriculture. There are a theological seminary for Protestants and a Protestant Auxiliary Bible Society; a society of agriculture, science, and the belles-lettres; a high-school, a free drawing-school, and a maternity society.

Montauban is the seat of a bishopric; the diocese comprehends the department of Tarn et Garonne. The bishop is a suffragan of the archbishop of Toulouse and Narbonne.

The arrondissement of Montauban has an area of 619 square miles, and comprehends 62 communes. It is subdivided into eleven cantons or districts, each under a justice of the peace. The population in 1831 was 107,853; in 1836 it was 106,799.

MONTBE'LIARD. [DOUBS.]

MONTBRISON. [LOIRE.]

MONTCALM, MARQUIS DE. [WOLFE, GENERAL.]

MONTDIDIER. [SOMME.]

MONTECASI'NO is the name of a celebrated monastery in the kingdom of Naples, in the province of Terra di Lavoro, near the borders of the Papal state. It is situated on the summit of a steep and lofty mountain, which is an offset of the Apennines, and which rises above the valley of the Frigido, an affluent of the Liris. The town of San

Germano, which is built at the foot of the mountain, partly occupies the site of the antient Casinum, a town of the Volsci, and subsequently a Roman colony, which was sacked by Hannibal's troops on their march from Capua towards Rome. Remains of the antient town are still seen, including an amphitheatre, a theatre, and several sepulchral monuments. It was in A.D. 528 that St. Benedict repaired to this spot, and began the foundation of this celebrated monastery, which afterwards became the head-quarters of his order. [BENEDICT, SAINT.] The monastery was destroyed by the Longobards about the year 582, was restored more than a century after, and became more magnificent than before, being enriched by gifts from various princes. Ratchis, king of the Longobards, as well as Carloman, brother of Pepin, king of the Franks, retired to Monte Casino, where they became monks, and died there. The monastery was again destroyed by the Saracens, A.D. 884, but was restored in the year 949. The age that followed was a period of the greatest splendour for the monastery: the abbot was a powerful feudal baron, who had jurisdiction over an extensive territory, and interfered in the quarrels of the neighbouring princes and of the Normans. The abbot Desiderius, afterwards pope Victor III., rebuilt the church of the monastery in the year 1066, and a numerous assembly of bishops assisted at its consecration. The bronze gates, which were wrought by his order about the same time at Constantinople, and which are still seen, exhibit in silver inlaid letters a list of all the tenures, castles, fiefs, and lands possessed by the abbey at that time. The abbots were elected by the monks till 1454, when the abbotship was bestowed in commendam on several cardinals in succession. The last commendatory or titular abbot was Giovanni de' Medici, afterwards Pope Leo X., after which the regular election of abbots was restored. The abbot was elected for six years, during which he was also bishop of San Germano and the adjacent district. He was first baron of the kingdom of Naples, enjoyed ample privileges, and went out generally in a coach and six. At the expiration of the six years, he returned to his former condition, but retained the privilege of wearing the cross, as a mark of his dignity, and he had precedence in great religious ceremonies.

The revenues of the abbey were 100,000 ducats, about 17,000*l.* sterling. With these the monks supported not only their own community, which consisted of about fifty professed members, besides lay brothers or servants, but also extensive accessory establishments, such as the hospice at the foot of the mountain, where sickly and aged monks were kept, and travellers and visitors were entertained, and a seminary in the town of San Germano attached to that episcopal see.

Among other literary men who visited, at various times, the monastery of Monte Casino, chiefly for the sake of its library, were Boccaccio, Poggio Bracciolini, and Mabillon, the accounts of whom may be referred to for the condition of that institution in their respective epochs. Swinburne and other travellers of the last century have given an account of Monte Casino as it was before the French revolution and invasion.

After the French occupied the kingdom of Naples in 1806, they suppressed all the wealthy convents, abolished among others the feudal rights of Monte Casino, and seized its landed property, but maintained the establishment, as well as those of Monte Vergine and La Cava, with a few monks in each to take care of the valuable archives and libraries of those institutions. King Ferdinand, after his restoration in 1815, gave back to the monastery of Monte Casino part of its former possessions. The monastery has now a revenue of 24,000 ducats, about 4,000*l.* sterling, and is inhabited by about 15 monks. The last account we have seen of Monte Casino is by the Hon. Keppel Craven, in his interesting 'Excursions in the Abruzzi and the Northern Provinces of Naples,' London, 1828, from which we derive the following description.

The vast structure, every side of which exhibits long rows of windows, covers the whole platform of the detached and conical mountain, the ground sloping from the base of the walls on all sides: some of the adjoining borders have been converted into enclosed grounds, and furnished with fruit-trees and timber of larger growth. The edifice is built of small stones, covered with a reddish-gray stucco, of a sober yet not dull hue. The road to the monastery winds in a zig-zag up the mountain, and gives access to the building through an archway cut in the rock and a double gate leading into a large court, followed by two other courts of equal dimensions, communicating with each other by open arcades. The middle court is provided with a large cistern, and from one of its extremities a handsome flight of steps ascends to the quadrangle before the church, which stands on a much higher level. The quadrangle is enclosed by cloisters, the arches of which are supported by fine granite columns, brought from the ruins of Casinum. Marble statues of the principal benefactors of the community are placed in niches in the wall of the cloisters. The church is very handsome, rich in marbles, and is ornamented with several interesting sepulchral monuments; amongst others, that of Piero de' Medici, the son of Lorenzo the Magnificent, who was drowned in the Liris after the defeat of the French, in whose army he served, by Gonzalo of Cordova, in 1503. The ceiling and lateral chapels are painted by Luca Giordano and other Neapolitan and Sicilian painters. The organ is one of the finest in Italy. The seats in the choir are of walnut and oak wood, richly carved. The church is kept remarkably clean, and in this respect it reminds the traveller of St. Peter's at Rome. The rest of the monastery is grand and imposing, but not magnificent, being distributed internally in a style of simplicity which corresponds with the original institutions of the order. The contrast between the modest dimensions of the cells of the individual monks and the magnificent distribution of the public or communal part of the building, such as the courts, porticoes, church, chapter, and refectory, is characteristic of the old spirit of monastic institutions, in which the community was everything and the individual nothing.

The library of Monte Casino, which is now kept in very good order, contains 18,000 volumes, among which are some rare editions of the fifteenth century. The archives contain a valuable collection of original charters, diplomas, grants, &c., of emperors, kings, and Longobard dukes, as well as papal bulls; many of the charters belong to the ninth century, and some MSS. to the sixth century; a curious letter of Mahomet II. to Pope Nicholas V., with the answer of the latter; a collection of autograph letters of Mabillon, Montfaucon, Muratori, and other learned philologists. (Valéry, *Voyages en Italie.*) There is also a small collection of antiquities, inscriptions, and a chair of 'rosso antico,' of exquisite workmanship, which was found in the neighbourhood.

MONTECUCULI, RAYMOND, COUNT DE, Prince of Melfi, Knight of the Golden Fleece, and Generalissimo of the Imperial armies, was born at Modena in 1608, of a noble family of that duchy. Following the example of some of its members, he entered the service of the house of Austria in the Thirty Years' War; and after bearing arms as a simple volunteer under one of his uncles, and rising through the usual gradations of rank, he first signalized his military talents at the head of two thousand horse, by surprising and cutting to pieces a body of ten thousand Swedes, who were engaged in the siege of Numslau, in Silesia. But he soon after experienced the inconstancy of fortune, being himself defeated and made prisoner, in 1639, by the Swedes under the celebrated Bannier, near Prague. He is said to have beguiled the two years of his captivity in cultivating the taste for letters which he subsequently evinced; and, after his release, he resumed his service, with increasing reputation, in the defence of Silesia and Bavaria, and in the defeat of the Swedes under Wrangel at Triebel, in 1647; until the termination of hostilities, by the peace of Westphalia in the following year, enabled him to revisit his native duchy. There, at the marriage festivities of the duke Francesco I., he had the misfortune to kill one of his dearest friends, Count Manzani, in a tournament; perhaps the latest recorded catastrophe which attended the dangerous games of chivalry.

In 1657 Montecuculi was sent by the emperor to assist John Casimir, king of Poland, against Ragotski, prince of Transylvania, and the Swedes, whom he drove out of Poland, and compelled to conclude a peace. He was subsequently employed in Hungary in the war, of which he has himself given a relation in his memoirs, between the Imperialists and the Turks; and in 1664, he gained so decisive a victory over the latter at St. Gothard as to compel them to sue for a truce of twenty years.

In 1673 he reached the climax of his fame by being opposed to the illustrious Turenne, in the war between the empire and France on the Rhenish frontier. The nicely balanced operations of these two great generals, who, without committing the event to a battle, displayed more science in marches and encampments than other commanders have exhibited in a whole series of victories, were the admiration of their contemporaries; and when the fall of Turenne by a chance shot, in 1675, gave free scope to the genius of his opponent, Louis XIV. could find no one but the great Condé competent to arrest the progress of Montecuculi. Another most able though indecisive campaign closed the services both of Condé and Montecuculi: the latter of whom, claiming no victory, deemed it his highest honour to have encountered without defeat the two greatest French generals of their century. The remaining few years of his life were passed in peace at the Imperial court, and he died in 1680.

As a general, Montecuculi was accused of excessive caution and want of enterprise, qualities which he himself held to be no reproach. He had profoundly studied the art of war; and the memoirs which he composed upon its general principles and practice, as well as upon the peculiarities of warfare against the Turks, and on the operations of the Turkish war of 1661-1664, still retain their value, not only as the most interesting and instructive records of the martial establishments and service of his times, but for the soundness of the maxims which they contain, applicable to all ages of the military art. He was a zealous and generous patron of letters, as well as a great strategist; and to him principally the Academy of Naturalists at Vienna owes its establishment.

A good French translation of the *Memoirs of Montecuculi* was published at Amsterdam, in 1752, with a 'Life of the Author' prefixed.

MONTE'GO BAY. [JAMAICA.]

MONTE'LIMAR, or MONTE'LIMART, a town in France, capital of an arrondissement in the department of Drôme, situated at the junction of the Jabrou and the Roubion, two small streams which flow into the Rhône a little below the town, in 44° 33′ N. lat. and 4° 44° E. long., 381 miles from Paris by Sens, Auxerre, Lyon, Vienne, and Valence.

The Itinerary from Burdigala to Hierosolyma (Bordeaux to Jerusalem), and the Theodosian or Peutinger Table, mention a place, Acunum, on the road between Valentia (Valence) and Arausio (Orange); and Ptolemy mentions a Roman colony, Acusio, in the country of the Cavares. These two places are considered as identical, and some geographers fix them on the site of Montélimar; but D'Anville prefers to fix them at Aucone, a village near Montélimar, on the bank of the Rhône. It is at any rate probable that Montélimar rose on the decay of the Roman town. In the religious wars of the sixteenth century it was taken by the Huguenots, who had a considerable party in the town (A.D. 1567), and retaken by the Catholics; but it was not till the reign of Henri IV. that internal peace was restored.

The town is delightfully situated in the midst of hills, covered with vines and mulberry and other fruit trees. It is surrounded by walls, which have boulevards within and without. The town gates face the four cardinal points. The ruins of an antient citadel command the place. Several canals traverse the town, and the road from Lyon to Marseille runs through the best built and pleasantest quarter. There is a stone bridge over the united streams of the Roubion and the Jabrou.

The population in 1831 was 5816 for the town, or 7560 for the whole commune; in 1836 it was 7966 for the commune.

There are silk-throwing mills; linens, wicker-wares, and excellent morocco, chamois, and other leather, are manufactured. Trade is carried on in walnut-oil, wax, honey, silk, corn, hay, wine, &c. The meadows round the town are irrigated with considerable skill; and there are lime-kilns and tile-kilns. Many silkworms are bred. Truffles of middling quality are found, and there is a tolerably copious medicinal spring. Faujas de St. Fond, the geologist, was a native of Montélimart.

There are a subordinate court of justice, one or two fiscal government offices, and a high school; a public library of 3000 volumes, and a collection of chemical and philosophical apparatus.

The arrondissement has an area of 436 square miles, and comprehends 68 communes. It is subdivided into five cantons, or districts, each under a justice of the peace. The population in 1831 was 62,530; in 1836 it was 64,612.

MONTEM CUSTOM, the antient custom of a procession of the scholars of Eton school in Buckinghamshire *ad montem*. It is made every third year on Whit-Tuesday, to a tumulus near the Bath road, which has acquired the name of Salt-hill, by which also the neighbouring inns have been long known. The chief object of the celebration is to collect money for *salt*, as the phrase is, from all persons present, and it is exacted even from passengers travelling the road. The scholars who collect the money are called salt-bearers, and are dressed in rich silk habits. Tickets inscribed with some motto, such as *Ad Montem, Mos pro Lege*, or *Pro More et Monte*, by way of pass-word, are given to such persons as have already paid for *salt*, as a security from any further demands.

This ceremony has been frequently honoured with the presence of the king and queen, and the royal family, whose liberal contributions, added to those of many of the nobility, and others, who have been educated at Eton, have so far augmented the general collection, that it has been known to amount to near 1000*l*. The sum so collected is given to the senior scholar, who is going off to Cambridge, for his support at the university. It would be in vain perhaps to trace the origin of all the circumstances of this singular custom, particularly that of collecting money for *salt*, which has been in use from time immemorial. The procession itself seems to be coeval with the foundation of the college, and it has been conjectured with much probability that it was that of the *Bairn*, or *Boy-bishop*. It originally took place on the 6th of December, the festival of St. Nicholas, the patron of children, being the day on which it was customary at Salisbury, and in other places where the ceremony was observed, to elect the Boy-bishop from among the children belonging to the cathedral. It is only since 1759 that the time of the celebration of the Eton Montem has been changed. It was formerly a part of the ceremony that a boy dressed in a clerical habit, with a wig, should read prayers.

(Huggett's *M.S. Collections for a History of Windsor and Eton Colleges*, in the British Museum; Lysons's *Magna Britannica*, vol. i., p. 558; Brand's *Popular Antiquities*, 4to edit., vol. i., p. 337-349.)

MONTENEGRINS. [MONTENERO.]

MONTENE'RO, 'the black mountain,' so called on account of the dark forests which cover its sides, is the name given by the Venetians, and adopted by European geographers, to a mountainous district forming part of the high land of Albania, and situated on the borders of Herzegovina, and of the former Venetian and now Austrian territory of Cattaro. An offset of the chain which bounds Albania to the north, the Mounts Bertiscus and Scardus of the antients, runs in a southern direction between the sources of the Narenta and the Moroka, and forms the boundary between the Turkish provinces of Albania and Herzegovina. On reaching the innermost recess of the deep gulf of Cattaro, north-east of the town of Perasto, this ridge divides into two branches, one to the north west and the other to the south-east, both of which advance to the coast of the Adriatic Sea, and encircle between them the basin of the gulf of Cattaro with its several bays and the territory around, which constitutes the Austrian districts of Castelnuovo, Risano, Perasto, Cattaro, Budua, and Pastrovich. To the east of the main ridge, and north-east of the Austrian territory, lies the district of Montenero, consisting of several high valleys sloping to the south-east, the waters of which flow into Turkish Albania by two streams, the Schiniza and the Ricovcernovich, both affluents of the lake of Scutari. The length of this mountainous and little known district is reckoned at about twenty-five miles from north to south, and about eighteen in its greatest breadth from east to west: it is said to contain about 60,000 inhabitants, a fierce race, which has always maintained its independence against the Turks. The following are the principal valleys of Montenero:—1. Katunzka Nahia, the widest and most central, is watered by the Ricovcernovich, and contains the capital, Cettigne, with a convent, the residence of the Greek bishop, and the villages of Gnegusi, Xagneudo, and others. Mount Bukovizza rises above this valley in the centre of Montenero. 2. Liesanska Nahia, which runs north of and parallel to the preceding, contains the village of Dobro and some hamlets. 3. Czerniska Nahia, the southernmost district of Montenero, a long narrow valley between the Austrian territory on the west, from which it is divided by mounts Giurgevo, Ortich, and Resevich, and Turkish Albania on the east, from which it is separated by another ridge, contains several villages, Ocinichi, Optocichi, Dobraceli, &c. (*Carte des Bouches de Cattaro et de Montenero*, by Max. de Traux, an Austrian engineer, Vienna, 1808.)

The inhabitants of Montenero, or Montenegrins, are a Sclavonian race, and speak a dialect of the Sclavonian. They call their country Czerna Gora. They belong to the Eastern church, and are governed by their Wladika, or bishop, assisted by a council of the chief families. All the men are armed, and extremely jealous of their independence. Their country is not very fertile; it produces fruits, but little corn, and has good pasturage for cattle, and much timber. The Montenegrins are given to plunder, and they now and then make predatory incursions into the Turkish territory. In the wars of Venice with the Turks they acted as auxiliaries, though at times troublesome ones, of the former power.

In 1767 an adventurer made his appearance among them, who gave himself out for Peter III., emperor of Russia, and created considerable disturbance for a time. After the fall of Venice in 1797, Cattaro was given up to Austria. By the treaty of Presburg in 1805 it was ceded to France; but before the French garrison could reach that district, the natives, joined to the Montenegrins, excited by a Russian agent, rose in arms and occupied Cattaro, Castelnuovo, and the other towns. This served to the French as a pretext for taking forcible possession of the neighbouring republic of Ragusa. But the Montenegrins came down from the mountains, and besieged General Lauriston within the town of Ragusa. A desperate war ensued between the Montenegrins and the French commanded by Marmont, Lauriston, and Molitor, in which no quarter was given; until the French at last took possession of Cattaro, and drove the Montenegrins back to their mountains. (Botta, *Storia d'Italia*, b. 22.)

Since 1814 the Montenegrins are nominally under the protection of Austria, to whom they are occasionally a source of trouble, on account of their incursions into the Turkish territory, and the consequent complaints of the Turkish authorities. A French traveller, Sommieres, has written a *Voyage Historique et Politique à Montenero*, 2 vols. 1820.

MONTEREAU. [SEINE ET MARNE.]

MONTEREY. [MEXICAN STATES.]

MONTESQUIEU, CHARLES DE SECONDAT, BARON DE LA BRE'DE ET DE, was born on the 18th of January, 1689, at the Château de la Brède, in the immediate neighbourhood of Bordeaux. He was descended from a noble and otherwise distinguished family of the province of Guienne. His grandfather had filled the post of *président à mortier* in the parliament of Bordeaux, a post which Montesquieu himself afterwards filled. His father entered the same service, but quitted it early. The nobility which Montesquieu inherited was conferred upon his great-grandfather by Henry IV.

Montesquieu gave in youth the promise of his future fame. His habits were most studious, and his desire for learning was encouraged in every way by a fond and judicious father. At the time that he was engaged in a most laborious study of the civil law, with a view to the profession for which he was destined, he was also preparing a work on a theological subject, namely, 'Whether the idolatry which prevailed among the heathens deserved eternal damnation?' He attained the rank of *conseiller* in the parliament of Bordeaux in 1714, and three years afterwards, on the death of a paternal uncle, he succeeded at the same time to his fortune and to his post of *président à mortier* in the same parliament. With the most assiduous and conscientious discharge of his duties as a judge, he united the pursuit of literature. In 1716 he had become a member of the Academy of Bordeaux, and he was very zealous in endeavouring to direct the attention of this body more to physical science. He seems at this time to have been very much impressed with the importance of physical science, which he afterwards neglected altogether for the pursuit of moral science. About this time he wrote his 'Physical History of the Antient and Modern World,' which was published in 1719. He shortly returned however, and allowed the Academy likewise to return, to literature; and he now wrote several small essays on literary subjects, which were read at meetings of the Academy. In 1721 appeared the work which first brought him fame, the 'Lettres Persanes,' which was published anonymously, but the author soon became known. The popularity of these letters was so great, that, as Montesquieu says in a preface to a later edition, 'Booksellers used to go about the street, catching every one by the sleeve, and begging, "Pry'thee, write for me some Persian Letters."'

His classical romance, called 'Le Temple du Gnide,' was published in 1725. In the course of the next year Montesquieu formed the resolution of retiring from his judicial duties, and of devoting himself entirely to literature. He accordingly sold his presidentship. A vacancy occurring shortly after in the French Academy, on the death of M. de Sacy, Montesquieu became a candidate for the vacant place. His principal claim to the distinction was derived from the 'Lettres Persanes,' but these seemed likely for a time to be the chief obstacle to his success. Notwithstanding their general popularity, an outcry had been raised against them by many on the ground of irreligious tendency; and the Cardinal de Fleury, the chief minister, now wrote to tell the president of the Academy that the king would refuse his consent to the election of the author of so irreligious a work as the 'Lettres Persanes.' The course taken by Montesquieu for the purpose of overcoming the royal opposition does not seem to have been the most straightforward and manly. He immediately published, according to Voltaire, a new edition of the 'Lettres,' in which the passages objected to were omitted or softened; and having carried this edition to the minister, and having disavowed all the obnoxious passages of the earlier editions, he succeeded in changing the king's resolution. (*Ecrivains Français du Siècle de Louis XIV.*)

D'Alembert gives a somewhat different account: but inasmuch as this appears in an *éloge*, it is to be received with suspicion. There seems indeed to be no authority for the statement which D'Alembert makes, and which is indeed unnecessary if the contents of the book were such as the minister could approve of, that several letters by another hand were inserted by the printer of the book. The writer of the life of Montesquieu, in the 'Biographie Universelle,' rejects D'Alembert's account, and, admitting that Montesquieu disavowed the obnoxious passages of his work when they were likely to stand in the way of his ambition, attempts to justify him on the ground that the work had been published anonymously; that he had never since put his name to it, and that there was in consequence no fraud in disavowing that of which he had never acknowledged the authorship.

The result however was that Montesquieu gained the support of the minister, and was elected a member of the Academy. He shortly after set out on an extensive course of travels. He went first to Vienna, where he had much intercourse with the celebrated Prince Eugene; then travelled through Hungary and Italy, staying for some time at Venice, at Rome, and at Genoa. He next travelled through Germany into Holland, and thence, in company with lord Chesterfield, he came to England. In England he stayed two years, receiving great attentions from the great, whether by rank or by reputation, and collecting materials, as he had done also in the other countries which he had visited, for his great work.

On his return to France he spent two years in studious retirement in the country. He published in 1734 his work on the causes of the 'Greatness and Decline of the Romans;' and immediately after its publication he set to work to prepare the 'Esprit des Lois.' He was engaged upon this for fourteen years; and he tells us that very often, frightened with the greatness of his task, he was disposed to abandon it. When at last it was completed, he submitted it to the judgment of his friend Helvetius, who, by reason principally of its desultory unconnected character, strongly dissuaded him from publication. But whatever misgivings Montesquieu may have had while the work was in progress, were now entirely removed; and undeterred by the remonstrances of Helvetius, he published, and he had his reward in an almost universal admiration. Montesquieu did not very long survive the publication. He died in February, 1755, after a short but severe illness.

The personal character of Montesquieu was in every respect excellent. He had married at the age of twenty-six, and his family consisted of a son and two daughters. Through life he practised a rigid economy, on the principle, as we are told by M. d'Alembert, that he ought to transmit his patrimony unimpaired to his children; but he took care that his economy should not stand in the way of charity. In the intercourse of society Montesquieu appears to have been agreeable without being brilliant.

The writings of Montesquieu show much variety of talent. Even if the 'Esprit des Lois' had not been written, the author of the 'Lettres Persanes,' remarkable for their refined humour, and of the 'Temple du Gnide,' an exquisite little romance, could not have been forgotten. And without disparaging at all the merits of Montesquieu's great and best known work, it may be said that these smaller productions are much more perfect in their kind than is the 'Esprit des Lois' as a treatise on political science. The chief merits of this work are its agreeable style, its various knowledge, its ingenious and at the same time sensible mode of treating the art of government, and its enlightened advocacy of what, not very definitely or correctly, are called the principles of civil liberty. The last-mentioned merit is greater on account of the time at which the work appeared. The defects of the work, on the other hand, are want of system, shallowness, not so much of knowledge as of thought, and (what is at once a sign and a consequence of this shallowness) an undue exaltation of experience over principles. The time again at which the work appeared will serve in the way of extenuation of these defects; and it is to be remembered also that the plan of the work is professedly inductive rather than scientific.

The 'Esprit des Lois' has given occasion to a work by M. Destutt de Tracy, which, though partaking in some degree of the vagueness of Montesquieu's work, is very valuable both in itself and as a commentary on the 'Esprit des Lois.' Its title is 'Commentaire sur l'Esprit des Lois.'

MONTEVIDEO, or S. FELIPE DE MONTEVIDEO, is the capital of the republic of Uraguay, or Banda Oriental, in South America. It is situated in 34° 55′ S. lat. and 56° 10′ W. long., and built on a small promontory, which forms the eastern shore of its harbour, the western consisting of another projecting point connected with a hill, from which the town has received its name. It is 130 miles from Cape S. Mary, which forms the northern point of the entrance of the La Plata river, and opposite the town the river is still 70 miles wide. Its harbour is more than 4 miles long and more than 2 miles wide, but too shallow for large vessels; it is also exposed to the *pamperos*, or south-western winds, which blow over the extensive plains called *pampas* with exceedingly great force. With all these disadvantages, it is the best harbour on the broad æstuary of the La Plata river. The town is in general well built, the streets being wide, straight, and intersecting each other at right angles: they are paved, and have narrow footways. The houses are built with taste, and have flat roofs and parapets. The cathedral, dedicated to the apostles S. Felipe and S. Jago, is not distinguished by its architecture, nor are there any other public buildings of note. Montevideo is a very healthy place, but suffers from want of wood and water. The inhabitants use rain-water, which is collected in cisterns placed in the court-yard of each house; but there are also some wells dug near the sea-shore, from which water is brought in carts for the supply of the town. The population, which, before 1810, is stated to have amounted to 30,000 or even 36,000 souls, was reduced by war and a siege, which the town had to sustain against the Brazilians, to 15,000 souls; but it has probably again increased during the last ten years. Its commerce is increasing. The principal articles of export are the produce of the numerous herds of the country, as hides, salted and jerked beef, tallow, and horns, to a very considerable amount.

(Henderson's *History of Brazil*; and Brackenridge's *Voyage to South America*.)

MONTEZU'MA. [Mexico.]

MONTFAUCON, BERNARD DE, a Benedictine of the congregation of St. Maur, and a very learned antiquary, was born January 17th, 1655, at Soulage in Languedoc. He was the son of Timoleon de Montfaucon, lord of Roquetaillade and Conillac, and was the second of four brothers. He has himself preserved, in his 'Bibliotheca Bibliothecarum MSS.,' the pedigree of his family, which was originally from Gascony. His early studies were conducted first in his father's castle at Roquetaillade, and afterwards among the religious at Limoux. His first profession in life was military, and he served in one or two campaigns in Germany under marshal Turenne. The death of his parents however, and of an officer of distinction under whom he had fought, induced him, after two years, to change his plan of life, and at the age of twenty, in 1675, he entered the congregation of St. Maur. In this learned Society he had every opportunity to improve his early education.

His first work was a supplement to Cotelerius, entitled 'Analecta Græca,' 4to., Paris, 1688, with notes by him and the fathers Anthony Pouget and James Lopin. In 1690 he published a small volume entitled 'La Verité de l'Histoire de Judith,' 12mo. His next important work was a new edition of St. Athanasius, in Greek and Latin, 3 vols. folio, a labour which established his reputation as a profound scholar.

In the same year Montfaucon, who had turned his thoughts to more extensive collections of antiquities than had then appeared, determined to visit Italy for the purpose of consulting the manuscripts in the Italian libraries. In this pursuit he passed three years, and upon his return in 1702, published an account of his journey and researches in his 'Diarium Italicum.'

During Montfaucon's residence at Rome he held the office of procurator-general of his congregation at that court; and while there, in 1699, published a little volume in vindication of the Benedictine edition of the works of St. Augustin, in 11 vols. fol., the publication of which had been begun by some able men of his Order, at Antwerp, in 1679, and was not completed till 1700. In 1706 Montfaucon published, in 2 vols. fol., a collection of the antient Greek ecclesiastical writers, with a Latin translation, notes, dissertations, &c., and in 1708 his 'Palæographia Græca.' In 1709 he published 'Philo-Judæus on a Contemplative Life,' in French, 'Le Livre de Philon de la Vie Contemplative,' &c., translated from the Greek, with notes, and an attempt to prove that the Therapeutæ of whom Philo speaks were Christians; and in 1710 an 'Epistola' on the fact mentioned by Rufinus that St. Athanasius baptised children when himself a child. This was followed in 1713 by an edition of what remains of the 'Hexapla' of Origen, 2 vols. fol., and an edition of the works of St. Chrysostom, begun in 1718, and completed in 1738, 13 vols. fol.

In 1715 he published his 'Bibliotheca Coisliniana,' fol., Paris; and in 1719, the year in which he was chosen a member of the Academy of Inscriptions and Belles-Lettres, his great work, entitled 'L'Antiquité Expliquée et Representée en Figures,' Paris, 5 vols. fol., to which, in 1724, was added a Supplement in 5 vols. This was followed by another interesting work, 'Les Monumens de la Monarchie Françoise,' 5 vols. fol., Paris, 1729-1733. His last and not the least important of his works was his 'Bibliotheca Bibliothecarum MSS. nova,' 2 vols. fol., Paris, 1739. Montfaucon died suddenly at the abbey of St. Germain de Pres, December 21, 1741, at the advanced age of eighty-seven. Besides the works already enumerated, he contributed many curious and valuable essays on subjects of antiquity to the Memoirs of the Academy of Inscriptions and Belles-Lettres, as well as to other literary journals. (Moreri, *Dict. Hist.*; Chalmers's *Biogr. Dict.*, vol. xxii., p. 298-303.)

MONTFERRAND. [Clermont.]

MONTFLANQUIN. [Lot et Garonne.]

MONTFORT. [Ille et Vilaine; Seine et Oise.]

MONTFORT, SIMON DE. [Henry III.]

MONTGOLFIER. [Balloon.]

MONTGOMERY. [Montgomeryshire.]

MONTGOMERYSHIRE, a county of North Wales, bounded on the north by Denbighshire, on the east and south-east by Shropshire, on the south by Radnorshire, on the south-west by Cardiganshire, and on the west and north-west by Merionethshire. Its form is compact, and approximates to that of an oblong quadrangle, having its sides respectively facing the north-east, north-west, south-east, and south-west: the length of the quadrangle from north-east to south-west varies from 23 to 40 miles; the breadth from 19 to 33 miles. The area of the county is estimated at 839 square miles; it is the second of the Welsh counties in extent, being inferior only to Caermarthenshire (974 square miles). The population, in 1831, was 66,482, which gives 79 inhabitants to a square mile. In amount of population it is the fifth of the Welsh counties, being inferior to Pembrokeshire, but superior to Caernarvonshire; in density of population it is the ninth, being inferior to Cardiganshire, but exceeding Brecknockshire. Montgomery, which gives name to the county, is 150 miles from London, in a direct line north-west; 168 miles by the road through Worcester, Tenbury, Ludlow, and Bishop's Castle; or 174 miles by Birmingham and Shrewsbury.

Surface and Geology.—Montgomeryshire is entirely an inland county, and belongs wholly to the mountainous tract of Wales. The north-western border toward Merioneth shire is occupied by the Berwyn Mountains, and when these form two branches enclosing the valley of the Dovey, the south-eastern branch belongs in great degree to Montgomeryshire. It separates the basin of the Dovey from that of the Severn.

The south-eastern border is occupied by the heights which extend from the neighbourhood of Shrewsbury across Clun Forest to Rhayader in Radnorshire. Irregular branches from these two principal chains occupy the intermediate part of the county, and are separated by narrow valleys watered by the various streams that flow into the Severn, to the basin of which the whole county belongs, except that part which is enclosed between the two branches of the Berwyn chain, and which belongs to the basin of the Dovey. The principal peaks are Cefn Ucha, Craig Mwyn, Moel Angel, Bwlch y-Fedwyn, Mynydd Cemmes, and Moel Fre, in the Berwyn chain; and the Breiddin hills (Moel Golpha, Moel Fammau, and Cefn Cistyll) about 1200 feet high; Long Mountain, 1330 feet; Kerry Hill, and Llandinam Mountain, 1895 feet high, in the chain that skirts the Shropshire and Radnorshire border. Plinlimmon belongs to the Berwyn chain, and is partly in this county, but its summit (2463 feet) is just within the border of Cardiganshire.

The county is almost entirely occupied by the slate rocks which overspread so large a portion of Wales. The principal exceptions are the Breiddin hills, which are composed of rocks of very varied character, granite, greenstone, and conglomerate; and a small tract at the eastern angle of the county, near the junction of the Severn and the Vyrnwy, where the new red-sandstone, or red marl of Cheshire and Shropshire, is found. The mineral treasures are not very abundant. Lead and zinc are procured from mines near Llangynog or Llangynnog, in the hills that bound the valley of the Tanad or Tanat; lead in the Berwyn mountains near Plinlimmon, and copper and zinc between Llanfyllin and Oswestry, on the Shropshire border. Millstones are quarried in the Breiddin hills; stone for other purposes, in the neighbourhood of Plinlimmon; slates of rather inferior quality at Llangyniog in the vale of the Tanat, at Llanwddyn in the vale of the Vyrnwy, in the hills near Llanidloes, and at Machynlleth; and a little coal and limestone near the border of Shropshire.

Hydrography, Communications, &c.—The Severn is the principal river of the county; it rises just within the border towards Cardiganshire, on the eastern side of Plinlimmon, and flows east about twelve miles to Llanidloes, receiving at that town the Clywedog, a river of about the same length as the Severn itself, and a number of small brooks. From Llanidloes the Severn flows north-east in a winding channel about thirty-eight miles, past Newtown and Welsh Pool, to the junction of the Vyrnwy on the border of the county towards Shropshire. A little below the junction of the Vyrnwy the Severn quits the border to enter Shropshire.

Between eight and nine miles below Llanidloes it receives the Tirannon, eleven or twelve miles long, and the Afon Garno, of about the same length; about nine miles lower down it receives the Mule, eleven miles long; and about five miles lower still the Rhiw, which is seventeen or eighteen miles long, and the Camlet, about twenty miles long; this last rises in Shropshire near the hill called Stiper Stones, six miles west-north-west of Church Stretton. All these streams, except the Mule and the Camlet, join the Severn on the left bank. That part of the course of the Severn which lies in Montgomeryshire or on the border may be estimated at fifty-one miles.

The Vyrnwy rises on the border near Bwlch-y-Pawl, and receives a number of small streams, as the Eunant, the Afon Gedig, the Afon Gynnan, the Glasgwm, and the Cowni; it flows south-east in a winding channel twenty-two miles to the junction of the Twrch, twenty-one miles long, which receives the Branwy and other small streams, and passes Llanfair. From the junction of the Twrch the Vyrnwy flows nine miles till it receives the Cain, eleven or twelve miles long, from above Llanyllin; and about a mile lower down the Tanat. The Twrch joins it on the right, the Cain and the Tanat on the left bank. The Tanat rises near Trim-y-Sarn on the Merionethshire border, and flows east-south-east into the Vyrnwy, chiefly in Montgomeryshire, partly on the Denbighshire border, and for two or three miles in Shropshire; it receives the Rhaiadr, the Afon Farrog in Montgomeryshire, and the Ymrch on the border of Montgomeryshire and Denbighshire. From the junction of the Tanat the Vyrnwy flows about 9 miles further to its junction with the Severn; its whole course is about 45 miles.

The southern part of the county is watered by the Wye, an important tributary of the Severn, which rises on the south-east side of Plinlimmon near the source of the Severn, and flows south-east thirteen or fourteen miles into Radnorshire, receiving by the way the Tarrenig, the Bidno, and the Nant-y-Durrel.

The Dovey chiefly belongs to Merionethshire. [MERIONETHSHIRE.] It enters Montgomeryshire about four miles below Dinas-y-Mowddy, and flows about nine or ten miles to the neighbourhood of Machynlleth, where it again touches Merionethshire. Its remaining course is between Merioneth shire on the north-west, and Montgomeryshire and Cardiganshire on the south-east. Of its tributaries the Tafalog and the Cwmcelli partially, and the Afon Yale, the Crewy, and the Dulas entirely, belong to this county. The Lyfn Nant, another feeder, separates Montgomeryshire from Cardiganshire. The Dulas has its source in the Glas Llyn, a small lake not a mile in extent in any direction, but yet the largest in the county.

Of these rivers only the Severn and the Dovey are navigable in that part which belongs to this county. The navigation of the Severn begins at Welsh Pool; that of the Dovey in the neighbourhood of Machynlleth: the length of the Severn navigation in or upon the border of this county is about eleven miles; that of the Dovey five or six miles.

The only navigable canal is the Montgomeryshire canal, which was commenced under an act obtained A.D. 1794. It commences in the Severn at Newtown, and runs along the valley of that river past Welsh Pool, about four miles below which it quits the immediate neighbourhood of the Severn, and runs northward to Llanymynech and Llanyblod will in Shropshire, where it joins a branch of the Ellesmere canal. Its whole length is twenty-seven miles, almost entirely in this county; it has a short branch below Welsh Pool to Guilsfield.

The principal roads which pass through this county are those from London by Shrewsbury to Caernarvon, Barmouth, Towyn, and Aberystwith. The road to Caernarvon crosses the north-eastern side of the county near the Denbighshire border, through Llanfyllin and Llangynnog to Bala in Merionethshire. The Barmouth road passes through the centre of the county by Welsh Pool and Llanfair to Dinas-y-Mowddy in Merionethshire: that to Towyn branches from the Barmouth road between Welsh Pool and Llanfair, and runs through Llanbrinmaer and Machynlleth. The Aberystwith road passes through Montgomery and along the valley of the Severn by Newtown and Llanidloes to Llangerrig, and from thence by the valley of the Wye into Cardiganshire. Another road from London to Aberystwith passes through Ludlow and Bishop's Castle to Newtown, where it joins the road just described. A road from Bishop's Castle runs by Montgomery to Welsh Pool; and another runs from Newtown to Llanbrinmaer and Towyn.

Divisions, Towns, &c.—Montgomeryshire takes its name from the town and castle of Montgomery, founded by Baldwin, lieutenant of the Marches to William the Conqueror and William Rufus, and recaptured probably from the Welsh by Roger de Montgomery, earl of Shrewsbury, who gave both to town and castle his own name. The Welsh call the town, from the name of its original founder, Tre Faldwyn, and the county Sir Tre Faldwyn. The county was formed in the reign of Henry VIII. It is divided into nine hundreds, as follows·

Name.	Position.	Pop. in 1831
Llanfyllin	N.	6,849
Deuddwr or Deythur	N.E.	2,417
Pool	N.E.	9,057
Cawrse	E.	2,712
Mathrafal	Central & N.W.	5,899
Machynlleth	W.	7,927
Llanidloes	S.	12,159
Montgomery	S.E.	5,532
Newtown	Central	13,930
		66,482

It contains the borough and market towns of Montgomery and Machynlleth, at one or other of which the county-court and court of election for the county members are held; Newtown and Welsh Pool, at which the assizes are now held in turn; Llanidloes and Llanfyllin; and the market-town of Llanfair.

Montgomery is in the hundred of Montgomery, 168 miles from London by Ludlow, or 174 by Shrewsbury. Baldwin or Baldwyn, who had been appointed lieutenant of the Marches by William the Conqueror, built a castle or other military post here, and laid the foundations of the town (A.D. 1092). Both appear to have been almost immediately captured by the Welsh, from whom they were taken again (A.D. 1093) by Roger de Montgomery, earl of Arundel and Shrewsbury. The earl fortified the place and called it after his own name; but in 1094 it was taken by the Welsh, who put the garrison to the sword, and ravaged this part of the border-land. William Rufus assembled an army, repulsed them, and strengthened and provisioned the castle of Montgomery. It was however again taken and utterly destroyed by the Welsh; but after a severe contest the Norman power prevailed, the Welsh were driven to their fastnesses, and the earl of Shrewsbury rebuilt the castle. This however appears to have shared the fate of its predecessor, for Henry III. built a new castle here, A.D. 1221, which was, ten years afterwards, taken and burned by Llewelyn, prince of North Wales. Montgomery afterwards formed part of the possessions of the Mortimer family. In the civil war of Charles I. the castle was fortified for the king; but it was given up by the governor to the Parliamentarians, and was shortly afterwards besieged by the Royalists. The advance of a body of 3000 Parliamentary troops to its relief led to a desperate encounter, in which the Royalists (5000 strong) were defeated, with the loss of 500 slain and 1400 prisoners. The castle was afterwards dismantled by the order of the House of Commons.

The town is partly on the slope and partly on the summit of a hill, which is commanded by a much loftier elevation in the immediate neighbourhood. It is a small place, consisting of four principal streets, which meet in the market-place in the centre of the town. The houses are well built and of respectable appearance, and the town is the residence of several persons of small independence, to whom its quiet situation and delightful environs, and the cheapness of living, render it attractive. It is not on any great thoroughfare, and has little trade or manufacture. There is a weekly market on Thursday, well supplied with corn and provisions of all kinds. There are several yearly fairs. The population of the parish in 1831 was 1188, about one-third agricultural.

The castle stood on a steep projecting eminence on the north side of the town. The remains consist of a fragment of a tower at the south-west angle and some portions of the walls: between the buildings and the precipitous side of the hill above the town is a level space, probably used as a parade for the garrison. This castle appears to have been defended by four ditches cut in the solid rock, and crossed by drawbridges. The town itself was also defended by walls flanked with towers and secured by four gates; but of these defences there appear to be no other remains than a few trifling fragments of the wall. At the foot of the castle-hill are traces of a small fort, conjectured to be the original Norman castle erected by Baldwyn; and on a neighbouring hill, intersected in the only accessible parts by deep ditches, are the remains of an extensive British camp, from which is a fine view of the vale of Montgomery. The church is an antient cruciform building, not very large, in the early English style, with a tower erected in the course of the present century. There are some interesting monuments in the church. The town-hall is a brick building, with a market-house underneath; and there is a new county gaol on the road to Shrewsbury. There is a meeting-house for Calvinistic Methodists.

Montgomery is a corporate town; the limits of the borough and parish are the same. The corporation consisted, at the time of the Municipal Commissioners' Reports, of 72 resident burgesses. There is no town-council; but two bailiffs, who have jurisdiction in the borough, are elected by the burgesses in common hall. The corporation remains unaltered by the Municipal Reform Act. The borough has returned one member to parliament from the time of Henry VIII. Llanidloes, Llanfyllin, Machynlleth, and Welsh Pool were formerly contributory boroughs, but had been disfranchised for above a century before the Reform Act, by which they were restored, and Newtown added. The county-court and the election for the county member are held either at Montgomery or Machynlleth.

The living is a vicarage in the archdeaconry of Salop and diocese of Hereford, of the clear yearly value of 347*l.*

There were, in 1833, four day-schools, with 167 children, and two Sunday-schools, with 133 children. One of the day-schools, with 42 children, was partly supported by an endowment and by donations.

Machynlleth, or Machynllaeth, is in the hundred of the same name, 208 miles from London by Bishop's Castle, Newtown, and Llanidloes, or 215 miles by Shrewsbury and Welsh Pool. It has been commonly asserted to have been a Roman station, and some regard it as the Maglove of the 'Notitia;' but the station was probably at Cefyn Caer, near Pennal, or Penalt, in the neighbourhood of Machynlleth, but in an adjoining county. [MERIONETHSHIRE.] It was at Machynlleth that Owen Glyndwr held a parliament or assembly of the chief men of Wales, A.D. 1402, by which his title to the principality was formally acknowledged.

The parish is very extensive, and comprehends three townships, of which two, Uwch-y-Garreg and Is-y-Garreg, are entirely rural. The town is near the confluence of the Dulas with the Dovey. It is neatly and regularly built, and consists of two principal streets in the form of a ⊢ : the streets are wide and spacious. There is a town-hall and market-house, a plain building: the antient building, in which the parliament of Glyndwr assembled, is still standing, but is converted to private use. The church, rebuilt, with the exception of the tower, in the present century, is tolerably large. There are several dissenting places of worship, and there are national school-rooms.

The population, in 1831, was 2381, of which 1657 persons were in the town liberty or township; of the population of Uwch-y-Garreg and Is-y-Garreg townships, more than half was agricultural; of the population of the town liberty scarcely any. The chief manufacture of the town and neighbourhood is that of 'webs,' or coarse woollen cloths and coarse flannels: there are many carding-engines and fulling-mills; the weaving is generally done at the weavers' own cottages; the goods are chiefly sent to the market at Welsh Pool. A good deal of tanning is done. Slate is quarried in the neighbourhood. The river Dovey is navigable to within two miles of the town, and affords facilities for the export of oak-bark and timber, and the import of corn, coals, culm, limestone, raw hides, and other articles.

The markets are on Wednesday and Saturday, and there are at least six fairs in the year.

Machynlleth was formerly a parliamentary borough, contributory to Montgomery; and after being disfranchised above a century, was restored by the Reform Act: the parliamentary limits include the town liberty and a small portion of the township of Is-y-Garreg.

The living is a rectory, in the diocese and archdeaconry of St. Asaph, of the clear yearly value of 230*l.*, with a glebe-house.

There were, in 1833, in the town liberty, one day-school, with 39 children; one day and Sunday national school, with 126 children; and four Sunday-schools, with 665 scholars, 'men, women, and children, of all ages, who continue to attend during the whole of their lives.' The other two townships had two day-schools, with 41 children; and six Sunday-schools, with 486 scholars.

The county court is occasionally held, and the election of the county member occasionally takes place, at Machynlleth.

Newtown (in Welsh, Tre Newydd) is in the hundred of Newtown, 175 miles from London by Bishop's Castle. Little is known of the origin and early history of this place; the increase of the flannel manufacture has brought it prominently into notice. It is in a delightful valley on the right or south bank of the Severn, over which there is a stone bridge of three arches, erected a few years since in place of a more antient one of wood. There is another stone bridge of one arch on the road to Welsh Pool, over a brook falling into the Severn. The older houses are usually of timber and brick, but the houses of later erection are of more respectable appearance. The market-hall, a plain building, stands very inconveniently in the midst of the principal street. The church is an antient structure, of little architectural pretensions: the steeple is low, and is surmounted by a wooden belfry. There are in it some marble monuments of the Pryce family; and a beautiful carved screen, dividing the chancel from the nave, said to have been brought, together with the font, from the abbey of Cwm Hir, in Radnorshire. There are several places of worship for the different dissenting sects. On the north bank of the Severn, in the townships of Hendidley and Gwestydd, in the parish of Llanllwchaiarn, a suburb has been formed, which has received, and in all probability will receive, great additions.

By the Reform Act, Newtown was added as a contributary borough to Montgomery. The borough comprehends the parish of Newtown and the townships of Hendidley and Gwestydd, in the parish of Llanllwchaiarn. Its boundaries include a considerable rural district; but from the thriving condition of the place, the extension of the town in every direction may be anticipated, and the farmers are said to be connected with the flannel factories in the town. The number of 10*l.* houses within the boundary was estimated by the Boundary Commissioners at 262.

The population of the parish of Newtown in 1831 was 4550, about one-sixth agricultural; that of Llanllwchaiarn was about 2005, less than half agricultural: together 6555, of which about 5000 were resident immediately in the town or suburb. The staple manufacture of Newtown is that of flannel, which is of excellent quality: the manufacture is carried on chiefly in factories, and is conducted with skill. The quality of the water is also considered to conduce to the goodness of the fabric. There are several fulling-mills and bleaching-grounds. There are potteries, tan-yards, and malt-kilns: machinery of various descriptions is manufactured. The Montgomery Canal commences at this town; there is a large basin; and around this, or along the banks of the canal, are lime-kilns, and convenient wharfs and yards for landing and storing coals, bricks, slates, timber, and other articles. There are three weekly markets; on Tuesday for corn and provisions, on Thursday for flannels (lately established), and on Saturday for provisions. There are several yearly fairs, one of them a considerable fair for sheep and pigs. Petty-sessions are held in the town; and, by order issued in a late Gazette, the winter assizes are to be held here. It has been thought that the county gaol was formerly at Newtown: a public house, lately and perhaps still in existence, was called the Old Gaol.

The living is a rectory, of the clear yearly value of 406*l.*, with a glebe-house: that of Llanllwchaiarn is a vicarage, of the clear yearly value of 355*l.*, with a glebe-house: both are in the archdeaconry and diocese of St. Asaph, and in the gift of the bishop.

There were, in 1833, in Newtown and Llanllwchaiarn parishes, thirteen day-schools, with 355 children, and six Sunday-schools, with 1540 scholars.

Welsh Pool (so called to distinguish it from the town of Poole, in Dorsetshire) is locally in the hundred of Pool, 171 miles from London by Shrewsbury, or 176 by Ludlow, Bishop's Castle, and Montgomery. The town derives its name from a deep pool or lake, called Llyn Du, near which it is situated: from the same circumstance of its situation, the town is called, in Welsh, Tre Llyn. Cadwgan, a powerful chieftain of the district of Powys, began to build a castle here A.D. 1109, but it was left unfinished at his death. It was completed by another; and in 1191 was taken, after a long siege, by the English, who repaired and strengthened the defences. It was retaken, A.D. 1197, by the Welsh of Powysland; but these having taken part with the English, the castle was taken from them (A.D. 1223), and dismantled by the prince of North Wales. This castle was afterwards restored, and received the name of Powys Castle, which it still retains. The castle was fortified in the civil war of Charles I. by Lord Powys, the owner of it, who embraced the king's party. It was obliged to surrender, A.D. 1644, to the parliamentary commander, Sir Thomas Middleton.

The town is near the left or west bank of the Severn, in a hollow opening upon that river, and watered by two brooks which flow into the Severn. It consists of two parts, Pool Town and Welsh Town. The principal street runs east and west, and other streets branch from or intersect this at right angles. The main street is well paved; the houses are chiefly of brick, respectable, and built with a regularity not usual in Welsh towns; and from this circumstance, and from the predominance of the English language, Welsh Pool might be taken for an English town. The building used as a town and county hall, with a space beneath for a corn-market, is in the centre of the principal street. The church is spacious and handsome; it was rebuilt, with the exception of the chancel and the tower, in the latter half of the last century, and enlarged in the course of the present century. It is situated on a steep slope, and some parts of the churchyard are higher than the church. There are several dissenting meeting-houses, and a handsome building for the national schools.

The population of the parish of Pool (which is extensive, and has a detached portion in the hundred of Cawrse) was, in 1831, 4533. The principal manufacture is that of flannel, but it is not carried on so extensively as at Newtown, Llanidloes, and Llanbrynmair. The place was however for many years the chief mart for the flannels and webs of the counties of Montgomery and Merioneth; but within the last few years an attempt has been made to make Newtown the mart for flannels. There are several malt-kilns, and a stone-quarry in or near the town. The market for provisions is on Monday, that for flannels on every alternate Thursday. The Montgomeryshire Canal passes close to the town, and the navigation of the Severn begins here. There are several yearly fairs. Petty-sessions are held here, and the spring assizes for the county. The winter assizes have been lately removed to Newtown.

Welsh Pool received at an early period a charter of incorporation from the lords of Powys; but the governing charter is of James I. By the Municipal Reform Act the corporation consists of four aldermen and twelve councillors. The borough has a commission of the peace. The corporate jurisdiction extends over the whole parish, and parts of some other parishes. The borough was antiently contributory to Montgomery, but had lost the franchise for more than a century when it was restored by the Parliamentary Reform Act. The parliamentary borough includes nearly the whole of Pool parish, and a small part of the parish of Guilsfield.

The living of Welsh Pool is a vicarage, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 273*l.*, with a glebe-house.

There were in the parish, in 1833, twelve day-schools, with 303 children; two national schools, with 233 children; and three Sunday-schools, with 550 children. Two of the day-schools have a small endowment, for which some of the children are educated.

Powys Castle is in a spacious well-wooded park, on the south side of the town. It stands on a rocky ridge or elevation, and is built of red-sandstone, whence its antient name of Castell Coch, or Red Castle. The different parts of this castle are of various dates, and in varying and incongruous styles of architecture. The repairs lately carried on under the direction of Sir Robert Smirke, which are said to 'accord with the original design of the antient edifice,' have perhaps removed these incongruities. The interior has a heavy and gloomy appearance; but it is adorned with portraits and other paintings, some of them by the best masters, statues, vases, and other antiquities. The gardens are (unless lately altered) laid out in the old style, with terraces, clipped shrubs, and the remains of waterworks. Powys Castle is the seat of the Clive family.

Llanidloes is in the hundred of Llanidloes, 188 miles from London, through Bishop's Castle and Newtown. The town is in a pleasant vale watered by the Severn, on the south-east bank of which, 12 miles from its source, the town stands. The hills which bound this vale are chiefly laid out in sheep-walks. Llanidloes consists of two principal streets, crossing each other at right angles, and of some inferior ones. The houses were a few years since almost entirely built with timber frames and the intervals filled up by laths and mud or plaster; many were roofed with slabs of oak timber, cut into the form of slates; the streets, which are wide, were also disfigured by ashes or other refuse heaped up in front of the houses. But of late years great improvements have been made; many houses of better construction have been erected in the room of older structures, and the street nuisances have been cleared away. There are two bridges over the Severn, one of them is a handsome stone bridge of three arches. The market or town-house is in the middle of the town; it is a massy building framed with timber and the intervals filled up of lath and plaster or mud. The church consists of a nave and aisle separated from each other by curious clustered pillars, the capitals of which are decorated with palm-leaves. The roof of the nave is adorned with carved figures of cherubim holding shields charged with exquisitely carved armorial bearings. The columns and the carved work of the roof are said to have been brought from Cwm Hir Abbey in Radnorshire. There are several dissenting places of worship.

The parish is very extensive, including large tracts of waste land on the slope of Plinlimmon. The population in 1831 was 4189, of which population 2562 persons were in the township of Llanidloes. The staple manufacture of the place is flannel. There are several factories for carding and spinning the wool, and fulling-mills. The weaving is done chiefly at the weavers' houses. The flannel made here is perhaps not so fine as that of Newtown, but more durable. There are, in and round the town, several malt-houses or kilns, flour-mills, and tan-yards. Coarse slate and building-stone are quarried in the surrounding hills. There is a market on Saturday for wool, corn, and provisions; and several fairs in the year, some of which are great sheep-fairs.

Llanidloes is a corporate town, but the corporation is not noticed in the Municipal Reform Act, or in the Corporation Commissioners' Reports. It was antiently a contributory borough to Montgomery, and, like Machynlleth, Llanfyllin, and Welsh Pool, was restored by the Reform Act, after a disfranchisement of a century. The boundary of the restored borough is much more comprehensive than that of the old borough. The number of qualifying (*i.e.* 10*l.*) houses within the boundary was estimated by the Boundary Commissioners at 124.

The living of Lanidloes is a vicarage in the peculiar jurisdiction of the bishop of Bangor; its clear yearly value is 151*l.*, with a glebe-house.

There were in the parish in 1833 five day-schools (one partly supported by subscription), with 204 scholars, and seventeen Sunday-schools, with 2084 scholars. The following observations, from the overseers, are of importance, as explaining the nature of Welsh dissenting Sunday-schools. 'They are a kind of mixed congregation of all ages, parents with their children, heads of families with their servants. . . . The number of children, under 14 years of age, taught to read at these meetings scarcely amounts to one-third of the whole number returned; the rest being engaged in reading, repeating portions of scripture, or catechisms from memory, intermixed with praying and singing, making them upon the whole religious meetings rather than schools.'

Llanfyllin, or Llanvyllin, is in the hundred of Llanfyllin, 179 miles from London, by Shrewsbury and Llandrinio Bridge, or 180 miles by Shrewsbury and Montford Bridge; in a pleasant valley watered by the Cain, an affluent of the Vyrnwy. The town is on the south bank of the Cain, and is very small. The principal street runs east and west, and is crossed by the Abel brook, which flows into the Cain; over this brook is a neat bridge. There is a town-hall, a neat brick building with a covered area for a market underneath, on one side of the principal street. The church is a brick building erected early in the last century.

The population of the parish (which is of considerable extent) was, in 1831, 1836; of whom 858 were in the town. There is little business carried on; a small quantity of leather and malt is made and sent to neighbouring markets. The market is on Thursday, and there are several fairs.

Llanfyllin was incorporated by Llewelyn ap Gryffydd, a Welsh chieftain in the time of Edward II.; two bailiffs are chosen yearly (one by the lord of the manor, another by the burgesses), who are justices of the peace for the borough. The parliamentary franchise, which had been lost for a century, was restored by the Reform Act, and the limits of the borough considerably enlarged. Llanfyllin is contributory to Montgomery. It was estimated by the commissioners to contain about 60 qualifying or 10*l.* houses.

The living is a rectory in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 485*l.* with a glebe-house. There were in 1833 in the parish two day-schools with 60 children; two day and Sunday national schools, with 121 children in the week days, and a smaller number on Sundays; and five Sunday schools, with 150 scholars. The national schools are partly supported by endowment.

Llanfair, or Llanvair Caer Einion, is in the hundred of Mathrafal and near the centre of the county, 183 miles from London through Bishop's Castle, Montgomery, and Welsh Pool. The town is on a rising ground on the south bank of the Vyrnwy. It is neatly built and of pleasing appearance; the two principal streets intersect each other, nearly at right angles. There is a plain but neat and commodious town-hall, with a market-house underneath. The church is an antient building, capable of accommodating 500 persons. There are several dissenting places of worship.

The population in 1831 was 2687, about half agricultural. The principal manufacture is that of flannel, but it is carried on only to a very small extent. There is a market on Saturday, and there are several yearly fairs.

The living of Llanfair is a vicarage, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 338*l.*, with a glebe-house.

There were in 1833, in the parish, one infant or dame-school, with 46 children; four day-schools, with 112 children; and four Sunday-schools, with about 300 scholars.

There are traces of a Roman road about two miles south of the town, and some Roman antiquities have been dug up in the neighbourhood.

Llanbrynmair is a village in Machynlleth hundred, on the road between Llanfair and Machynlleth. The parish, which is of considerable extent, abounds with delightful scenery. It had, in 1831, a population of 2040. A considerable quantity of flannel is made in this parish: the manufacture employs above 100 men in weaving, besides those occupied in carding and spinning wool. Peat is dug in the parish. The church is an antient structure, adorned with some fine specimens of carved oak. There are some fine yew-trees in the churchyard.

The living is a vicarage, of the clear yearly value of 330*l.*, with a glebe-house: part of the revenue is appropriated to a sinecure rectory, the clear yearly revenue of which is 65*l.* The benefice is in the archdeaconry and diocese of St. Asaph.

There were in the parish, in 1833, three day-schools, partly supported by endowment or gift, with 128 children, and nine Sunday-schools, with 1285 scholars.

Llangynnog, or Llangynog, is a village in Llanfyllin hundred, on the road from Llanfyllin to Bala, in Merionethshire: it is in a pleasant but narrow vale, watered by the Tanat, and surrounded by lofty and steep mountains. The parish, which is about four miles long and as many broad, is the chief seat of the mineral wealth of the county. The village was characterised by Mr. Bingley (*Tour in Wales*, A.D. 1798) as 'small and dirty.' There are many detached farm-houses in the valley. The church is a small antient building, and there are one or two dissenting meeting-houses. The population of the parish, in 1831, was 499: 16 men were employed in slate-quarries, and 20 in lead-mines. The principal lead-mine was discovered in A.D. 1692, and was worked so successfully as to yield for forty years a yearly profit of 20,000*l.* After the working had been discontinued for many years, owing to the influx of water, the mine was drained and the working resumed. After a second discontinuance, it was again resumed, and is still carried on. The slates quarried are of tolerably good quality. Lead-mines appear to have been wrought in this valley at an early period.

The living is a rectory, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 126*l.*, with a glebe-house. There were in the parish, in 1833, two Sunday schools with 192 scholars, and a small endowment for a day-school.

Divisions for Ecclesiastical and Legal Purposes.—The county is for the most part in the archdeaconry and diocese of St. Asaph. Those parishes in the hundreds of Cawrse and Pool which are east of the Severn, and the whole hundred of Montgomery (except the parishes of Kerry and Moughtrey, which are in the diocese of St. David's, and in the archdeaconries of St. David's and Brecon respectively), are in the archdeaconry of Salop and the diocese of Hereford. The hundred of Llanidloes is in the peculiar jurisdiction of the bishop of Bangor. The number of parishes wholly or partly in the county is fifty-seven, but six belong chiefly to other counties. Of the remaining fifty-one, thirty-six are in the diocese of St. Asaph, six in that of Hereford, seven in Bangor, and two in St. David's. There are twenty-two rectories, eighteen vicarages, ten perpetual curacies, and one chapelry, beside three sinecure rectories: making in all fifty-four benefices. Of these eleven are under 100*l.* annual value, fifteen under 200*l.*, eleven under 300*l.*, eleven under 400*l.*, two under 500*l.*, and three under 600*l.* Of one no return has been made. The livings, with the exception of those in the diocese of Hereford, are mostly in the gift of their respective diocesans. All these dioceses are in the ecclesiastical province of Canterbury.

The county is included in the North Wales circuit. The assizes were, till lately, held at Welsh Pool; but, by order published in a late Gazette, they are to be held in the spring at Welsh Pool, and in the winter at Newtown. The county gaol and house of correction are at Montgomery, where the quarter-sessions for the county are held.

The county returns one member to parliament, and Montgomery with its contributory boroughs another. The court of election for the county member is held either at

Montgomery or Machynlleth; and the polling-stations are Montgomery, Machynlleth, Llanidloes, Llanfyllin, and Llanfair. The contributory boroughs to Montgomery were antiently Llanidloes, Llanfyllin, Machynlleth, and Welsh Pool; but these were virtually disfranchised by the decision of a committee of the House of Commons, A.D. 1728, and the elective franchise was monopolised by the burgesses of Montgomery alone, until the former contributory boroughs were restored, and Newtown added as another contributory borough, by the Reform Act. All the old boroughs, except Montgomery, were enlarged by the Boundary Act.

History and Antiquities.—Montgomeryshire was, with the neighbouring counties, included, during the period of British independence, in the territory of the Ordovices, and on the reduction of the island under the Roman power, in the province of Britannia Secunda. It contains several memorials of Roman domination. The station Mediolanum, mentioned by Antoninus and Richard of Cirencester, is thought by the best antiquarians to have been in this county, though its exact site is not ascertained. It is supposed by some to have been on the bank of the Tanad (a site which will accord with its position in Richard's 'Itinerary'), between Heriri Mons (Tommen-y-Mûr, near Bala) and Rutunium (Rowton, near Shrewsbury); other authorities propose on plausible grounds to fix it at Myfod on the Vyrnwy. It is supposed that there was a station at Cefyn Caer [MERIONETHSHIRE], near Machynlleth. Some writers will have this to be the Maglove of the 'Notitia;' but there is so much uncertainty as to the stations of the 'Notitia,' that this can be regarded as merely a conjecture. Various Roman antiquities have been found near Machynlleth. The site of a Roman camp is traceable at Caer-Sws, about five miles west of Newtown: it appears to have been quadrangular, about 600 feet in length and 300 broad. Several Roman bricks were dug up in one angle of this camp, and employed in building a chimney in the neighbourhood. There are other marks of intrenchments near it, and traces of a Roman road called 'Sarn Swsan.' A Roman fortress is said to have stood at Castell Caer Einion, about four miles from Llanfair, but there are now no traces of it.

After the withdrawal of the Romans we hear nothing of this county for many years. It was the scene of hostility between the Welsh and the Mercians under Offa. The celebrated 'dyke' made by the latter traverses the county from north to south, passing a little to the east of Welsh Pool and Montgomery, and including the eastern part of the county in the Saxon territory. The rest of the county was included in Powys or Powysland, a designation which had previously been given to this part of Wales. In the latter part of the ninth century Powys became a separate principality, under chieftains who had their residence at Mathrafal, near the banks of the Vyrnwy, above Myfod. These princes of Powys were engaged in frequent hostilities with the Mercian Saxons along the border. There are some earthworks and other traces of the castle of the princes of Powys at Mathrafal.

In the year 894, in the reign of Alfred, the Danes entered the county. Hastings, or Hasten, or Hesten, their leader, had invaded the eastern parts of England; and in his third campaign, A.D. 894 or 895, he entrenched himself at Buttington, on the east bank of the Severn, close to Welsh Pool. There he was besieged by Alfred's thanes, until, reduced to desperation by famine, he broke through the blockading force, and with fearful loss returned to his former quarters on the east side of the island.

After the Conquest, Powys became the continual object of attack by the Norman lords of the marches or frontiers. These hostilities led to the erection of the castles of Montgomery by the Normans, and Powys, near Welsh Pool, by the Welsh, and to a continued and severe struggle for the possession of these strongholds. The division of Powysland between two chieftains served to weaken the Welsh power, and to augment the predominance of the Norman barons.

In the latter part of the eleventh century a desperate engagement was fought on the hills of Carno, near the Afon Garno, between the forces of Gryffydd ap Cynan, lawful claimant of the throne of Gwynedd, or North Wales, assisted by Rhys ap Tewdwr, prince of South Wales, against those of Trahaiarn ap Caradog, his usurping competitor. The engagement was the most bloody of any recorded in the Welsh annals, and ended in the death of Trahaiarn and the entire defeat of his army.

The independence of Powys was overthrown before the final subjugation of North Wales: it became an English lordship, which remained for many years in the posterity of John de Charlton, who, in the time of Edward II., married the heiress of the Welsh chieftains. The barony and title passed to the Greys, a Northumberland family, until it became extinct in the reign of Henry VIII. The only remaining castles, or ruins of castles, appear to be those of Montgomery and Powys. There do not appear to be any monastic ruins in the county; none, at any rate, of importance.

In the civil wars of Charles I. Montgomery and Powys castles were the objects of contest. The incidents of the war are noticed above, in the account of the towns of Montgomery and Welshpool.

(Pennant's and Bingley's *Tours in Wales; Beauties of England and Wales;* Arrowsmith's *Map of England and Wales;* Greenough's *Geological Map; Reports of Boundary and Municipal Corporation Commissioners*, and other *Parliamentary Papers.*)

STATISTICS.

Population.—Montgomeryshire is mostly an agricultural county. Of 16,723 males twenty years of age and upwards, 4295 are engaged in agricultural pursuits, and 1639 in manufactures or in making manufacturing machinery. This latter number is chiefly employed in weaving, an occupation followed in this county more than in any other county of Wales. At Llanidloes 323 men are so employed, and in making machinery for that purpose and in other branches of the woollen manufacture. There are 549 woollen weavers at Newton, 180 at Llanllwchaiarn, 109 at Llanbrynmair, at Welsh Pool 68; indeed scarcely any parish throughout the county is deficient in this species of manufacture.

The following table contains a summary of the population, &c., of every hundred, as taken in 1831:—

HUNDREDS, &c.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males twenty years of age.
Cawrse (hundred) .	451	486	2	12	356	76	54	1382	1330	2,712	718
Deythur „ .	441	503	6	7	338	99	66	1231	1186	2,417	641
Llanfyllin „ .	1235	1336	6	61	726	313	297	3496	3353	6,849	1703
Llanidloes „ .	2178	2338	17	49	1090	807	441	5923	6236	12,159	2878
Machynlleth „ .	1517	1613	7	94	720	468	425	3881	4046	7,927	2011
Mathrafel „ .	1162	1232	6	28	626	289	317	2917	2982	5,899	1493
Montgomery „ .	974	1090	3	26	602	262	226	2883	2649	5,532	1505
Newton „ .	2496	2931	8	96	1233	1231	467	6930	7000	13,930	3546
Pool . „ .	722	809	1	7	626	138	45	1863	1939	3,802	956
Pool (town) .	993	1069	6	22	293	515	261	2542	2713	5,255	1272
Total .	12,169	13,407	62	409	6610	4198	2599	33,048	33,434	66,482	16,723

The population of Montgomeryshire, as given at each time the census was taken, was as under:—

	Males.	Females.	Total.	Increase per cent.
1801	..	..	47,978	..
1811	..	..	51,931	8·23
1821	29,743	30,156	59,899	15·34
1831	33,048	33,434	66,482	10·99

showing an increase between the first and last periods, of 18,504, or nearly 39 per cent. on the whole population; being 19 per cent. less than the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the three dates of—

		£		s.	d.	
1811	were	32,297,	being	12	5	for each inhabitant.
1821	..	33,273	„	11	1	„
1831	..	34,815	„	10	5	„

The sum expended for the same purpose for the year ending March, 1838, was 22,235*l.*; and assuming that the population had increased at the same rate of progression as in the ten preceding years, the above sum gives an average of 6*s.* 2½*d.* for each inhabitant. These averages are above those for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending the 25th of March, 1833, was 43,974*l.* 11*s.*, and was levied upon the various descriptions of property as follows:—

	£	s.
On land . . .	£39,680	0*s.*
Dwelling houses .	3,374	19
Mills, factories, &c. .	721	16
Manorial profits, navigation, &c.	197	16

The amount expended was—

	£	s.
For the relief of the poor . .	£35,346	8*s.*
In suits of law, removal of paupers, &c.	1,377	8
For other purposes . .	6,848	11
	£43,572	7

In the returns made up for subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 42,606*l.* 7*s.*, 40,503*l.* 13*s.*, 37,412*l.* 11*s.* (not given for 1837 in government tables), and 31,536*l.* respectively; and the expenditure for each year was as follows:—

	1834. £	1835. £	1836. £	1837. £	1838. £
For the relief of the poor	34,201	31,945	29,443	28,278	22,235
In suits of law, removal of paupers, &c. .	1,315	883	680	763	283
Payments towards the county-rate . .	6,344	4,952	4,946	not given	4,649
For all other purposes		2,163	2,102	1,787	1,840
Total money expended	£41,860	39,943	37,172	30,828	29,007

The saving effected on the whole sum expended in 1838, as compared with that expended in 1834, was therefore 12,853*l.* 7*s.*, or about 30¾ per cent.; and the saving effected on the sum expended for the relief of the poor was 11,966*l.* 4*s.*, or 35 per cent. as compared with the expenditure in 1834.

The number of turnpike trusts in Montgomeryshire, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 5; the number of miles of road under their charge was 450. The annual income arising from tolls and parish composition in lieu of statute duty, in 1835, was 18,297*l.* 16*s.*, and the annual expenditure in the same year was as follows:—

	£	s.	d.
Manual labour	4,548	17	0
Team labour and carriage of materials	166	11	0
Materials for surface repairs .	252	17	0
Land purchased	53	13	0
Damages done in obtaining materials	9	10	0
Tradesmen's bills	101	14	0
Salaries of treasurer, clerk, and surveyor	949	4	0
Law charges	1,325	13	0
Interest of debt	2,383	5	0
Improvements	6,160	6	0
Debts paid off	150	0	0
Incidental expenses . . .	418	4	0
Estimated value of statute duty performed	2,237	9	0
Total .	£18,757	3	0

The county expenditure in 1834, exclusive of the relief for the poor, was 5306*l.* 16*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building, and repairs, &c.	3,199	12	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	504	0	0
Prosecutions	523	15	0
Clerk of the peace . . .	91	8	0
Conveyance of prisoners before trial .	84	18	0
Conveyance of transports . .	47	10	0
Coroner	169	14	0
Debt, payment of, principal and interest	311	2	0
Miscellaneous . . .	374	17	0
Total	£5,306	16	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 191, 157, and 222, making an average of 27 annually in the first period, of 22 in the second period, and of 32 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 11, 12, and 30 respectively. Among the persons charged with offences, there were committed for—

	1831.	1832.	1833.
Felonies . .	9	10	30
Misdemeanors .	2	2	0

The total number of committals in each of the same years was 6, 7, and 34 respectively.

	1831.	1832.	1833.
The number convicted was . .	9	8	30
The number acquitted was . .	1	4	10
Discharged by proclamation . .	1	4	10

At the assizes and sessions in 1838, 48 persons were charged with crimes in Montgomeryshire, out of which number 10 had committed offences against the person, two of which were common assaults; one was charged with an offence against property committed with violence; 28 with offences against property committed without violence. The remaining 9 were committed for riot or breach of the peace, &c.

Of those committed 33 were convicted, and 15 acquitted or no bill found against them. Of those convicted 1 was sentenced to transportation for 10 years and 2 for 7 years, 1 to imprisonment for 1 year, 18 for 6 months or under, and 11 were fined. Of the offenders 42 were males and 6 were females. Among the whole number, 3, accused of breach of the peace, were superiorly instructed; 1 could read and write well, 19 could read and write imperfectly, and 16 could neither read nor write: the degree of instruction of 9 was not ascertained.

The number of persons qualified to vote for county members in Montgomeryshire is 2819. Of these 1539 are freeholders, 203 leaseholders, and 1077 occupying tenants. The number of voters is about one in 24 to the whole population, and one in 6 to the male population twenty years and upwards, as taken at the census of 1831.

There are four savings' banks in this county. The number of depositors and amount of deposits on the 20th November were:—

	1832.	1833.	1834.	1835.
Number of depositors . .	1120	1161	1284	1417
Amount of deposits . . .	£31,174	32,036	35,527	38,772

The various sums placed in the savings' banks in 1836, 1837, 1838, were distributed as under:—

		1836.		1837.		1838.	
		Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding	£20	746	£ 6,473	837	£ 6,750	863	£ 7,631
„	50	543	16,458	555	17,826	641	19,556
„	100	168	11,834	191	12,152	194	13,169
„	150	84	8,621	44	5,754	46	5,487
„	200	22	3,760	20	3,682	18	3,214
Above . .	200	7	1,624	8	1,857	10	2,330
		1,580	48,770	1,655	48,021	1,772	51,437

Education.—The following summary is taken from the Educational Returns laid before parliament in the sessions of 1835: the inquiry was made in 1833.

	Schools.	Scholars.	Total.
Infant schools . . .	6		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		7	
Females . .		33	
Sex not specified .		59	
		—	99
Daily schools . . .	120		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		1,837	
Females . .		1,426	
Sex not specified .		1,305	
	——	——	4,568
Schools . .	126		——
Total of children under daily instruction			4,667
Sunday-schools . . .	192		
Number of children and others at such schools; ages from 4 to 70 years:—			
Males . .		4,652	
Females . .		4,393	
Sex not specified .		7,433	
		——	16,478

Assuming that the population had increased between 1831 and 1833 in the same ratio as in the ten preceding years, and that the children between the ages of 2 and 15 years bore the same proportion to the whole population as in 1821, then we obtain 22,604 as the approximate number of children between those ages living in Montgomeryshire in 1833. Fourteen Sunday-schools are returned from places where no other school exists, and the persons who attend them (1144 in number) cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Thirteen schools, containing 846 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. Some of the Sunday-schools consist of adults and aged persons as well as children. Making allowance for these two causes for inaccuracy, we may perhaps fairly conclude that not more than three-fourths of the whole number of children between the ages of 2 and 15 are receiving instruction in Montgomeryshire.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	—	—	—	—	6	99	—	—
Daily Schools	21	1004	9	754	81	2392	9	418
Sunday Schools	5	376	182	15,895	1	45	4	162
Total...	26	1380	191	16,649	88	2536	13	580

The schools established by dissenters, included in the above statement, are—

		Scholars.
Daily schools . .	7, containing	221
Sunday-schools .	143 „	12,774

The schools established since 1818 are—

		Scholars.
Infant and other daily schools	61, containing	2,464
Sunday-schools . .	161 „	14,305

No school in this county appears to be confined to members of the Established Church or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by dissenters, with whom are here included Wesleyan Methodists. Lending libraries of books are attached to 4 schools in Montgomeryshire.

MONTH. [MOON; YEAR.]

MONTI, VINCENZO, born in 1753, near Ferrara, in the Papal State, studied at Ferrara under the poet Minzoni, and gave early indications of poetical genius, as well as of correct taste in refusing to join the effeminate race of sonneteers and courtly versifiers, and resorting to the good old racy style of Dante for his model. From Ferrara Monti repaired to Rome, the capital of his native country, and the general resort of aspiring unprovided provincials who looked for patronage and support. In that metropolis he was fortunate enough to be introduced to Don Luigi Braschi, the favourite nephew of the then reigning Pope Pius VI., and was retained by that nobleman as his secretary, an office well suited to the habits and disposition of the young poet. He assumed the convenient costume of an Abbé, which at Rome was a general passport into society, and did not bind the wearer to any clerical duties or vows. Monti was now in a fair way to favour: he wrote amatory verses for the fair and sacred elegies for the church, was noticed by prelates and cardinals, was admitted into the Academy of the Arcadians, and had disputes with several members of that pedantic assembly. He was abused and slandered because he took no pains to conceal his contempt of his brother versifiers. He bore the annoyance for some time, but at last his spirit, naturally intolerant, rose under the persecution of mediocrity, and he repaid his adversaries with interest in a 'Sonetto colla Coda,' or 'sonnet with a tail,' a satirical composition addressed to father Quirinus, in which he draws, in a few angry satirical strokes, a sketch of his enemies, using the plainest vituperatives, and a phraseology compared with which Byron's 'English Bards and Scotch Reviewers' might be called a model of urbanity. Alfieri's dramas were at that time the subject of general discussion in Italy. With all their faults, they bore the stamp of a superior mind, and Monti readily acknowledged the powers of the writer, but he disapproved of the abruptness and stiffness of his diction, and of the frequent inharmoniousness of his verse. Monti thought, and with reason, that the language of Italy was fully capable of expressing energy without harshness, and in order to demonstrate this he composed in 1786 his tragedy of 'Aristodemo,' which was received with great applause, and established his literary reputation. The 'Aristodemo' is a strictly classical drama, and is a fine specimen of that species of composition The subject, taken from Pausanias, is the voluntary death of the king of Messene, after having concluded peace with Sparta. Remorse for an atrocious though secret crime, the murder of his own daughter, committed by Aristodemus in his younger years, through the force of disappointed ambition, and a gloomy belief in the unavoidable decrees of fate, are the leading features of the character of the king, which is delineated with fearful and solitary grandeur. Touches of softer feeling appear here and there like wild flowers amidst a barren desert, and serve to relieve the deep shade of terror which pervades the whole drama.

Monti dedicated his drama to the Duchess Braschi, his patron's consort, who was then the reigning beauty of Roman fashionable society, and to whom he addressed also other minor compositions, among which is his beautiful allegory of 'Amor Pellegrino.'

When Pius VI. proceeded to Vienna to remonstrate with Joseph II. on his ecclesiastical reforms, Monti wrote a poem on the subject of that journey, entitled 'Il Pellegrino Apostolico,' which, like all Monti's works, contains great beauties of execution.

The tragical death of Hugo de Bassville, the agent of the French republic, who while endeavouring to excite a revolution at Rome was murdered in the streets by the populace, in January, 1793, suggested to Monti the idea of a poem in terza rima, which he entitled the 'Basvilliana.' The poet represents the soul of Bassville issuing out of its bleeding body, when a tutelary angel comforts the trembling spirit with the assurance that its sins are remitted, but that eternal justice has decreed that it shall wander over the earth and witness the horrors which are being perpetrated in France, until the measure of God's wrath shall be full, and that country shall have expiated its crimes. The soul of Bassville takes an affecting leave of its earthly frame, the companion of its mortal career.

> 'Poscia l'ultimo sguardo al corpo affisse,
>   Già suo consorte in vita, à cui le vene
>   Sdegno di zelo e di ragion trafisse;
> Dormi in pace, dicendo, o di mie pene
>   Caro compagno, infin che del gran die
>   L' orrido squillo a risvegliar ti viene:
> Lieve intanto la terra, e dolci e pie
>   Ti sien l'aure e le pioggie, e a te non dica
>   Parole il passeggier scortesi e rie.'

The spirit takes its flight towards France, and the poem, which is an imitation of Dante's 'Comedia,' consists of descriptions of the scenes which it witnesses, the massacres, the anarchy, the execution of Louis XVI., interspersed with dialogues with the souls of other victims of the Revolution. Some of the descriptions are truly magnificent, such as that of the gigantic cherub watching over the Vatican, the account of the horrors of Marseille, the description of Paris under the reign of terror, and the tragedy of the 21st of January, when the poet introduces the shades of former regicides and of infidel writers exulting at the execution of Louis, and the phantoms of the antient Druids rejoicing in the sight of bloody holocausts renewed. Among the strange but striking conceptions of the poet, we may notice one in canto iv., where the angel tells Bassville that the souls of several revolutionists and members of the Convention have been sent to eternal torments before their natural death, and that demons have taken possession of their bodies, so that these satanic incarnations breathe and act, sit in the Convention, and write and speak under the inspiration of the intrusive spirits, but in appearance as if the bodies were still animated by their former possessors. The poem, which was left unfinished, ends with canto iv., when war is proclaimed in heaven, and echoed throughout Europe, against France.

The 'Basvilliana' had an astonishing success: eighteen editions of it appeared in the course of six months. Fantastic as the conception may appear, it is still considered as Monti's best work.

When the French armies invaded North Italy and occupied Ferrara, the country of Monti, the poet left Rome and repaired to Milan, the capital of the new Cisalpine republic. Here he was in a new atmosphere, and he wrote in favour of republics and revolutions: among others he composed a savage song for the theatre of La Scala on the occasion of the festival of the 21st of January, 1799, the anniversary of the day of the execution of Louis XVI., an act which he had so violently execrated a few years before in the 'Basvilliana.' About the same time he wrote his famous sonnet against England, beginning 'Luce ti nieghi il sol, erba la terra,' and in which, after a shower of invectives and curses, he foretells the day when, stripped of all her ill-gotten wealth, Britain shall be reduced to the primitive occupation of fishing to support herself:

'. . . . . . all 'amo abbandonato,
Farai ritorno pescatrice iguuda.'

At the epoch of Suwarrow's invasion of Italy in 1799, Monti, with many others, took refuge in France, from whence he returned after the battle of Marengo. On his return he wrote a beautiful song in praise of his native country, which was set to music and became very popular:

'Bella Italia, amate sponde,
Pur vi torno a riveder,
Freme in petto e si confonde
L'alma oppressa dal piacer.'

He also wrote his second political poem, which he styled a 'Cantica,' on the death of his friend Mascheroni, a man of science and letters, who had died in France, in exile, in 1799. It is a vision, like the 'Basvilliana,' but the sentiments are more placid and humane. There is the same difference between the two as there is between the 'Inferno' and the 'Purgatorio' of Dante. While we admire the splendour of the 'Basvilliana,' we feel more at ease, our sympathies are better engaged, in reading the 'Mascheroniana.' Monti introduces the poet Parini, who died after the invasion of Italy by the Austro-Russians, relating to Mascheroni the vicissitudes of his country. The stern soul of Parini detested the dishonesty and the ravings of the pretended republicans: 'He had seen ill-fated Italy clad in a mantle of mock liberty, and exposed to the scorn of the stranger. Iniquitous laws emanated from the new legislators; vanity and ignorance, frenzy and discord, filled the senate hall; whilst the sighs of the people were unheeded at the bar. The measure of guilt was at last filled; plunderers were wallowing in plenty, upright men shed tears of distress, and our Lycurguses were meantime feasting at table, seated between Cypris and Bacchus. But the northern storm came with a horrid blast from the Noric Alps, and put an end to their unhallowed carousal. Then fresh disasters befell my poor country.' Next follows a brilliant sketch of Bonaparte's Egyptian campaign, his return to France, his victory over his enemies, foreign and domestic—the whole crowned by the battle of Marengo.

Monti's drama called 'Caio Gracco' contains some impressive scenes, but the play is altogether inferior to the 'Aristodemo.' His third tragedy, 'Galeotto Manfredi,' founded upon an incident of the Italian middle ages, is still weaker.

Monti was appointed professor of eloquence at Pavia; and in 1805, Napoleon having made himself king of Italy, appointed Monti to be historiographer of the new kingdom. The poet, instead of history, wrote verses; and in 1806 he published six cantos of a poem in praise of Napoleon, which he entitled 'Il Bardo della Selva Nera.' It related the war of 1805, the great battle of Austerlitz, the exaltation of the elector of Bavaria (the ally of Napoleon) to the dignity of king, and the marriage of his daughter with Eugène. In this composition Monti indulged, as usual, in vituperations against the Austrians and other enemies of France. But the Austrians were soon after reconciled to Napoleon, whose interest it was not to allow them to be insulted. The Russians however still remained at war, and Monti might revile them as 'northern barbarians;' but after the peace of Tilsit, their emperor, having become the ally of France, could no longer be abused with impunity. Monti, supple as he was, appears to have been puzzled with these continual transformations of friends into enemies and *vice versâ*, and he left his poem unfinished. He might however still find means of eulogising Napoleon without offending others: accordingly he wrote his praises and those of his brother Joseph; he wrote on the birth of Eugène's children, and on the second marriage of Napoleon himself: he was, in fact, court poet to the whole dynasty. He did not remain unrewarded: he was made a knight of the iron crown and of the legion of honour; he received another decoration and a pension from Murat; and he became also, what he really deserved to be, a member of the Institute of the kingdom of Italy. He enjoyed quietly his honours till 1814, when another 'northern storm' again came to disturb the good people of Milan. Monti was now growing old, and, accustomed to political vicissitudes, he bowed to the new conquerors. Being requested by the authorities to write something for the imperial dynasty of Austria, he complied, and sang the praises of the 'just and pacific government of Francis,' in two short dramatic pieces: one in May, 1815, on the occasion of the archduke John of Austria receiving the oath of the Lombard authorities; another in January, 1816, on the occasion of a visit of the emperor himself to Milan. His pension was continued to him by the Austrian government, and he remained at Milan. After the marriage of his only daughter with Count Perticari of Pesaro, both father and son-in-law engaged in a philological work, entitled 'Proposta di alcune correzioni ed aggiunte al Dizionario della Crusca,' which became the signal of a paper war between the Tuscan and the Lombard literati, or rather between the ultras of both parties, the Crusca and the Anti-Crusca. [CRUSCA, ACCADEMIA DELLA.] Monti's 'Proposta' is valuable, not only as a supplement to the Italian Dictionary, but as a store of erudition: it contains several disquisitions or essays upon questions connected with philology and history.

Monti was a classicist, and, as such, waged war against the 'Romantici,' as they are called, or that school of writers who have undertaken to modernise the literature of Italy. In one of Monti's latest effusions, 'Sermone sulla Mitologia,' we find condensed, in elegant verse, Monti's creed concerning poetical composition. He exclaims against the 'northern school,' that has 'decreed the death of all the gods of Olympus.' Monti pleads for mythology and classicism like an able advocate in a weak cause; but when he says that under the new or romantic school every object in nature becomes inanimate and unimpressive; that the sun is degraded to a mere huge immoveable disk of fire; the sea is nothing more than a deep excavation, filled with slimy unseemly monsters; that all creation, in short, becomes divested of poetry,—he speaks as a prejudiced partisan; he forgets that there are beauties in nature older than and independent of the fictions of mythology; he forgets the magnificent poetry of the Old Testament; he forgets the poetry of Shakspere and Ariosto; he forgets that of his own 'Basvilliana,' the most splendid of his works; he forgets that even his favourite authors, Dante and Tasso, besides numerous others, have painted the sea, the firmament, and the fields of the earth in the most poetical colours, without having recourse to Phœbus and Thetis, to Dryads and Fauns.

Monti may be considered as the last of a list of writers who form the connecting link between the old and modern literature of Italy. He was the contemporary of Alfieri, Parini, Pindemonte, Foscolo, and, in the latter part of his career, of Manzoni. With these his name will go down to posterity for his truly poetical genius, his feeling of beauty, and the fluency and harmony of his verse.

Monti died at Milan, in October, 1828. His works were collected and published at Bologna, in 8 vols. 12mo., 1828; and another edition of his choice works, including some inedited ones, was published in 5 vols. 8vo., Milan, 1832.

MONTICULARIA, Lamarck's name for a genus of lamelliferous corals. [MADROPHYLLIÆA.]

MONTLIVALTIA. [MADROPHYLLIÆA.]

MONTMARTRE. [PARIS.]

MONTMEDY. [MEUSE.]

MONTMIRAIL. [MARNE.]

MONTMORENCY, the name of an old and illustrious French family, so called from the little town of the same name situated a few miles north of St. Denis near Paris. The oldest of this family on record is Bouchard de Montmorency, who lived about A.D. 950, and was one of the great feudal lords of his time. He married Hildegarde, daughter of Thibaud count of Chartres and Blois. His son Bouchard II., was one of the principal lords of the court of king Robert about the year 1000. Matthew I., lord of Montmorency, was high constable of France under Louis the Young; he married Aline, a natural daughter of Henry I. of England, and died in 1060. His grandson Matthew II. of Montmorency, was the friend of Louis VIII., and the chief support of his government, and of that of queen Blanche, during the minority of Louis IX. The lord of Montmorency ranked as first baron of France, and was styled first baron of Christendom. The family afterwards became divided into several branches, one of which, though not the eldest, obtained the ducal title from Henri II. of France in 1551. The first who bore the title of duke was Anne de Montmorency, marshal and high constable of France, who distinguished himself in the wars of Francis I., was in great favour with his successor Henri II., but after his death was set aside by Catherine de' Medici and the Guises, was recalled to court in 1560, fought against the Calvinists, was mortally wounded at the battle of St. Denis, in November, 1567, and died three days after, at his house in Paris, at seventy-four years of age. He was a brave but ferocious warrior, was totally illiterate, and yet, through his natural talent and the experience of a long life, he was an able statesman and counsellor. His grandson Henri II., duke of Montmorency, marshal of France, fought with distinction under Louis XIII., but being dissatisfied with Richelieu, he conspired and revolted in Languedoc in favour of the duke of Orleans. He was seized, tried, and beheaded at Toulouse in October, 1632. The house of Montmorency continues to this day in several of its branches, namely the princes of Montmorency, the dukes of Laval Montmorency, and the Montmorency dukes of Luxembourg. (Moréri, *Dictionnaire; Almanach de Gotha.*)

MONTMORILLON. [VIENNE.]

MONTPELLIER, a town in France, capital of the department of Hérault, situated near the little river Les, which flows into the Mediterranean, in 43° 36′ N. lat. and 3° 53′ E. long.; 368 miles in a direct line south by east of Paris; 436 miles by the road through Nevers, Moulins, Clermont, Mende, and Anduze; or 483 miles through Sens, Auxerre, Lyon, Valence, Le Pont St. Esprit, and Nîmes.

Montpellier was built in the tenth century to replace the episcopal town of Maguelone, which stood on an island in a neighbouring lake, and had been destroyed by order of Charles Martel for favouring the Saracens. The town consisted at first of two parts, Montpellier (antiently Montpeslier) properly so called, and Montpellieret, or Montpeslieret: the first was fortified. The two have since grown together, and now form one city. Montpellier had at an early period lords of its own, who distinguished themselves in the crusades and other wars against the Mohammedans in the eleventh and twelfth centuries. In the twelfth century the town was one of the chief commercial stations of France. Benjamin of Tudela (who Hebraizes the name, מָנפּשלייר) thus describes it:—'It is a place well adapted for trade, and is distant about two leagues (פרסאות, which the editor translates 'parasangæ') from the sea. Hither, on account of trade, very many both Christians and Mohammedans resort from every quarter: from Algarve (or perhaps Algier, אלערוה;), from Lombardy, and other parts of Italy; from Egypt, and Palestine, and Greece, and France, and Spain, and England; and some may be found there from people of every tongue, together with the Genoese and Pisans.' Benjamin mentions that many learned men (Jews, as their names show) were settled there; and also many wealthy men, who granted aid and protection to those who resorted to them. (Elzevir edit. A.D. 1633.)

The lordship of Montpellier was at this time in the hands of the kings, first of Aragon, and subsequently of Majorca, a younger branch of the same house. These princes held their lordship immediately of the bishops of Maguelone, who divided with them the jurisdiction of the city, under the suzerainty of the kings of France. The portions both of the bishop and the king were alternately united to the French crown; the first in the reign of Philippe IV. le Bel (A.D. 1293), by purchase; the second in the reign of Philippe VI. de Valois (A.D. 1349), also by purchase. The lordship was subsequently conferred on Charles le Mauvais, king of Navarre (A.D. 1371), in exchange for certain lordships ceded by him to the king of France; but on the forfeiture of that king's domains for treason (A.D. 1378), it was re-united to the French crown. A sedition, excited by the severity and exactions of the duke of Anjou, the king's brother and lieutenant, was suppressed (A.D. 1379), and the city, after one brief alienation of fifteen months, was permanently united to the domains of the crown.

In A.D. 1538 the bishopric of Maguelone was transferred to Montpellier. Montpellier came into the hands of the Huguenots in the reign of Henri III., and they, having organised it as a municipal republic, retained possession of it until the crushing of the reformed party by Richelieu, under Louis XIII. Montpellier, after enduring a long siege, surrendered to the king (A.D. 1622). Louis XIII. ordered the construction of a citadel to retain the place in subjection.

Montpellier is situated on an eminence, from which there is an extensive prospect over the Mediterranean and the adjacent coasts, extending on one side to Mont Ventoux, in Provence (not to the Alps, as some authorities state), and on the other to Le Canigou, one of the summits of the Pyrenees. It is only however in very clear weather that these extreme points can be seen. Montpellier is surrounded by antient and now ruined walls of freestone. The citadel is of little strength; it is however well kept up, and has a good parade. The streets are narrow, crooked, and steep; but the houses, which are almost all of stone, are substantially built, though not handsome, except in the newer parts. Most of the places or squares are small and of irregular form; the public fountains are numerous, but none of them are remarkable for propriety of design or excellence of workmanship. There are two promenades, the esplanade between the walls of the town and the ramparts of the citadel, and the Peyrou, a terrace planted with trees and covered with turf, and raised ten or twelve feet above another terrace, forming an exterior walk. On the upper terrace are a bronze equestrian statue of Louis XIV., and an hexagonal tower adorned with columns, enclosing a reservoir supplied with water by a fine modern aqueduct about five miles long. The water from this reservoir falls in a cascade over artificial rocks, and supplies the various fountains of the city. The cathedral presents little that is worthy of notice, except a picture in the choir of the fall of Simon Magus, by Sebastian Bourdon, who was a native of Montpellier. The former amphitheatre of St. Côme, now the Exchange, is adorned with a handsome Corinthian portico, and is perhaps the handsomest building in the city. The modern anatomical theatre is a fine building, and the gate of Peyrou, a triumphal arch opening on the promenade of Peyrou, is also handsome; but the other public buildings, as the former episcopal palace (now occupied as a medical school), the court-house, the prefect's house, &c., are of ordinary appearance.

The population of Montpellier, in 1831, was 33,954 for the town, or 35,825 for the whole commune; in 1836 it was 35,506 for the commune. These enumerations are, we believe, exclusive of the students and other strangers, who are attracted to Montpellier by its literary advantages, or by the high repute which the city enjoys for the beauty of its situation and the healthfulness of its air. The manufactures of the place are considerable, and trade is prosecuted on a large scale. There were, in 1816, eight banking-houses. Liqueurs, perfumery, preserves, dried fruits, verdigris, alum, cream of tartar, vitriol and aquafortis, woollen cloth, muslins, coloured cottons, calicoes, table linen, cotton handkerchiefs, cotton counterpanes, blankets, hosiery of silk, cotton, or wool, hats, leather, corks, and paper, are manufactured; and these various articles, with the wool, wine, brandy, oranges, citrons and other fruits, and oil of the surrounding districts, furnish the chief articles of trade. The verdigris of Montpellier is in particular repute; it is chiefly made by females. There are several printing-offices, sugar-houses, potteries, and oil-mills, a paper-mill, and a saw-mill. Cette is the port of Montpellier, and there are ready communications with Narbonne, Carcassonne, Nîmes, Avignon, and other cities of the south of France.

Montpellier is the seat of a bishopric, the diocese of which comprehends the department of Hérault: the bishop is a suffragan of the archbishop of Avignon. It has a Cour Royale, the jurisdiction of which extends over the departments of Aude, Aveyron, Hérault, and Pyrénées Orientales, and an Académie Universitaire, whose circuit is coincident with the jurisdiction of the Cour Royale. There are a subordinate court of justice, a court for commercial causes, a board of trade, and several fiscal and administrative government offices. Montpellier is the head-quarters of the ninth military division, which comprehends the departments of Ardèche, Gard, Lozère, Hérault, Tarn, and Aveyron. There are barracks and some military offices, several prisons, a house of correction for eight departments, with suitable workshops, and a charitable institution for the benefit of the prisoners.

There are, besides the cathedral, seven Catholic churches, a Protestant church, and a Jews' synagogue, four hospitals, one of which is for foundlings, and another for the insane. These hospitals, as well as the house of correction, are remarkable for their excellent management. The mont-de-piété is remarkable for advancing money upon pledges without interest. There are two Protestant Bible Societies, one of them for each sex.

Montpellier has a number of institutions for educational and scientific objects. There are the faculties of science and medicine connected with the Académie Universitaire; also a college or high school. The school of medicine of Montpellier, one of the most eminent in Europe, owes its establishment to the Moorish or Arab physicians driven out of Spain by the Christians (A.D. 1180), and received here by the lords of Montpellier. From its first establishment it has been much resorted to. Several eminent physicians and surgeons have been born in this city, and others have here received their education: among the latter are Chirac and Barbeyrac, and the chemist Chaptal. There are attached to this school a library and a museum of natural history, and a collection of anatomical models in wax. The chair of the professor of anatomy is a fine marble antique, brought from the ruins of the amphitheatre at Nîmes. There are special schools of pharmacy and veterinary medicine, schools of engineering, drawing, architecture, practical geometry, and music; societies of the sciences and arts, of practical medicine, and of agriculture; a museum of painting and sculpture, containing some specimens of the first masters. There is a botanic garden, one of the four in France designed for naturalising foreign plants, and the first for that purpose established in France. It contains more than eight thousand plants, an orangery, and a hot-house for tropical plants.

Cambacères and the historian Daru were natives of Montpellier.

Montpellier offers many attractions to strangers; numerous cafés, excellent inns, public baths, and a theatre where the performances are constant; to which may be added the beauty of the situation. The air is purer and less scorching and stifling than at Marseille. Flies are less troublesome, and the keen blasts of the Mistral are less felt.

The arrondissement of Montpellier has an area of 780 square miles, and comprehends 116 communes. It is divided into 14 cantons or districts, each under a justice of the peace. The population, in 1831, was 120,051; in 1836 it was 123,656.

MONTREAL, one of the five districts into which the province of Lower Canada is politically divided. [CANADA.] It comprises nineteen out of the forty counties of the province, and its comparative importance will further appear from the fact that, of 511,917 inhabitants returned in the provincial census of 1831, there were 290,050, or very nearly three-fifths, living in the district of Montreal. Of this number about four-fifths were Roman Catholics, and principally of French origin. The number of inhabited houses existing in the district at that time was 48,323: the extent of land in occupation was about 2,500,000 acres, only one-half of which was then brought under profitable cultivation. The area of the district is 44,711 square miles, upwards of 28 millions of acres, or about 6000 square miles less than the area of England. There has been no account of the population taken since 1831; but calculating from the number of births and deaths, and the amount of emigration during the next five years, it was estimated that the population of the district amounted, in 1836, to 323,173.

MONTREAL, an island in the river St. Lawrence, situated 580 miles from the mouth of that river, at the point of its confluence with the Ottawa. This island is of triangular shape, about 32 miles long and 10½ miles broad. Its surface is low and flat at the western side, where it is subject to frequent inundations; but the level rises gradually towards the east, till it forms a ridge, whereon the upper part of the city of Montreal is built, at the height of 600 feet above the sea. This island forms one of the nineteen counties into which the district is divided, and is a seigniory, which was formerly vested in the seminary of St. Sulpice at Paris, but is now held by a resident religious body under that name, which supports one of the public institutions of the city of Montreal. The population of the island, in 1831, was 43,773, including 27,297, the inhabitants of the city.

MONTREAL, the City of, second in importance only to Quebec in the province of Lower Canada, is built on the south side of the island, in 45° 31′ N. lat. and 73° 34′ W. long. It was founded in 1640, under the name of Villemarie, on the site of an Indian village called Hochelaga, and very soon came to be a place of some importance. It is now divided into nine parishes; the streets are wide and airy; the principal streets run either parallel to the river or at right angles to it. A great proportion of the houses are large and of handsome elevation, built with a greyish stone; the roofs are all covered with sheet-iron or tin plates. The population is estimated at present to exceed 35,000. One of the streets, Rue Notre Dame, is 1344 yards long and 30 feet wide. In this street are the principal public buildings; among others the Hôtel-Dieu, occupying a frontage of 324 feet, with a depth of 468 feet, the seminary of St. Sulpice, and the convent of Notre Dame. The Catholic cathedral, the English church, the Montreal General Hospital, the *Hôpital Général des Sœurs Grises*, and the new college, are also worthy of notice.

Montreal is a place of great trade. In the year 1836 there entered and cleared from the port the following amount of shipping:

	Inwards.		Outwards.	
	Ships.	Tons.	Ships.	Tons.
From and to Great Britain	73	19,410	68	18,444
From and to other British colonies . . .	23	2,392	31	3,457
From and to the United States of North America	—	—	—	—
From and to Foreign countries . . .	2	487	—	—
	98	22,289	99	21,901

The harbour is small, but while the river continues open, it is always secure. Ships drawing 15 feet water can receive and discharge their cargoes close to the shore. The harbour was formerly difficult of approach, owing to the rapid of St. Mary about a mile below the city, which is so strong, that, with light or contrary winds, it was not possible to stem it; but this difficulty is now overcome by the employment of steam-tug vessels. Montreal was formerly the head-quarters of the North-West Company. [FUR TRADE.]

MONTREUIL. [PAS DE CALAIS.]

MONTROSE. [FORFARSHIRE.]

MONTROSE, JAMES GRAHAM, MARQUIS OF, born in the year 1612, was descended from one of the most antient families in Scotland. His grandfather, John, third earl of Montrose, was some time lord high chancellor of Scotland, and afterwards appointed vice-roy of the kingdom—'supremus regni Scotiæ procurator'—for life; and he succeeded his father, John, fourth earl of Montrose, in 1626, being then just fourteen years of age. The following year he was served heir to his father in his several estates in the counties of Dumbarton, Forfar, Linlithgow, Perth, and Stirling. He married soon after, and then went on foreign travel till about 1633, when, at the age of twenty-one, he returned to Scotland, with the reputation of being one of the most accomplished gentlemen of his time. He was probably present at the coronation of King Charles I., which took place in the above year, though he does not appear to have immediately taken any prominent part in the quarrel of which that splendid ceremonial was the commencement. He soon joined the popular party however in opposing the canons and other arbitrary innovations of the court on the established religion of the country; and on the 15th November, 1637, when the celebrated *Tables* were made up, that is to say, committees for managing the popular cause, his name was added to the table of the nobility, to the great dismay of the bishops, who, according to Guthrie, 'thought it time to prepare for a storm when he engaged.' He was indeed the most ardent and zealous of his party, displaying at times a heat and enthusiasm which set form and gravity at utter defiance. Such was his behaviour on occasion of the king's proclamation approving of the 'Service Book.' On that occasion Montrose stood for some time beside Johnston, while the latter was reading a protestation in name of the Tables, but at length, that he might see the whole crowd, he got up upon the end of a puncheon, which made his friend the earl of Rothes say, 'James, you will never be at rest till you are fairly lifted up above your fellows;'—a remark uttered in mere jest, but recorded with great solemnity by Gordon of Straloch, who adds that the prophecy was 'accomplished in earnest in that same place, and some even say that the same supporters of the scaffold on which it occurred were made use of at Montrose's execution.' In the preparation of the National Covenant, which was projected by the Tables, Montrose was also a leading actor; and in swearing and imposing it on individuals there was none more zealous than he. This course of conduct, springing from the natural ardour of his temper, continued for some time: till at length, conceiving his importance and military talents undervalued by the Covenanters when Argyle and Lesly were allowed to lead, the one in the senate, the other in the field, Montrose determined on going over to the king. With that view he entered into a secret correspondence with Charles, but this being detected, the Covenanters threw him into prison, where he was when Charles made his second visit to Scotland. This took place in the year 1641; and as the principal object of the royal visit was to gain the Scots over to his interest, Charles made various concessions, and Montrose was set at liberty with his adherents in the beginning of the year 1642. From that time he retired to his own house in the country, living privately till the spring of 1643, when the queen returning from Holland, he hasted to wait on her majesty at Burlington, and accompanied her to York. He embraced this opportunity to urge on the queen, as he had formerly done on the king, what he termed the dangerous policy of the Covenanters, and with the impetuosity natural to his character, solicited a commission to raise an army and suppress them by force of arms. The marquis of Hamilton however thwarted him for the present, and he returned home; but neither his ceaseless activity, nor his deadly hatred against the party with whom he had formerly acted, and particularly against their leaders, whose recent imprisonment of him had fired his indignant spirit to revenge, and who filled the place which his ambition had long aimed at, could be laid asleep. Accordingly he took another opportunity of waiting on the king with his proposals on behalf of his majesty, by whom he was favourably received; and at length, in the month of April, 1644, he was created Marquess of Montrose, and constituted captain-general and commander-in-chief of all the forces to be raised in Scotland for the king's service under prince Rupert. The royal arms were for some time unsuccessful however, and the prince seems to have regarded Montrose in no other light than that of a fearless but somewhat wrong-headed enthusiast. Montrose's counsels indeed were almost always of a desperate character, and no failure ever destroyed his confidence of ultimate success. His army was reinforced from all quarters, its attacks were desultory and violent, and its progress was marked by depredation and waste. At Tippermuir, a wide field about five miles from Perth, where Montrose came in sight of the enemy, upwards of 6000 in number, drawn up in one long line, with horse at the flanks, the Covenanters' horse were overpowered, according to Wishart, by a shower of stones. The result was fortunate: the flight of the horse threw the ill-disciplined foot into irremediable confusion, numbers were killed through fatigue and fear, and the whole of the artillery and baggage of the vanquished fell into the hands of Montrose and his men; and the defeat of Tippermuir was but the beginning of a series of conquests, which laid all Scotland open to the victorious Montrose. The last of the series was the battle (or rather, massacre) of Kilsyth, fought in the month of August, 1645. On this occasion Montrose had the advantage of selecting his ground with deliberation, whereas the Covenanters, on the other hand, came up after a toilsome march, and were even ordered to remove from their first position in the very presence of the enemy. While this change was taking place, Montrose cast his eye upon a company of cuirassiers, and, pointing them out to his men as 'cowardly rascals cased in iron,' he threw off his coat and waistcoat, tucked up the sleeves of his shirt, and drawing his sword with ferocious resolution, cried out, 'Let us fight the fellows in our shirts.' The example was instantly copied by the enthusiastic and sanguinary troop, and, falling upon the enemy before they had taken up the places assigned them, the battle which ensued became a mere massacre—a race of 14 miles, in which 6000 of the Covenanters, if we are to believe the royalists, were cut down and slain. Montrose now carried such of his men as would accompany him to the borders, presuming on the continued success of his arms. He was however mistaken: at Philiphaugh, near Selkirk, he was surprised by General Lesly on the 13th September, 1645, and upon the panic-struck royalists was that day inflicted a fearful retaliation for their previous enormities. Montrose regained the Highlands with a few followers, but was perfectly unsuccessful in all his endeavours to excite sympathy towards either his person or cause; and on the king's surrender to the Scots, Montrose capitulated, and was permitted to embark in a small vessel for Norway, on the 3rd September, 1646. On this occasion he put on the disguise of a menial, and passed for the servant of his chaplain. When on the Continent at this time he had the offer of the appointment of general of the Scots in France, lieutenant-general in the French army, and captain of the gens d'armes, with an annual pension besides his pay; but he declined all appointments, saying he wished only to be of service to his own sovereign.

He remained abroad till the accession of King Charles II., when he received a commission for a new invasion of his native country. Accordingly, selecting the remote islands of Orkney for his rendezvous, he despatched thither a part of his troops, consisting of foreign auxiliaries, in the month of September, 1649; and in the month of March following, he himself arrived there. In their very first encounter with the enemy however on the mainland, his forces were utterly routed; and after some time, he himself was discovered on foot in the disguise of a Highland rustic. In this condition he escaped to the house of McLeod of Assint, by whom he was delivered up to General Lesly, and then conducted towards Edinburgh in the same mean garb in which he was taken; but in Dundee a change of raiment was allowed him. His reception in the capital was that of a condemned traitor, sentences of excommunication and forfeiture having been pronounced by the General Assembly and parliament so far back as the year 1644; and many barbarous indignities were heaped upon him. But throughout, his dignity remained undiminished, and he now excited a sympathy which had never before been felt for him. He received sentence of death with the same firmness; and on Tuesday, the 21st May, 1650, the sentence was executed upon him: he was hanged on a gibbet 30 feet high, and his limbs, after being severed from his body, were affixed to the gates of the principal towns in the kingdom. 'Thus perished,' says Laing (*Hist. of Scotland*, b. 6), 'at the age of thirty-eight, the gallant marquis of Montrose, with the reputation of one of the first commanders whom the times had produced. He excelled in military strategems, but his talents were rather those of an active partisan than of a great commander, and were better fitted to excite and manage a desultory war than to direct the complicated operations of a regular campaign. His genius was great and romantic, approaching the most nearly (in the opinion of Cardinal de Retz) to that of the antient heroes of Greece and Rome. But his heroism was wild and extravagant; prone to vast and desperate enterprises, without consulting the necessary means; actuated rather by passion than by virtue, by prejudices rather than by regulated principles; and it was less conspicuous during his life than from the fortitude with which he sustained an ignominious death.' He retained his heroism and self-possession to the last.

On the Restoration, King Charles II. reversed the sentence of forfeiture which had been passed by the parliament; and his scattered remains were collected and buried with great solemnity in the cathedral church of St. Giles, Edinburgh.

MONTSERRAT, one of the Lesser Antilles, is about 22 miles south-west from Antigua, and about the same distance north-west of Guadaloupe. The island is about 12 miles long from south-east to north-west, and about 7 miles broad.

Montserrat was discovered by Columbus, and received this name from him in consequence of its resemblance to a mountain of the same name near Barcelona, and as being descriptive of its appearance, that of a broken mountain. The first settlement was made on it in 1632, by the English under Sir Thomas Warner. It was taken from the English in 1664 by the French, but was restored at the peace of Breda, and has since continued in the possession of the English. The island is of volcanic origin; the mountains are in many places quite inaccessible, and separated from each other by almost perpendicular chasms, which, with the sides of the mountains, to their summits, are clothed with a luxurious vegetation, including both lofty trees and tropical shrubs. On the south-west side, in a dell formed by the junction of three conical hills, and at a height of 1000 feet from the level of the sea, is a souffrière, or boiling sulphurous spring.

The town of Plymouth is situated on the south-west side of the island, in 16° 42′ N. lat. and 62° 19′ W. long. It is small, but well built. The shipping lies off the town in an open roadstead. There is indeed no harbour or bay on any part of the shore, and it is hazardous for ships to remain at the island during the hurricane months. A heavy surf beats constantly on the shore, and it requires some skill on the part of those who manage the boats to land or embark with safety. For conveying produce and goods to and from the ships, a peculiar kind of boat, called a Moses boat, is used.

The island is esteemed to be so healthy, that it has acquired the name of the Montpellier of the West. The average mortality of the troops stationed there is found to be far less than is experienced in any other of the West India stations.

The population in 1834 was as follows:—

	Males.	Females.	Total.
Whites . . .	140	149	289
Free Blacks . .	412	562	974
Apprenticed negroes .	2,827	3,155	5,982
	3,379	3,866	7,245

Montserrat is a dependency of the island of Antigua, but has a separate legislature of its own, consisting of eight members of the House of Assembly, two of whom are returned from each of the four districts into which the island is divided, and six members of council. The settlers are mostly Irish, or the descendants of Irishmen.

The island produced for exportation in 1836, 11,586 cwt. of sugar, 33,300 gallons of molasses, 17,930 gallons of rum, and 300 lbs. of cotton.

At the distance of about three leagues to the north-west, and between Montserrat and Nevis, is a high, round, barren, and uninhabited rock, to which the name of Redonda has been given; it may be seen at a distance of nine or ten leagues.

MONTUCLA, JEAN ETIENNE, was the son of a merchant at Lyon, in which city he was born, 5th September, 1725. At the age of sixteen he became an orphan, and his grandmother, who had been left guardian of his education, died shortly afterwards. At the Jesuits' College of Lyon his attention was chiefly directed to the study of the antient classics, although a decided taste for philological pursuits in general, assisted by a peculiarly retentive memory, enabled him to become acquainted with several of the modern languages, among which the Italian, English, Dutch, and German are mentioned as those with which he was more particularly conversant. At this college also, under Le Père Béraud, the subsequent tutor of Lalande, he attained to considerable proficiency in those sciences of which he was afterwards the historian.

From Lyon he went to Toulouse, in order to qualify himself for the legal profession, and having taken the usual degrees, he thence proceeded to Paris.

At the public libraries of that metropolis, and at the scientific soirées of M. Jombert, he made the acquaintance of Diderot, D'Alembert, Cochin, Lalande, and others. To his intercourse with D'Alembert in particular, he probably owed much of his mathematical knowledge; and Lalande, if he did not suggest a history of the mathematical sciences, at least gave him considerable encouragement to carry out the design when once it had been formed. In 1754 he published in 12mo. anonymously, the 'History of the Researches for determining the Quadrature of the Circle,' to which was appended 'An Account of the Problems of the Duplication of the Cube, and the Trisection of an Angle.' A second edition of this work appeared in 1831, in 8vo., edited by Lacroix. The following year (1755) he was admitted a member of the Academy of Berlin; and in 1758 he published, in two volumes 4to., the first part of the 'History of the Mathematics.' After this he began to be employed by the government; first, as intendant-secretary at Grenoble, where he became acquainted with the family of M. Romand, whose daughter he married in 1763; and then (1764), as secretary and astronomer royal to the expedition for colonising Cayenne. Upon his return to France the following year, he obtained, through the instrumentality of his friend Cochin, the situation of 'premier commis des bâtiments,' the duties of which he discharged most assiduously for twenty-five years. To the above appointment was added the honorary one of censor royal of mathematical books. His leisure was devoted to the education of his family and to scientific pursuits, but the latter he is said to have conducted with extreme secrecy, lest he should be suspected of neglecting his official duties. In this way he edited, in 1778, a new and greatly improved edition of Ozanam's 'Mathematical Recreations,' in 4 vols. 8vo., and so carefully had he concealed his connection with the work, that a copy was forwarded to him, in his capacity of censor, for examination and approval. The income he derived from his situation under the government, though small, was sufficient for the immediate wants of himself and family, but by the events of the Revolution he lost his situation, and was left little short of destitute.

In 1794 he was employed in forming an analysis of the treaties deposited in the archives of the foreign department, and about the same time he was nominated professor of mathematics to one of the central schools of Paris, but his health not permitting him to fill the appointment, a situation in the 'Jurés d'Instruction' was assigned to him. In 1798 he published a second edition of the first part of his 'History of the Mathematics,' in which he introduced many improvements and augmentations. With the exception however of the profits, if any, which he may have derived from this work, his only resource for two years, from which he could provide for his family, was an insignificant situation in the office of the National Lottery. Upon the death of Saussure, in 1799, the minister Neufchâteau conferred upon him a pension of 2400 francs, which he lived but four months to enjoy. He died on the 18th of December, 1799. His modesty and benevolence were no less conspicuous than his erudition and the smallness of his fortune. When Lalande, deputed by the Academy, offered him some situation in that society, he declined the honour on the ground of incompetency.

Before his decease he had occupied himself with the second part of his History. The completion of the work was confided to Lalande, who, with the assistance of several scientific individuals, among whom was Lacroix, published the remaining two volumes in 1802. The whole work is divided into five parts, and these are subdivided into books and chapters. Part I. contains the History of the Mathematics up to the destruction of the Grecian empire. Part II. comprises the History of the Sciences among the Arabs, Persians, Jews, Indians, Chinese, and other Oriental nations. Part III. contains the History of the Sciences among the Latins and the Western nations up to the commencement of the seventeenth century. These three parts form the first volume. Part IV., forming the second volume, and comprehending the History of the Sciences during the Seventeenth Century, is divided into nine books, namely, 1, Progress of Geometry, as treated after the manner of the Antients; 2, Progress of Analytical Geometry; 3, Progress of Mechanics about the middle of the Seventeenth Century; 4, Progress of Optics about the middle of the Seventeenth Century; 5, Progress of Astronomy during the Seventeenth Century; 6, Rise and Progress of the Differential and Integral Calculus in the latter part of the Seventeenth Century; 7, Progress of Mechanics during the same period, 8, Progress of Optics during the same period; 9, Progress of Astronomy during the same period. The remaining two volumes form the fifth part. It comprises the History of the Sciences during the greater part of the Eighteenth Century, and is likewise divided into nine books, namely, 1, Geometry and Analysis; 2, Optics; 3, Analytical Mechanics; 4, Practical Mechanics and Machines; 5, Plane Astronomy; 6, Physical Astronomy; 7, Astronomical Tables, Instruments, Observatories, &c., and Judicial Astrology; 8, Progress of Navigation, as regards the Construction and Management of Vessels; 9, Progress of Navigation as regards the Piloting of a Vessel and the determination of its Geographical Position. The work concludes with a series of supplements on the Capstan; on the History of Geography; on that of the Quadrature of the Circle; on the History of Music; a defense of the Philosophers of Antiquity; Notice concerning the Calculus of Derivations by Arbogast; and a short notice of the Life of Montucla.

As a whole it contains treatises upon almost every branch of the pure and applied sciences, and abounds with interesting details concerning the various discoveries and improvements which have contributed to their progress. Bonnycastle, speaking of Montucla, in his preface to the translation of Bossut's 'History of the Mathematics,' justly remarks—'If he be not so profound as some other writers, he is frequently less obscure, and may often be consulted with advantage upon points where the original writers would be nearly unintelligible to common readers; in short, there is perhaps no work which is capable of affording more pleasure and instruction to those who propose to devote themselves to those studies, or which is likely to create a more earnest desire to prosecute them.' On the other hand it may be said that the subjects treated of do not succeed each other in so elementary and natural an order as might be wished, and that the language is sometimes excessively diffuse, and burthened with much repetition.

(*Notice Historique lue par Auguste-Savinière le Blond à la Société de Versailles, le* 15 *Janvier*, 1800, 8vo.; *Biog. Universelle;* Hutton's *Mathematical Dictionary*, &c.)

MONZA. [MILANO, PROVINCE OF.]

MOOD, or MODE. [VERB.]

MOOLTAN. [HINDUSTAN, vol. xii., p. 221.]

MOON (Latin *Luna*, Greek σελήνη, sĕlēnē), the satellite of the earth, a heavenly body which moves round the earth, sharing the motion of the earth round the sun.

In a day or two (depending on the state of the weather) from the time called in the almanacs 'the new moon' a thin silver crescent is seen with its horns turned from the sun and placed to the eastward of the sun, after which it soon sets. Its distance from the sun increases, the horns at the same time growing fuller, until, in 7¼ days, it is at ninety degrees (or as far as from the horizon to the zenith) distant from the sun, and the crescent has become a semicircle of white light. The distance still increases, until the moon is 180° distant from the sun, or in the opposite part of the heavens, by which time the light part has become a full circle: this happens in somewhat more than 14½ days from the new moon. The satellite still continues its revolution among the stars, becoming westward of the sun after the full moon, and, decreasing by the same steps as it increased, is lost a day or two before the time which the almanacs point out as the next new moon. The whole of this process takes up what is called a *lunation*, or a *lunar month:* the lunar months are slightly unequal, but their average period is 29 days, 12 hours, 44 minutes, $2\frac{9}{10}$ seconds, or 29·5305887215 mean solar days. To show the irregularity of the lunations, we give the times of all the new moons which take place in the years 1838 and 1839, with the intervals.

1838.	h.	m.		Excess of Interval over 29 days. h.	m.	1839.	h.	m.		Excess of Interval over 29 days. h.	m.
Jan. 26	1	52	A.M.			Jan. 15	2	53	P.M.	14	30
Feb. 24	0	8	P.M.	10	16	Feb. 14	3	28	A.M.	12	35
Mar. 25	9	45	P.M.	9	37	Mar. 15	2	13	P.M.	10	45
Apr. 24	7	1	A.M.	9	16	Apr. 13	11	18	P.M.	9	5
May 23	4	23	P.M.	9	22	May 13	7	10	A.M.	7	52
June 22	2	34	A.M.	10	11	June 11	2	42	P.M.	7	32
July 21	2	22	P.M.	11	48	July 10	11	1	P.M.	8	19
Aug. 20	4	26	A.M.	14	4	Aug. 9	9	19	A.M.	10	18
Sept. 18	8	45	P.M.	16	19	Sept. 7	10	21	P.M.	13	2
Oct. 18	2	25	P.M.	17	40	Oct. 7	2	13	P.M.	15	52
Nov. 17	8	2	A.M.	17	37	Nov. 6	8	11	A.M.	17	58
Dec. 17	0	23	A.M.	16	21	Dec. 6	3	1	A.M.	18	50

It appears then not only that the lunar month varies, but that there is no yearly cycle of variation. Before however we make any remark on the preceding, we shall place by its side materials for confidence in the almanac from whence the preceding times were quoted. Taking at hazard a volume of astronomical observations, and opening the part where the results of the lunar observations are found, we took the first right ascensions [ASCENSIONS] of the moon which we came to, opposite to which, for comparison, were written the predicted right ascensions of the moon for the same times. The dates matter nothing, since it is only the accordance of prediction with observation which is to be noticed. (*Camb. Obs.*, 1835, p. 128.)

Predicted R.A. h.	m.	s.	Observed R.A. h.	m.	s.	Difference.
14	23	57·87	14	23	57·61	26-100ths of a second.
23	1	59·84	23	1	58·55	1^{s} and 29-100ths.
4	56	13·31	4	56	14·01	7-10ths of a second.
18	7	40·74	18	7	40·50	24-100ths of a second.

The lunar theory then, resting upon the Newtonian doctrine, enables astronomers to find the position of the moon within a part of the heavens answering to a second of diurnal revolution, while the rough observations with which astronomy must always commence would not give the length of a lunation within an hour.

Taking the lunar phenomena in the order of discovery, we next notice that this planet writes its mark on the earth in terms which have been understood from the earliest ages of astronomical inquiry. The alternate rise and fall of the waters, called the *tides*, is found to follow its motions, so that high water is always found to succeed the time when the moon comes on the meridian, whether on the visible or invisible side of it. At first sight it would appear that there is high water twice a-day (that is, in the common solar day), but it is found on further examination that the interval between high water and high water is a little more than twelve hours; so that in the year 1838 that phenomenon occurred only 705 instead of 730 (twice 365) times. Now the motion of the moon round the heavens is found to take place (one time with another) in 27·32166142 solar days (we shall presently see why this is not a lunation), which gives 13° 10′ 35″ increase of right ascension in each solar day, or 13° 8′ 23″ in a sidereal day, or actual revolution of the earth. Hence the meridian of the spectator, between two times at which the moon is on the visible side of that meridian, must make so much more revolution as is necessary to overtake a body which revolves through 13° 8′ 23″ while it revolves through 360°; which gives $24^{h}\ 55^{m}$ of a revolution of the earth for each lunar day, or $12^{h}\ 27\frac{1}{2}^{m}$ for its half. Now the year contains 366¼ *sidereal* days, or simple revolutions of the earth; and it will be found that $12^{h}\ 27\frac{1}{2}^{m}$ is contained 705 times and a fraction in $366\frac{1}{4}^{d}$. As every reader may not be acquainted with the distinction of sidereal and solar time, we may here simply state (referring to SUN and TIME for detail) that the common day is not the simple revolution of the earth, but includes the additional time in which the meridian overtakes the sun, which has moved forward about a degree. Thus it appears, that even on a single year the coincidence of half a lunar day and the interval between two times of high water is sufficiently apparent. It may be said that we have assumed the question by counting the times of high water from an almanac constructed on the supposition which we wished to establish. This would be true if we had talked of the year 1840; but we may consider an almanac for 1838 as now a verified prediction: it would have made no small noise in the public papers if there had been a tide more or less in the Thames than was predicted in the almanacs. The theory of the tides is the most difficult in astronomy, owing to the disturbing action of winds, channels, &c., as well as its intrinsic* mathematical difficulties; but this one phenomenon has never had its exception in open sea—that every transit of the moon over (either side of) the meridian is followed by the rise of the water, though so high a wind has been known as to prevent the tide coming up a river.

We return to the phenomena of the *phases* (Greek for appearances), as they are called, of the moon, namely, the changes in the quantity of its illuminated part. These may be immediately explained on the supposition that the moon is not luminous itself, but receives its light from the sun.

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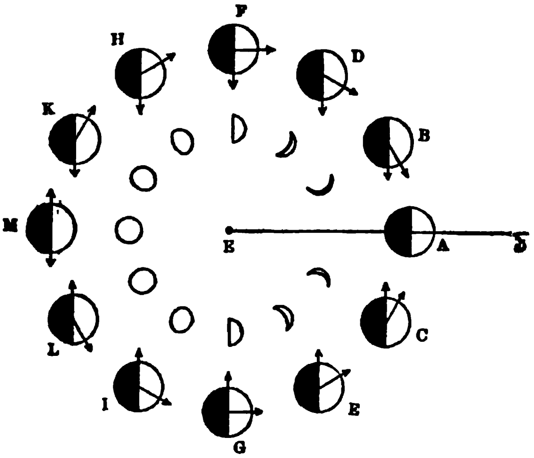
* The reader is referred to Mr. Lubbock's lately published treatise on the tides for proof of the rapid progress which the minute accordance of prediction and observation is making.

To show how this may be, suppose a ball, illuminated by another ball at a great distance in the direction ES, to be carried round the spectator at E. This ball may be always subdivided into a visible and invisible half, since one-half must hide the other in all positions. But it may also be divided into an illuminated and unilluminated half. At A the visible half is all unilluminated, and though we have called it the visible half (meaning in a position to be seen, if there were light), it will not be seen. But when the ball arrives at B, a small portion of the illuminated half is in the visible half, as much as is intercepted between the arrows. At D a larger portion of the illuminated part is visible, and at E a full half of the visible surface is illuminated. A little consideration of this scheme (which is moreover explained in all popular works) will show not only the occurrence of phases precisely similar to those of the moon, but also that the circular boundary of the enlightened part is towards the illuminating body. We copy from Riccioli his collection of the Latin and Greek terms used with respect to the different phases:



A Novilunium, luna silens, Conjunctio, Congressus cum sole, Neomenia, Synodus, Lunæ accensio.	νεομηνία νουμηνία σύνοδος
B Prima phasis, Nova luna.	πρώτη φάσις νέα σελήνη
C Ultima phasis.	ἐσχάτη φάσις ἔνη σελήνη
Luna novissima, Interlunium, seu intermenstruum, est tempus inter ultimam et primam phasim, à C ad B.	ἀφανισμὸς
B, C, D, E, Corniculata, Falcata, curvata in cornua.	μηνοειδὴς
D Primus sextilis aspectus, et E secundus.	ἑξαγώνος
F Prima Quadratura, G secunda; luna dividua, bisecta, dimidiata, semiplena.	τετραγωνος διχότομος ἡμίτομος
H, K, L, I, Luna Gibba, gibbosa; H primus, I secundus aspectus trinus; Luna in triquetro.	ἀμφίκυρτος τρίγωνος
M Plenilunium, Oppositio, Luna Totilunis, in diametro sinuata in orbem, medius mensis.	πανσεληνος διχομηνία
Luna crescens ab A per F in M, Luna descrescens seu senescens ab M per G in A.	σελήνη αὐξανομένη σελήνη φθίνουσα

If the moon moved in the plane of the ecliptic, or of the sun's motion, as in the figure, there would be an eclipse of the sun at every new moon (A), and of the moon at every full moon (M); since in the former case the moon would hide the sun, and in the latter the earth would intercept the sun's light. The moon however is generally a little on one side or the other of the ecliptic, not enough to introduce any sensible error into the preceding explanation of the phases, but enough to hinder the eclipses from taking place, except now and then: we shall see more of this presently. Again, if the sun remained in the line E S, the lunation, or complete cycle of phases, would be of the same duration as the actual revolution of the moon round the heavens. Since however the sun moves slowly forward in the same direction as the moon, the latter does not alter its phases so rapidly as in the figure, nor is the cycle of phases complete until the moon has overtaken the sun.

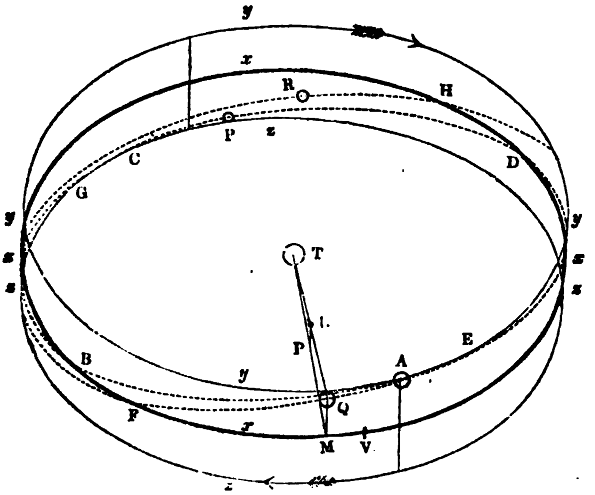
It is usual to divide the whole lunation into four quarters, the first from new moon to increasing half moon, the second from half moon to full moon, the third from full moon to waning half moon, the fourth from half moon to new moon. Each of these is called the change of the moon, and it is a very common belief that a change of weather and wind is to be expected, if not at every change of the moon, at least much oftener at the changes than in the intervals. This opinion, when not absolutely received as true, is usually treated as the extreme of absurdity. It is in truth neither one thing nor the other, as the following considerations will show.

The atmosphere is continually undergoing a slight alteration from the effects of the tide. At new and full moon (or rather a little after these phenomena) there are those great tides called the spring-tides, arising from the action of both luminaries: at the two quarters the same luminaries oppose each other, and the quarters are followed by the smaller floods, called neap-tides. What effect may be produced by this succession of smaller and greater oscillations of the sea, which must produce oscillations of the atmosphere, it is impossible to say beforehand. Again, we know nothing of the electric action of either luminary upon the earth, or whether any and what electric state may depend upon their relative position. We have therefore abundant grounds *à priori* to abstain from forming any opinion upon the effect of the heavenly bodies upon the weather; and we shall now state the results of such facts as observation has furnished. A few years ago M. Arago collected the evidence on this subject in an article published in the 'Annuaire:' the general conclusion derived from them is, that upon the whole there is *a little* more rain during the second quarter than during either of the others; but that there is no reason to confirm the common notion that a change of the moon is accompanied by change of weather It has also been observed that the height of the barometer is, one time with another, less in the middle of the second quarter than in that of either of the others; and that it is somewhat greater at new and full moon than at the quarters. With regard to a great many other asserted effects of the moon upon animal and vegetable life, it can only be said that there is no conclusive evidence for or against them; nothing but a long series of observations can settle such points, and this is not likely to be made (or if made, to be made fairly) by those who have predetermined the questions in one way or the other. For an account of M. Arago's paper, see the *Penny Magazine*, Nos. 82 and 84.

The moon's age is usually reckoned from the new moon, and the rules by which Easter is found depend, or should depend, upon a correct knowledge of this age at the beginning of the year, called the EPACT. But all readers should remember that the sun and moon by which Easter is found are not the real bodies, but fictitious ones, moving not with the real but the average motions, and therefore sometimes before and sometimes behind the real bodies. It should then be no matter of surprise if, as will happen, Easter-Sunday should sometimes be seven days sooner or later than it would be if the real bodies were employed. [EASTER.]

We now come to the actual motion of the moon round the earth, which is the most complicated question in astronomy. Roughly speaking, it may be said that the moon's motion is circular, which is sufficient for the explanation of the phases; it is somewhat, but very little, more correct to say it is elliptical. If the moon's orbit were actually exhibited in space, an ellipse might be found which would nearly fit one of its convolutions; but the succeeding convolutions would depart further and further from such an ellipse, and it would be nineteen years before a convolution would again occur which is situated in space near to the ellipse with which we started. And though astronomers have found a way of simplifying the question, by supposing the moon to move in an ellipse which itself moves in space, yet we may better explain the subject by arriving at that ellipse from the real motion than by beginning with it.

When the motion of the moon is watched in the heavens with instruments fitted to measure her apparent diameter, it is soon found that she changes her distance from the earth, becoming alternately larger and smaller. Her path is not very much inclined to the ecliptic, so that she is never 5¼° from some one of the positions which the sun has had or will have in the course of the year. We may explain the *apparent* path in the heavens by the following figure,



which represents a portion of the apparent heavens. T is the earth in the centre, *xxxx* is the circle of the ecliptic; *yyyy* and *zzzz* are small circles parallel to the ecliptic, and each distant from it in the heavens by an angle of 5° 8′ 47″·9. The moon may rise 8′ 47″·15 above *xxxx*, or fall as much below *zzzz*; but these two circles are chosen because they are *means*, that is to say, for every convolution which rises above *xxxx* there will be another, described at some other time, at which it falls short of *xxxx*; so that in a long series of years the sum of all the arcs by which convolutions rise above *xxxx* would be equal to the sum of those arcs by which other convolutions do not attain *xxxx*. The angle 5° 8′ 47″·9 is, in the astronomer's elliptic fiction, the mean inclination of the orbit to the plane of the ecliptic. The dotted line A B C D E F G H is one complete convolution of the orbit and the greater part of another. We suppose the moon to set off from its highest point (high and low have reference to the ecliptic) A, at or very near *yyyy*: from thence it falls to the descending node B, and continues to descend to its lowest point C, from whence it rises to the ascending node D, and from thence ascends to E, from thence to the next descending node F, from thence to G, the lowest point (at or near *zzzz*), and to the next ascending node H, &c. In this way the whole of the lunar zodiac is interlaced with the convolutions of its orbit, which go on for ever; nor have we any reason to suppose that the cycle of convolutions is ever complete, so as to begin again.

The first thing we have to notice is what is called the regressive motion [Motion] of the nodes. The first node we meet with is B, and the next, D, is not exactly opposite to B, but a little behind the opposite point; the next, F, is still more behind B. The words before and behind have reference to the direction of the motion. This recession of the node amounts, one year of 365 days with another, to 19° 19′ 42″·316, and the node makes a complete retrograde revolution in 6793·39108 mean solar days, or 18·6 years nearly. The point in which the moon ascends through the ecliptic falls back more than twice the moon's diameter in each revolution. The amount however is subject to some variation; that given above is its average.

Again, the apparent diameter of the moon is observed to vary, owing to an alteration of her distance from the earth. When least it is 29′ 2″·91; when greatest 33′ 31″·07. But it is observed that the least and greatest diameters of a single revolution are not exactly the same as those of another revolution; and also that the place where the diameter is least is not exactly opposite to that in which it is greatest, but always in advance. Thus the diameter, being greatest at A, becomes least at P, in advance of the point opposite to A, greatest again at Q (in advance of A), and least again at R. Now the apparent diameter must be least when the distance is greatest, and *vice versâ;* the point of a convolution most distant from the earth is called the apo-gee, that nearest to the earth the peri-gee. There is then a progression of the apogee, and its average quantity is no less than 6′ 41″ for each solar day, or 40° 39′ 45″·36 in 365 days; which is equivalent to a complete revolution in 3232·575343 mean solar days, or about nine years. The quantities above given are averages, for the actual progression is irregular.

We may notice then five distinct species of months—1. The average sidereal month, or complete circuit of the heavens. 2. The average lunation, common month, or interval between two conjunctions with the sun. 3. The average *anomalistic* month, or revolution from perigee to perigee. 4. The average tropical month, or from the vernal equinox to the vernal equinox again (the equinox being in retrograde motion [Precession]). 5. The average nodical month, or from a node to a node of the same kind. The quantities of these months are as follows (Baily, *Astron. Tubles and Formulæ*) in mean solar days.—

	d.	h.	m.	s.		d.
Sidereal month	27	7	43	11·5	or	27·32166142
Lunation .	29	12	44	2·9	„	29·53058872
Anomalistic month	27	13	18	37·4	„	27·55459950
Tropical month	27	7	43	4·7	„	27·32158242
Nodical month	27	5	5	36·0	„	27·21222222

If we compare the lunation with the common year, we shall find that 235 lunations make 6939·69 days, while 19 years make 6939 or 6940 days, according as there are four or five leap-years in the number. Neither is wrong by a day; consequently in 19 years the new and full moons are restored to the same days of the year. This does not absolutely follow, either from the preceding or from the method which gave it, since neither is the coincidence exact, nor are the months exactly equal. But it will generally so happen; and this is the foundation of the Metonic Cycle. [See also Calippus.] Again, 223 lunations make 6585·322 days, and 242 nodical revolutions make 6585·357 days, so that there is only ·035 of a day, or 50 minutes difference between the two. This period of 223 lunations is the Saros, a celebrated Chaldean period, and contains in round numbers of days 18 years and 10 days, or 18 years and 11 days, according as there are five or four leap-years. It may be worth while to express these numbers of lunations in terms of the other months.

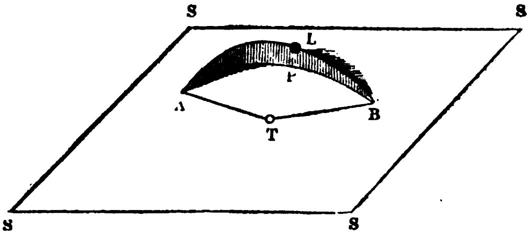
Metonic Cycle.—235 lunations make 253·999 sidereal months, 251·852 anomalistic months, and 255·021 nodical months.

Saros.—223 lunations make 241·029 sidereal months, 238·992 anomalistic months, and 241·999 nodical months.

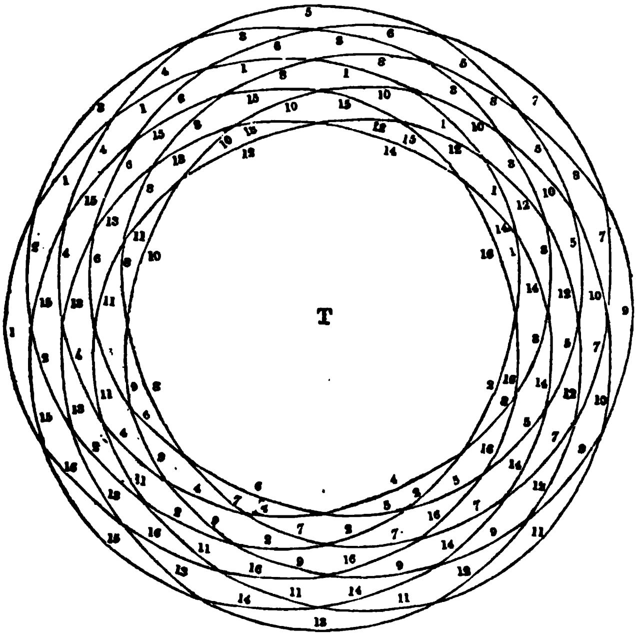
The rate at which the moon moves is different in different parts of the orbit. We may speak either of the rate at which she changes longitude, latitude, or distance from the earth; and owing to the smallness of the inclination of her path to the ecliptic, her motion in longitude is nearly the same thing as her motion in her own orbit. The quickest motion is at or near the perigee, and the slowest at or near the apogee. The moon's rate of motion follows no easily obtainable law in its changes, which are different in different months. The rate of change of latitude is greatest near the nodes, and the rate of change of distance from the earth is least at the apogee and perigee, and greatest at and about the intermediate points. We have hitherto considered the apparent path of the moon among the stars: we now pass to the real orbit in space. Her average distance from the earth is 29·982175 times the equatorial diameter of the earth, which makes about 60 radii of the earth, or 237,000 miles. But the radius of the sun's body is 111¼ times the radius of the earth; so that a large sphere, which, having its centre in the earth, should contain every part of the moon's orbit, would not be a quarter of the size of the sun.

Again, the sun's distance is 23,984 radii of the earth, or nearly 400 times the moon's average distance. A good idea of the relative magnitudes of the distances may be obtained as follows:—Take a ball one inch in diameter, to be the sun, and another of one half an inch in diameter to be the sphere which envelops the moon's real orbit; place these nine feet apart, and a proper idea of the distance of the sun, compared with its size and that of the moon's orbit, will be obtained.

To form a sufficient notion of the real orbit, imagine another body, directly under the moon on the plane of the ecliptic, to accompany her in her motion. Let S S S S represent the plane of the ecliptic, in which the sun must se, and A L B a part of the real orbit, from an ascending to a descending node; L being a position of the moon, P is the projected body on the plane of the ecliptic; and the



motion of P will be very nearly that of L, owing to the smallness of the rise of A L B above the plane of the ecliptic. The motion of the projected body will then be of the kind of which the following is an exaggeration.



Suppose the moon to set out from 1 on the left, being then in apogee, and also at a node: the projected body will then describe 1 1 1, &c., until it comes to its perigee at the first 2, which is in advance of the point opposite to the apogee. But the real moon will have come to the plane of the ecliptic before it is opposite to the first 1, so that at the first 2 the moon will be below the projected orbit. The projected body then describes 2 2 2 ... up to the next apogee 3, and so on; the real moon having come above the ecliptic before the last 2 but one. In the present figure the number of folds is limited, and the last joins the first; in the moon's orbit the number of folds is unlimited. The real relation between the greatest and least distances is slightly variable in the different folds; one with another it may be thus stated: 5½ per cent. being added to the mean distance will give the greatest or apogean distance, and subtracted, the least or perigean distance. Taking the fiction of the moving ellipse for the moon's orbit, its eccentricity is ·0548442.

In the article Gravitation will be found a sketch of the producing causes of the inequality of the lunar motions, showing that they arise from the effect of the sun's unequal attraction of the earth and moon; were it not for which, the latter would describe an ellipse round the former. In the present article we intend only to describe the motions themselves. We have pointed out both the apparent orbit in the heavens, and the real orbit: it remains to ask, In which manner is the real orbit described? At a given time, how is the moon's place in the heavens to be ascertained?

Returning again to the apparent orbit, we first consider motion in longitude only; that is, we ask how to find the moon's longitude at the end of a given time. Let us suppose then that, Q being the apparent place of the moon in the heavens, we draw Q M on the sphere perpendicular to the ecliptic, so that M has the same longitude as Q To connect this figure with the last, suppose that the moon was at L when it was projected in the heavens to Q, and let P be the projection of L on the ecliptic: then P will be thrown upon M in the heavens. The average motion of M will be that of the moon, or a circuit in 27·32166 days. If then we were to suppose a fictitious moon setting out from M, and moving with this average motion, it would never be far from the point M; which last, from the irregularity of the real moon's motion, would be sometimes before and sometimes behind the fictitious moon.

If we could observe the fictitious moon, thus regularly moving in the ecliptic (say every day at midnight), and also the real moon, we might take a long series of years' observations, and sum all the excesses of M's longitude over that of the fictitious body, when there are excesses, and all the defects, when there are defects. We might expect to find the one sum equal to the other; but we are taught by the theory (which, as before seen, is exact enough to find the moon's place within a second) that the equality of these sums will not be absolutely attained in any series of years, however great, if we take the commencing point, at which M is to coincide with the fictitious body, at our own caprice. Wherever Q may be, there is a proper place for this fictitious moon, before or behind M, from which if we allow the former to start, the longer we go on with the series of supposed observations, the more nearly will the excesses balance the defects; supposing always that our series of observations stops at the end of a complete number of circuits, and not in the middle of one. This position is called the *mean place* of the moon, as distinguished from Q, its *real place*. Let us suppose it to be at V; then if the average moon start from V, with the moon's average motion, it will at every instant of time point out what is called the mean place of the moon corresponding to the then real place. At the commencement of the present century, that is, when it was 12 o'clock at Greenwich on the night of December 31, 1800, the longitude of the average moon, or the moon's mean longitude, was (according to Burckhardt) 118° 17′ 3″; and the mean longitude at any other time is found by adding in the proportion of 4809°·38468 for every 365 days, and making the necessary additive allowance for the precession of the equinoxes. [Precession.]

In the same way the node and perigee of the moon have their mean places, and, as we have seen, their mean motions. The mean longitude of the perigee, at the commencement of the century, was 266° 10′ 7″·5; that of the ascending node 13° 53′ 22″·2.

To the above must be added that these average motions, as they are called, are subject to a slight acceleration, which hardly shows itself in a century: that of the longitude was detected by Halley from the comparison of some Chaldean eclipses with those of modern times. This acceleration would, in a century, increase the mean longitude of the moon by 11″, that of the perigee by 50″, and that of the ascending node by 7″.

The mean longitude being ascertained for the given time, the true longitude is found by applying a large number of corrections, as they are called, some determined from the theory of gravitation, but the larger ones, as might be supposed, detected by observation before that theory was discovered, and since confirmed by it. Into this subject it will be impossible to enter at length; we shall therefore merely instance a few of the principal corrections for the longitude, observing that the latitude, the distance, &c. are all determined by adding or subtracting a number of corrections from the results of the supposition that the moon moves uniformly in the ecliptic at her average distance from the earth.

The first correction is one which brings the motion nearer to an elliptical one, and is called the *equation of the centre* It depends upon the moon's distance from her perigee, called the anomaly. The *mean* anomaly is the distance of the moon's mean place from that of the perigee. The mathematical expression is (we give only rough constants),

$$6^\circ\ 17 \times \sin\ (\text{mean anomaly}).$$

The second correction, known as the *evection*, and discovered by Ptolemy, is,

$$1^\circ\ 16' \times \sin\ \{2\,(\text{☾} - \odot) - \text{mean anomaly},\}$$

where ☾ and ⊙ stand for the mean longitudes of the moon and sun.

The *variation* and the *annual* equation (discovered by Tycho Brahé) are represented by

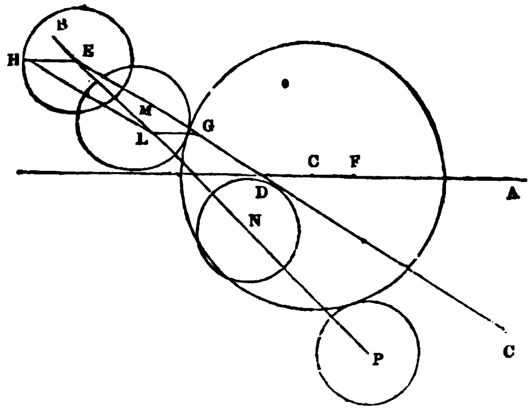
$$39' \times \sin 2\,(☾ - \odot)$$

and $$11' \times \sin\ (\odot\text{'s mean anomaly.})$$

Many such corrections (but those which remain, of less amount) must be added to or subtracted from the mean longitude before the true longitude can be determined.

Having thus noticed the actual motions of the moon, we proceed to the phenomena of eclipses, and of the harvest-moon, as it is called. An eclipse of the moon has now lost most of its astronomical importance, and can only be useful as an occasional method of finding longitude, when no better is at hand. Eclipses of the sun, observed in a particular way, may be made useful in the correction of the theory both of the sun and moon; in this case matter is absolutely hid from view by matter, and the moment of disappearance can be distinctly perceived. But in the case of the moon, which is eclipsed by entering the shadow of the earth, the deprivation of light is gradual; so that it is hardly possible to note, with astronomical exactness, the instant at which the disappearance of the planet's edge takes place.

In a lunar eclipse the first thing to be ascertained is the diameter of the earth's shadow at the distance of the moon. Suppose this shadow, that is, its section at the distance of the moon, to be represented by the circle whose centre is C: it is directly opposite to the sun, its centre is on the ecliptic, and moves in the direction of the sun's general motion, or from west to east.



Let C A be the ecliptic, and let B C be a part of the moon's orbit, with the node at D. It must be remembered that the whole takes place on a very small part of the sphere, so that all the portions of the orbits which actually come into use may be represented by straight lines. Let the centre of the moon be at E when that of the shadow is at C; and let the hourly motions of the sun (that is, of the shadow) and of the moon be C F and E G. If then we communicate to the whole system a motion equal and contrary to C F [Motion], the shadow will be reduced to rest, and the relative motion of the moon with respect to it will remain unaltered. Take E H equal to C F, and contrary in direction; then E L will represent the quantity and direction of the hourly motion of the moon relatively to the shadow at rest. By geometrical construction therefore, M, N, and P may be ascertained, the positions of the moon's centre at the beginning, middle, and end of the eclipse; and E M, E N, and E P, at the rate of E L to an hour, represent the times elapsed between that of the moon being at E and the phenomena in question. Such is the geometrical process: the one employed in practice is algebraical, and takes in several minor circumstances which it is not worth while here to notice.

An eclipse of the moon is a universal phenomenon, since the moon actually loses her light, in whole or in part; while in an eclipse of the sun, the moon hides the sun from one part of the earth, but not from another. The former can only take place when the conjunction (or sameness of longitude) of the moon and earth's shadow, that is, the opposition of the sun and moon, or the full moon, happens when the moon is near her node. The subject of eclipses is fully explained, with as little as possible of mathematics, in the 'Library of Useful Knowledge,' 'Astronomy,' pp. 87-101. See also Sun; Saros. For the phenomena of the occultation of a star by the moon, see Occultation.

By the *harvest-moon* is meant a phenomenon observed in our latitudes at the time of the full moon nearest to the autumnal equinox, when it happens for a few days that the moon, instead of rising fifty-two minutes later every day, rises for several days nearly at the same time. Something of the sort takes place always when the moon is near her node; but the circumstance is most remarkable when it happens at the time of greatest moonlight. The reason is that the increase of declination (which is most rapid when the moon is near the equator, which she must be when full moon comes nearly at the time of the equinox) compensates the retardation which would otherwise arise from her orbital motion. [Sphere.] See the treatise above cited, pp. 80, 81.

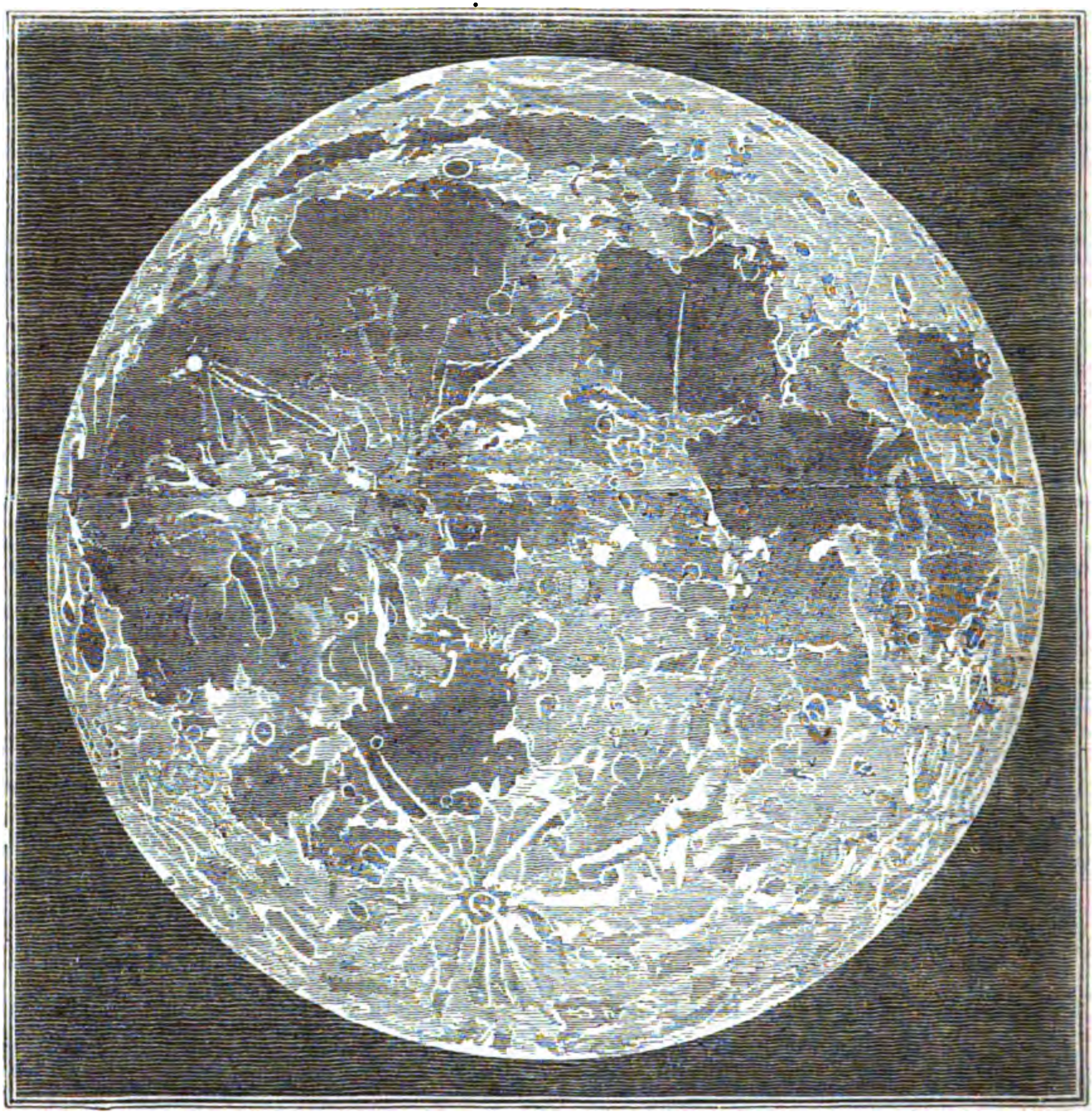
The discovery of the telescope, and the examination of the moon which followed, soon showed that the planet always turns the same face towards the earth, or very nearly. From hence it immediately follows that the moon must revolve round an axis in the same time as that axis revolves round the earth. If any one should walk round a circle without turning himself round, that is, keeping his face always in the same direction, he would present alternately his front and back to the interior of the circle. But if he desires to turn his face always inwards, he must turn round in the same direction as he walks round. [Motion, Direction of.] If the moon moved uniformly round in her orbit, and had a uniform rotation of the same duration, then if her axis were perpendicular to the plane of the orbit, and the spectator were always at the earth's centre, the face of the moon would be always actually the same. None of these suppositions are true. 1. The motion in the orbit is irregular, while the rotation is uniform and exactly the sidereal month: the consequence will be that when the moon is moving quicker than the average, a little of the western side will be coming into view, and a small portion of the eastern side will be disappearing, and *vice versâ*. 2. The axis of the moon is not perpendicular to her orbit, but is out of the perpendicular by an angle of $5^\circ\ 8'\ 49''$; the consequence is, that as she revolves in her orbit, the north and south poles of the moon will alternately become invisible, each during half a revolution. 3. The spectator is in motion round the earth's axis, which will slightly vary the part seen of the moon in the course of the day. These effects are called librations: (1) the libration in longitude, (2) the libration in latitude, (3) the diurnal libration. The second will be elucidated in Seasons, Change of, and the third in Precession and Nutation.

The way in which we know that the face presented is always nearly the same, is by observation of that face, which is varied by numberless spots and streaks. The following is a view of the average face in the mean state of libration, that is to say, no part of the present edge is ever hidden by libration, without as much of the opposite edge being hidden at some other time.

One cut represents the appearance of the planet; the other is a plan on which numbers and letters are laid down, referring to the following list, which contains the names usually given to them, and which were given by Riccioli, whose nomenclature has been generally adopted. Many other names are given, but the following are the most remarkable:—

1 Pythagoras.
2 Endymion.
3 Plato.
4 Aristotle.
5 Hercules.
6 Atlas.
7 Heraclides Falsus.
8 Heraclides Verus.
9 Posidonius.
10 Archimedes.
11 Cleomedes.
12 Aristarchus.
13 Eratosthenes.
14 Copernicus.
15 Kepler.
16 Hevelius.
17 Schickardus.
18 Tycho.
19 Pitatus.
20 Petavius.
21 Fracastorius.
22 Bullialdus.
23 Gassendus
24 Arzachel.
25 Ptolemy.
26 Langrenus.
27 Grimaldus.
A Mare Fœcunditatis.
B Mare Nectaris.
C Mare Tranquillitatis.
D Mare Serenitatis.
E Lacus Somniorum.
F Lacus Mortis.
G Mare Frigoris.
H Mare Vaporum.
I Sinus Æstuum.
K Mare Humorum.
M Oceanus Procellarum

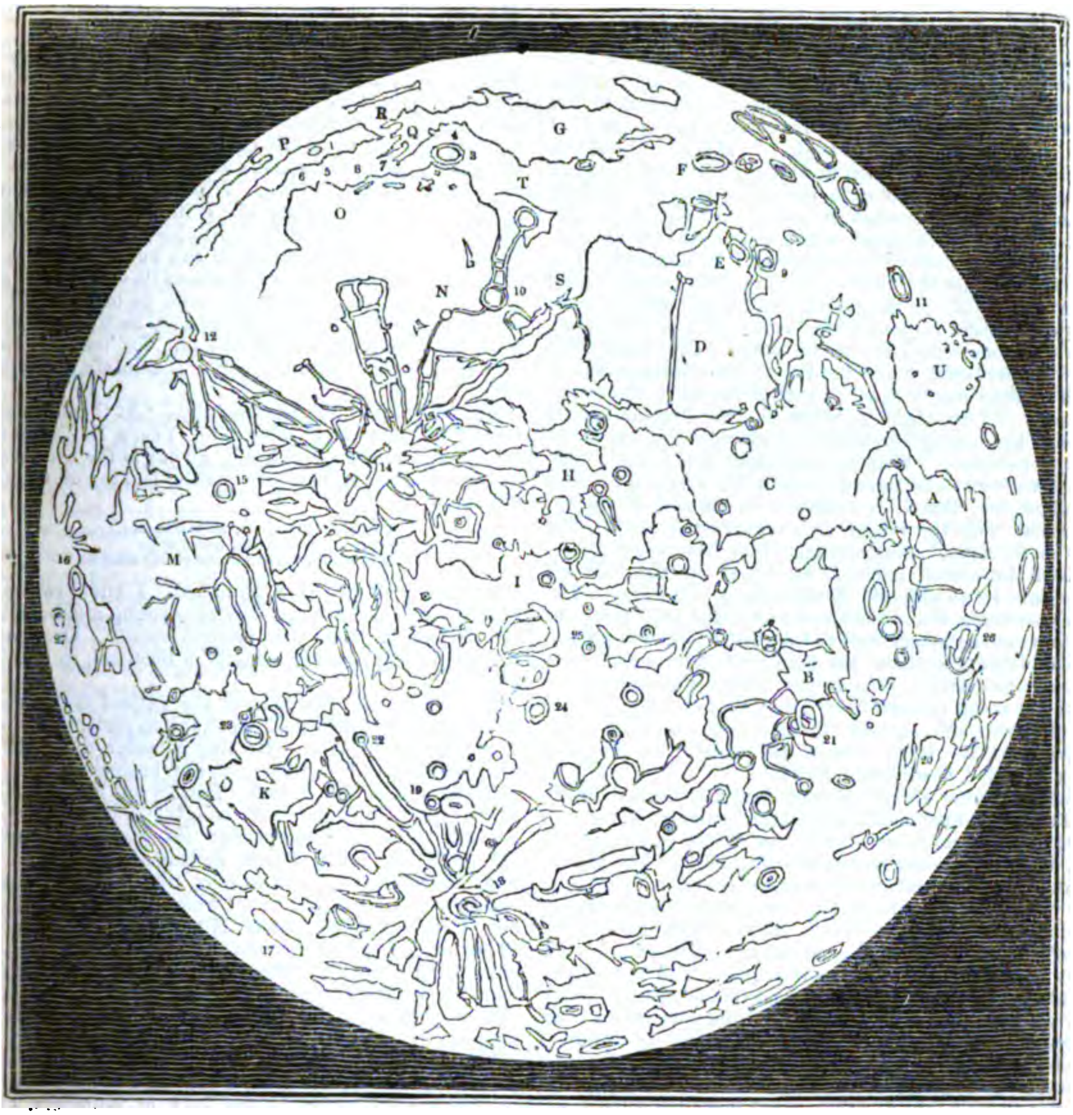
N Mare Imbrium.
O Sinus Iridum.
P Sinus Roris.
Q Terra Pruinæ.
R Terra Siccitatis.
S Palus Nebularum.
T Terra Grandinis
U Mare Crisium.



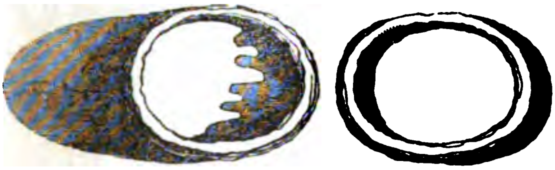
From the manner in which the moon is seen, as well as from the stars, when she approaches near them, undergoing no refraction whatever, it is certain that she has either no atmosphere, or one of a degree of tenuity which must exceed, perhaps, that of the best exhausted receiver. From this it has been inferred that there are no fluids at the surface of the moon, since, if there were, an atmosphere must be formed by evaporation. It is however enough to say that the fluids, if such there be, must be very different from those which abound at the surface of the earth. Since the moon has a day (with reference to the sun) of a whole sidereal month in duration, each part is 14¾ days in sunlight, and 14¾ days without it. The intense heat and cold which must thus alternate would destroy human life, even on the supposition that terrestrial vegetation could be maintained. The fluid on the warm side (if any) must be constantly evaporating and passing off to the colder side. 'The consequence must be absolute aridity below the vertical sun, constant accretion of hoar frost in the opposite region, and perhaps a narrow zone of running water at the borders of the enlightened hemisphere. It is possible, then, that evaporation on the one hand, and condensation on the other, may, to a certain extent, preserve an equilibrium of temperature, and mitigate the extreme severity of both climates.' (Sir J. Herschel, *Astronomy*, p. 230.)

The mass of the moon, as determined from her effect upon the earth's motion, is about one-eightieth (or ·01252) of that of the earth, her volume is one-forty-ninth of that of the earth, and the average density of her material ·615, or about six-tenths, of that of the earth. A body weighing six pounds at the earth, would weigh one pound at the moon, if tried against weights which retained their terrestrial gravity. Travelling 10 miles an hour on the surface of the moon, would enable a person to keep up with the sun; so that it is not at all impossible that animal life may be maintained by constant migration, keeping always near the boundary of light and darkness.

The surface of the moon exhibits a very large number of mountains 'almost universally of an exactly circular or cusp shaped form, foreshortened however into ellipses near the limb; but the larger have for the most part flat bottoms within, from which rises centrally a small, steep, conical hill. They offer in short, in its highest perfection, the true *volcanic* character, as it may be seen in the crater of Vesuvius. . . . . . And in some of the principal ones, decided marks of volcanic stratification, arising from successive deposits of ejected matter, may be clearly traced with powerful telescopes. What is moreover extremely singular in the geology of the moon is, that although nothing having the character of seas can be traced (for the dusky spots which are commonly called seas, when closely examined, present appearances incompatible with the supposition of deep water) yet there are large regions perfectly level, and apparently of a decided alluvial character.' (Sir J. Herschel, *Astronomy*, p. 229.) The mountains are known by their shadows, which are perfectly visible, and which are long when they are near the boundary of light and darkness, or when the sun is in the horizon, and disappear when they



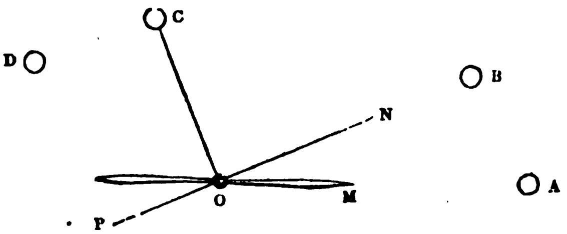
are 90° from that boundary, or when the sun is overhead. We copy from Schroeter's 'Selenotopographische Fragmente' two representations of the spot Archimedes, the first when very near the dusk part, the second when far from it.



By the help of these shadows, as well by other means, the heights of many of the lunar mountains have been measured, and some have been found whose heights exceed a mile and a half.

It might be supposed that nothing could ever be known of the figure of the moon, since we can only see one side. But this very circumstance leads us to some knowledge on the point. It is impossible to believe that the moon should revolve on her axis precisely in the same average time as she revolves round the earth, without half a second of difference, and not to suppose that there is some mechanical connection between the two revolutions, so that either one is a consequence of the other, or both are consequences of some common cause. As this subject is rarely elucidated in elementary treatises, we have somewhat abridged several of those topics which are usually treated, in order to supply considerations for which we could only refer to treatises of the most mathematical character.

It is well known in mechanics that the rotation of a body is in no way affected, if we suppose its centre of gravity to be fixed instead of moveable, provided the same forces act in both cases. Thus if a stick be tossed into the air (or rather into vacuum) by an impulse communicated at one end, and the same impulse be communicated to a similar stick which revolves on its centre of gravity, the first in its combined rotation and translation, and the second in its rotation only, will always remain parallel to each other, if they were so at first. Let us now suppose a needle placed on a point, and magnetic, round which a ball of iron revolves from A. If the needle be first at rest, then when the ball moves towards B, it will endeavour to draw the needle towards the position O N, and the needle will begin to revolve in the same direction as the ball. Suppose that by the time the needle points to O N, the ball is at O C, O C and O N being perpendicular; the ball then acts equally on both sides of the needle, and all acceleration of the rotation stops. When the ball arrives at D, it is tending to destroy its former effect, pulling the end P towards it. It may thus be seen that if the needle were heavy enough, the ball would by its motion cause an oscillation, working to produce rotation in one direction during half its revolution, or



rather more, and the opposite effect during rather more than another half revolution, in alternate quarters. But if the needle were light enough, it is easily seen that the rotation in the first direction might be produced so rapidly, that the second mode of action should never be exerted, or the revolving ball should never so far outstrip the needle that N O C should become a right angle. In this case the action would go on in one direction until the needle would acquire a rotation equal to and even exceeding that of the ball. But in the latter case, when the needle overtakes and passes the ball, the opposite action would be immediately exerted, and the acceleration of rotation would be checked. The end would be, that the needle would acquire a rotation equal to that of the ball, on the average, and would revolve so as always to present its point either to the ball, or alternately a little on one side and on the other. The same effect would be produced if the needle, at the commencement, had a rotation nearly equal to that of the ball; the consequence would be, that the action in one direction would continue long enough to establish permanent equality of the average rotations. Without supposing the moon a long needle, with one end turned towards the earth, it is found by calculation, that it is sufficient to suppose it slightly spheroidal, with the longer axis towards the earth. The same mathematical considerations which have so completely resolved the orbital motions, show that the figure of the moon must be an ellipsoid [SURFACES OF THE SECOND DEGREE] revolving round the shorter axis, and presenting the extremity of the longer axis to the earth. But the proportions of these axes have not been well determined, from want of observations: theory has outrun practice on this point. It is but comparatively lately that even the inclination of the moon's equator to the ecliptic has been determined at 1° 30′ 10″·8; that of the equator to the *orbit* being 5° 8′ 49″, as already noticed.

One more very curious phenomenon has been shown to be of the same kind as the preceding; namely, of the sort which must be made absolutely true by the earth's attraction, if it were nearly true at the beginning. The moon's equator cuts her orbit in a line which is always parallel, or very nearly so, to the mean position, for the time being, of the line of nodes of the moon's orbit. If the axis of the moon's rotation were perpendicular to the ecliptic, this must be the case, for the moon's equator and the ecliptic would then be parallel planes. And the moon's axis being nearly perpendicular to the ecliptic, it may be shown from spherical trigonometry that the two lines in question could not make an angle of many degrees. But the fact observed (by Dominic Cassini, before the theory of gravitation was thought of) is either actual parallelism, or something differing from it by very trivial oscillations. It is difficult to represent this phenomenon to a person unacquainted with geometry. It may be thus stated: the moon's orbit, the ecliptic, and the moon's equator, are three planes which form a triangular prism when produced. Or thus: if the moon were made to revolve rapidly round its axis, and if the earth were made a source of light and heat giving seasons to the moon, as the sun does to the earth, then the nodes of the moon's orbit on the ecliptic would coincide with the equinoxes, and the moon's orbit would be divided into summer and winter paths by the same line as that in which the sun's path cuts the orbit.

A great many miscellaneous phenomena connected with the moon might be collected, for which we have not space. For the light thrown on her surface when eclipsed see REFRACTION, for a remarkable appearance sometimes observed when she passes over a star see OCCULTATION; for her use in finding LONGITUDE see that word.

MOON, ECLIPSE OF THE. [MOON.]

MOON, SUPERSTITIONS RESPECTING THE. Brand, in his 'Popular Antiquities,' gives a long list of lunar superstitions. It was formerly conceived that if hogs were killed when the moon was increasing, the bacon would prove the better in boiling. (See the *Husbandman's Practice, or Prognostication for ever*, 8vo., Lond., 1664.)

Tusser, in his 'Five Hundred Points of Husbandry,' under February, says:—

Sowe peason and beans in the wane of the moon
Who soweth them sooner, he soweth too soon:
That they with the planet may rest and rise,
And flourish with bearing most plentiful wise.'.

In Decker's 'Match me in London,' act i., the king says, 'My lord, doe you see this change i' th moone? Sharp hornes do threaten windy weather.'

Werenfels, in his 'Dissertation upon Superstition, (Transl., 8vo., Lond., 1748), p. 6, speaking of a superstitious man, says, 'He will not commit his seed to the earth when the soil, but when the moon requires it. He will have his hair cut when the moon is either in Leo, that his locks may stare like the lion's shag; or in Aries, that they may curl like a ram's horn. Whatever he would have to grow, he sets about it when she is in her increase; but for what he would have made less, he chuses her wane. When the moon is in Taurus, he never can be persuaded to take physic, lest that animal, which chews its cud, should make him cast it up again. If at any time he has a mind to be admitted into the presence of a prince, he will wait till the moon is in conjunction with the sun, for 'tis then the society of an inferior with a superior is salutary and successful.'

Aubrey, in his 'Miscellanies,' says, 'At the first appearance of the new moon after New Year's Day (some say any other new moon is as good), go out in the evening and stand over the spars of a gate or stile, looking on the moon, and say—

All hail to thee, moon, all hail to thee,
I prith'ee, good moon, reveal to me
This night who my husband (wife) shall be.

You must presently after go to bed. I knew two gentlewomen that did this when they were young maids, and they had dreams of those that married them.' Dr. Jamieson has quoted these words as used in Scotland, in a different form.

Tacitus, in his 'Manners of the antient Germans,' observes that 'they hold their meetings on certain days, either at the new or full moon; for they consider these the most favourable times for entering on any business.'

Brand quotes Duchesne's 'History of England,' p. 18, where, speaking of the Irish, he says, 'Quand ils voyent la nouvelle lune, ils flecchissent les genoux et recitent l'Oraison Dominicale, à la fin de laquelle ils disent à haute voix, addressant leur parolle vers elle, "Laisse nous aussi sains que tu nous as trouvez;"' which Vallancey confirms in his 'Collectanea de Rebus Hibernicis,' No. xiii., p. 91. 'The vulgar Irish at this day retain an adoration to the new moon, crossing themselves, and saying 'May thou leave us as safe as thou hast found us.' Park observed a similar practice in the interior of Africa among the Mandingoes.

The *Man in the Moon*, one of the most antient and most popular of our superstitions, is supposed to have originated in the account given in the Book of Numbers, ch. xv., v. 32, &c., of a man who was punished with death for gathering sticks on the Sabbath-day.

MOON SEED is the seed of various kinds of Menispermum, and is so called on account of its figure.

MOOR, a name given to extensive wastes which are covered with heath, and the soil of which consists of poor light earth, mixed generally with a considerable portion of peat. The want of fertility in moors arises chiefly from a deficiency or superabundance of moisture, the subsoil being either too porous to retain it, or too impervious to allow it to escape. Both extremes occur in some moors, which are parched up in dry weather, and converted into a dark mud by any continuance of rain. A considerable portion of iron in a state of hydrate is also generally found in the soil of moors, which is very hurtful to the vegetation of plants, except heath, furze, and other coarse plants, which almost entirely cover the moors. This iron is carried down through the light surface-soil, and, if it meets with a less porous earth below, is frequently deposited in a thin layer, cementing the particles of silicious sand, which are carried down with it, and forming what is called the *heath-pan* or *moor-band*. This substance is perfectly impervious to water, and wherever it exists in a continuous state, all attempts at improvement are vain, till it is broken through or removed. The roots of trees occasionally find a passage through interstices or fractures of the pan, and then often grow luxuriantly. But wherever young trees are planted, without the precaution of breaking through the moorland, they invariably fail, and disappoint the expectations of the planter, who, seeing fine large trees growing around, naturally imagined that the soil was peculiarly fitted for them. If the stump of a large tree, which has been cut down, is grubbed up, pieces of the moor-band may often be seen all around the stem, at a short depth below the surface, so arranged as to show evidently that the tap-root, having found an aperture, and extending its fibres downwards into a better soil, has, in swelling, broken the pan and pushed it aside. When the moor consists of a loose peaty earth of little depth incumbent on a rock, as is the case in many mountainous countries, no art can fertilise it. In dry weather the whole surface has the appearance of a brown powder like snuff, which becomes a spongy peat as soon as it is soaked with rain. The hardiest heaths and mosses alone can bear this alternation; and where the substratum of rock is not broken into crevices through which the roots penetrate, all vegetation ceases except mosses and lichens.

In the valleys, where the waters have brought various earths mixed with decayed vegetable matter from the surrounding hills, the substance deposited is mostly peat, which is useful as fuel in proportion to the quantity of bitumen and carbon which it contains. When the peaty matter is mixed with a considerable portion of clay and sand, forming a peaty loam, and a convenient outlet can be found for the superabundant water, it is very capable of improvement, chiefly by draining, burning, and liming. [Barren Land.] As soon as the heath is destroyed by burning it together with a portion of the surface, and the peat-bog has acquired a certain consistency by draining, the application of hot lime will enable it to produce potatoes and oats, and the peaty matter will soon be converted into a rich soil, abounding in humus, and requiring only repeated cultivation to become extremely fertile. [Peat.] Much judment is required to know whether a considerable capital may be safely laid out in the improvement of moors. In some cases the return is certain and very considerable; in others the capital is entirely thrown away. Sometimes extensive moors have been converted into flourishing farms of arable and grass land, as in many parts of Scotland and the north of England; sometimes they have been most advantageously planted with forest-trees, and, where there is a great extent of waste and a scanty population, this is generally the most certain mode of improving a property, although the return is slow and distant.

A prudent proprietor, before he begins expensive improvements, will do well to have his wastes carefully examined by a good surveyor. The soil and subsoil, and the situation of the springs, should be carefully ascertained by boring in different places to the depth of five or six feet. It will thus appear whether any portion can be readily converted into arable land, or improved as pasture, or whether plantations of trees may be safely made. The division of the waste into fields by deep ditches will often be sufficient to lay them dry; if not, recourse must be had to draining. In the humid climate of Great Britain and Ireland, the water which falls in rains in the winter half of the year is always more than is necessary for healthy vegetation, and ditches are generally indispensable to keep the surface dry. The convenience of enclosures for pasturing cattle and sheep to advantage, added to this, has made the division of wastes by ditches and banks an invariable preliminary to cultivation. Expensive draining may not always be expedient, where the soil is naturally poor; but wherever there is sufficient loam, either immediately under the peat or mixed with it, and lime can be obtained at a moderate cost, the soil may always be brought into cultivation, and will fully repay any judicious outlay of capital.

In many situations on the slopes of hills, or in the valleys, good earth may be found at a moderate depth, which, being carted on the moor, will materially improve the surface. It should be carted out in the beginning of winter, and spread over the surface an inch or two deep. It should be left so a considerable time, especially if there is any appearance of ochre or iron in the earth. The exposure to the air and rain will convert the hydrate or carbonate of iron into an oxide, and thus render it innoxious. The earth also will absorb fertilising portions of the atmosphere, and be much improved. It may then be ploughed in with a shallow furrow, and incorporated with the natural soil by harrowing. A small quantity of lime and manure will bring this mixture into a productive state.

There are many moors which, although incapable of profitable improvement as arable land, may, at a comparatively small expense, be much improved as pasture for sheep and cattle. The principal means of effecting this are, judicious draining by ditches, and enclosing the fields with banks or one walls, both as shelter for the stock and convenience of feeding. The heath may be burnt and the ashes spread about, and the surface having been scarified to the depth of a few inches, some grass-seeds suited to the soil and climate may be sown. The surface will soon show a manifest change by the increase of green patches, and a subsequent liming will complete the improvement. When the health of the stock, as well as the increase of food, is taken into the account, it will be found that such an improvement of moor-land soon repays the outlay.

When the surface of the ground is very uneven with protruding rocks, interspersed with large stones, the only improvement which can be undertaken is to plant trees, chiefly of the fir or pine tribe, which will grow well if put in judiciously. The plants should be of the last year only, and the ground where they are to be planted should be well examined to find out whether there is a moor-band or rock below. The first must be broken through, which may be done by trenching or by means of heavy-pointed iron bars thrust into the ground with considerable force, wherever a plant is put in. If there is a rock below with six inches of earth over it, provided it be not of a very compact and solid nature, the fir-trees will grow rapidly, and the roots will find crevices to strike into. A plantation should begin in a sheltered spot, and it may be enlarged every year towards the more exposed side. Thus even the highest and bleakest hills may in time be covered with wood, and, if properly managed, cannot fail to be profitable. [Plantations.]

Moss-land is often confounded with moor; but it is very distinct in its nature. Moss-land is produced by the accumulation of aquatic plants, and its origin is chiefly vegetable. When it has a considerable depth, and its substance has lost all power of vegetation, it forms peat-bogs of more or less consistency, as the water is drained off or retained in its pores. In the latter case it appears like a spongy vegetable mass, consisting almost entirely of fibres, so interwoven as to form a very light substance, in which water is easily retained, which keeps up a kind of internal vegetation, by which the quantity of the moss is gradually increased. This is the substance which covers the surface of bogs, and where it is of some consistence it allows a passage over them [Bog]; but where it is very thin and loose it deceives the eye by an appearance of solidity, like that of a smooth green pasture, which however gives way to the pressure of the foot, and allows it to sink through it with very little resistance. The only way to improve moss is to drain it, and then convert the vegetable matter of which it is composed into soil, by means of lime and pressure. The latter is effected by putting on a considerable quantity of earth, especially sand and gravel, which, incorporating with the moss, consolidates it, and assists the lime in decomposing the vegetable fibre. After this it becomes extremely fertile, producing abundant crops of potatoes and oats; and whenever it has acquired sufficient solidity by the treading of sheep and cattle, it will produce good crops of wheat, or, if laid down to grass, give abundance of hay and pasture. Trees do not thrive in mossy soil, there being too little solidity for the roots, and the large trunks which are frequently found in bogs must have grown before the moss was formed. This may be easily imagined. A wood laid flat by a storm or hurricane may obstruct the natural flow of the waters, and cause them to accumulate. The prostrate trees become surrounded by aquatic plants, which spread their fibres and roots freely through the water, and, decaying, make room for others. Thus the trees are gradually covered and buried in the moss till future generations find them, when the moss or bog is explored for fuel or for improvement. The trees which are found buried in mosses frequently show evident signs of having been gradually covered. The upper surface is often decayed and uneven, while the lower shows that it has remained submerged and protected from the contact and influence of the air, and thus preserved from rotting.

MOOR-BUZZARD, the English name for *Circus æruginosus* of Aldrovandus and authors. [Falconidæ, vol. x., p. 183.]

MOOR-COCK, one of the names of the Red Grouse.

MOOR-FOWL, one of the names of the Red Grouse.

MOOR-HEN, the common English name for the *Gallinule*, or *Water-hen*, *Fulica chloropus*, Linn.

MOOR-TITLING, one of the names for the *Chick-stone*, *Stone-chatter*, *Stone-chat*, *Stone-smith*, and *Stone-smick*, *Saxicola rubicola*, Bechst.

MOORE, EDWARD, a writer of some dramatic and poetical reputation, was born in 1712, and bred to the business of a linen-draper, which he followed for some time in London, until he deserted it for the pursuit of literature. He married a lady, named Hamilton, of a strong poetical vein, who was supposed to assist him in his writings. His first metrical work was 'Fables for the Female Sex,' which, though in humour and elegance far inferior to those of Gay, have numbered him, by their pleasing versification and well pointed morals, among the happiest imitators of that writer. These fables were succeeded by 'The Trial of Selim the Persian,' an ingenious complimentary effusion on Lord Lyttelton, in return for some favourable notice from that nobleman.

Moore's dramatic pieces were, two unsuccessful comedies, 'The Foundling' and 'Gil Blas;' and 'The Gamester,' a tragedy, which, without any striking touches of genius, still retains its place on the stage, and its hold on the feelings, by a natural and affecting exhibition of domestic misery. The last literary undertaking in which Moore became engaged was the editorship of 'The World,' a miscellaneous weekly paper, to which Lords Lyttelton and Chesterfield, Horace Walpole, and other distinguished persons of the day contributed. The series closed with the death of Moore, which occurred in 1757.

MOORE, Dr. JOHN, M.D., better known as a miscellaneous writer than a physician, was the son of a minister of the Scotch church, and was born at Stirling in the year 1729. In his youth, after having studied in the university of Glasgow, he served for a time as a medical officer in the British army in Flanders, in 1747-8, and subsequently became surgeon to the household of the earl of Albemarle, English ambassador at the court of Versailles. Having passed some years abroad in these stations, he returned to Scotland, and entering into partnership as a surgeon, settled at Glasgow, from whence, after taking his degree as physician, he was induced, in the year 1772, to accompany the young duke of Hamilton to the Continent, in the joint capacity of medical attendant and travelling tutor. With his charge he spent five years in visiting some of the most interesting parts of Europe; and returning home in 1778, and establishing himself in London, he gave the result of his observations of foreign countries to the world in two lively works, under the title of 'A View of Society and Manners in France, Switzerland, and Germany,' and 'in Italy.' These, his first literary productions, were followed by a volume of 'Medical Sketches,' and by 'Zeluco,' the ablest and most popular of his novels, in which he has powerfully portrayed the dreadful effects of indulgence upon a disposition naturally selfish and cruel. His succeeding works, 'A Journal of a Residence in France during the Revolution of 1792,' 'A View of the Causes and Progress of the French Revolution,' 'Edward,' a novel, 'Mordaunt, or Sketches of Life, Character, and Manners in various Countries,' and an edition of Smollett's works, with a memoir of the author, had upon the whole inferior merit. His personal character is said to have been adorned with many estimable and pleasing qualities; the knowledge of the world which he had acquired in foreign travel caused his society to be much courted; and his conversation, aided by a countenance full of expression, was distinguished by the same tone of moral sentiment, as well as by the same shrewdness of remark and caustic humour, which appear in his writings. He died at Richmond, near London, in 1802.

A complete edition of Dr. Moore's works in seven volumes, with an apparently accurate Memoir of his Life, by Robert Anderson, M.D., was published in Edinburgh, in 1820.

MOORE, SIR JOHN, a lieutenant-general and knight of the bath, one of the most distinguished British officers of modern times, was the eldest son of the author of 'Zeluco.' He was born at Glasgow in the year 1761, and received his first commission in the army at the age of fifteen years. The aristocratic connections formed by his father secured his rapid advancement; and before he found the earliest occasion of proving his personal merit, he had already been some years a lieutenant-colonel, and had also sat in parliament for the Lanark district of boroughs. It was in the descent of the British troops upon Corsica, in 1794, in concert with the patriotic Paoli, that Moore first distinguished himself; and in subsequent services, in the West Indies in 1796, in Ireland during the rebellion of 1798, and in the disastrous expedition to Holland in the following year, in which he received two severe wounds, he fully established for himself the reputation of an officer of the highest promise. A more auspicious duty now awaited him; and in the expedition to Egypt in 1801, with the rank of major-general, he commanded the reserve of the army, and highly distinguished himself at its head. For his services in this campaign, in which he was again wounded, he was deservedly created a knight of the bath.

On the recommencement of hostilities, after the short peace of 1802, Moore was usefully employed, by his own desire, in a camp of instruction on the Kentish coast, in training his own and several other regiments as light infantry; and these troops, of which the renowned light division of the Duke of Wellington's army in the Peninsular War was afterwards composed, gave by their achievements the best proof of the value of the system on which they had been instructed in the school of Moore. The freedom and simplicity of movement, which he had substituted for some of the pedantries of the German tactics, were found as desirable and as well calculated for the general service of the infantry as for light troops alone; and these improvements have accordingly been incorporated into the existing regulations for the exercises of the British army.

From the business of tactical instruction, Moore was called to more active service; and after being for some time employed in the occupation of Sicily, he was sent, in May, 1808, at the head of a body of about 10,000 men, to Sweden, with a view of aiding the gallant but unreasonable sovereign of that country, Gustavus Adolphus IV., in the defence of his dominions against the designs of Napoleon. On this arduous mission, he became involved in a serious dispute with the eccentric king, from which he, not without some difficulty, extricated himself and his troops; and he returned with them to England at that crisis in the war against France, which opened to the British arms a new field of action in the Spanish Peninsula: a field destined to witness his calamitous struggle and victorious fall, and to immortalise at once his misfortunes and his glory.

Moore landed in Portugal, in August, 1808, too late to share in the battle of Vimiero: but after the expulsion of the French from that kingdom, and the recall of the British generals who had negotiated the Convention of Cintra, he was appointed to the command of the army which, to the number of 5000 cavalry and 30,000 infantry, was intended to co-operate with the Spanish forces in the north of the Peninsula against the French invaders. Of this auxiliary army, part was to arrive direct from England under Sir David Baird, and to land at Coruña, while the greater proportion, composed of troops already in Portugal, was to be led by Moore himself to the scene of operations. He accordingly began his march from Lisbon in October, 1808: but he had scarcely entered Spain before the defeat and destruction of the Spanish armies at all points on their northern line utterly extinguished the prospect of a successful campaign. On a false report that the direct northern road through Almeida, by which his infantry had advanced, was impassable for artillery, he had imprudently been induced to send his cavalry and guns, under Sir John Hope, by a circuitous southern route through Badajos; to the north, a long tract of country still divided him from the troops which had landed under Baird at Coruña; and with forces thus widely disjointed, he found himself exposed to the assaults of victorious and rapidly advancing French armies of immense numerical superiority. In this critical position, he remained for some time inactive at Salamanca, urged by his own desponding views of the contest to retreat into Portugal, and goaded by the sanguine temper of the British ambassador in Spain, Mr. Frere, to advance, with assurances that his presence might yet preserve Madrid from falling into the hands of the enemy. The surrender of that capital soon dispelled so much of the ambassador's illusions: yet the intelligence was followed by some indecisive movements on the part of the British general against the advanced corps of the enemy under Soult, until he suddenly ascertained that the whole of the disposable French armies in the Peninsula were gathering to surround him. Rejecting all hope of the defence of Portugal, he commenced a rapid, if not too precipitate, retreat to Coruña: the sufferings and disorders of which, conducted as it was in the depth of a severe winter, and through the mountainous region of Gallicia, will long be remembered in our military annals. Its disasters were closed, on the 16th of January, 1809, by the battle of Coruña, in which the troops, though previously to all appearance exhausted and disorganised, were reanimated, by the exertion of their gallant leader and their own native valour, to inflict a decisive repulse upon their pursuers. Their triumph was dearly purchased by the loss of their commander: the circumstances of whose death may challenge and support a comparison with the most illustrious examples of heroism in antient and modern times, with the last moments of an Epaminondas, a Bayard, or a Wolfe. He probably had little desire to survive the mental agony which he had suffered in so disastrous a retreat; he expressed great satisfaction that the enemy were beaten; he reminded his sorrowing friends 'that he had always wished to die in that way;' and his expiring words breathed a hope that 'the people of England would be satisfied—that his country would do him justice.'

The operations of the memorable campaign in which Moore had so gallantly fallen were canvassed after the event with all the virulence of faction by conflicting parties, who either desired to shift the blame of failure from the government on the general, or to transfer it from him to his employers. Scarcely indeed has the question, which must determine Moore's claims to the character of an able commander, been impartially treated even to this day. The noble and graceful virtues of his private life, his lofty and generous sense of honour, his chivalrous courage, his forgetfulness of himself, and his enthusiastic devotion to the service of his country, even his enemies have been unable to deny. In stations of subordinate command, he had also unquestionably displayed very considerable talents, and a perfect acquaintance with the science of his profession. But until the campaign of 1808-9 he had never held the chief command in the field; and the fact whether he possessed the highest qualities of military genius must be tried by his conduct in that arduous service. He was placed in a position of the utmost difficulty; with an army, which, though full of courage, was young in action, and not inured to privation; with an inexperienced staff, and a commissariat wretchedly defective; without the means of obtaining either information or supplies, in a country where warfare has, in all ages, been attended by peculiar difficulties; called upon to aid a nation as full of blind presumption and ignorance, as its rulers were of imbecility and treachery; and opposed to armies ably commanded, thoroughly organised in every department, long seasoned to warfare, and immensely superior in numbers. These were difficulties under which any but the commander of first-rate ability and unshaken confidence in the resources of his own comprehensive intellect was sure to sink; and that Moore was not found equal to them is no more a subject of reproach upon his zealous and gallant spirit, than that nature had not endowed him with the genius of a Fabius or a Wellington. He wanted in fact that perfect undoubting trust in himself, in every adversity, which is characteristic of the greatest commanders, and belongs to the very highest order of minds. He disbelieved in his own ability, and overrated that of his opponents. From the first to the last, he desponded of fortune, and foresaw only disasters: he hesitated only in vigorous action, and decided upon nothing but failure. The Duke of Wellington has generously said, that he could discover only one error in Moore's campaign, in not providing for retreat when he advanced against Soult: but the neglect of preparation for an orderly and gradual retrograde movement through the strong country of Gallicia was only indicative of the same absence of all hopefulness, which had already pronounced Portugal itself indefensible. How the events of the following campaigns refuted this opinion need not here be said; but Moore, in his despair and dread of responsibility, abandoned every thought except the preservation of the army.

That he achieved this object without dishonour is sufficient to redeem all the errors, if such there were, which had attended his career; and it should ever be gratefully remembered to his glory, that, when there were those under his command at Coruña who dared to utter hints of a convention with the French for obtaining permission to embark unmolested, he indignantly spurned the proposal, as unworthy of a British army which, amidst all its sufferings, had never known defeat. He welcomed indeed a battle as the surest means of clearing every stain from the dubious character of his retreat; he was as doubtless of victory on the coast at Coruña, as he had been apprehensive of destruction in the interior of Spain; and in that last act of undaunted firmness, he put a seal with his blood to a whole life of magnanimous devotion.

The personal history of Sir John Moore has been written at some length in a memoir contained in the third volume of Gleig's 'Lives of British Military Commanders;' and more recently, in a Life of him, by his brother, in 2 vols. 8vo., 1834: but elaborate investigations of his last campaign may be found in the justificatory 'Narrative' of his brother (London, 4to., 1809), and in a criticism on it in the second volume of the 'Quarterly Review;' in Colonel Sir John Jones's 'Account of the War in Spain and Portugal, and in the first volume of Colonel Napier's 'History of the War in the Peninsula,' which the author, a zealous and ardent partisan, has consecrated to the eulogy of Moore, and to the able defence of his operations.

MOORISH ARCHITECTURE, otherwise the Moresque style, that variety of Saracenic or Mohammedan architecture practised by the Arabs or Moors of Spain, and of which many exquisite remains in that country, at Cordova, Granada, &c. [ALHAMBRA], still attest both their skill and taste. Although some have spoken very slightingly of this style as exceedingly fanciful and capricious, by others it has been rapturously extolled as the most poetical and fairy-like species of architecture, and highly characteristic of a refined, luxurious, and imaginative people; and although it must be confessed that it is not reducible to any fixed rules, it is evident that it was formed according to consistent principles of taste, and that it is marked by a strong national physiognomy. One of its most striking and peculiar features is the *horse-shoe arch*, or, as it might with more propriety be termed, the *crescent arch*, because it resembles that symbol of Mohammedan faith, and was therefore in all probability expressly adopted in imitation of it. This being admitted, at once and naturally accounts for a form that is else very unlikely to have suggested itself, or to have originated in any purpose of construction; so far therefore this hypothesis of ours—for we have not borrowed it from any one else—has something like a plausible basis to rest upon. Perhaps, too, the same religious symbol may be recognised in the smaller curves or scallopings which frequently serrate or indent the outline of the arch itself, and from which, no doubt, were borrowed the cusps that form the trefoils, quatrefoils, &c. in Gothic architecture, though certainly not out of respect to the symbol of Islamism.* To the crescent or horse-shoe arch, again, we should point as having directly suggested the crescent or bulbous dome, so characteristic a form of that feature in Mohammedan countries. The outline or section of the latter accords so strikingly with the curvature of the other (the one being constructed at its base, the other at its span), that we can hardly suppose it to have been a merely accidental coincidence, especially as such form of dome is hardly to be accounted for otherwise than by some intention of the kind: and more particularly if the dome of Santa Sophia is to be received as the prototype for such feature in Mohammedan architecture. So far from its being altogether capricious, this style appears to exhibit a singular degree of intention and consistency, although they cannot be said to be perfectly architectonic, or to have been dictated by constructive principles. It is true the bulbous dome does not exactly belong to Moorish architecture, but rather to the latter Mohammedan, still we may be excused for referring to it in our estimate of the style generally; and we may further remark, that domes of such shape bear some analogy to that of the Oriental turban, which form of head-dress may possibly in some degree have led to a taste in favour of a similar-shaped covering or *head* to a mosque or other building: and we may observe that the term Glavà, or head, is employed by the Russians in the meaning of a dome or cupola.

Although the horse-shoe arch is a peculiar, by no means however is it a constant feature in the style, or employed to the exclusion of other forms of arches; on the contrary, there are several varieties, comprising the pointed horse-shoe, and others, as is shown in the annexed figures.

Fig. 1 is an example of the crescent or horse-shoe form, having the centre *c* on the diameter of the arch raised above the chord or spring of the curve (the dotted line), and consequently the curve itself is greater than a semicircle. The same figure further exemplifies some differences of application, the side or half A showing the arch supported

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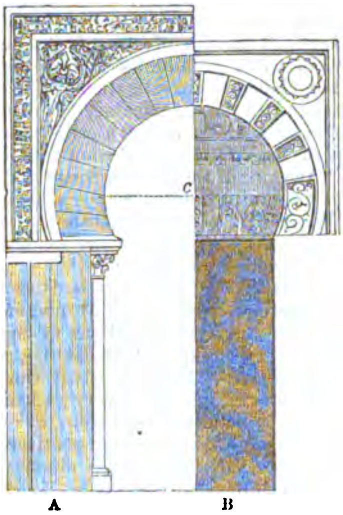
* Whether the pointed arch was actually borrowed from Saracenic architecture or not, it was certainly practised in that style long before our European Gothic arose. It was common in the Mohammedan structures of Cairo in the tenth century; and Hessemer refers to the Mosque Tolun, erected by Ahmed Ibn Tolun, in 877-880, as the earliest instance of it whose date can be depended upon with certainty.

Fig. 1



on columns, the other without columns; besides which it illustrates other variations; for on the side B the head of the arch is closed over a square-headed aperture not wider than the span or chord; whereas on the side A the opening between the columns is as wide as the diameter of the arch itself in its greatest width through the centre *c*.

Fig. 2.

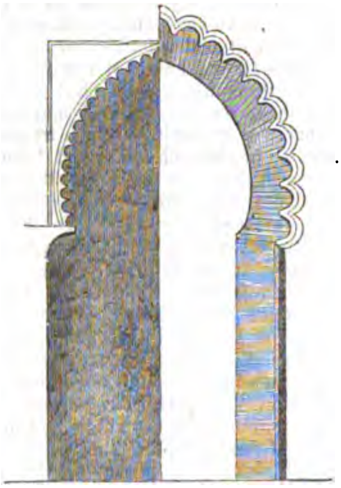


Fig. 2 is an instance of a pointed crescent arch, it being struck from two centres, which, as in the other case, are elevated above the line of the impost, or spring, from which the curve commences. This figure also exhibits two varieties of decorations, both of them by scalloping; one half being scalloped on the intrados, or edge of the arch itself; and in the other, the extrados, or outer circumference, being so cut, or more properly speaking, the edge of the face of the wall within which the arch recedes; of which kind is the gate in what is called the Casa del Carbon at Granada.

The next example is of what may be called the cusped or scalloped arch, strictly so termed, the outline being produced by intersecting semicircles, similar to the trefoil-headed compartments in our Gothic windows; but beyond that general resemblance, which certainly goes far to confirm the opinion that the Gothic style borrowed something from the Saracenic, the character is altogether different, not only because it is here the whole arch which is so shaped, instead of merely a subdivision within a larger opening, but also both on account of the external moulding following the same form, and of quite a different mode of decoration. In Gothic architecture the spandrels, or triangular spaces between the foils, are panelled with splayed surfaces uniting in the centre. Arches of the kind here shown occur in the sanctuary of the great mosque at Cordova, where they rest upon columns which both in their capitals and shafts bear considerable similarity to Corinthian ones, except that they are shorter and without bases, and are therefore very different from the slender pillars peculiar to Arabian architecture.

Fig. 3.

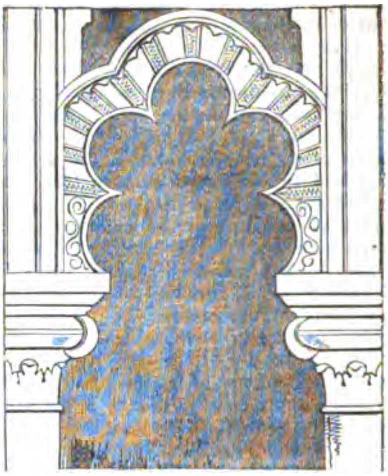


Fig. 4 exhibits an example of such pillars, and also another variety of Moorish arches (from the Court of the Lions in the Alhambra) very unlike any of the preceding

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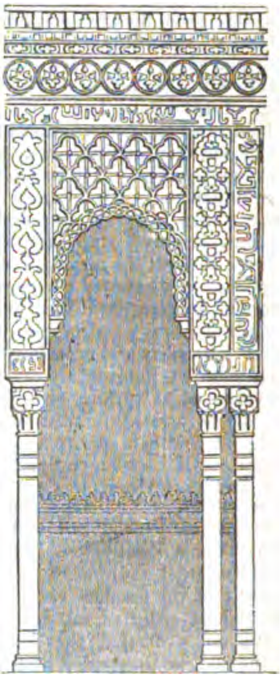


specimens, it being circular-headed, and *stilted*, that is, it is considerably more than a semicircle, its height in fact almost equal to its breadth, but, instead of contracting downwards, like the horse-shoe form, it is continued down straight to the impost, whereby the arch or semicircle has the appearance of being raised or *stilted*, and made loftier than the arch itself would else be. It also exhibits another peculiarity which the Arabs seem greatly to have affected, namely, *corbelling*, or resting arches upon brackets which serve as their imposts; owing to which such arches have the appearance of being suspended over the opening below, which becomes wider and the support or pillar slenderer in proportion to the projection given to the corbels.

The above will suffice to show the principal varieties, in which we have chiefly attended to the form of the arches themselves, without attempting to show detail and decoration, to which it would be impossible to do any sort of justice upon so contracted a scale, although it may serve for mere explanation. As supplementary however to what has been said, it should be observed as one characteristic of the style, that whatever their shape, or however applied, arches are generally placed within a square-headed panel or compartment, variously ornamented, and frequently surrounded with a margin or border similar to the square label in Gothic architecture (see Gothic Architecture, page 326, cut, for instance of a highly enriched compartment in which the arch is set). Sometimes there are two margins or labels.

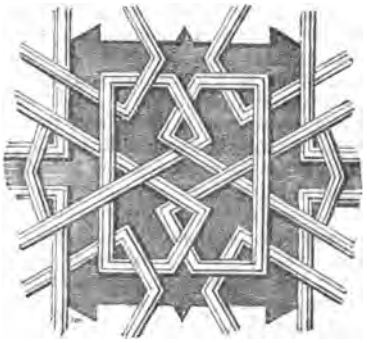
and the space between them is filled up either with inscriptions or other decoration. This mode however was confined to large arches, not supported upon columns, but forming an opening through a wall, for a gate or door; and it was for such purposes that the crescent arch was chiefly used, particularly for entrances to mosques. These were further distinguished by the breadth and richness of the archivolt or border surrounding the arch; and which was sometimes equal to the radius or semidiameter of the curve. In some instances the whole archivolt was uniformly decorated; in others only at intervals, or on the alternate voussoirs or arch-stones, some idea of which may be obtained from B, *fig.* 1.

Pillars are in general of exceedingly slender proportions, almost to apparent insecurity, and certainly by far too much so to satisfy those who acknowledge no other standard of beauty than classical architecture. Yet the lightness thus produced is altogether different from that which is the character of Chinese architecture, where, owing to the naked poverty of the forms themselves, and the style of embellishment, it degenerates into flimsiness; whereas in the Moorish or Arabian style the lightness of particular forms tends rather to heighten the general luxuriance. Some have imagined that this element of slenderness in regard to pillars indicates a tent origin of the style; and that while the pillars themselves were fashioned in imitation of the poles which supported the awning, the idea of the latter was in a measure kept up by the general decoration of various devices in mosaic work, and painted stucco, or glazed tiles, which gave to the whole the semblance of being covered with richly-patterned carpeting or embroidered tapestry; not indeed in exact imitation or so as to aim at illusion, but with just that degree of adherence to a prototype which is observable in all artist-like architectural decoration. This tent-like character was further kept up by concave ceilings and cupolas, emblazoned with painting and gilding. The whole surface was frequently broidered over with decoration, which consisted almost entirely of ornamental patterns composed either of foliage or geometrical figures, though occasionally with an intermixture o th. The decorations of the former class have given rise to the modern term *Arabesques*, as indicating scroll-work and foliage ornament filling up a frieze or compartment, although it is not very correctly applied, being usually intended to express a combination of animal and vegetable forms, human figures and those of birds and quadrupeds terminating in foliage and flowers; whereas no such mixture occurs in Arabian architecture, all imitation of the human or even animal shape being interdicted by the Mohammedan law. Their geometrical patterns exhibit singular beauty and complexity, inexhaustible variety of combinations, and a wonderful degree of harmonious intricacy, arising out of very simple elements; to which must be added the variety produced by colour also, whereby the same arrangements of lines and figures could be greatly diversified. Hence though apparently quite unmeaning, and intended only to gratify the eye, such embellishment must have powerfully recommended itself to a people both imaginative and contemplative, and whose fancy would find occupation in patiently tracing and unravelling the manifold intricacies and involvements, the mazes of what at first sight looks like a mere labyrinth, until its scheme unfolds itself; but merely momentarily as it were, being again lost when attention is diverted from it to particular parts. It is on this account that Hessemer assigns so very high a value to Arabian decoration, as being strictly ornamental and strikingly characteristic.

One very prevalent and very peculiar element of Arabian decoration is the use of inscriptions evidently with reference to their ornamental effect. So far there is a very striking analogy between the practice of the Moslems and that of the antient Egyptians: if the latter covered the walls of their edifices with hieroglyphics, the others inscribed theirs no less profusely with sentences; and the characters of their ordinary writing, elegant and fanciful in themselves, were as studiously ornate and calligraphic as possible; and so well do they harmonise with the rest, as to seem to belong to the embellishment, and to have sufficient value as such independent of their meaning. Neither was the effect of colouring and gilding wanting to set off the inscriptions in the most brilliant manner. In short, even by those who consider much of it to have been in false taste, architectural decoration must be allowed to have been carried by the Arabians to a very high pitch; and although it may be too florid, too prodigal, too *inflated*, and overlaid with ornament, it well deserves to be studied, if not to be copied, as many ideas may be derived from it, for novel combinations both of forms and colours. And for such study we may here point out Mr. Owen Jones's splendid work on the 'Alhambra,' and Hessemer's 'Arabische Bauverzierungen;' in both of which publications the plates exhibit the original colours.

Lattice or open trellis-work was another fertile source of embellishment, and was very much akin to the perforated tracery frequently met with in Gothic buildings. In this respect the two styles display great similarity of taste, distinguishing themselves herein from almost every other; notwithstanding that each has a peculiar character of its own. This species of ornamental work is supposed by some to have been derived from netting suspended before apertures in order to exclude insects; and in Arabian architecture it certainly partakes far more of the character of network than Gothic tracery does, the interstices being smaller, and the design filling the whole of one aperture; whereas in the Gothic style the ornamental tracery is confined to the heads of windows. Besides which, the character of Arabian tracery—if we may venture so to call it—is altogether different, it being composed of straight lines, frequently so disposed as to form stars in some parts of the design. As far as an idea of the peculiarities of the style in this respect can be formed from a single specimen, the example here annexed (on the authority of Hessemer) of a portion of a window in the mosque of Hakim at Cairo, may be of some assistance. The pattern is rich and playful; and notwithstanding that, although regular, it appears at first sight to be rather complicated, will be found to be composed of merely a repetition of the same forms, yet producing a constant variety, according as the lozenge or the star is fixed upon by the eye as the centre from which the rest of the pattern diverges.

Fig. 5.



Of perforated battlements and parapets, this style furnishes some exceedingly rich and tasteful specimens, although not among the remains of Moorish architecture in Spain. Several of them are exceedingly intricate and delicate also, and may therefore, almost without exaggeration, be compared to lace-work as seen against the sky. Of this kind are the parapets of the mosques Lashar and Akmer at Cairo, which in some parts have perforated battlements of fanciful outline rising above the general parapet of open work. Curves, forming pointed horse-shoe arches, occur in some of the patterns; further than this it is impossible to pretend to describe them, except it be to remark that the stone-work is very slender, and the open spaces large in proportion, and that the ribs or stems of which the former is composed have something the resembance of being interwoven, one passing alternately before and behind the next, after the fashion of wicker-work.

Equal fancy and diversity of invention are shown in the devices of mosaics and pavements, many of which appear exceedingly elaborate, although, when analysed, they are found to be very simple in principle: for instance, some patterns exhibiting octagons, stars, and other figures, are produced merely by series of zigzag lines intersecting each other at right angles, different combinations being obtained according as the points of the zigzags are turned from or towards each other. Among the other ornaments which mark this style, the honeycomb fretwork and stalactites-like drops, or pendents of ceilings and roofs, deserve to be mentioned, also the small star-shaped apertures cut in a sloping direction through the domes or vaults over baths, for the purpose of admitting only a subdued degree of light. These latter must be allowed to be a highly pleasing and ingenious contrivance; and if, in regard to the other enrichments, there was oftentimes too lavish a prodigality, it was almost uniformly accompanied by a powerful degree of the poetical and picturesque.

The above are the principal characteristic elements of the style generally, but all of them do not enter into every design. Domes and minarets [Minaret], for instance, are features almost confined to mosques and other religious edifices. Instead, too, of being employed singly, domes were occasionally introduced in great profusion, there being, besides the principal one, a number of smaller ones, sometimes according and at others contrasting with it in shape. Variety and contrast were further greatly increased by the lofty and slender forms of minarets being opposed to the swelling curves of domes; owing to which combination, buildings in this style often exhibit a very striking picturesqueness of outline.

Such features however do not occur in the remains of Moorish architecture within the Spanish peninsula. Externally they are rather plain than at all remarkable for richness: even the Alhambra itself, gorgeous as it is in its courts and halls, bears on its outside less the character of a palace than of a fortress composed of irregular masses of building and square towers of various dimensions, forming an ensemble wild, rude, and irregular, but eminently characteristic and impressive. A certain severity and solidity likewise distinguish the mosque at Cordova, which belongs to the earlier epoch of the style, it having been erected in the first century after the Moors had established themselves in Spain. It is an insulated oblong building, extending 620 feet from north to south, including a spacious court at its north end or side. The interior presents almost a forest of jasper and other marble columns, upwards of six hundred in number, and dividing the plan into eleven aisles in one direction (350 feet in length), and thirty-five in the other. In that division of the building appropriated to the imams and chiefs was the great *kibla*, or sanctuary (in which the Korân was deposited), an octagon covered with a dome shaped out of a single block of stone;—the *mihrab*, or pulpit, and the *maksura*, or khalif's seat. After the conquest of the city in 1236, by San Ferdinand, this mosque was converted into the cathedral, in consequence of which the character of the interior has been greatly injured by the erection of a Gothic choir in its centre. As a splendid work of a later epoch of the style, Cordova could once boast of the palace called the Az-zahrâ, erected about the middle of the tenth century by the celebrated Abd-el-rhaman III., the eighth Umeyyah sovereign of Spain. Of this edifice, which was at the distance of about two leagues from the city, nothing now remains to attest its former magnificence, except the descriptions given of it by Mohammedan writers, according to which it was adorned with four thousand marble pillars, and had walls and pavements of the same material. The sumptuousness ascribed to the edifice and its fountains and baths might pass for mere Oriental hyperbolism, were it not that the evidence still afforded by the Alhambra, and by parts of the Alcazar at Seville, removes the suspicion of exaggeration; or rather, the exuberant beauties revealed to us by the latter structures greatly surpass anything the most florid description can picture to the mind. The Alhambra, the residence of the Moorish kings of Granada, is supposed by some to have been founded by Mohammed Ibn Alhamar, the first ruler, who reigned from 1238 to 1273; according to others, was begun by his successor Mohammed II. (1273-1302), or by Nasser, and completed by Abu-l-hejaj in 1348. This highly interesting and important monument of western Arabian architecture is now rendered comparatively familiar to us, both by descriptions and drawings, and by geometrical and pictorial illustrations of its principal parts and decorations. Besides the two elaborate publications by Murphy and Jones, many drawings of a more popular kind have been given us by Roberts, Lewis, and other able draftsmen, besides several including other specimens of the same style in the 'Landscape Annual' for 1835 and 1836. As a modernised imitation of the style—that is, as far as a few generalities of form go, the Pavilion at Brighton may be mentioned, though it is little better than a shadow or faint reflection of the original. Any adequate copy of such architecture is now almost out of the question: yet specimens of it might occasionally be introduced with both propriety and effect, in single apartments or enclosed courts, where it could be made to display itself upon a moderate scale, and without requiring to be kept up in any other portion of the building. It also recommends itself for detached ornamental buildings in gardens and pleasure-grounds, provided its spirit be adhered to without regard to economy, where economy becomes wasteful absurdity.

MOORS. This name is generally given to the Arabs who subdued Spain at the beginning of the eighth century, and held it until the latter end of the fifteenth. In the chronicles of Spain and France they are designated by the writers of the middle ages under various denominations; they are called by some *Sarraceni*, from *Sharkyin* (Eastern people), *Agareni*, or descendants of Agar, and *Ismaelitæ*, or sons of Ismael. By more polished writers, like Rodericus Toletanus, and others, they are styled *Arabes*, but their most common denomination, and perhaps the most appropriate, is that of Moors (*Mauri*), owing to their having come from that part of Africa known to the Romans by the name of Mauritania.

Thirty-five years after the death of their prophet, the Arabs, after conquering the fertile regions of Asia, invaded the vast continent of Africa. The deserts of Barca and Marmarica, once so formidable to the Roman legions, were completely overrun; Carthage, still the proud capital of Africa, was levelled with the dust, and after forty years of unremitting warfare the whole continent of Africa, from the Pillars of Hercules to the farthest limits of Sudan, received the laws of the Arabian conquerors. [Berber.] Far from being satisfied with the possession of so many kingdoms, the military ardour of the Arabs seems to have received fresh vigour from every succeeding conquest, for no sooner were they firmly established in Africa than they invaded and subdued Spain.

The immediate causes and most of the incidents of that memorable invasion by which the Arabs were brought into the very heart of Europe, are involved in fabulous obscurity. The chronicles of that country point out, it is true, an incensed nobleman named Julian, who is said to have secretly invited the Arabs to invade the country; but this account, unsupported by historical evidence, has of late been rejected as altogether inconsistent with truth. The geographical position of the peninsula, its genial climate and reputed wealth, the necessity of giving employment to the motley tribes of Berbers who were daily flocking to the standard of the Arabian generals, the spirit of discord reigning in the Gothic monarchy, and the proffered assistance of the Jews who, under the reign of Roderic's predecessors, had been subjected to the most cruel treatment, are no doubt among the causes which led to that striking event.

On the 5th day of the moon of Rejeb, A.H. 92, which corresponds to April 30th, A.D. 711, Tárik, a freedman of Músa Ibn Nosseyr, the Arabian viceroy of Africa, landed with a small band of followers at the foot of the rock Calpé, which received afterwards his name (Jebal-Tárik, or Gibraltar), and two months after his disembarkation the memorable battle was fought on the banks of the Guadalete, which put an end to the Gothic empire of Spain. Cordova, Granada, Jaen, Malaga, Toledo, then the capital of Spain, were either speedily reduced or opened their gates to the conquerors, and before Músa, who was now hastening from Africa at the head of considerable forces, could land at Algesiras, his lieutenant Tárik was the master of the wealthiest cities and the most extensive provinces in the peninsula. On the arrival of Músa the whole country, with the exception of the mountain crags of the Asturias, was subdued with that rapidity which characterised Arabian conquest.

1st Period, A.D. 711-756.—*Governors of Mohammedan Spain.*—During the first forty-six years after the conquest Spain was governed by Amirs, dependent upon and appointed by the viceroys of Africa, and not unfrequently raised to command by the voice of the people or the will of the army. Their number was twenty-one, including Tárik Ibn Zeyád, the first instrument of the conquest, and his master Músa, who, on his arrival in Spain (April, 712), assumed the supreme command, and the duration of their government was forty-six years. Their names and chronology are as follows:—

Abd-el-azíz, son of Músa, who, on his father's departure for Damascus, whither he was summoned in 714 to answer the charges brought against him, remained entrusted with the command, followed up the conquests made by his father. He subdued Lusitania, invaded Navarre, and consolidated the Arabian empire of Spain. After a government of nearly two years (716), he was assassinated by the orders of the khalif Suleymán, while performing morning prayers in the mosque of Seville, then the seat of Arabian government.

Ayúb Ibn Habíb Al-lakhmi, one of the officers entrusted by the khalif with the execution of his sentence, administered the affairs of the country for six months, until the arrival of the governor Al-haur Ibn Abd-al-rahman, A.D. 717.

Al-haur made a successful incursion into Gothic Gaul (718), and gained considerable spoil; but his severity and his tyrannical exactions, which fell alike on the natives and on the Arabs, excited great discontent against him. The complaints of the people reached the court of Damascus, and he was deposed at the end of 718.

As-samh Ibn Málik was the next general appointed to govern Spain. Under his command the Moslems penetrated once more into Gothic Gaul, took Carcassone and Narbonne, and were on the point of reducing the important city of Toulouse, when a defeat experienced under its walls obliged them to return to the peninsula. This memorable battle, in which the Arabian governor himself and thousands of his bravest warriors fell, took place in May, 721.

Anbasah Ibn Sohaïm Al-kelbi, his successor in command, administered the peninsula for four years and five months, during which he made some trifling incursions into Gaul. On his return from one of these expeditions (in May, 725), he died a natural death.

Hodheyrah Ibn Abdallah governed Spain until the arrival of Yahya Ibn Salamah, who ruled for two years and a half without making any conquests. He was deposed in 725, and succeeded by Othmán Ibn Abi Nesa, better known to the readers of romance as Munuza.

Othmán, who under the preceding governors had been the scourge of the Gallic provinces, persevered in his attacks, but his authority was only acknowledged a few months, for he was replaced in 727 by Hodheyfah Ibn Al-ahwas, who was himself soon displaced to make room for Alhaïthám Ibn Obeyd. The new amir was accused of cruelty and rapacity, and, at the instigation of the principal officers in the army, was deposed in 728.

Abd-el-rahman, the predecessor of Anbasah, and the same who after the battle of Toulouse led back into Spain the remains of the invading army, was next appointed by the khalif to command in Spain. His new administration was signalised by acts of justice; he punished those local governors who had been guilty of oppression, and restored to the Christians the lands which had been taken from them. In 732 he invaded Gaul at the head of the largest Mohammedan army which had yet trodden the plains of the Continent, and penetrated as far as Tours, where he was met by Charles Martel. The issue of the contest is well known; the Moslems were defeated after a most bloody engagement, which lasted the greatest part of the day: the body of their general and his bravest soldiers remained on the field of battle, and the victorious progress of the Arabs was once more stopped in the heart of France (733).

Of the succeeding governors of Mohammedan Spain, viz. Abd-el-malek Ibn Katn, who arrived from Africa and held the reins of government for three years, until he was deposed; Okbah Ibn Al-hejáj, who kept it until 741; Balkh Ibn Basher, Thaalebah, Husám Ibn Dherár, and Thuebah, little is known except that through their private quarrels and interminable feuds the fire of discord was kindled among the Arabian tribes, and that their Spanish empire was brought more than once upon the very brink of ruin.

Yúsuf Al-fehri was the last governor who ruled over Spain in the name of the Eastern khalifs. Elected by the people and the army in 739, his appointment was confirmed at Damascus; he administered the government for nearly ten years, during which Mohammedan Spain continued to be a prey to civil war. Yúsuf had to contend with Samil, Aamir, Huseyn Al-okayli, and other competitors for power.

2nd Period.—Spain under the Sovereigns of the House of Umeyyah. A.D. 756-1036.—*Kings.*—The overthrow of the dynasty of the Beni Umeyyah in the East, and the tragic events by which it was marked, were calculated to have the greatest influence on the destinies of Mohammedan Spain. A descendant of that family, Abd-el-rahman Ibn Muawiyah, escaped from the general massacre of the Beni Umeyyah in 748, and, after wandering for some time in Egypt and Barbary, landed on the coast of Spain in the early part of 755. He was received with open arms by the inhabitants, who detested the yoke of the Abbasides, and after defeating in two pitched battles (May and September, 756) the generals of the khalif, he made his triumphant entry into Cordova, in December, 756. Spain now ceased to be a dependency of the Eastern empire, and continued to be governed by the posterity of Abd-el-rahman, who received the surname of *Ad-dákhel*, or the Conqueror. His reign was long and prosperous. The Christians, profiting by the civil dissensions of the Arabs, had extended their frontiers, but they were now again driven to the mountain fastnesses of Asturias. Cordova, the capital, was enlarged and embellished by Abd-el-rahman, who surrounded it with walls and conveyed water to it. He began the building of the great mosque [CORDOVA], and formed ship-yards along the coast; he is moreover said to have been the first to transplant the palm and the pomegranate into the congenial climate of Spain: and he encouraged science and literature in his states. This good king died on the 29th of September, 788, after a reign of thirty-four years and one month.

Hishám, surnamed *Ar-rádhi* (the benevolent), the youngest of Abd-el-rahman's twenty male children, succeeded to the empire by his father's appointment. His reign, although prosperous, was of short duration. He had to contend with his two brothers Suleymán and Abdallah, who, considering themselves injured by their father's will, tried to enforce their claims by arms; but, being defeated in every encounter, they were soon compelled to make their submission. In his expeditions against the Christians, Hishám was equally successful. He obliged Bermudo the *Deacon*, king of Asturias (791), to sign a most humiliating treaty. His generals (793-4), penetrating far into France, seized on Narbonne, which they plundered and burnt, advanced as far as Carcassone, defeated Duke William, one of Charlemagne's lieutenants, and returned laden with immense booty, the fifth part of which Hishám applied to the completion of the mosque begun by his father. Hishám died in June, 796.

Al-hakem I., surnamed Abú-l-aássi (the father of cruelty), son of Hishám, succeeded his father. His reign was extremely unquiet. No sooner did his uncles hear of Hishám's death than they again asserted their right of primogeniture; but their attempts proved unsuccessful, for Suleymán was defeated and killed near Valencia, in 799, and Abdallah only obtained the royal pardon on condition of residing in Africa. An insurrection at Toledo in 805, and another within the very walls of his capital in 817, both of which he visited with the utmost rigour, prove that he was no favourite with his subjects. In 818, on the pretext of a slight disturbance in one of the suburbs of his capital, he gave orders that it should be razed to the ground, and that the inhabitants, about 40,000 in number, should be transported to Africa, whence a considerable body passed to Egypt and seized on the island of Crete, which they kept until 961. [CANDIA.] After this signal act of tyranny Al-hakem received the surname of *Rabadhí* (he of the suburb). He died in May, 822.

Abd-el-rahman II., surnamed *Al-ausatt* (the middle one), succeeded his father Al-hakem. He had at first to contend against his great-uncle Abdallah, who, leaving his place of confinement in Africa, again tried the fortune of war in Spain. He was however defeated. In his transactions with the Christians, Abd-el-rahman was still more fortunate than either of his two predecessors. Barcelona was retaken from the Franks in 827; a Mohammedan fleet burned the suburbs of Marseille in 839; and he fought with success against the Scandinavian vikingur, who, in 844-5, appeared for the first time on the coast of Spain. His internal administration also is justly commended. He erected works of public utility; mosques and colleges were built, roads made, and canals dug for the benefit of agriculture; he was likewise an enthusiastic lover of science and literature, which he fostered with unexampled liberality. This excellent monarch died, universally regretted, in August, 852.

He was succeeded by his son Mohammed I., whose reign was anything but glorious. At war with his own subjects, he was unable to stop the progress of the Christians, who, under Alphonso III., began to make successful inroads into the very heart of the Moslem dominions. To his hereditary states of Galicia and Asturias that enterprising monarch added the rest of Leon, Old Castile, Estremadura, and a considerable portion of Lusitania. To these military disasters must be added a drought of one year's duration (867), which terminated in a pestilence, an earthquake which swallowed up several towns (881), and another piratical invasion of the Northmen (860-1). His reign lasted 34 years and 11 months. Mohammed died in July, 886, at the age of 65.

His son and successor Al-mundher, being unable to contend with Kalíb, a daring rebel, who in his father's days had been suffered to reign independent in Toledo and the neighbouring districts, was defeated and slain, after a reign of one year and eleven months, in July, 888.

Abdallah, his brother and successor, had not only to contend against the rebel Kalíb, but to take the field against his own sons Mohammed and Kásim. The former he defeated in a pitched battle near Calatrava, in 889. With the latter he was equally successful; after a short campaign he defeated (895) the forces of the two princes, both of whom fell into his hands. Mohammed, the eldest, was confined in a dungeon and strangled by his orders; Kásim was spared. Abdallah died in October, 912, after a reign of 25 years, appointing for his successor his grandson Abd-el-rahman III., the son of Mohammed.

Abd-el-rahman III., surnamed *An-nássir lidin-illah* (the defender of the faith of God), may safely be pronounced the greatest monarch that the Spanish Arabs ever had. When still young, the mildness of his temper, his generosity, and his love of learning had made him the favourite of the people, so that notwithstanding his uncles were in every respect fit for the management of public affairs, his appointment was received by the nation with unfeigned joy. Abd-el-rahman's first care was to purge the country from the rebels, who under the reign of his predecessors had seized on the best districts of the Peninsula. Of these the most powerful was Kalíb, who, assisted by the Christians, extended his sway over the best portion of Mohammedan Spain: he was pursued from fortress to fortress, his army cut to pieces or dispersed, and himself obliged to wander in disguise through the mountains of Aragon, where he met with an obscure death; and although his two sons Suleymán and Jaafar attempted some time afterwards to revive the war, their plans were completely defeated, and Toledo and other cities, which were still attached to their cause, were obliged to capitulate (944).

In his expeditions against the Christians, Abd-el-rahman was equally successful. In 938 he gained a signal victory over Ramiro II., king of Leon, and in 940 he defeated, near St. Estevan, that monarch, who commanded his forces in person. His wars with Ordoño II., king of Leon, had the same happy termination. His estates too were considerably increased by the addition of a large portion of Mauritania, and the city of Fez, its capital, which he wrested from the hands of the Idrisites.

Elated by so much success, Abd-el-rahman shook off the yoke which, in religious matters at least, still bound Spain to the East, and assuming the titles of *Amir-el-múmenín* (commander of the faithful), Khalif, and Imám, began to give his unreserved attention to the extension and embellishment of his capital, and to promote the welfare of his subjects. His additions to the great mosque of Cordova, the foundation of the town and palace of Az-zahrá, the endowment of several colleges and schools, the formation of an extensive library within his palace, the construction of roads, canals, and aqueducts, all attest his taste for luxury, his love of the arts, and his unceasing activity.

Of the justice of this sovereign the Mohammedan writers have recorded a striking example. On the appointment of his son Al-hakem to succeed him in the empire, his youngest son Abdallah resented the nomination, and entered into a conspiracy to deprive the favoured brother of his life. The plot however was discovered: Abdallah was arrested, and, notwithstanding the entreaties of his intended victim, condemned to death and executed (950). After a prosperous reign of upwards of 50 years, Abd-el-rahman died, on the 16th October, 961, in the 73rd year of his age.

The vacant throne was filled by Al-hakem II., surnamed *Al-mostanser billah* (he who seeks for the help of God), and who to the many brilliant qualities of his father united an unbounded love for literature. Al-hakem's reign was one of comparative tranquillity; little or no war was waged against the Christians; the family dominions in Africa were protected rather than increased by conquest, so that his whole attention was directed to the promotion of science in his states. His reign indeed has been not inappropriately called 'the golden age of Arabian literature in Spain.' He founded schools, endowed colleges, and by his unbounded liberality attracted to his court the learned of every country. He formed at Cordova a public library called 'the Library of Merwán,' the unfinished catalogue of which is said by the Arabian writers to have filled forty-four folio volumes. Al-hakem died in October, 976, after a reign of upwards of 15 years, leaving for his successor his son Hishám, who was then under eleven years of age.

On the accession of the youthful Hishám II., surnamed *Almuyyad billah* (he who is protected by God), to the throne, Mohammed Ibn Abi Aamir Al-mansúr, who had been his father's wizir, succeeded in gaining the affections of his sovereign and ruling in his name. He confined Hishám to the seraglio, and taking into his hands the administration of the kingdom, he assumed all the insignia of royalty. Indeed most of the Arabian historians have not hesitated to call Al-mansúr a usurper, and to number him among the kings of Cordova. But if his ambition was great, his talents made him equal to the task: he was brave, generous, and just; and his wars with the Christians show that he was gifted with great military talents. During his life he is said to have directed no less than seven and twenty expeditions into the very heart of the Christian dominions, which he seems to have entertained the idea of reducing entirely to the sway of Islám. In 983 he took the important fortress of Gormaz, Simancas in 984; Sepulveda in 986. In 987 he took and razed Coimbra, and in 997 he stormed and burnt the city of Leon, the capital of the Spanish monarchy; he went even as far as Santiago, which he took in 985, and penetrated within the very precincts of the shrine of Compostella, the bells of which he sent to Cordova to be melted into lamps for the great mosque.

In Africa too Al-mansúr considerably extended the limits of his empire. The six and twenty years of his administration, or rather reign, constitute one of the most brilliant pages in the history of Mohammedan Spain.

Al-mansúr died in August, 1001, on his return from an unsuccessful expedition, the only reverse during his long career of triumph, some say from grief, others from wounds received in battle, leaving the administration of the realm in the hands of his eldest son Abd-el-malek, who still kept his sovereign in confinement, and ruled as absolutely as his father. But Abd-el-malek did not possess the brilliant qualities of Al-mansúr; in his expeditions against the Christians he was generally unsuccessful, and his internal administration was not good. He died in 1008, in Cordova, probably from the effects of poison, after administering the affairs of the khalifate for six years and four months.

He was succeeded in command by his brother Abd-el-rahman, who, treading in the footsteps of his father and brother, assumed all the power, while Hishám led a profligate life within the walls of the seraglio. But not satisfied with what he held, the ambitious minister aimed at royalty itself. He prevailed upon Hishám, who was childless, to name him his successor; but his rash act was the cause of his ruin, for Mohammed, a prince of the blood, repaired to the frontiers, assembled an army, invested Cordova, and Abd-el-malek having been deserted by his followers, was made prisoner, and crucified by the victor's orders, on the 17th of January, 1009.

The apparent motives of Mohammed's rebellion seemed to be to release his sovereign from the dependence and captivity in which he had been held by the sons of Al-mansúr. But no sooner did he see his authority firmly established, than giving out that Hishám, whom he kept in still closer confinement, was dead, he caused himself to be proclaimed in his stead, and assumed the titles of Khalif and *Mahdí billah* (the directed by God). Mohammed did not long enjoy his usurpation; he had soon to contend against a powerful adversary, Suleymán, also a member of the royal family, who, at the head of the African guard, took the field against him, defeated his troops, and gained momentary possession of the capital in 1009; and although Mohammed re-entered Cordova a few months afterwards, he fell a victim to the fury of the populace, who tore him to pieces, and sent his head to the camp of his rival (Aug., 1010).

Suleymán, surnamed *Almostaïn billah* (he who implores God's protection), administered the affairs of Mohammedan Spain in Hishám's name, although some authors suppose that Hishám was secretly put to death by his orders. But the power of the Umeyyah dynasty, and indeed of the Mohammedan empire of Spain, was fast decaying. The governors of the provinces, refusing to acknowledge the authority of a capital which became the possession of any daring rebel, refused all allegiance to the sultans of Cordova. The antient inheritance of the khalifs was cut up into a thousand petty kingdoms, which, being isolated and weakened, fell an easy prey to the attacks of the Christians. The throne of Cordova itself was occupied by numerous adventurers. Suleymán was defeated and slain by Ali Ibn Hamud (1016), who was himself assassinated in the bath by two of his Slavonian eunuchs (1017). Al-Kásim, and Yahya, the brother and nephew of Ali, disputed the crown with Abd-el-rahman IV., surnamed *Al-mortadhí* (he who is agreeable to God). Abd-el-rahman V., Mohammed III., who was killed in battle in 1018, and lastly Hishám III., occupied alternatively the throne of Cordova for a space of thirteen years.

With Hishám III. (1031) ended the Khalifate of the West, and the noble race of the Beni Umeyyah, who, with a slight interruption of five years, had occupied the throne of Spain for 251 years, and given a series of seventeen sultans to Cordova.

Third period: 1031-1238. *Independent Kingdoms.*—With the extinction of the khalifate of Cordova, the ambitious local governors throughout the Peninsula threw off the mask, and, asserting their independence, assumed the title of kings. Ibn Abbád rose in Seville; Idris Ibn Ali in Malaga; Elvira and Granada obeyed Habús Ibn Maksán; and Valencia was under the rule of Abd-el-aziz, a descendant of the famous Al-mansúr. Badajoz and the whole of Estremadura were under the dominion of Abdallah Ibn Alaftas; Saragossa, Huesca, and most of Aragon, under that of Al-mondher Ibn Yahya; Ismail Ibn Dhi-l-nún reigned at Toledo; Tehwar at Cordova; and Zohaïr and Khaïran, two Slavonian eunuchs, who had passed their youth in the seraglio of Hishám II., held, the former, Almeria and Murcia; the latter, Denia. Cities, even of the second order, such as Carmona, Algesiras, Albarracin, had also their rulers, and the empire of the Beni Umeyyah was divided into as many kingdoms as there were governments before. To detail the history of these petty dynasties, some of which lasted nearly a century, while others had but an ephemeral existence, would be a long and arduous task. It may be sufficient to say, that after a bloody civil war, most of the smaller states were again blended into one or another of the great kingdoms, and that (at the end of the eleventh century) Mohammedan Spain was divided among Mohammed Ibn Abbád, king of Seville, Yahya, king of Toledo, Al-mostaïn, king of Saragossa, and Omar Al-motawakel, king of Badajoz and part of Portugal.

During this period of troubles and civil war, a considerable portion of Portugal and much of New Castile fell into the hands of the Christians. The kings of Leon and Navarre, and the counts of Barcelona, suspending their own animosities, resolved to share in the spoils of their falling rival. After a siege of three years Toledo was compelled to capitulate, and on the 25th of May, 1085, Alfonso entered the antient capital of the Gothic monarchy. The whole of New Castile soon followed the fate of its capital. Alfonso pushed on his conquests, and was going to invade the dominions of Al-muatamed Ibn Abbád, the most powerful sovereign of Mohammedan Spain, when a religious and political revolution changed the aspect of affairs in the Peninsula.

Empire of the Almoravides, 1099-1146.—Towards the middle of the eleventh century, two men, named Yahya Ibn Ibráhím, and Abdallah Ibn Yásim [Almoravides], the former a pilgrim to Mecca, where he learnt divinity and jurisprudence, the latter a distinguished theologian, succeeded by their combined efforts in rescuing some of the African tribes who dwelt beyond the chain of Mount Atlas from the state of gross ignorance in which they lived, and in instructing them in the dogmas of religion. Under the pretext that to diffuse a holy religion was among the most imperative of duties, Abdallah easily prevailed upon his obedient disciples to make war upon their neighbours. The surrounding isolated tribes were gradually reduced, and the people united under this confederacy received the name of *Murabitins*, or Almoravides, which signifies men consecrated to the service of God. Abdallah now assumed the title of Amír, and was succeeded by Abú Bekr, who, leaving his native deserts, undertook the conquest of northern Africa. His cousin Yúsef Ibn Táshfín subdued Fez and the greatest part of Mauritania, and in 1073 the power of the Almoravides was universally acknowledged throughout northern and part of central Africa. To this monarch the Mohammedan princes of Spain had recourse when pressed by the victorious arms of Alfonso; and Yúsef, whose ambition knew no bounds, eagerly seized upon the opportunity of extending his conquests. He crossed the strait at the head of a powerful army (Aug., 1086), and meeting Alfonso near Badajoz, at a place called Zalaca, gained over him a signal victory (Oct., 1086), which, being followed by other successes, had the effect of checking the progress of the Christian king. But if the Moslems of Spain were by this timely aid saved from their common enemy, they had soon to lament that they ever invited to their country so dangerous an ally; for, struck by the fertility and pleasing aspect of the Peninsula, compared with his native deserts, the wild conqueror turned his arms against the very people whom he was called to protect, and succeeded, partly by treason and partly by violence, in establishing his supremacy in Spain.

Yúsef, the first monarch of that race, died in Marocco, in September, 1106. He was succeeded by his son Ali, who, in 1108, defeated near Ucles an army of Castilians, and slew the infante Don Sancho, son of Alfonso. In 1118 however the important city of Saragossa was wrested from the Moslems, and the north of Spain for ever freed from their sway.

To Ali, who died in February, 1143, succeeded Táshfín Ibn Ali, under whose reign the Christians made great progress. Obliged to defend his own kingdom of Mauritania against the attacks of the Almohades (another sect of enthusiastic Africans, who were then contending for power), Táshfín had no leisure to attend to his possessions across the sea, and Spain was left to its own resources. Táshfín died in July, 1145, at Oran, where he was besieged by an army of Almohades.

Ibráhím Abú Isḥák, the last monarch of the dynasty of the Almoravides, succeeded his father, but his reign was of short duration. Unable to resist the rising power of the Almohades, who were wresting from him city after city, he shut himself in his capital, the city of Marocco. On the surrender of that place, in 1146, he was brought to the presence of Abd-el-múmen, the general of the assailing forces, and immediately beheaded.

Empire of the Almohades.—Mohammed Ibn Abdallah, a native of Herga in Africa, or, according to some authors, the son of a lamplighter in the mosque of Cordova [Almohades], was the founder of a new religious sect, which, like that of the Almoravides, originated in the deserts bordering on Mount Atlas, and soon spread over the whole of Africa. By making his followers believe that he was the twelfth imám of the race of Alí, and the *Mehedi*, or director, who was to teach mankind the path of salvation, and cause virtue and happiness to reign over the whole earth; by inveighing against the vices and corruption of the Almoravides, and promising Paradise to those who should fall in the contest, he attracted numerous proselytes to his standard. In 1121, after associating with him in the empire a promising youth named Abd-el-múmen, he marched against the Almoravides at the head of considerable forces. In 1122 he defeated their army, commanded by Abú Bekr. In the following year he gained no less signal a victory. Marocco, Fez, and other important cities were subdued in 1125 by his lieutenant Abd-el-múmen, and in 1149 the whole of northern Africa acknowledged the spiritual and temporal yoke of the Almohades.

Mohammed died in 1129. He was succeeded by Abd-el-múmen, who was eager to add the possession of Spain to his African conquest. This was easily accomplished by means of his generals; but as he was preparing to cross the straits and take the command of his African bands against the Christian kings, death surprised him in the month of March (others say May), 1163.

He was succeeded by his youngest son, Yúsef Abú Yakúb, who appears at first to have cultivated the arts of peace. It was he who, in 1171, built in Seville the famous mosque and the magnificent square tower belonging to it, which forms at present part of the cathedral. He also built a bridge of boats on the Guadalquivir. In 1173 he defeated Alfonso VIII., king of Castile, and, after laying the country waste and taking several fortresses, returned victorious to Africa. He again crossed the sea in 1184, and landed in Spain, where he remained until the moment of his death (July or August, 1184), occasioned by wounds received in an engagement near Santarem in Portugal.

Abú Yúsef Yakúb, better known by the surname of Almansúr, landed at Algesiras, and defeated Alphonso III. of Castile in the plains of Alarcos. He then marched against Toledo, the capital, and although he could not reduce it, he took Madrid, Guadalaxara, and all the surrounding territory. Yúsef died in January or August, 1199, leaving behind him the character of an able, brave, and magnanimous prince.

Mehammed Ibn-Abdallah, surnamed *Annássir lidinillah* (the defender of the religion of God), was the next prince of the race of the Almohades who occupied the throne of Mohammedan Spain, which was every day being reduced to narrower limits. No sooner was Mohammed on the throne than he made a last effort to regain the possession of those countries which had been lost by his ancestors. In May, 1211, he crossed the strait with an army, the largest perhaps that Africa ever poured on the shores of Spain (for we are told that it amounted to several hundred thousand men), and encamped on the summit of that mountainous chain which divides New Castile from Andalusia. He was soon met by the combined forces of the Christian princes and thousands of foreign volunteers, whom a crusade proclaimed by the Pope Innocent III. brought to their help. The day was fatal to the Almohades: they were defeated with dreadful carnage, and the battle of Las Navas may be considered as one which in its immediate consequences involved the ruin of the Mohammedan empire in Spain. Mohammed died in Marocco, in July, 1213, not without suspicion of poison.

The reign of Yúsef II., surnamed Abú Yakúb, who was only eleven years of age on the death of his father, was a scene of continued troubles. He died without issue, in January, 1224. His successor, Abl-málik Abd-el-wahid, lost both life and empire a few months afterwards (1224) at the hands of Abdallah Abu Mohammed, surnamed Al-adel, who himself was strangled in October, 1227.

Almámún Abú Ali was not more fortunate. He had to contend in Africa against his relative Yahya, who disputed the throne with him, and in Spain against an enterprising chieftain, Ibn Húd by name, who had himself proclaimed king of Mohammedan Spain, and ultimately succeeded in wresting that country from the Almohades. Almámún died in 1232.

The power of the Almohades was now fast declining. Mohammed, the successor of Almámún, strove in vain to re-establish his supremacy in Spain: he was obliged to quit that country, and leave it in the hands of his adversaries, who divided it among themselves. Jomayl Ibn Zeyán held Valencia and the surrounding country; Ibn Húd was obeyed in Aragon and part of Andalusia; and Mohammed Ibn Alahmar ruled despotically over Jaen and the best part of the province of Granada. Occasionally at war with each other, the above-mentioned princes showed their inability to contend with the Christians. Cordova, the proud capital of the Mohammedan empire, surrendered to the victors in June, 1236; Valencia capitulated in September, 1238; Denia in May, 1244; and during the year 1246 all the fortresses on both banks of the Guadalquivir, from Jaen to the gates of Seville, fell into the hands of the Christians.

Mohammed Ibn Alahmar, king of Granada, became the vassal of Ferdinand III., who in 1248, assisted by his powerful subject, wrested from the Moslems the important city of Seville.

Fourth Period. 1238-1492. *Kingdom of Granada.*—By becoming the vassal of Ferdinand, the new king of Granada, Mohammed Ibn Alahmar, insured peace for his dominions as long as Ferdinand lived. However, on the death of Alonso X., surnamed the learned, who succeeded his father in the throne of Castile, a desultory warfare was prosecuted on both sides, which ended in a truce in 1266. Ibn Alahmar died in January, 1273.

He was succeeded by his son, Mohammed II., under whose reign another attempt was made by the Africans to re-establish in the heart of Spain the supremacy of Islám. In 1275 Ibn Yúsef, king of Fez and Marocco, crossed the straits at the head of considerable forces, and at first gained some advantages; but he was soon compelled to retire to his own dominions. Mohammed, king of Granada, likewise attempted to regain part of the territories lost by his father; but after a reign of twenty-nine years spent in continual war with the Christians, he died without accomplishing his object, in 1302.

Mohammed III., surnamed Abú Abdalla, his son and successor, was an unfortunate monarch. He had not only to contend against his own subjects, who revolted at Guadix and Almeria, but to defend his kingdom from the Christians, who, in 1308, snatched from him the important fortress of Gibraltar. On his return to Granada, after an unsuccessful attempt to relieve Almeria, which the king of Aragon had invested (1309), he was the victim of a popular commotion, and obliged to resign his throne to his brother Nasser.

The commencement of Nasser's reign was propitious. The siege of Almeria was raised; and Ceuta, which had been in the hands of the Africans, and had become one of the keys of the straits since the Christians held Gibraltar, was reduced by his generals. But the same inconstant mob which had raised him to power, now decreed his deposition. In 1314 the people of Granada rose and proclaimed Ismail Ibn Faraj. Nasser went out against them, but, having been defeated and besieged in his palace, he was obliged to resign and retire into private life.

Ismail Ibn Faraj, surnamed Abú-el-walíd, a prince of the blood, showed great abilities both as a warrior and as a statesman. Although, in 1316, he failed in his attempt to take Gibraltar, he gained (1319) a most signal victory over the Christians commanded by Pedro, Infante of Castile, and his uncle John, both of whom remained dead on the field of battle. Martos and Baza were taken in 1325, and the eastern limits of his empire were considerably extended through his conquests in Murcia. This however did not save him from his internal enemies. Mohammed, a prince of the royal blood, having received an insult from him, swore that he would take revenge; and as Ismail was one day walking with his prime-vizir through the corridors of the Alhambra, he was assailed by a band of assassins, headed by Mohammed in person, and both king and minister fell under the poniards of the conspirators, in 1325.

After the death of Ismail, his son Mohammed IV. was unanimously raised to the throne of Granada. The commencement of his reign was unprosperous. Othmán, the captain of his guards, revolted, and proclaimed Mohammed Ibn Feraj. The Castilians (1328) seized on Vera, Olbera, Ayamonte, and other fortresses; and on the king going out in person to stop their progress, he was defeated, and his army dispersed. The rebel Othmán, who belonged to the royal family of Fez, having obtained reinforcements from Africa, took Algesiras, Marbella, and Ronda. But towards the end of his reign fortune proved more favourable to his arms. In 1329 he retook the important city of Baena, recovered Gibraltar in 1330, and succeeded in reducing all the rebel governors to obedience. However, as he was preparing to cross over to Africa on a visit to Abu-l-hasan, king of Fez, he was assassinated at Gibraltar, in 1333

Yúsef Abu-l-hejáj, who at the time of his brother's death was at Granada, was immediately raised to the throne. In the words of the Arabian writers, he was the most pacific, the most patriotic, and the most enlightened monarch that ever reigned at Granada. In the intervals of peace he seems to have given his unreserved attention to the reform of the administration of justice, to the encouragement of mechanical and other useful arts, and to the promotion of the general welfare. During his reign the Africans under their king Abu-l-hasan made a last but unsuccessful attempt to plant the banners of Islamism in the centre of Spain. They were met on the banks of the river Salado near Tarifa by the Castilians and Portuguese (Oct., 1340). The Africans were cut to pieces with immense loss, and the Moorish king's wives, together with a rich booty, became the prize of the victors. The loss of Algesiras in 1343, and that of many important towns in 1344, followed this most signal victory, and the limits of the kingdom of Granada were thus considerably narrowed. Like most of his predecessors, Yúsef fell by an assassin. In the month of December, 1352, he was stabbed while at prayers in the mosque by a madman.

Mohammed V., the eldest son of Yúsef, inherited the virtues and the abilities of his father. At peace with the Christians, he gave his entire attention to promote the prosperity and welfare of his subjects, but rebellion, as usual, came to thwart his good designs. Some discontented chieftains, whom the severity of his judgments had displeased, turned their eyes to his brother Ismail, and in the year 1359 attacked Mohammed's palace, massacred the guard, and rushed into the royal apartments. Finding their victim gone, they tumultuously proclaimed Ismail their leader.

Ismail II. did not reign long. Scarcely had he occupied the throne for one year, when he himself fell a victim to the ambition of one of his courtiers, Abú Said by name, who had assisted in raising him to the throne, but who now besieged him in the Alhambra, made him prisoner in a sally, and had him put to death in July, 1360.

The usurper Abú Said did not long enjoy the fruit of his treason. Being at war with Pedro, surnamed the Cruel, king of Castile, and with the dethroned monarch Mohammed V., whose authority was still acknowledged at Ronda and the neighbouring districts, and seeing that he could not well resist both his enemies, he resolved to do homage to the crown of Castile, and to hold his kingdom thenceforth as an hereditary fief. Having obtained a safe conduct, he repaired to Seville with a small escort, and presented himself before the Castilian king. But either the riches which the Moor had with him, even after presenting a considerable portion to Pedro, awoke the avarice of that prince, or, what is more probable, Pedro was in secret intelligence with Abú Said's rival: the fact is, that, in violation of the rules of hospitality, the unfortunate monarch was put to death. This happened in 1362.

By the death of the usurper, the throne of Granada devolved upon the legitimate sovereign. The remainder of Mohammed's life was troubled only by one unimportant revolt, which was speedily repressed. He took Algesiras in 1370, and razed the fortifications. Mohammed died in 1391.

Yúsef II., surnamed Abú Abdallah, succeeded to his father. Scarcely however was he seated on the throne, when he narrowly escaped falling a victim to the rebellion of his son Mohammed, who, by accusing his father of being a friend to the Christians, had succeeded in forming a powerful party. The sedition having been appeased, Yúsef invaded Murcia (1391), but without much success. He was more fortunate in 1394, when the grand-master of Alcantara, who had advanced to the gates of Granada with a body of cavalry, was cut to pieces with his men, and himself slain. Yúsef died in 1395, with symptoms of poison.

No sooner had Yúsef expired, than Mohammed VI., the same son who had conspired against him, seized on the sceptre, to the prejudice of his eldest brother Yúsef, whom he confined in a dungeon in the castle of Salobrena. The first year of his reign he passed at peace with the Christians, and even visited Enrique III. in Toledo; but war having broken out again, through the indiscretion and temerity of the governors of the frontier fortresses on both sides, the Moors took Ayamonte in 1397, and in the following year they defeated a small army of Christians on the banks of the Guadiana. These successes however were more than balanced by the loss of Zahara and other towns, which the regent Ferdinand took from them in 1407. Mohammed died in 1410.

Immediately after Mohammed's death, his brother, Yúsef III., was released from his confinement and placed on the throne. He governed the kingdom with comparative tranquillity, and for a period of 14 years, during which peace was only interrupted once, in 1416, when the Christians under the Infante Don Fernando took possession of Antequera. Yúsef died in 1424.

Mohammed VII., surnamed Al-yaiserí, or the left-handed, succeeded his father Yúsef. His first care after taking the reins of government was to renew the truce with the Christians, a circumstance which, united to his haughty and overbearing temper, made him exceedingly unpopular with his subjects. Having moreover prohibited some favourite public amusements, he became so odious, that an insurrection broke out at Granada, his palace was invested and forced, and he had to escape to the court of his kinsman, the sultan of Tunis, in 1428.

The vacant throne was filled by Mohammed VIII. At the head of an army furnished him by the king of Tunis the dethroned monarch appeared the ensuing year in Andalusia, entered Granada, besieged the usurper in his palace, and beheaded him in 1430. But Mohammed was destined to lose his throne a second time, for Yúsef Ibn Alahmar, a descendant from the first kings of Granada, made an alliance with John II., king of Castile, and, having defeated the troops of his rival in 1435, marched on Granada, and entered the capital without opposition, while Mohammed fled to Malaga for refuge.

Yúsef IV. was immediately hailed king, but after a short and turbulent reign of six months, he died in 1435, and Mohammed, the dethroned monarch, who resided at Malaga, was proclaimed for the third time. Not even then was the unfortunate king suffered to govern in peace, for in 1445 his nephew, Mohammed Ibn Othmin, raised a commotion among the people, seized on the Alhambra, took Mohammed prisoner, and confined him to a dungeon, where he passed the remainder of his days.

The usurper was immediately proclaimed under the name of Mohammed IX., but a new competitor for the throne, whose name was also Mohammed Ibn Ismail, and who was supported by the Castilian monarch, seized on the fortress of Montefrio, and maintained himself there in spite of all the exertions of Mohammed. During four or five years the kingdom of Granada was exposed to all the horrors of a civil war, increased tenfold by the devastating irruptions of the Christians. At last, in 1454, the rebels, who had hitherto kept on the defensive, having received reinforcements from John, king of Castile, marched against Granada, defeated the royal troops, and triumphantly entered that capital, from which the Moorish king was fortunate enough to escape in disguise.

Mohammed X., son of Ismail, was then received without opposition, and reigned for twenty-one years in comparative tranquillity, and without the frequent revolts which had precipitated so many of his predecessors from their thrones. But the existence of the Moorish kingdom of Granada was fast drawing to a close. In 1460 the Christians took Gibraltar, and Archidona, and subdued all the intermediate country; the frequent incursions of the borderers also narrowed considerably the limits of the Moorish kingdom, now bounded by the mountains of Elvira and the sea. A peace was at last concluded in 1463, on condition that the Moorish king should hold his kingdom as a fief of Castile, and pay an annual tribute of 12,000 pistoles in gold. Mohammed died in 1466.

Muley Ali Abu-l-hasan, the eldest son of Mohammed, succeeded him, but the state of affairs grew every day worse. In 1470 the governor of Malaga revolted, and did homage to the king of Castile. Granada, the capital, and even the harem, became the scene of those commotions and discords that hastened the ruin of the Moorish empire. The sultana Ayesha, mother of Abú Abdallah, heir presumptive to the throne, entertained a mortal hatred towards another of the king's wives, a Spanish lady called Zoraya, and mother of two princes. At that time the two powerful states of Aragon and Castile were united, and the doom of the kingdom of Granada was sealed. The taking of Zahara (1481) by the generals of Abú-l-hasan, was the signal of a war of reprisals. The city of Alhama, one of the bulwarks of the kingdom, was reduced in 1482; and the ensuing year several important fortresses opened their gates to the conqueror. In the meanwhile the city of Granada was the scene of popular commotion and civil war. The court was divided into two hostile factions—that of Ayesha and Zoraya, the two wives of Abu-l-hasan. The tribe of the *Thegrís* (Zegris) supported the former; that of the Beni Serraj (Abenserrages) the latter; one held the Albayzin, the other the Alhambra; and the streets of Granada were stained with the blood of its inhabitants. Although Abú Abdallah succeeded in dethroning his father in 1483, he was himself taken prisoner by the Christians near Lucena, in April, 1483. Abú-l-hasan regained momentary possession of his capital in 1484, but he was soon disturbed by Abú Abdallah, who, having obtained his liberty again, disputed the throne with his aged father.

At last the people of Granada, leaving the father and son to fight their own quarrels, appointed Abdallah, surnamed *Zagal*, or the brave, to distinguish him from his nephew, called *As-saghir*, or the small, to be their king. In the meanwhile Ferdinand was pushing on his conquests. In June, 1484, he besieged and took Alora and Setenil, and defeated the Moors in two partial engagements. In 1485, Ronda, Marbella, Coïn, &c., fell into his hands: Loxa surrendered in 1486, and the ensuing campaign began by the taking of Malaga. But the successes of Ferdinand did not awake the Moors to a sense of their danger, or induce them to put an end to their civil dissensions; for, profiting by the absence of Zagal from his capital, Abu Abdalla As-saghir marched upon Granada and usurped the throne.

This monarch, who is better known in the Spanish chronicles by the name of Boabdil, was the last king of Granada. In the spring of 1491 Ferdinand invested that capital, and after a siege of nearly a year, the standard of the cross waved on the red towers of the Alhambra. Thus ended, after many vicissitudes, an empire which had lasted for nearly eight centuries.

Government, Institutions, &c.—The government and institutions of the Spanish Arabs may be said, with very few exceptions, to have been modelled upon the Eastern khalifate. The sovereign, who was the source and depository of all power, possessed entire spiritual as well as temporal supremacy: he administered the government with the advice of his *mexuar*, or council of state; the office of *hajeb*, or prime-minister, corresponded in the nature and variety of its functions with that of a Turkish grand-vizier. The provinces were governed by *walis*, or military commanders; and the administration of justice, for which there was no other base than the Korân and the traditional decisions of the companions of the Prophet, was placed in the hands of the kadis, although the sovereign himself could, in cases of appeal, revoke their sentence. The sultan selected his successors from among his progeny, and not unfrequently associated one of his sons in the empire during his lifetime.

But although the principles of government were the same as in the East, and the vices of Mohammedan constitutions as prominent, yet the position of the Spanish Arabs, surrounded as they were by enemies, contributed to give to their institutions a vigour and solidity which they never possessed in the East. The khalifs of Cordova supported a large military force, always ready to take the field, and a numerous fleet to defend the coast of their empire from any maritime invasion. Agriculture and trade were fostered by means of wise and paternal regulations; population increased at an astonishing rate; and the revenue, which is computed at five millions sterling—an enormous sum for the time—enabled the khalifs of Cordova to surround their throne with a magnificence and splendour unparalleled even in the gorgeous capitals of the East.

Sciences; Literature; Arts.—It is now universally acknowledged in Europe that the Arabs succeeded to the sciences of the Greeks; that at a time when ignorance and barbarism prevailed through every part of the Roman empire, literature and philosophy found an asylum amongst them; and that by a singular revolution in the history of nations, Europe became indebted to her Mohammedan invaders for the first lessons of science and learning. With what ardour and success every branch of knowledge was cultivated in the East, the readers must already have perceived in various articles of the present work [ARABIA; ABDALLATIF; AVEMPACE; ASIA; &c.]; it will now suffice to say, that to the Western Arabs especially, and to their settlement in a corner of our continent, we owe the preservation of most of the sciences cultivated by the Greeks.

The first conquerors of Spain, like those of the East, were a rude and illiterate people. It was not till the times of Abd-el-rahman, the first of the Beni Umeyyah (A.H. 139, A.D. 756), that any attention was paid to the cultivation of letters. That monarch and his successors founded colleges, formed public libraries, encouraged literary pursuits by their example and their liberality, and by their successive efforts the study of the sciences was introduced into their states, and continued to flourish to a later period in Spain than in the East. The limits of this sketch prevent us from taking a complete survey of Arabian literature; we shall therefore omit theology and grammar, the favourite studies of the nation, and make a hasty review of those sciences which the Spanish Arabs cultivated with the greatest success.

Poetry has always been the favourite pursuit of Eastern nations: by the Arabs indeed it was cultivated with an ardour which amounted to a passion, and Arabia is said to have produced more poets than all the rest of the world together. The taste was rather increased than abated in Spain, and the catalogues of Casiri show to what extent the muses were courted, since not only war, love, and satire, but grammar, theology, rhetoric, and even the abstruse sciences often form the subject of their compositions. Their poems consist of idylls, elegies, epigrams, odes, satires, and almost every other species of poetry which we have received from the Greeks and Romans, except epic and dramatic poetry, which they never attempted. Besides these, the Spanish Arabs are considered as the inventors of a sort of idyll called *maushahah* (a word meaning in Arabic 'the variegated'), from the nature of the composition, which is a description in the most vivid colours of a woman, a city, a horse, a flower, or any similar object. The most distinguished among the poets of Mohammedan Spain are, Yahya Ibn Hudheyl and Ahmed Ibn Abd-rabbihi, who flourished in the ninth century; Yayhia Ibn Al-hakem Al-ghazzal, who wrote in 940 a poem on the Conquest of Spain by Músa; Abú Tâlib of Alcira, who acquired the honorable surname of *Al-mutennabí* (the inspired); Ibn Abdún, who wrote the 'History of the Kings of Badajoz' in verse; Almuatamed Ibn Abbad, king of Seville; Almunder, king of Saragossa; and the famous Abú-l-walíd Ibn Zeydun, whose poems have lately been translated by Mr. Weyers.

The historians of Mohammedan Spain are equally numerous, but their merits are generally not great. The best of them give us meagre statements of facts, unaccompanied by reflection and destitute of method. The most antient is Abú Beker Al-rázi, who flourished towards the end of the ninth century; Ibn Hayyán, who wrote a general history of Spain in 60 volumes; Mohammed Al-modhdhafer, king of Badajoz, who left a history of his own times, equally voluminous; Al-homaydí, who wrote a biographical dictionary of illustrious Moslems; Ibn Bashkuwâl of Cordova; Ibnu-l-Abbár of Valencia; and the vizier Ibnu-l-Khattíb, who wrote several valuable works on the history of the kings of Granada.

But it was in the physical and experimental sciences that the Spanish Moslems most excelled. From the establishment of the Umeyyah dynasty, the greatest attention was paid to the study of mathematics, and all the other exact sciences. Copies of the works of Dioscorides, Hippocrates, Galen, Aristotle, Apollonius, and other Greek writers, were procured in Constantinople, brought to Cordova, and translated. Among the most eminent professors of philosophy, the following are particularly distinguished: Averroes (or rather Abú Abdallah Ibn Roshd) of Cordova, who died A.D. 1198; Abdelmalek Ibn Zohr (commonly callled Abenzohar); and the famous Ibn Bajeh, or Avempace. Their knowledge of botany was considerable, and likewise that of medicine and chemistry, in both which sciences they made considerable proficiency. In mathematics and the sciences dependent on them, they were still more distinguished. A Spanish Arab, a native of Toledo, named Az-zarkal, improved the astrolabe, and invented an instrument for observing the motions of the heavenly bodies, which was long known in Europe by the name of its inventor.

The useful arts of life also engaged the attention of the Arabs. Agriculture, horticulture, and planting were encouraged by their kings; and the canals and other works for irrigation constructed by them, which are still extant in the plains of Murcia, Valencia, and Granada, sufficiently prove their skill in this branch of art. The mechanical arts and manufactures were likewise carried to considerable perfection. The use of writing-paper was introduced by them into Europe; gunpowder was also improved and first used by them in war; and there is every reason to suppose that to them belongs the honour of the discovery of the mariner's compass.

(Al-makkari's *History of Spain under the Arabs*, and other Arabian MSS. in the library of the British Museum; Conde, *Historia de la Dominacion de los Arabes en España*, 8vo., Mad., 1821; Casiri, *Bibliotheca Arabico-Hispana Escurialensis*, fol., Matriti, 1770; Masdeu, *Historia critica de España*, 8vo., Mad., 1783-97; Cardonne, *Histoire de l'Afrique et de l'Epagne*, 12mo., Paris, 1765; Chenier, *Recherches sur les Maures*, 8vo. Paris, 1787; Andres, *Dell' Origine, de' Progressi, e dello Stato Attuale d'ogni Letteratura*, 4to., Parma, 1783-97.)

MOORSHEDABAD, one of the districts into which the province of Bengal is divided. Its limits are so ill defined that it is not possible to describe them with accuracy. The district occupies the central part of the province, and is intersected by the Jellinghy river, one of the most westerly branches of the Ganges. The population of the district, including the capital, was estimated in 1801 at 1,020,572, about two-thirds of whom were Hindus, and the remainder were chiefly Mohammedans.

The most valuable products of the soil are silk and indigo. The neighbourhood of the capital is the chief seat of the manufacture of wove-silks and taffetas, both flowered and plain, and many other varieties of silk goods are made for internal consumption and for exportation. The land revenue, or Jumma, in 1814 amounted to 18,75,000 rupees (187,500*l.*), and the excise duties realised another lac of rupees (10,000*l.*).

MOORSHEDABAD, the capital of the district, and long the nominal capital of Bengal, is situated in 24° 11′ N. lat. and 88° 15′ E. long., on the Bhagirathi, the most sacred branch of the Ganges, about 120 miles above Calcutta, following the windings of the stream. The city was originally called Mucksoosabad, which was exchanged for its present name in 1704, when Moorshed Khooly Khan transferred to it the seat of his government from Dacca. It is an open town, and the buildings extend on both sides of the river through eight miles of its course. It is a remarkably ill-built town, presenting a great assemblage of mud and straw huts, placed without any regard to order, and intermixed with numerous trees. Near to the river there are a few tolerably good brick houses, and some mosques, but altogether the city may be pronounced one of the meanest in appearance in all India. The most conspicuous building in the town is the residence of the nabob, a modern house in the European style; the old palace is in character with the general aspect of the place.

Moorshedabad, or more properly *Cossimbazar*, a town about one mile to the south, which may be considered its port, is a place of immense traffic, and especially in the rainy season, which affords great facility for water conveyance. At this time the river is crowded with boats bringing and conveying away merchandise: the river is not navigable during two or three of the driest months in each year. The number of houses of all kinds in 1814 was about 30,000, and according to the computation usual in Bengal of eleven individuals to every two houses, the population of the town was 165,000. The city is the head-quarters of a circuit court embracing the surrounding districts of Boglipore, Purneah, Dinagepore, Rungpore, Rajeshahy, and Birbhoom.

MOOSE, or MOOSE DEER. [DEER, vol. viii., p. 351, et seq.]

MORAL SENSE is a name which, occurring first in Lord Shaftesbury's 'Inquiry concerning Virtue,' and afterwards adopted by Hutcheson, has since come to be very generally employed to denote the feelings with which we regard men's actions and dispositions. These feelings are known also by the name of feelings of moral approbation and disapprobation. This last name answers every purpose which is sought in naming, and is at the same time free from the many objections that may be urged against the phrase *moral sense*.

The phrase *moral sense* is objectionable, first of all, because the feelings for which it is proposed as a name have no analogy whatever to the external senses, from which the phrase is borrowed. The phrase therefore tends to give a wrong notion of the thing for which it is a name, an objection which is of itself altogether fatal to the use of the phrase for the purpose of naming.

But there is yet another objection which is more important than the last. The phrase *moral sense*, as well as the phrase *moral faculty*, and the word *conscience* (which is applied only to those cases in which the object of the feelings of moral approbation and disapprobation is one's own actions and dispositions) and other similar phrases and words that might be mentioned, tend to convey a notion of a separate independent principle in man from which he derives directly his moral judgments and feelings. And accordingly the use of these phrases and words has led writers on morals to adopt this notion. The moral sense, or moral faculty, or conscience, is spoken of as something implanted within man by God, through which he instinctively distinguishes between moral good and evil, virtue and vice, and approves of the one and disapproves of the other. The theory that men observe the consequences of actions and dispositions, and that the ideas gotten by this observation are converted by an ordinary process of association into the feelings called the feelings of moral approbation and disapprobation, is rejected as degrading. Now though we were to admit that a man possesses an inward monitor which tells him at once what is right and what is wrong, it is clear at the same time that any one may plead the dictates of this monitor in defence of anything that he may choose to do, or not to do, and that others will have no means of correcting this plea. Thus if there is degradation in the other course, there is danger in this. Mr. Bentham has referred all systems of morals founded on a separate independent principle, whether called *moral sense* or *conscience*, or by any other name, to individual caprice, liking or dislike, sympathy or antipathy. (*Principles of Morals and Legislation*, chap. 2, note.)

We quote the following passage from an admirable article in the first number of the 'London Review,' as serving to explain further the erroneous theory to which the phrase *moral sense* has led, and to justify the principle upon which the following article on morals is written. After stating, as a fact in human nature, that we have moral judgments and moral feelings, and that concerning these judgments and feelings there are two theories, the writer proceeds:—

'One theory is that the distinction between right and wrong is an ultimate and inexplicable fact; that we perceive this distinction as we perceive the distinction of colours by a peculiar faculty; and that the pleasures and pains, the desires and aversions, consequent upon this perception, are all ultimate facts in our nature; as much so as the pleasures and pains, or the desires and aversions, of which sweet or bitter tastes, pleasing or grating sounds, are the object. This is called the theory of the moral sense, or of moral instincts, or of eternal and immutable morality, or of intuitive principles of morality, or by any other name; to the differences between which those who adopt the theory often attach great importance, but which, for our present purpose, may all be considered as synonymous.

'The other theory is, that the ideas of right or wrong, and the feelings which attach themselves to those ideas, are not ultimate facts, but may be explained and accounted for—are not the result of any peculiar law of our nature, but of the same laws on which all our other complex ideas and feelings depend: that the distinction between moral and immoral acts is not a peculiar and inscrutable property in the acts themselves, which we perceive by a sense, as we perceive colours by our sense of sight; but flows from the ordinary properties of these actions, for the recognition of which we need no other faculty than our intellects and bodily senses. And the particular property in actions which constitutes them moral or immoral, in the opinion of those who hold this theory (all of them at least who need to be noticed), is the influence of those actions, and of the dispositions from which they emanate, upon human happiness. This theory is sometimes called the theory of utility.' (*London Review*, article 'On the state of Philosophy in England,' vol. i., p. 172.)

A masterly exposition of the objectionableness of the phrase *moral sense*, and of the theories that are founded upon it, will be found also in Mr. Austin's 'Province of Jurisprudence determined.'

MORA'LES, AMBROSIO, a Spanish historian and antiquarian, was born at Cordova, in 1513. His father Antonio was an eminent physician, whom Cardinal Zimenez appointed principal professor of philosophy at Alcala, and to whom the marquis of Priego presented the house which tradition pointed out as the one that Seneca had inhabited, in order, said the donor, that it might become again the dwelling of the wisest Cordovan. Ambrosio had for his maternal grandfather Fernan Perez de Oliva, who left him a valuable source of information in his geographical work, 'Imagen del Mundo.' Another Fernan Perez de Oliva, who was Ambrosio's maternal uncle, and a professor of philosophy and theology at Salamanca, took a prominent part in his education. He was also indebted to Juan de Medina, and to Melchior Cano, two great writers and eloquent professors of divinity of that time, the former at Alcala, the latter at Salamanca, where he was the great antagonist of his eminent colleague Bartholomew Carranza, and a still greater opponent of the Jesuits. This Cano or Canus is the author of the excellent treatise 'De Locis Theologicis,' and was a great reformer of the schools, from which he banished many futile and absurd questions.

While yet a youth, Morales produced a translation of the Pinax or Table of Cebes. But a religious enthusiasm rose far above all his literary aspirations, and pervaded all his actions.

At the age of nineteen, Morales became a Jeronymite, when his religious fervour being no longer controllable, in order to secure himself against temptation, he attempted to follow the precedent of Origen. The excruciating pain inseparable from this self-mutilation drew from him a shriek which brought a brother monk to his cell in time to give him effectual aid. In order to obtain a papal dispensation for his conduct, he set out for Rome, but fell into the sea, and was saved, according to his own account, by a miracle. Considering this accident as a warning not to proceed, he joined his friends at court, and lived thenceforward as a secular priest. After the death of his father, he became a professor at Alcala, where he had, among others, Guevara, Chacon, Sandoval, and the first Don Juan of Austria, among his pupils. He sustained the high literary credit of his family by his investigations into the antiquities of Spain. He began to collect materials in 1541, and to arrange them in 1560. On the death of his friend Florian de Ocampo, he obtained the vacant place of royal chronicler; but his first appearance as an author was in defending the historian Zurita. When the relics of Justus and Pastor were translated to Alcala, Morales was called upon to record that event and the ceremony on the occasion, together with the martyrdom of those saints. On the death of the chronicler Castro, he was sent to inspect his papers, as belonging, in virtue of his office, to the king. The following year he had to examine the Codex Albeldensis, which was a collection of councils given to Philip II. by the Conde de Buendia. At the death of the bishop of Plasencia, the collector of MSS. for the Escurial, Morales succeeded him in that office, which he exercised with zeal and discrimination. He made indices to his fresh acquisitions, such for instance as the Codex Emilianensis, another collection of councils.

In the meantime he extended the 'Coronica general de España,' which Ocampo had carried no further than the death of the Scipios. After he had continued the history to the end of the Gothic period, Morales was sent to Leon, Galicia, and Asturias, to examine sepulchres and temples, archives and libraries: he collected much curious matter which was published from the original MS. in the Escurial, by the antiquarian Florez in 1765, and has been since inserted in the complete collection of Ambrosio's works, Madrid, 1791-2. It was important to explore all those places, in which alone information could be obtained as to the restoration of the Gothic kingdom, and the centuries immediately following; papers and documents belonging to less antient times might be found everywhere, since by the reconquest of Toledo the Moors were soon driven to southern Spain. In his 70th year (1583) Morales finished the third volume of his history, which completed the work to 1037. By way of relaxation he printed a volume of the works of his uncle Fernan Perez de Oliva; and he inserted at the end of it fifteen essays of his own, his juvenile version of Cebes, and an exposition of Don Juan of Austria's device. The Inquisition suspended the publication of this book till certain passages in his uncle's works should be corrected, but as the Inquisitors neglected to make the corrections, the work remained unpublished. The late editor of Morales had a copy before him; and the pieces of Morales himself are included in the last and the only complete edition of his writings. In his seventy-second year he recast his favourite manual, 'Arte para servir a Dios,' the production of an unlettered Franciscan, Alonso de Madrid, adhering however as closely as he could to the mode in which the subject had been treated. In spite of its religious merits, Morales could not help wishing the work had been in better Spanish, and accordingly he undertook the labour of amending the language. He died in 1591, in his 78th year, and was buried at Cordova pursuant to his directions. Cardinal Sandoval, his pupil, erected a fine monument to his memory, which was not completed till after his own death. Southey has expressed a high opinion of the works of Morales, though he blames at the same time his religious enthusiasm.

Ambrosio is the Leland of Spain, but, happier than Leland, he lived to make use of the materials which he collected, and he brought down the history of his country from its early Roman period (where Ocampo had left off) to the middle of the eleventh century. He accomplished this task with great fidelity and industry, though the reader may smile at his credulity. There is perhaps no historian whose personal character is better developed in his works, a circumstance which gives them a particular interest. Although any good historian of Spain must be more indebted to Morales than to any of his predecessors, it has been wrongly supposed that Garibay drew much from Morales. Estevan de Garibay y Zamalloa wrote first, and Morales himself praises Garibay's diligence in consulting documents, and commends the good use which he made of them. This testimony is honourable both to Garibay and Morales, since both had pursued the same course of research among the archives and the deeds belonging to monasteries and churches.

MORA'LES, CRISTOBAL, or CRISTO'FORO, a great Spanish singer, who, about the middle of the sixteenth century, became the most eminent composer at the Roman Pontifical chapel. His masses and other sacred musical works were standard compositions till they were superseded by those of Palestrina, who followed soon after.

MORA'LES, LUIS, surnamed 'El Divino,' from having devoted his pencil exclusively and most successfully to sacred subjects; in which respect however he is far from standing alone among the numerous Spanish painters. His Saviours and Magdalens exhibit the extreme of human suffering endured with a celestial meekness. The same works badly imitated, or rather caricatured, by his son and several scholars, have created a prejudice against Morales, such performances having been imputed to him either ignorantly or wilfully. Thus Pacheco ('Arte de la Pintura') considers him as a man who had a reputation which he did not deserve. Also Palomino, by whom Bryan (*Dict. of Paint.*) has been misled, has affirmed that Morales never drew the human figure at full length. He must have done it however in some cases, according to the description of Morales's principal works given by the industrious Cean Bermudez (*Diccion. de Profesor. de Bell. Art. en España*). This tasteful and judicious critic moreover finds in Morales correct design, knowledge of the naked form, a fine gradation of tints, and the most perfect expression of sorrow, or true Christian grief.

Philip II., passing through Badajos on his return from Lisbon, in 1581, relieved Morales, who was then suffering from poverty and old age, with a yearly pension of 300 ducats. He thus made some slight amends for having dismissed him, and refused to employ his talents at the Escurial, after Morales had gone there by the king's express command. Morales was born at the beginning of the sixteenth century, at Badajoz, where he died, at a very advanced age, in 1586.

MORALITIES, or MORAL PLAYS. [ENGLISH DRAMA, vol. ix., p. 427.]

MORALS is a word used in several different senses, which it is desirable to distinguish. 1. It has been employed, together with the expressions *moral philosophy* and *moral science*, to denote the whole field of knowledge relating primarily to the mind of man; and in this sense it is coextensive with the word *metaphysics*. To this use of the word there are many objections; and it has accordingly now almost entirely ceased. 2. *Morals*, as well as the expressions *moral philosophy* and *moral science*, denotes specially the science of what is called man's duty, what he ought and ought not to think, feel, say, do. In this sense of the word, morals is one department of metaphysics; mental philosophy, or mental science, or psychology (which, as we shall see presently, is a necessary foundation for morals), being another department. This is in every way the most convenient use of the word, and is now generally sanctioned by custom. In this sense of the word *morals*, it is convertible with *ethics* and with *deontology*, a word which, coined by Mr. Bentham, is more apposite to the subject-matter of the science it denotes than any word derived either from the Latin *mos* or the Greek *ethos* (ἔθος), and which has also the advantage of being formed analogously to *psychology*, and to the names of most sciences. 3. *Morals* and *ethics* are at the same time names for the art corresponding to the science which has just been spoken of, the art of performing one's duty, or (as it is generally described) the art of living a good and a happy life. The art and the science being coextensive, and differing only in this, that the same subject-matter is viewed from different points, the indiscriminate application of the same term to both engenders no confusion worthy of notice.* 4. *Morals* is, in current conversation, synonymous with *morality;* thus denoting not only the science and the art, but also what is the subject-matter both of the one and of the other.

It is the purpose of this article to give a brief general account of morals, considered as the science of man's duty.

Morals then is a name for the science which teaches what it is man's duty to do and not to do, or (changing the phrase) what he ought and ought not to do; or again, what it is respectively right and wrong for him to do; or (to resort to yet another change of phrase) which teaches what is respectively virtue and vice. Our account of the science must necessarily commence with an explanation of this, its fundamental idea, which is thus expressed in so many different ways.

It is man's duty to do, or he ought to do, or it is right that he should do, or lastly, that is virtue, which, on the most general view possible of the tendencies of a disposition or an action, conduces most to the happiness of mankind. That which, of any two acts thus viewed, conduces the less to this happiness, it is his duty not to do; or he ought not to do, or it is wrong for him to do, or lastly is vice. So, absolutely and unconditionally, of any disposition or action which tends, on the whole, to cause unhappiness. It is generally stated, in consistency with this explanation, that conduciveness to the general happiness of mankind is the criterion of duty or virtue.

Two questions now arise, to which, before we proceed further, some sort of answer must be given. The answers to these questions will lead us to separate the science of morals from two other sciences with which it is often more or less confounded, viz. mental science, or psychology, and theology, and also to point out the relations in which it stands to these sciences. The two questions are, what does human happiness consist of? and what renders the pursuit of human happiness man's duty?

We shall answer the second of these questions first. It is man's duty to strive to increase the general amount of human happiness, because he knows, both from the adaptation of the external world to that end, and from express revelation of God's will, that God desires the happiness of mankind. The full and detailed establishment of this proposition belongs to theology, in its two departments of natural and revealed religion. Thus is morals connected with theology. We have said that their provinces have been often more or less confounded, and this has taken place principally in two ways. God having revealed, in a general manner, the assignment of rewards and punishments in a future life to the performance of duty and its violation in this, some writers, as Paley for instance, have directly referred virtue to an expectation of these rewards and punishments, and, instead of treating them as something extraneous and accidental, have introduced them as essentials into the definition of morality.† Now morals has nothing to do with these rewards and punishments further than to determine what are the dispositions and actions to which they are respectively assigned; and this is determined altogether independently of the rewards and punishments themselves. The other way in which the provinces of morals and theology have been confounded (and here the confusion is complete) is by deriving all duty directly from the revealed will of God. Those who consult the Bible only, as being the depository of God's revealed will, for a complete enumeration of their duties, clearly reject morals as an independent science, and merge it entirely in theology. It is needless to observe that the Bible, which, as Mr. Burke observes in a well-known passage, 'is not one summary of doctrines regularly digested, in which a man could not mistake his way,' cannot take the place of, any more than it can be superseded by, a science which systematically treats duty on the principle of conduciveness to the general happiness of mankind.

The question, what does human happiness consist of? remains to be answered. And here too we can only generally indicate the mode of answering the question, rather than provide in detail the answer itself. Man is so framed as to be susceptible of certain pleasures and certain pains. These pleasures and pains are of two different kinds, physical and intellectual; in the last division being included the pleasures and pains of sympathy, and also those derived from the feelings of moral approbation and disapprobation. These pleasures and pains differ of course among themselves, both in kind and degree. Now generally the greater the number of pleasures gratified, and the greater the number of pains avoided, the more is man's happiness consulted; and when there is a necessity of choice between pleasures and pains of different kinds, this happiness is consulted more, in proportion as the pleasures and pains respectively gratified and avoided are more enduring and extensive in effect. The full enumeration and explanation of all the pleasures and pains of which man is by nature susceptible belongs to psychology, or mental science. Morals, availing itself of the results of this science, proceeds to determine, by a comparison, in each case, of known pleasures and pains, in respect of number and value, the different duties of man.

Much confusion has been made between mental and moral science, first by treating the moral feelings (as they are called), or the feelings of moral approbation and disapprobation, as the immediate object of moral science; and secondly, by supposing these feelings, under such names as conscience and moral sense, to be the only and all-sufficient criterion of morality or duty. The consideration of these feelings, as of all other feelings, belongs to mental science. So far as they contribute to increase the number of human pleasures and pains, their consideration is a necessary preliminary to the treatment of moral science. So far, on the other hand, as the proper direction of these feelings is concerned (which belongs to the act of education), it is clear that the enumeration and explanation of duties should precede. Those writers who, merging altogether moral in mental science, derive all duties from what they call an independent moral faculty, which, by way of making the thing clearer, they name *conscience*, or *moral sense*, or *right reason*, commit the error of mistaking the effect for the cause. So far as the judgments of this conscience, or moral sense, or right reason, are good and proper judgments, so far must they be founded upon the results of moral science, treated, as we propose to treat it, in reference to the principle of conduciveness to the happiness of mankind. And it will invariably be found that whatever of good exists in any moral system professing to be founded on something else is really (though its authors imagine otherwise) derived from this science. But where direct and conscious reference is not made to this science, there is no longer any security for the proper direction of the moral feelings. As Dr. Paley happily expresses it, 'a system of morality, built upon instincts, will only find out reasons and excuses for opinions and practices already established—will seldom correct or reform either.' [MORAL SENSE.]

Thus much in the way of preliminary disquisition. We now proceed to enumerate man's several duties.

It is of course out of the question to give a complete enumeration of single separate duties, or (in other words) to state in detail all that a man ought or ought not to do under all possible varieties of circumstances. This can hardly be expected, or at any rate is seldom professed, and never accomplished, in treatises expressly devoted to the subject. The most at all events that can be done here is to name, with the addition of some brief general explanation, the chief general classes of duties. The adaptation of these general duties to particular cases is often obvious. In some cases, which will be specially noticed, the carrying out into minute detail of general rules of duty opens new and large departments of inquiry, which may be considered either as constituting separate sciences, or as belonging to other sciences rather than to morals.

In thus taking refuge in a general classification of duties we shall have to furnish the reader with a list of *dispositions* which it is the duty of man respectively to cultivate and not to cultivate. A disposition is a tendency in a man to act (under which word is comprehended thinking, feeling, speaking, and doing) generally in a certain way. The names for the different dispositions thus come to embrace general classes of actions. For instance, the disposition called *benevolence* leads to innumerable actions which, under innumerably different circumstances, it is man's duty to perform; and the name therefore stands as a general name for all these actions. To name singly and separately all these actions would perhaps not be practicable, and certainly not be desirable. Certain subclasses of them may be named, in explaining the beneficial tendency of the general disposition, or (in other words) the reasons why it is man's duty to cultivate this disposition. This last explanation will necessarily comprehend a general view of the advantages of the different actions which the disposition tends to produce.

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* Writers on morals indifferently define it as a science and as an art. Thus (to give an instance of each) Paley defines it as 'that science which teaches men their duty and the reasons of it;' Henry More, in his 'Enchiridion Ethicum,' as 'the art of living a good and happy life' (*ars bene beateque vivendi*).

An able and distinguished writer in the 'London and Westminster Review' denies to morals all claim to the title of a science. 'Morality,' he observes, 'is not a science, but an art; not truths, but rules.' (Vol. iv., p. 10, article on *Political Economy, and on the Method of Philosophical Investigation in that Science.*) In the same way, Mr. Mill, in his 'Analysis of the Human Mind,' wherever he has occasion to speak of morals, speaks of it as an art. It seems to us, that morals is either a science or an art, according to the manner in which it is treated; a science, if its subject-matter is exhibited in the form of propositions; an art, if in the form of rules. It seems to us also, that the fitter way of treating it is as a science.

† Paley's well-known definition of virtue is, 'The doing good to mankind, in obedience to the will of God, and for the sake of everlasting happiness.' This definition is considered by the writer of this article as open to great objections.

There are many different principles of classification on which the enumeration of duties may proceed. It is perhaps not too much to say that all duties may be deduced, with a greater or less exercise of ingenuity, as corollaries from any one which has been previously established. Thus Wollaston, in his 'Religion of Nature,' deduces all man's duties from the duty of truth. Hobbes again, in his 'De Cive,' derives all morality from the duty of preserving peace. It is clear that the mode to be adopted of treating the subject, or, in other words, the mode of classifying our enumeration of duties, is a matter entirely of convenience; and, merely as a matter of convenience, we shall adopt the division of duties which has been partly acted upon by Dr. Paley, and which is perhaps the division most generally resorted to by writers on morals.

We shall treat of a man's duties, first, as they regard himself individually, and, secondly, as they regard others. It is necessary to remark, in order to prevent misapprehension, that one duty is a duty towards oneself, and another duty is a duty towards others, not on account of its tending respectively to produce happiness only to oneself or only to others, but simply from the accidental circumstance of oneself in the one case and others in the other being, as it were, the outward object of the action or disposition which constitutes the duty. 'Those acts of ours,' to quote from Mr. Mill, 'which are primarily useful to ourselves, are secondarily useful to others; and those which are primarily useful to others are secondarily useful to ourselves.' (*Analysis of the Human Mind*, vol. ii., p. 234.) Much of the good resulting from the performance of what we call duties towards ourselves consists in our being thereby better enabled to do good to others; and together with the happiness conferred on others by the performance of our duties towards them, is the happiness caused to ourselves by the gratification of our feelings of sympathy and of duty, and the additional security that is gained for the good-will of others towards ourselves.

I. A man's duty to himself consists generally in the preservation of the life with which his Creator has endowed him, and in the improvement, to the greatest degree in his power, of the faculties which he possesses.

The first part of this duty is altogether negative. A man must abstain from wantonly exposing himself to danger, or, in other words, he must be *prudent*, and he must refrain from *suicide*. For when man learns that God has adapted his created world to the production of general happiness, he learns at the same time that life has been given for that purpose; and in foolishly risking or in laying violent hands upon his own life, he tends so far to mar God's object. He throws away his own means of attaining happiness in the way in which God has willed that he should attain it, and he destroys also his means of promoting the happiness of others.

As regards the second part of a man's duty towards himself, consisting in the improvement of his faculties, or, as we may otherwise express it, of his intellectual and moral being, this is partly positive and partly negative. It is a man's duty to improve himself, so far as he can, by study and by cultivating good dispositions; the full explanation of the best mode of doing which belongs properly to the subject of education. It is his duty also not to deteriorate his character by sensual excesses. The vices which he has thus to guard against are principally two, *lust* and *intemperance;* the latter of which divides itself into *drunkenness* and *gluttony*. The names of the two virtues opposite to the two vices of lust and intemperance are *chastity* and *temperance*. The cultivation of these two virtues, or the abstinence from the two corresponding vices, is recommended not only by the good accruing to the individual, but also by the extent to which he is thereby saved from inflicting injury on others.

II. In considering a man's duties towards others, we would adopt the subdivision of duties towards men generally as men, and duties towards men as members of the same society. These last duties will be again subdivided into duties towards members of the same political society or state, and duties towards members of the same family.

1. The duties towards men generally as men, or towards mankind, may be comprehended under the general names of *benevolence* or *kindness*, *courage*, *sincerity*, and *humility*.

In benevolence or kindness are included *sympathy*, or a general disposition to assist our fellow-men; *pity*, or kindness towards those in distress, and towards inferiors; *generosity* or *liberality*, which, being the disposition to make our own means serviceable to others, turns pity to good account; *gratitude;* and *charity*, in the sense in which it is used by St. Paul, or the disposition to judge kindly of others' conduct. The vices opposed to sympathy, pity, generosity, gratitude, and charity, are *selfishness*, *hardheartedness* or *cruelty*, *avarice*, *ingratitude*, and *malevolence* or *uncharitableness*. *Slander* is one principal form in which the last-mentioned evil disposition displays itself. The cultivation of the virtues comprehended under the name *benevolence*, and the avoidance of the opposite vices, have an obvious and immediate bearing on the happiness of others. At the same time it is not to be forgotten that happiness accrues to the benevolent man himself from the gratification of his natural feelings of sympathy, and that by doing good to others he disposes others to do good to him.

Courage is valuable, as tending to give effect to our benevolence. It must not exist in such excess as to lead a man to adventure a great risk for a disproportionately small object, and must therefore be governed by prudence. Mr. Mill indeed has treated of courage as a particular form of prudence, a mode of treating of it which we cannot think proper.[*]

Sincerity comprehends *truth* in words and *honesty* or *justice* in conduct. The manner in which the practice of these virtues, or the abstinence from the opposite vices of *lying* and *cheating*, is recommended by general utility, is obvious. Without the general observance of truth and honesty, men would have no confidence in one another, and there would be no safety. The proverb, that 'honesty is the best policy,' pithily expresses the bearing of this virtue on one's own good.[†]

It remains to speak of *humility*. This is perhaps not so decidedly a virtue as its opposite, *pride*, is a vice. The evil of this vice consists in its tendency to hurt the feelings of others, and to diminish our disposition to do good. Tolerance of others' opinions, and reverence towards superiors in intellectual and moral worth, are forms of humility; and these are dispositions which, when they exist, are fruitful of much good both for oneself and for others.

2. The duties towards men as members of the same political society or state resolve themselves into the general dispositions of *patriotism* and *obedience*. The first is a virtue, the value of which has been often greatly overrated, and which is very apt to degenerate into the failing called *nationality*. But nevertheless it is a virtue. As the general happiness is best pursued by each individual making his own happiness his own chief object, and again by each body of individuals making the pursuit of their own separate interests their chief object, patriotism properly tempered, or the desire to benefit one's own country so long as this is not done in such manner as to injure other countries, is one valuable means of promoting the general happiness of mankind. Of obedience to those who are invested with authority in a state, and to the laws, it belongs to morals to speak only in the most general manner. The filling up of the detail belongs to political science. This

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[*] 'When we perform acts of courage or fortitude, the chance of evil, that is, danger, is incurred for the sake of a preponderant good. If the good were not something more than a balance for the chance of evil, the consequences of the act would not be a balance of good, but of evil. It would therefore be an immoral, not a moral act, and would have no title to the name of courage. . . . . . Courage, in fact, is but a species of the acts of prudence; a class selected for distinction by a particular name; that class in which evils of great magnitude, or rather of a particular description, are to be hazarded for the sake of a preponderant good.' (Mill's *Analysis of the Human Mind*, vol. ii., p. 236.)

There is an obvious difference, which Mr. Mill seems strangely to have lost sight of, between courage being governed by prudence, as it unquestionably ought to be, and courage being only a particular form of prudence. We cannot agree with Mr. Mill either in classing courage among the duties owed by a man to himself.

[†] Kant, in his 'Metaphysic of Ethics' (*Metaphysik der Sitten*), classes the virtue of sincerity among the duties owed by a man to himself. 'A lie is the abandonment and, as it were, the annihilation of the dignity of a man.'

science having determined what laws ought to be enacted, on the ground of conduciveness to general happiness, morals enjoins obedience to them, without reference to their individual goodness, but for the sake of maintaining political society generally, and of preserving to men all the advantages which political society yields.

3. The duties towards others who are members of the same family consist altogether in affection, which manifests itself differently according to the different family relations. Thus we speak of conjugal affection, paternal and maternal affection, filial affection, and fraternal affection. Conjugal affection implies fidelity. The proper exercise of the paternal and maternal affection opens a wide field of discussion; but it may be said generally to show itself best in the proper education of the children. Into filial affection gratitude and reverence largely enter. Fraternal affection differs from friendship only in the peculiar relation under which the feeling exists.

Thus have we given a brief general summary of man's duties. We have said nothing of duties towards God, which are generally made to form a separate division in treatises on morals, because we conceive that these duties, so far as they depend on God's special commands, and thus differ from the duties which we have enumerated, and which we come to know by observing their tendency to promote general happiness, belong to the separate subject of religion; in the same way as the duties which depend on positive laws enacted in a political society have been referred to political science. Generally we may say that man ought to entertain feelings of reverence and gratitude to God, by reason of his superiority, and of the blessings which he has conferred upon us. But the duty of entertaining these feelings in this particular case flows at once from the general duties of gratitude to a benefactor and reverence towards a superior; and inasmuch as the application of the general duties to this particular case needs not the assistance of revelation, and involves no essential difference from the application to other cases, there seems no necessity for a separate division.

So also the duty of kindness to the inferior animals must be taken as a corollary from the general duty of kindness which has been inculcated. The pain which we believe that God wills shall not be inflicted upon men, we must believe too that he wills shall not be inflicted on other animals which he has created. The pain of which animals are susceptible we suppose to be of the same sort as that of which men are susceptible; at least we have no means of conceiving any other sort of pain. And inasmuch as no different circumstances are introduced, there is no need for a separate division wherein to treat of our duties towards the inferior animals.

We shall not prolong this article by a list of works on the subject. The greater number of works which are professedly written on morals are, for a reason which has been indicated in the course of the article, in reality works on a part of mental science. Such for instance is the character of that part of bishop Butler's works which is generally spoken of as belonging to the subject of morals. A good treatise on morals and a good history of moral science are both desiderata in our literature. Paley's treatise on Moral Philosophy, which is perhaps on the whole the best that we possess, has many faults both of matter and of arrangement; and the value of Sir James Mackintosh's 'History of Ethical Science,' which enjoys, somehow or other, a high reputation, will best be known by reading Mr. Mill's severe but yet, in our opinion, not unjust criticism entitled 'A Fragment on Mackintosh.'

MORASS. [MARSHES.]

MORATIN, NICOLAS FERNANDEZ (the elder Moratin), was born in 1737, at Madrid, where he died in 1780. Coming shortly after the poetical reformers Luzan and Montiano, he became the practical reformer of the Spanish theatre in the last century. His comedy 'La Petimetra' contains some fine passages, but wants comic power. In his tragedy of 'Lucrecia,' which has greater merit, the style is not always adapted to the dignity of the subject. Neither of these pieces was performed; such was the prejudice against what was denominated French taste. Moratin's three discourses, 'Desengaños al Teatro Español,' drove from the stage, with the aid of an injunction from government, the 'Autos Sacramentales.' Besides remodelling the drama, Moratin was a still more successful restorer of lyric poetry in Spain. His talents and his amiable character soon gained him the friendship of the learned of the time—the Maestro Flores; the minister Llaguno, the translator of the Athalie; the botanist and humanist Ortega; the eloquent Clavijo Fajardo, the translator and annotator of Buffon, and the editor of 'El Pensador,' the best periodical of that time; his own competitors or rivals, as it were, Montiano, Ayala, Cadahalso, and others—in a word, natives as well as foreigners all sought Moratin's friendship. The Arcadians of Rome gave him the name of Flumisbo Thermodonciaco as a fellow-member. In 1764 he published periodically some of his light poetry, under the title of 'El Poeta.' Soon after appeared his didactic poem on the chase, 'La Diana,' which threw into the shade El Piscator Salmantino, Castro, Nito, Cernadas, and many other writers of that class, who were then corrupting the public taste and disgusting the lovers of genuine poetry.

In 1770, through his patron the Conde de Aranda, he overcame the opposition of the anti-reformist performers to exhibiting on the stage his 'Hormesonda,' a tragedy, which is far from being perfect, thought it is the best of his dramas. The same subject has been treated by the living poet Quintana, in his 'Pelago.' This great effort of Moratin encouraged Ayala to write his 'Numancia destruida;' Cadahalso, his 'Sancho Garcia,' and Huerta, his 'Raguel,' in order to support tragedy in her new garb on the Spanish stage. From a like impulse the 'Hacer que hacemos,' 'El Señorito Mimado,' and 'La Señorita mal criada' of young Thomas Iriate or Yriarte, and 'El Delinquente honrado' of Jovellanos, advanced that reform in comedy which Moratin's son Leandro accomplished. Moratin wrote another tragedy, 'Guzman el Bueno,' which contains several fine passages, but it was not performed.

Unassuming and of too retired habits to make his way in the world, totally helpless when brought among place-hunters, Moratin never importuned the great, not even those to whom he had free access. He asked nothing, he expected nothing, and he got nothing. He practised the law merely for the sake of providing for his wife and son. From this uncongenial labour he was at last released by his friend Ayala, who, quitting Madrid for the benefit of his health, selected Moratin as the person best qualified to fill his chair of Poetica, a situation for which these two friends had before been competitors. A poet is hardly at home in the field of practical utility. However by a 'Memoir on the means of encouraging Agriculture in Spain without injuring the breed of cattle,' Moratin attracted the attention of the Economical Society of Madrid, and soon became an active member of it. He always refused to make any application to the Spanish Academy and to that of History to become a member of those bodies. 'What absurdity,' he once wrote to Llaguno, 'to compel an aspirant to literary honours to beg for them, just as a person wanting a place in the Excise has to petition for it.' Accordingly his beautiful canto, 'Las Naves de Cortés,' passed unnoticed when the Spanish Academy crowned a much inferior composition of José Vaca de Guzman.

Many of Moratin's prose writings, and the whole of his interesting correspondence with Bayer, Conti, Llaguno, Cadahalso, and others, have been lost in consequence of repeated searches and seizures of the family papers in Ferdinand's reign. Among them was perhaps his 'Historical Letter on Bull-fights,' proving them to be not derived from the Romans, but peculiar to Spain. This work however is not mentioned by his son Leandro Moratin, in the biographical notice of his father, which he prefixed to the 'Obras Postumas de Don Nicolas Moratin' (Barcelona, 1821, and London, 1825). This edition is founded on a collection of the author's poetry, which he himself gave in a corrected form, a few months before his death, to his friend Bernascone. Interspersed in it are the following pieces, which have particular merit:—'Las Naves de Cortés,' 'Amor y Honor,' 'Don Sancho en Zamora,' 'Abdelcadir y Galiana,' 'Consuelo de una Ausencia,' 'Fiestas de Toros en Madrid,' 'La Empresa de Micer Jaques Borgoñon.' There is a collection of dramas and other works of Moratin, but it is a very rare book.

Cut off unfortunately in the prime of life, after struggling with the difficulties inseparable from the profession of an author, and boldly opposing the routine established by ignorance and fashion, the elder Moratin nevertheless succeeded in effecting a beneficial change in public opinion, and he gave it the sanction of his high moral and intellectual character. This was a glory the more enviable and rare inasmuch as it is derived solely from the services which he rendered to his country.

(Signorelli, *Storia Critica de' Teatri*, vol. vi.; *Foreign Review*, 1828, vol. i.; *Obras Literarias de* Martinez de la Rosa, tom. ii.; Salvá's *Catalogue of Spanish Books*, London, 1826.)

MORATIN, LEANDRO FERNANDEZ, son of the preceding, a greater dramatist than his father, and also one of the Arcades of Rome under the poetical appellation of Inarco Celenio. He was born at Madrid, on the 10th of March, 1760, began to versify at six or seven years of age, and obtained at the age of eighteen a second prize or *accessit* from the Spanish Academy for his heroic poem entitled 'Toma de Granada.' In order to obtain this precocious success, he secretly availed himself of the few leisure moments which he could steal from the mechanical occupation of a jeweller, to which his father had bound him, in order to divert his mind from poetry, and save him from the evils of poverty. Fortunately, his daily wages of eighteen reals (about 3*s*. 6*d*. of our money), which he gained by his humble occupation, enabled him, after the early loss of his father, to support himself and his mother. But soon losing her also, Moratin joined an uncle, who was a jeweller of the king, without however discontinuing his intercourse with the learned, such as Melon, and Fathers Estala and Navarrete.

Directed by these distinguished individuals, his muse was further encouraged by the above Society with another *accessit*, for his 'Leccion Poética,' a satire, as it was required to be by the academical programme, against poetasters. It is in fact a short *Ars Poetica*, far more methodical and critical than the previous metrical compilation of rules by 'Juan de la Cueva,' but it has been superseded in its turn by the more appropriate and didactic 'Poética' of Martinez de la Rosa, in 1827.

At the suggestion of Jovellanos, Moratin became secretary to Cabarrus, a high statesman and financier, who was sent, in 1786, by the Spanish government to Paris. On his return in 1789, the young poet chastised, in most humorous and witty prose, the intruders into Parnassus, in his anonymous 'Derrota de los Pedantes,' written in the fashion of the 'Viage al Parnaso' of Cervantes. In the same year, the celebrated minister Floridablanca rewarded his ode to the new king, Charles IV., with a small pension; but he was at last raised to independence by a much greater patron, 'El Principe de la Paz,' the great favourite of both king and queen, once the arbiter of the whole Spanish empire in both hemispheres, and now forgotten, though still living—Godoy. To Moratin's credit, it ought to be remembered, that he never kicked, as so many did, the fallen political lion.

In 1790 he brought out on the stage his play of 'El Viejo y la Niña' (which shows the consequences of great disparity of age in marriages), his first and most felicitous drama. In 1792 followed 'La Comedia Nueva,' or 'El Café,' a very comic satire against stage absurdities and bad taste, which cannot be translated on account of its local and national allusions. About this time Moratin travelled through France, England, Belgium, Germany, Switzerland, and Italy, both to observe society and the art of reflecting it on the stage. He returned in 1796, and in 1798 he published his translation of Hamlet, which is a complete failure. More fortunate afterwards, he produced in 1803 'El Baron' (or the Impostor), which though not one of his best performances, eclipsed the similar piece of 'La Lugareña orgullosa;' in 1804, 'La Mogigata' (a hypocritical young lady preparing herself for the cloister in order the better to carry on her intrigues); in 1806, 'El Si de las Niñas,' the subject of which also is a female who defeats all her mother's attempts at restraint, and the object of her previous instructors. It was represented twenty consecutive days, reprinted four times in the same year, and afterwards translated into many languages.

Elated by his popularity, Moratin was preparing some new pieces, when the suspicions of the Inquisition, which were enviously directed against him, checked his ardour. Although powerfully shielded by Godoy, his 'Escuela de los Maridos,' Moliere's 'Ecole des Maris' (admirably adapted to Spain and modern times), was not represented till the 17th of March, 1812, under Joseph Bonaparte, who made the author chief royal librarian. On the restoration of Ferdinand in 1814, Moratin's property was seized, and himself reduced to actual starvation. Still, before the close of that year, friendship and gratitude, the prominent features of his character, induced him to prepare, for the benefit of the actor Blanco of Barcelona, 'El Medico á Palos,' a piece which was modelled, with proper adaptations, on Molière's 'Médecin malgré lui.' Beloved as he was in that city, the dread of official and concealed persecutors made him leave it in 1817 for Paris, where he lived with his early friend Melon, till the restoration of the popular Spanish constitution in 1820, when he returned to Barcelona. After editing here his father's works in 1821, as stated in the previous article, he left that city again on account of the yellow fever, and went to join his friend Silvela at Bordeaux.

He now devoted himself exclusively to the improvement of his own 'Origenes del Teatro Español,' a work of vast and rare erudition and research, the subject of which is still far from being exhausted, and is discontinued by the author just before the appearance of the exuberant Lope de Vega and his prolific school. At the end of 1825 Moratin's health began to decline. Accompanied by Silvela, he returned in 1827 to Paris, where he died on the 21st of June, 1828, and was buried near Molière's monument in Père la Chaise.

Although a lyric poet of equal genius and more taste than his father, and though he had the credit of having improved the blanc verse (verso libre) so suitable to the Spanish ear, and of having moreover used new combinations of metres and rhymes, Moratin did not consider himself entitled to the double title of a lyric and dramatic poet. A severe correctness, an excessive caution against all flights of imagination, and a strict submission of all other powers to the control of judgment, deprived L. Moratin of that originality and freedom which are necessary for one who would aspire to be a first-rate poet. He is very roughly handled by the *Foreign Quarterly Review* (vol. ii., p. 595), but he is vindicated, *con amore*, by a rival publication, the *Foreign Review* (vol. ii., p. 147). Galiano (*Athenæum*, 1834, p. 371), in his attempt to steer a middle course between the two critics, after acknowledging that L. Moratin 'accurately portrayed the manners and forms of Spanish society,' lowers his plays in rather a summary manner to the level of clever dialogues. But how could the characteristic vivacity and freedom of that society be exhibited in what Galiano calls 'meagre and uninteresting plots?'

Instead of intricacy, the great object of former dramatists, L. Moratin was poetically fond of simplicity, as an element of beauty. Moreover, it was by constant observation in the ranks of middle life that he attained the power of correctly representing the faults and feelings which characterise that class of society. It would be out of place here to touch on the dispute between the classical and romantic schools, in which the two Moratins were involved.

The poetical works of L. Moratin having been purchased in 1824 by his friend Arnao, the greater part of them were published by him at Paris, in 3 vols. 8vo., 182[illegible], and reprinted by the same, in 3 vols. 12mo., in the following year. Part of this collection, 'Poesias Liricas de L. Moratin,' were printed in London by Calero, for Salvá, in 1 vol. 12mo., 1825.

The splendid edition, in three thick vols. 8vo., by the Spanish Academy in 1830, of the 'Obras de Don Leandro Moratin,' was reprinted in 1835, at Barcelona, without the 'Origenes.' This edition of 1830 does not comprehend 'El Auto de Fé Logroño,' which appeared with notes under the name of the 'Bachiller Gines de Posadilla,' nor the following works, which remain in MS.: a translation of 'Candide' a fragment of his own life; 'Viage á Inglaterra é Italia,' 'Catalogo de todos los Escritos Españoles del género escénico conocidos hasta el dia;' various criticisms of dramatic compositions; abridgement of 'Fray Gerundio;' and his literary correspondence with Jovellanos, Llaguno, Cean, Forner, Signorelli, Conti, and others. All these works were being collected in 1831 for the press, by Salvá and Silvela. Of L. Moratin's dramas, the foundation of his fame, numerous editions have appeared.

(*Obras de* Martinez de la Rosa, vol. ii.; Cortejano, *Juicio Crítico de D. L. Moratin*, Barcelona, 1833; Revilla, *Juicio Crítico, de D. L. Moratin*, Sevilla, 1833; Brunet, *Supplément au Manuel du Libraire*, Paris, 1834; and C. H. Senior's *Catalogue of Spanish Books*, 1838.)

MORAVIA (in German, Maehren; in Slavonian, Morawa) is a German province of the Austrian monarchy, situated between 48° 40′ and 50° 25′ N. lat., and 15° 10′ and 19° 6′ E. long., including in these limits Austrian Silesia, which extends along the whole north-eastern frontier, and with which it forms one province. It terminates in a point towards the north, and is bounded on the north-east by Prussian Silesia and Galicia, on the north-west by the Prussian county of Glaz and by Bohemia, on the south-east by Hungary, and on the south-west by Lower Austria. Its area is rather more than 10,000 square miles (of which Austrian Silesia is nearly 1800 square miles). The population in 1830 was 2,060,000, and in 1834, 2,110,140, of whom 470,000 belong to Austrian Silesia. The division of the province is into eight circles, viz. Olmütz, Brünn, Iglau, Znaym, Hradisch, and Prerau in Moravia, and Teschen and Troppau in Silesia.

Face of the Country; Soil; and Climate.—Moravia is divided from Bohemia by a chain of mountains called the Bohemian-Moravian chain; from Prussian Silesia by a part of the Sudetes, called the Gesenke, or the Moravian chain; and from Hungary by the much higher and wider Carpathian range. Moravia is thus shut in by mountains on the east, north, and west: it is open towards the south, in which direction the Morawa takes its course towards the Danube. The interior is traversed by other chains, so that more than half of the country is mountainous. One of the most remarkable of these latter chains is the range extending from Brünn to Olmütz, and thence eastward. It contains numerous caverns and hollows, the best known of which is the Mazocha, sixteen miles north-east of Brünn, a frightful abyss, 300 feet long, 180 broad, and 960 deep, in the midst of a forest. The mountains however enclose fertile valleys, and the lower part of the province, about the centre and towards the south, consists of fine extensive plains, the soil of which is extremely fruitful. The greater part of the country is from 480 to 900 feet above the level of the sea, declining rapidly towards the south. The rivers are numerous: the largest is the Marsch, or Morawa, which gave to the country the name which it has borne ever since the end of the seventh century. This river, the navigation of which is difficult, rises in a cavern at the northern point next to Bohemia and Glaz, flows in a southern course through the middle of the country, receives most of the rivers (excepting a few that run into the Oder), especially the Theya or Taya, and leaving the province at the southern point, from which it forms the boundary between Austria and Hungary, falls into the Danube above Presburg. There are no lakes properly so called, but numerous meres or ponds abounding in fish, of which there are 468 in the circle of Znaym alone, the total surface of which is said to be nearly 100 square miles. Moravia is subject, from the inequality of its surface, to considerable variation of temperature; but notwithstanding its elevation and northern latitude, it enjoys a milder climate than some other countries in the same parallel. The greatest heat in summer is 95°; in winter the mercury sometimes falls to 16° (Fahrenheit). The mean annual temperature at Olmütz is 48°.

Natural Productions.—The animals are horses, oxen, sheep, swine, goats, red deer, hares, feathered game and domestic poultry, especially geese, of which great numbers are exported. With respect to the productions of the soil, Moravia is one of the richest provinces of the empire. Of corn it has on the whole more than sufficient for its own consumption, especially an abundance of very fine wheat. Very large quantities of rye, barley, and oats are grown. Flax is the most important product, and it is nearly equal in quality to that of Prussian Silesia. Hemp is cultivated in the southern part; but the consumption of hemp and of flax is so great, that large quantities of both are imported. Fruit is plentiful and of good quality. The vine flourishes in some parts; and between forty and fifty years ago, so much land was appropriated to the culture of the vine, that the government thought it necessary to interfere, and in 1803 issued an ordinance prohibiting the laying out of new vineyards. The forests furnish vast quantities of timber for building and fuel, potashes, gall-nuts, &c. The pastures are extensive in the mountain districts. The mines are of great antiquity. Formerly some mines of gold and silver were worked, but they were neglected in the troubles of the fifteenth and sixteenth centuries, and have not been resumed. At present iron, sulphur, vitriol, alum, coals, marble, pipeclay (*meerschaum*), and some precious stones, particularly topazes, are produced.

Manufactures and Trade.—The woollen, linen, and cotton manufactures are very flourishing, and on a large scale, and furnish supplies for an extensive export trade to Germany, Hungary, Austria, Italy, and the Levant. The manufacture of thread is likewise considerable. Dyeing is carried on at Brünn, which is particularly celebrated for dyeing Turkish red. Moravia enjoys also the benefit of a great transit trade. The imports are colonial produce, wool, Vienna silks, Russian furs, tallow, wine, oil, porcelain, glass, &c.

Religion, Education, &c.—The inhabitants are partly of Slavonian and partly of German origin, the former being about three-fourths of the whole. In 1825 there were 425,000 Germans, 1,399,000 Slavonians, 27,358 Jews, and 90 Gipsies, all professing the Roman Catholic religion, except 54,000 Lutherans, who have 54 churches; 14,000 Calvinists, with 17 churches; and the Jews, who have 54 synagogues. The Roman Catholics are under the archbishop of Olmütz and the bishop of Brünn: Silesia is under the bishop of Breslau. There is a university at Olmütz, re-established in 1827; gymnasia in every circle, for those who study the higher branches of learning; and about 1500 schools in the towns and the country, in which 130,000 children are educated. The charitable institutions, such as hospitals, asylums for the blind, &c., are numerous.

History.—Moravia was inhabited by the Quadi and Marcomanni during the existence of the Roman empire. When the Quadi went with the Vandals to Spain in 407, the country was occupied by the Scyri, the Rugii, the Heruli; and, about 548, by the Lombards, when a kingdom of Moravia, more extensive than the present province, was established, which was conquered by Charlemagne, who compelled Sampslaus, the king, to be baptized. After numerous vicissitudes, Swiatopluk united all the tribes, and formed a kingdom, which is said to have included not only Moravia, but Bohemia, Misnia, Brandenburg, Pomerania, Lusatia, Silesia, part of Upper and Lower Pannonia, and Dalmatia. This prince died in 894, and was succeeded by his three sons. By dissensions between them, and unsuccessful wars with the Boii (Bohemians) and the Magyars, Moravia was much weakened, and lost its independence in a great battle in 907. It was often a prey to the Hungarians, Poles, and Germans, and after many changes became subject to the kings of Bohemia. In 1527, when the emperor Ferdinand I. succeeded to the crowns of Hungary and Bohemia, Moravia was added to the possessions of the house of Austria, with which it has ever since been united.

There are many considerable and flourishing towns in Moravia, some of which have been already described [AUSTERLITZ; BRÜNN], and others [OLMÜTZ; TESCHEN; TROPPAU; ZNAYM] will be described in their order. There are also other flourishing towns. In the circle of Olmütz is *Sternberg*, a municipal town belonging to Prince Liechtenstein, which is agreeably situated in the mountains, and has 8200 inhabitants, who carry on flourishing manufactures of woollen cloth, linen, canvas, calicoes, and stockings. *Prossnitz*, likewise a municipal town, belonging to Prince Liechtenstein, is situated on the Rumza, in the fruitful district of Hanna, of which it is the chief town. It has four suburbs and several churches. There are manufactures of fine cloth, kerseymere, and linen, several brandy distilleries, and the greatest corn-market in Moravia. The population is nearly 9000. In the circle of Brünn is *Nicolsburg*, the chief town of an extensive lordship belonging to Count Dietrichstein: it has a palace, with a library of 20,000 volumes, a fine cathedral and several other churches, a gymnasium, &c. It has about 7800 inhabitants, of whom about 3000 are Jews. *Eisgrub* has a magnificent palace, the usual summer residence of Prince Liechtenstein, with one of the finest and most extensive parks in Germany, in which there is a celebrated tower in the Oriental style, 218 feet high, the finest orangery in Germany, and an immense collection of exotic trees and plants. Eisgrub has 1800 inhabitants. *Iglau*, the capital of the circle of the same name, is a well-built walled town on the river Iglawa. It has 6 churches, a gymnasium, a well-endowed hospital, flourishing manufactures of woollen cloth and linen, and a great trade, particularly in corn and hops. The population is 14,000. The celebrated fortress of Spilberg, in which State prisoners are confined, is in the circle of Brünn.

(Stein; Hörschelmann; Hassel; Blumenbach; Rohrer; *Oesterreichische Encyclopædie*, &c.)

MORAVIAN MOUNTAINS. [GERMANY.]

MORAVIANS, or MORAVIAN BRETHREN, a congregation of Christians descended from the Bohemian brethren, who were a branch of the Hussites. [HUSS, JOHN.] The Bohemian brethren dissented from the Callixtines, and refused to subscribe to the articles of agreement between that party and the council of Basle in 1433. They then formed themselves into a distinct community, called 'the brothers' union,' and as they were obliged to live in seclusion through fear of persecution, they were called by their enemies 'Grübenheimer' or Troglodytes. They looked upon the Scriptures as their rule of faith, rejected transubstantiation, and were very strict in their discipline, excluding the vicious, the scoffers, and the worldly from their communion. They established among themselves a superintendence over the practical and domestic conduct of individuals, who were distributed into three classes, the beginners, the proficient, and the perfect. They had their bishops, seniors, presbyters, and deacons, who administered their civil as well as ecclesiastical affairs. Like the Quakers they refused to do military service.

When the great Reformation took place in Germany, the Bohemian brethren sent envoys to Luther in 1522, who approved of most of their doctrines and discipline, and although he did not admit every article of their confession of faith, yet he said that it might be tolerated as it was. (Mosheim, *Ecclesiastical History*, sixteenth century, iii. 2, 2.)

In 1547 most of the brethren were expelled from Bohemia by Ferdinand I., upon which they took refuge in Poland and Prussia, where they formed several settlements, especially at Marienwerder. They were united for a time with the Lutherans by the convention of Sendomir, but afterwards drew closer to the Calvinists at the synods of Ostrorog in 1620 and 1627, and adopted Calvin's creed, retaining their own Bohemian forms of discipline. (Elsner, *Brevis Conspectus Doctrinæ Fratrum Bohemorum*, in Gerdes's *Miscellanea Groningiana*, vol. vi.)

Under Maximilian II., those brethren who had remained in Bohemia and Moravia enjoyed full toleration, and they formed their chief settlement at Fulnek in Moravia, whence they received the name of Moravian brethren. But in the subsequent Thirty Years' war, their settlements in Bohemia and Moravia were utterly destroyed, and, after various migrations, their descendants were settled, in 1722, by Count Zinzendorf, on his estate of Bethelsdorf in Upper Lusatia, where their colony took the name of Herrnhut, from a hill in the vicinity called Hutsberg. They then established themselves as a new community under the name of the United Brethren, to which Protestants of every denomination were admitted, without being obliged to renounce their respective creeds, but on condition of conforming to their rules of discipline, which were derived from those of the Bohemian brethren. Since that time the community of the United or Moravian brethren has greatly increased, and has spread through Germany, Holland, the United States, and other Protestant countries. Wherever they have formed a new and distinct settlement, they have enforced their regulations of civil and religious discipline upon all the members of the community, but there are many Moravians scattered about in towns among people of different communions, where they form small congregations and have their own meetings. The Moravians do not assume to constitute a separate sect, and whenever they have been required as a body to state their creed, they have professed a general adherence to the confession of Augsburg, and their preachers, without pledging themselves to all its articles, reject any doctrine which is utterly repugnant to it. They avoid discussions on the speculative truths of religion; they acknowledge the manifestation of God in Christ, and consider the life, sufferings, death, and merits of the Saviour as the foundation of their faith. They look upon the Scriptures as the revelation of God. They also believe that the Spirit of God continues to enlighten inwardly those who pray for it for the purpose of regulating their conduct, and they make a practice of invoking it in circumstances of doubt and uncertainty, before coming to a determination. Each community, represented by its elders, presbyters, and deacons, provides for the spiritual wants of its members, for its churches, schools, hospitals, and other public establishments, and the funds for these objects are raised partly by subscriptions and partly by rates levied on the householders. In other respects every family in the community carries on its private affairs, and manages its own interests and property as in other communities. The erroneous notion of their having community of goods arose from the circumstance that some of their first settlers in North America, being few and forlorn among strangers, found it convenient for a time to put their earnings into a common stock.

The principal settlements of the Moravian brethren are—Herrnhut in Lusatia, which is still their head establishment; Niesky, in the same province, where they have a college, as well as at Gnadenfeld in Silesia; Christiansfeld in Holstein; Neuwied on the Rhine below Coblenz, a flourishing settlement in a beautiful situation; Monmiral in the canton of Neuchatel in Switzerland, where they have an institution for boarders; Zeyst near Utrecht; Fulneck in Yorkshire; Fairfield in Lancashire, Ockbrook in Derbyshire; Gracehill in the county of Antrim in Ireland; Sarepta in Southern Russia near Astrakhan; Bethlehem and Nazareth in Pennsylvania, in the latter of which places they have a college; and Salem in North Carolina.

One of the principal objects of the Moravian institution is to send out missionaries among the heathen. They have missionaries among the Caffres and Betchouanas in South Africa, among the Delaware Indians and the Cherokees in North America, among the Eskimaux of Labrador, and among the negroes of the West Indies.

The Moravians are simple and decent in their dress, and, like the Quakers, reject all gaudiness and ornament. Promiscuous assemblages of the two sexes are forbidden among them, as well as plays, games, and dancing. They have however church music and singing. The unmarried men live together in a separate building called the house of single brethren, under the superintendence of an elder; and there are likewise houses for single sisters and widows. Marriages among members of the society must be sanctioned by the elders. They wear no mourning for the dead, looking upon death as a happy release from earthly bonds: their expression on such an event is, that the deceased is gone home to the Lord.

The Moravians in general bear a very good character: they seem to have realised, better than any other Christian congregation, the great Christian principle of peace and charity; they are not exclusive, and the differences which exist among the various Protestant sects seem among them to be smoothed down and almost obliterated. They are not very numerous. In a long and very minute article concerning them in the 'Encyclopædia Americana,' under the head 'United Brethren,' it is stated that there are not more than 14,000 professed members in Europe, and about 4000 in America. But these members are independent of a much larger body of Protestants of various sects, who, without having subscribed their articles of discipline, or forming part of their congregation, either live along with them, or are connected with them, and receive instruction from their preachers, besides the converts whom their missionaries make among the heathen. Cranzen has written a history of the Moravian or United brethren.

MORAY, or MURRAY FRITH, is a gulf of the German Ocean, bounded on the north-west by the counties of Ross and Cromarty, and on the south-east by those of Nairn and Elgin. The north-western shore of the frith extends nearly in a straight line from Kessock ferry, opposite the town of Inverness, to Tarbet-Ness, the north-western extremity of Ross-shire, a distance of thirty-two miles. Midway between these points is the entrance to the frith and harbour of Cromarty, the Portus Salutis of the Romans. The south-eastern shore extends from the town of Inverness to Fort George, and thence to Burghead on the coast of Elginshire. The ports along this shore are merely tide havens. The distance of Burghead from Tarbet-Ness is fifteen miles, which may be considered the width of the frith at its entrance. At Inverness the width is about a mile, and not much more at Fort George, in consequence of the channel being just there narrowed by Chananry Point. The frith extends about seven miles above Inverness, under the name of Loch Beauley. At the head of this loch is the embouchure of the Glass-water, and the north-eastern extremity of the Caledonian Canal unites with it a little to the west of Inverness. Vessels of large burthen come up to Inverness, where the anchorage is safe. The herring fishery of the frith is of great value. In the year 1834 there were 19,956 barrels cured at Banff, the principal part of which had been taken in the Moray frith. The Gaelic name of the Moray Frith is Farar, or Varar; the latter of which names appear in Ptolemy.

(Map of the Shires of Ross and Cromarty in the *New Statistical Account of Scotland;* M'Culloch's *Stat. Acct. of Brit. Empire.*)

MORAYSHIRE. [ELGINSHIRE.]

MORBEYA. [MAROCCO.]

MORBIHAN, a department in the north-west part of France, bounded on the north by the department of Côtes du Nord, on the east by that of Ille et Vilaine, on the south-east by that of Loire Inférieure, on the south and south-west by the Atlantic ocean, and on the west by the department of Finistère. Its form approximates to that of an irregular oval, having its greatest length, from north-west to south-east, from the neighbourhood of Gourin to that of Roche-Bernard, 85 miles; and its greatest breadth, at right angles to the length, from the neighbourhood of Mauron to that of Sarzeau, 52 miles. The islands belonging to the department are not included in the above statements of dimension and site. The area of the department (including the islands, we presume) is given at 2709 square miles, which is considerably above the average area of the French departments; and is rather greater than the area of Lincolnshire, the second of the English counties in respect of size. The population in 1831 was 433,522; in 1836 it was 449,743, showing an increase in five years of 16,221, or nearly 4 per cent., and giving 166 inhabitants to a square mile. In amount and density of population it exceeds the average of the French departments, and considerably exceeds the English county with which we have compared it. Vannes, the capital, is in 47° 39′ N. lat. and 2° 47′ W. long., 244 miles in a direct line west by south of Paris, or 277 miles by the road through Dreux, Alençon, Mayenne, Laval, Rennes, and Ploërmel.

The coast-line in this part of France is very much broken. The southern part of the department is indented by the bay into which the Vilaine flows; on the north side of which bay are several inlets of shallow water, penetrating four or five miles inland. There are also several islands, of which the principal is that of Dumel or Dumet. The Pointe de Penvins forms the north-western boundary of the bay of the Vilaine: this is succeeded by the Pointe St. Jacques and the Pointe du Grand Mont, and the shallow bay of St. Gildas. North-west of this is the narrow entrance to the Morbihan (a word which, in the Lower Breton or perhaps Celtic language, means 'the little sea'), a considerable gulf, landlocked on every side, and extending twelve or fourteen miles from east to west, and six or seven from north to south. It is for the most part occupied by shoals and sand-banks, but there are, between these, channels of deeper water by which vessels get up to Vannes, which is on an inlet on the north side of the gulf. There are a great number of islets in the Morbihan, the principal of which are the Ile aux Moines (Monks' Island) and the isle of Arz; both of these are inhabited, and are under cultivation. Opposite to the mouth of the gulf, a mile or two out to sea, is the little island of Mehan, and farther out the islands of Houat, Hoedic, and Belle-île. Houat and Hoedic are peopled by fishermen; the latter is defended by a small fort. Belle-île is by far the largest island on this part of the coast. [BELLE-ILE-EN-MER.] West of the gulf of Morbihan is the peninsula of Quiberon (antiently Keberoen), a long strip of land running out southward nearly ten miles from the main, and forming with the mainland a capacious bay. The peninsula is insulated at high-water. In it are the three pointes or headlands, Beguenaud, Beguelonnet, and Couguet, the last at the southern extremity. The small fortified town of Quiberon is on this peninsula. In the year 1759 Admiral Hawke defeated the French fleet off Quiberon; and in 1795, during the war which followed the French revolution, a body of emigrants, conveyed and protected by a British squadron, took possession of this peninsula; but not being supported by the population of the surrounding country, they were compelled to surrender, and their principal officers, with the bishop of Dôl, who had accompanied the army, were shot as traitors at Vannes. North-west of Quiberon is the river Etel, a gulf or inlet extending six or seven miles inland, landlocked on every side, with a narrow entrance. North-west of this are Port Louis, or the æstuary of the Blavet, and the æstuary of the Éllé or Quimperlé, with the intervening headland of Tahit or Talut. Opposite to this headland is the isle of Groix or Groaix, extending about five miles in length from north-west to south-east, and about two miles broad. It has about 2000 inhabitants, who gain a subsistence by cultivating the soil, and by fishing for the congers that abound near the surrounding rocks, and salting them for food or sale. The whole length of the coast, with its windings, is estimated at 124 or 125 miles.

The northern side of the department is occupied by the lower slopes of the Monts d'Arrée, part of the great Armorican chain: a range of low hills branching off from these, and running south-east, separates the valleys of the Oust and Blavet. The whole department belongs to the great district of the primitive rocks, which occupies the north-western extremity of France. The only metal procured is iron; some authorities add lead, but there are no lead-mines now wrought. The number of iron-works is five: there are in them six furnaces for making pig-iron, and eight forges for making wrought-iron. The fuel employed is charcoal. Slate is quarried, and rock crystal, potters' earth, and a kind of sand which resembles emery are procured. There are considerable salterns in the marshes along the coast, and a number of mineral springs.

The rivers run from north to south, and from the proximity of the mountains in which they rise to the sea, are commonly small. The Ellé has its source in this department, flows into the adjacent department of Finistère, and at its mouth forms the boundary between the two. The Blavet rises in the department of Côtes du Nord, enters this department on the north side, and flows to Poutivy, where it becomes navigable. From thence it flows south-west into the sea opposite the island of Groaix. Its whole course is about 70 miles, of which 34 miles are navigable. It receives the Evel and the Scorf, the latter just at its mouth, which forms the haven of Port Louis. The Auray and the Artz fall into the gulf of Morbihan. The Vilaine, a more important stream than any of the foregoing, touches the boundary at its junction with the Oust, and after flowing about 5 miles along the border, has the rest of its course (of about 24 miles) within the department. It is navigable in all the part connected with this department. The Oust rises in the department of Côtes du Nord, and entering this department on the north side, flows south-east past Rohan, Josselin, and Malétroit (where it becomes navigable), into the Vilaine: the last six or seven miles of its course are on the border of the department. Its whole length is about 70 miles, for 24 miles of which it is navigable. The Lie, the Trinité (which receives the Due), the Claye, and the Aff flow into the Oust: the Aff forms for some distance the western border of the department.

The canal from Nantes to Brest enters this department on the east side near Rieux on the Vilaine. The summit-level of the part between the Vilaine and the Blavet has a length of a mile and a quarter; the length of the canal from the Vilaine to the summit-level is about 65 miles, with a rise of nearly 400 feet obtained by forty-two locks. The length from the summit-level to the Blavet is not more than 7 or 8 miles, with a fall of 230 feet obtained by eighteen locks. The canal follows the valley of the Oust to the neighbourhood of Rohan. After crossing the Blavet the canal follows the valley of that river into the department of Côtes du Nord.

The inland navigation of the department is thus given in the Government Returns:—Vilaine, 26 miles; Oust, included in the navigation of the canal from Nantes to Brest; Aff, 4 miles; Arts or Arz, 3 miles; Blavet, 9 miles; upper part of the Blavet, called Canal of the Blavet, 37 miles; Scorf, 9 miles; canal from Nantes to Brest, 80 miles: total 168 miles.

There are seven Routes Royales, or government roads, having an aggregate length of 348 miles, viz. 188 miles in repair, 96 miles out of repair, and 64 miles unfinished. The principal road is that from Paris to Lorient, which branches off from the great Brest road at Rennes (Ille et Vilaine), and entering this department on the east side, runs by Ploërmel, Josselin, Locminé, Baud, and Hennebon. Roads run from Vannes to Nantes (Loire Inférieure) by Muzillac and Roche Bernard; to Dinan (Côtes du Nord) and St. Malo (Ille et Vilaine) by Ploërmel and Mauron; to Guingamp and Lannion (Côtes du Nord) by Locminé and Pontivy; to Quimper and Brest (Finistère) by Auray and Hennebon; and a branch of the last-mentioned road runs to Morlaix and St. Pôl de Léon (Finistère), by Plouay, Le Faouet, and Gourin. A road from Ploërmel runs by Malétroit into the department of Loire Inférieure; and roads from Pontivy run to Josselin, to Baud, and to Loudéac (Côtes du Nord). The Routes Départementales have an aggregate length of 191 miles; viz. 122 miles in repair, and 69 miles out of repair: the bye-roads and paths have an aggregate length of nearly 3000 miles.

The air of the department is temperate but moist; fogs prevail along the coast. The valleys which intersect the hills on the north side of the department are frequently very fertile: and there are extensive plains along the coast, which produce abundant harvests. The wide heaths which are characteristic of Bretagne form more than a third part of the whole department. About 650,000 acres (above one-third of the whole department) are under the plough. The grain chiefly cultivated is rye; but buckwheat, millet, oats, and a little wheat are grown. The grain harvest is about sufficient for the consumption of the department. Turnips, lentils, flax, and hemp are extensively cultivated. There are about 42,000 acres of orchards and garden-ground: the fruit chiefly grown is the apple, and cider is the common drink of the peasantry. There are about 1700 acres of vineyards, from which a little wine of ordinary quality is produced. The woodlands have an extent of about 85,000 to 90,000 acres. The meadow-land comprehends more than 170,000 acres, beside nearly 30,000 acres of heath or open pasture-ground. Strong draught horses, horned cattle, and sheep are numerous. A government stud is kept up at Lanconnet or Langonnet. Bees are numerous, and their honey is considered excellent. The rivers and the coast abound with fish; and the coasts are likewise frequented by great numbers of water-fowl.

The department is divided into four arrondissements, as follows:—

		Area in Sq. miles.	Population. 1831.	Population. 1836.	Communes.
Vannes	S.E.	633	119,774	125,898	74
Pontivy	N.W.	660	98,976	101,345	45
Lorient	S.W.	773	128,458	133,307	48
Ploërmel	N.E.	643	86,314	89,193	61
		2709	433,522	449,743	228

In the arrondissement of Vannes are—Vannes (pop. in 1831, 8682 town, 10,395 whole commune; in 1836, 11,623 commune) [Vannes], on the gulf of Morbihan; Sarzeau or Sarreau (pop. of whole commune 6126), on a peninsula called the peninsula of Ruis, between the gulf of Morbihan and the mouth of the Vilaine; Muzillac, near the mouth of the Vilaine; Roche-Bernard and Rieux, on that river; La Gacille, on the Aff; Rochefort, on the Artz or Arz; and Questembert (pop. 3561 commune), between Vannes and Rochefort. Sarzeau is chiefly inhabited by fishermen. In the peninsula of Ruis, near the town, are the castle of Suscinion, built by Anne, the last duchess of Bretagne, and the village of St. Gildas de Ruis, of the monastery of which Abelard was abbot. La Roche-Bernard was formerly one of the nine baronies which sent deputies to the states of Bretagne. It is the centre of a grazing district in which many cattle are reared; the inhabitants manufacture pottery and trade in linens.

In the arrondissement of Pontivy are—Pontivy (pop. in 1831, 4112 town, 5956 commune; in 1836, 6378 commune), on the Blavet; Baud (pop. 5120 commune), on the Evel [Baud]; Locminé, on a small feeder of the Evel; Guemené, on the Scorf; and Le Faouet and Gourin (pop. 3626 commune), on the Ellé or its affluents. Pontivy owes its origin to a monastery founded here, A.D. 660, by St. Josse, brother of Judicael, one of the early kings of Bretagne. The town was in the feudal ages capital of the duchy of Rohan; it consists of two parts—the old town, in which are the remains of a castle belonging to the dukes of Rohan, and the new town, which consists of a few streets. There are fine barracks in the town, a house for the sub-prefect, a prison, and some pleasant promenades. During the Imperial régime the town of Pontivy bore the name of Napoléonville.

In the arrondissement of Lorient are—Lorient (pop. in 1831, 14,396 town, 18,322 whole commune; in 1836, 18,975 commune) [Lorient]; Port Louis (pop. 2024 town, 2591 whole commune), and Hennebon (pop. 3360 town, 4477 whole commune), on the Blavet; Plouay (pop. 3816), between the Blavet and the Scorf; Auray (pop. 3734), on the river Auray; and Pluvigner (pop. 4534), between the Auray and the Blavet. Port Louis was built by Louis XIII., in an advantageous situation for trade, at the mouth of the Blavet, to which, as well as to the town, the name of Port Louis was given. The town is on a peninsula, and is defended by bastions and a citadel which command the approaches to the town and the entrance of the port. The inhabitants are engaged in trade and in the sardine or pilchard fishery; a good deal of garden-ground is cultivated in the vicinity. During the Revolutionary period Port Louis was called Port Liberté. Hennebon was antiently a place of great strength, and derives interest from the gallant defence made here by Jeanne, countess of Montfort, A.D. 1342, against the forces of Charles de Blois, competitor with her then captive husband, Jean de Montfort, for the ducal crown of Bretagne. [Bretagne.] The antient massive walls still remain in tolerable preservation; they are flanked by strong towers, the battlements and machicolations of which are in some places almost entire; one of the antient gates is used as a prison. There is an antient Gothic church at Hennebon, but not within the antient walls. During the Revolution the ecclesiastical buildings which existed in and around the town sustained considerable damage. A large church and convent near the town were almost entirely destroyed; and of the abbey de la Joie, a fine building in the vicinity, only the fortified entrance and some ruins remain. The townsmen trade in corn, hemp, skins, honey, wax, cider, iron, and soap. Auray also possesses historical interest; here was fought (A.D. 1364) the battle which closed the struggle of De Blois and De Montfort for the duchy. [Bretagne.] The town is prettily situated at the base of an eminence, on which are the ruins of an antient fort. Many interesting buildings and religious houses were destroyed during the Revolution. There is a Carthusian convent near the town, where repose the remains of some of the royalists who perished in the expedition to Quiberon: a monumental slab is inscribed to their memory. The altar of St. Anne in this convent is much resorted to by the neighbouring peasantry. Near Auray, on the coast, is the great Celtic monument of Carnac. [Carnac.]

In the arrondissement of Ploërmel are—Ploërmel (pop. in 1831, 2271 town, 4851 whole commune; in 1836, 5207 commune), and Mauron (pop. 4229), on the Due; La Trinité, on the river La Trinité; Rohan, Josselin (pop. 2485 town, 2654 whole commune), and Malétroit (pop. 1687 town, 1781 whole commune), on the Oust; and Guer (pop. 3488), on a feeder of the Aff. Ploërmel was formerly a town of consequence; the dukes of Bretagne sometimes held their courts there, and many of them were interred in a Carmelite monastery of which the walls alone exist. Ploërmel was besieged by Henri IV., and the edifices of the town sustained considerable damage. There is a Gothic church connected with an Ursuline nunnery, which has some fine stained-glass windows, and the tombs of two of the dukes of Bretagne, removed hither from the Carmelite convent. The tombs are finely sculptured, and are in a perfect state. There are at Ploërmel a high school and an agricultural society. The townsmen trade in linen, corn, thread, butter, paper, leather, and cattle. Josselin has the picturesque remains of an antient castle, once the residence of Olivier de Clisson; the grey walls are on the summit of a lofty rock overhanging the river. Near the castle are many antient houses and an antient Gothic bridge. The castle received several additions from Anne, the last duchess of Bretagne, but is now fast falling to decay. The town of Josselin is superior in appearance to Ploërmel. The church, which during the Revolution was converted into a stable and much injured, has been restored to its original purpose. It contains the mutilated tomb and effigy of De Clisson. There is another church in the town, half ruined. There is a 'penitentiary house' capable of receiving five hundred persons, designed for those who are desirous of retiring for awhile to meditate upon their sins. Between Josselin and Ploërmel is Mi-Voye (mid-way) heath, celebrated for a combat fought (A.D. 1350) between thirty Bretons and as many English, in which the former were victorious.

The chief manufactures of the department are linens, coarse cloth and other woollens, cotton yarn, lace, paper, and leather. A great quantity of butter is made; and the coasting-trade and the coast-fishery, especially that of the sardine, are very actively carried on. Linens, salt, butter, cider, honey, wax, cattle, hides, tallow, and salt provisions are the chief articles of export.

This department constitutes the diocese of Vannes, the bishop of which is a suffragan of the archbishop of Tours. It is comprehended in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Rennes, and is in the thirteenth military division, the head-quarters of which are at Rennes. It returns six members to the Chamber of Deputies.

In respect of education this department is one of the most deficient in France; the number of young men enrolled in the military census of 1828-29 who could read and write, was fourteen in the hundred, the average of France being thirty-nine.

In early times this department constituted the territory of the Veneti, by far the most powerful of the maritime states of this part of Gaul. Some portions along the border of the department may have belonged to the neighbouring nations, the Osismii, the Curiosolites, the Redones, and the Namnetes. The Veneti possessed almost the only havens that offered a secure shelter along a considerable extent of coast, and this advantage, with their superior skill in maritime affairs, enabled them to acquire the sovereignty of the nations which frequented that part of the ocean, and to render them tributary. They used vessels of small draught of water, suited to the shallows which they had to navigate, and which took little damage when left aground by the receding tide; while their lofty stern and prow, and the general strength of their construction and equipment, enabled them to ride out the tempests to which they were exposed. In these vessels the Veneti carried on a trade with the British Islands and with other parts. Their towns and strongholds were situated on tongues of land running out into the sea, surrounded by banks and shallows, which, being covered by the flood-tide, admitted of no assault by a land force, and, being left dry by the ebb, kept off the attacks of a hostile navy. Confiding in the extensive confederation of which they were the head, in their nautical skill and in the advantages of their situation, they ventured to bid defiance to Cæsar (B.C. 56). But the extraordinary genius and resources of the Roman general overcame all obstacles, and enabled him to achieve the reduction of the Veneti and their supporters. (Cæs., *De Bell. Gall.*, lib. iii., c. 7-16.) In the Roman division of Gaul, the Veneti were comprehended in the province of Lugdunensis Tertia. The town of Dariorigum, or as it is variously written, Darioritum or Dartoritum, was the capital of the Veneti, and assumed, a little before the downfal of the empire, the name of Veneti. It is represented by the modern Vannes, which has risen from its ruins; but it is probable that the site of the antient town was two or three miles from Vannes, at a place called Darouec.

The post of Blabia or Blavia, mentioned in the 'Notitia,' was probably at the mouth of the Blavet; the Port Vindana of Ptolemy was probably the gulf of Morbihan; and a Roman dock at the entrance has been commemorated by the name Navalo, which its site still retains. Sulis, mentioned in the Theodosian or Peutinger Table, was probably at the junction of the little river Seuel with the Blavet; and Durerie, which is mentioned in the same authority, was probably Rieux on the Vilaine. The Vilaine was called by the Romans Herius, and the islands of Belle-Ile-en-Mer and Houat were probably known as Vindilis and Siata.

In the middle ages this department formed part of Bretagne. [BRETAGNE.]

MORDANTS. [DYEING.]

MORDAUNT, CHARLES, Earl of Peterborough, a nobleman famed for his romantic exploits in the war of the Spanish Succession, as well as for his lettered tastes and personal eccentricities, was the son of John lord Mordaunt, whom he succeeded in his title and estates. He was born in 1658. In his boyhood he served in the navy, but afterwards exchanged that profession for the army, and was present in 1680 at the siege of Tangier. He first obtained historical notice however by the decided part which he took in politics, during the reign of James II., against the despotic government of that king. Passing over to Holland, he attached himself to the Prince of Orange, upon whom he warmly urged the project of the expedition to England; and, on its success, was immediately created, in 1689, earl of Monmouth, a title which he subsequently exchanged for that of Peterborough, as the heir of his uncle, second earl of the latter name. Of the questionable though comparatively unimportant share of the new earl in the political transactions of the reign of William III., a full account may be collected from Bishop Burnet's 'History of his own Time,' but it was only after the opening of the Spanish Succession war that he obtained a more creditable field of action, by his appointment, in 1705, to the command of a naval squadron and body of 5000 English and Dutch land forces, with discretionary powers to act on the coasts of Spain and Italy. Receiving on board his fleet at Lisbon the archduke Charles of Austria, claimant of the Spanish crown, he sailed to the eastern coast of the Peninsula, and entered on a career of daring and successful adventure unparalleled in modern warfare. The capture of Barcelona, the reduction of Valencia, and the gaining over of all the eastern parts of Spain to the cause of the archduke, were among the fruits of his brilliant successes; and there can be little doubt that, if his plans had been followed, Charles might have been seated, for a time at least, on the throne of that kingdom. But the conduct of Peterborough himself was intolerably overbearing and arrogant; and his real services, as well as his presumption, rendered him an object of envy and disgust to the archduke and the other allied commanders. When therefore at length Peterborough petulantly resented the repeated neglect of his counsels, by declaring his intention of quitting Spain, Charles showed an ungrateful readiness to be rid of him.

The remainder of his public life was chiefly passed in hurrying from one court to another, so that he was humourously said to have 'seen more kings and more postillions than any man in Europe.' This spirit of locomotion however was anything but harmless: it engaged him in negotiations for which he had often no authority, and led him frequently to sow the seeds of intrigues, the more dangerous as they were supported by his singular talents, and were designed only to minister to a love of action and of personal display as reckless as his vanity was insatiable. In the struggle of parties, during the last days of Queen Anne, Peterborough, through hatred to Marlborough, sided violently with the Tories, and received the order of the Garter and other dignities and offices. On the accession of George I. therefore he had rendered himself too obnoxious to the Whigs to be employed in public business during their ascendency; and the remainder of his existence, which extended to 1735, was distinguished only by his affectionate intimacy with some of the most eminent literary men of his age—Pope, Swift, Prior, Atterbury, Berkeley, and others.

Gay, volatile, and generous to profusion, and with a mind as full of careless wit and negligent grace as of chivalric courage, ingenious expedient, and adventurous stratagem, Peterborough was equally fitted to dazzle in society and in the field. But, both for civil and military life, his qualities were more brilliant than solid; his best actions were the result of an inordinate passion for fame; and, in the gratification of this pursuit, his means were as unscrupulous as his appetite was greedy. With strong impulses of patriotic feeling, therefore, he was often regardless of his country's good; with the persuasive faculties of a diplomatist, he wanted the dignity and consistency of a true statesman; and with undoubted genius for war, he displayed the qualities of an admirable partisan rather than those of a great general.

A lively sketch of the character of Peterborough will be found in Horace Walpole's 'Catalogue of Royal and Noble Authors.' The political and military actions of his life are to be gathered from Burnet's 'History of his own Time;' from the 'Account of the Earl of Peterborough's Conduct in Spain,' by his physician, Dr. Friend; and from Captain Carlton's 'Memoirs.' A full account of his whole career is contained in the modern compilation of the 'Lives of British Military Commanders.'

MORE, SIR THOMAS, born in Milk-street, London, in 1480, was the son of Sir John More, one of the justices of the court of King's Bench. He was educated at St. Anthony's School in Threadneedle-street, under Nicholas Hart, a person of some celebrity in his day, and about his fifteenth year was placed, according to the custom of the times, in the house of Cardinal Morton, archbishop of Canterbury, where he became known to Colet, dean of St. Paul's, who used to say, 'there was but one wit in England, and that was young Thomas More.'

In 1497 More went to Oxford. He had rooms in St. Mary's Hall, but carried on his studies at Canterbury College (afterwards Christchurch). Here he studied Greek under Grocyn, which was then publicly taught in the university, though not without great opposition. During his residence at Oxford he first became acquainted with Erasmus, who resided there during the greater part of 1497 and 1498, and formed an intimate friendship with More, which continued during the whole of his life. It was also at Oxford that the greater number of his English poems were composed, which, though deficient in harmony and ease of versification, are spoken of by Ben Jonson as some of the best in the English language.

After More left Oxford he prosecuted the study of the law, first at New Inn, and afterwards at Lincoln's Inn, and soon acquired great celebrity for his legal knowledge. He was appointed reader at Furnival's Inn, where he delivered lectures on the law for three years; and about the same time he also delivered lectures at St. Lawrence's Church in the Old Jewry, on the work of St. Augustin, 'De Civitate Dei.' More was always fond of theology, and for some time thought of taking orders; but he finally relinquished this intention, and was called to the bar, though at what time is uncertain.

More appears to have soon acquired an extensive practice. He was appointed one of the under-sheriffs of London, which at that time was an office of considerable importance, since the under-sheriff was judge of the sheriff's court, which then possessed far greater jurisdiction than it does at present. More was considered one of the most eloquent speakers of his day; and his reputation became so great towards the latter part of the reign of Henry VII., that it is said that there was no case of consequence before any court of law in which he was not engaged as counsel. About the same time he was elected one of the burgesses of parliament, in which he opposed a subsidy which had been demanded by Henry VII. for the marriage of his eldest daughter. In consequence of this opposition More incurred the displeasure of Henry VII., a prince who never forgave an injury; and had not the king died soon afterwards, More had determined to leave the country.

After the accession of Henry VIII., More was called upon to take a still more active part in public affairs. In 1514 and 1515 he was sent, in conjunction with Tunstall, master of the rolls, and afterwards bishop of Durham, to Bruges, on business of considerable importance. In 1516 he was made a privy-counsellor, and received from Henry marks of the greatest favour. So great a favourite had he become, that the king used frequently to come to his house unexpectedly and spend the day with him.

About this time More composed his 'History of Richard the Third,' and his 'Utopia,' the work by which he is most known to modern readers. It is written in very good Latin, and was published first at Louvain in 1516, and afterwards at Basle, in 1518. The object of this work was to delineate More's ideas of a perfect commonwealth, which is placed in the imaginary island of Utopia. The society which is supposed to exist in this island is constructed on the principle that no one in the state shall have a right to separate property, since separate property is said to involve the unequal distribution of property, and thus occasions great suffering to those who are obliged to labour, and mental depravation to those who live on the labours of others. It is difficult to determine whether the opinions expressed in the 'Utopia' are to be considered as More's real sentiments.

In 1519 More resigned his office of under-sheriff, and in 1521 he was knighted, and made treasurer of the Exchequer. He was frequently employed by Henry in various public missions to France and the Netherlands; and he bitterly complains to Erasmus, in many of his letters, of being obliged to leave his friends and his books to discharge what were to him the most disagreeable commissions.

In the parliament which met in 1523 More was chosen speaker, and in the discharge of his duties he offended Wolsey, who endeavoured to injure him in the king's opinion. Henry however still continued to show the greatest marks of favour to More, and, as a proof of his esteem, appointed him, in 1525, chancellor of the duchy of Lancaster.

On the downfal of Wolsey, More was made chancellor, on the 25th October, 1529. He discharged the duties of his new dignity with the greatest impartiality and integrity, and was never accused by his bitterest enemies of any corrupt exercise of power. The only charge ever brought against him was first promulgated by Fox, in his 'Martyrology,' and copied by Burnet, in his 'History of the Reformation.' According to these writers, More was guilty of great cruelty in persecuting the Protestants; but even if this were true, it could not justly be brought as a serious charge against More's character in an age in which all parties that had the power persecuted their opponents. But we have, on the contrary, the testimony of Erasmus, that 'whilst More was chancellor no man was put to death for these pestilent dogmas,' which is confirmed by More's own express declarations in his 'Apology,' published in 1533, after his downfal from power, when he was surrounded by enemies, and his assertions, *if false*, could have been easily contradicted.

More continued chancellor till the 16th May, 1532. Henry had doubtless advanced More to the chancellorship with the hope that he would assist him in his divorce, and marriage with Anne Boleyn, and therefore pressed him strongly for his opinion on the subject. But More was sincerely attached to the Roman Catholic Church; he looked with a certain degree of horror upon a project which was denounced by the supreme head of the Church, and therefore begged Henry to excuse him from giving an opinion. This was granted for the time; but as it was evident that Henry had determined to effect the divorce, and would soon require the active co-operation of his chancellor, More asked and obtained permission to retire from the office.

From this time Henry, who never seems to have recollected any former friendship when his purposes were in the least degree thwarted, appears to have resolved upon the destruction of his old favourite. More was originally included in the bill of attainder which was passed against Elizabeth Barton and her accomplices; but his innocence in this case was so clear, that his name was afterwards omitted. The court party however soon found an opportunity of gratifying their vindictive master. By a law passed in the session 1533-4 it was made high treason, by writing, print, deed, or act, to do anything to the prejudice, &c. of the king's lawful matrimony with Queen Anne; and it was also provided that all persons should take an oath to maintain the whole contents of the statute. At the end of the session commissioners were appointed to administer the oath, and on the 15th April, 1534, More was summoned before them to take it. This More declined doing, but at the same time offered to swear that he would maintain the order of succession to the throne as established by parliament. In consequence of his refusing to take this oath, More was committed to the Tower; and in the same year two statutes were passed to attaint More and Fisher [FISHER] of misprision of treason, with the punishment of imprisonment and loss of goods. More remained in prison during thirteen months, during which time several efforts were made to induce him to take the oath and also to subscribe to the king's ecclesiastical supremacy; but as he refused to do so, he was, at the end of that time, brought to trial for high treason. He appears to have been indicted under the statute alluded to above, which made it high treason to do anything to the prejudice of Henry's lawful marriage with Queen Anne, and also for refusing to admit the king's ecclesiastical supremacy; and although the evidence against him completely failed, he was found guilty and condemned to death. He was beheaded on the 6th of July, 1535, and met his fate with intrepidity and even cheerfulness.

More's character was singularly faultless. His sweetness of temper and amiable disposition are frequently mentioned by his contemporaries. His piety was unaffected and sincere; and it was his love of truth alone which occasioned his death. In private life his conduct was most exemplary he was a kind husband, an affectionate father, and a faithful friend.

Erasmus, who often visited his house, says, that 'with him you might imagine yourself in the academy of Plato. But I should do injustice to his house by comparing it to the academy of Plato, where numbers and geometrical figures, and sometimes moral virtues, were the subjects of discussion: it would be more just to call it a school and an exercise of the Christian religion. All its inhabitants, male and female, applied their leisure to liberal studies and profitable reading, although piety was their first care. No wrangling, no angry word, was heard in it; no one was idle; every one did his duty with alacrity, and not without a temperate cheerfulness.' (Translated by Sir J. Mackintosh, in *Life of Sir T. More*, p. 15.) More was married twice; first to Jane Colt, the daughter of a gentleman of Essex, who left a son and three daughters; and afterwards to Alice Middleton, a widow seven years older than himself. The last male descendant of Sir T. More was Thomas More, a Jesuit, who was principal of the College of Jesuits at Bruges, and died at Bath in 1795.

The English works of Sir T. More were collected and published at London in 1557, and his Latin works at Louvain in 1566. His letters to Erasmus are printed in the collection of Erasmus's letters published at London, 1642. His 'Utopia' has been translated into English by Robynson, London, 1551, by Bishop Burnet, and more recently by Arthur Cayley, Lond., 1808.

The Life of Sir T. More has been written by his son-in-law, Roper, who married his favourite daughter Margaret; by his great-grandson T. More; by Hoddeston, London, 1652; by Cayley; and by Sir James Mackintosh, in 'Lives of Eminent British Statesmen,' published in Dr. Lardner's 'Cabinet Cyclopædia.'

MORE, HENRY, was born at Grantham in Lincolnshire, in the year 1614. He was sent to Eton, and afterwards to Christ's College, Cambridge, which he entered at the age of seventeen. At college he devoted himself with great zeal to the study of philosophy. He says himself, 'I immersed myself over head and ears in the study of philosophy, promising a most wonderful happiness to myself in it.' Dissatisfied with all other systems, he found rest for his mind only when he came to the writings of Plato; whence, as he tells us, he learnt that something better and higher than the knowledge of human things constitutes the supreme happiness of man, and that this is attainable only through that purity of mind and divine illumination which raise him to a union with God.

More took his degrees of B.A. in 1635, and of M.A. in 1639. He published in 1640 his 'Psychosoia, or the First Part of the Song of the Soul, containing a Christiano-Platonical Display of Life,' which was reprinted in 1647, and, together with some additional pieces, published under the title of 'Philosophical Poems.' He had been elected in the mean time a fellow of Christ's College, and he continued to reside there, performing the duties of a private tutor. His next published work was the 'Conjectura Cabalistica,' written, it is said, at the request of Lady Conway, a Quaker lady, with whom he had formed an intimate friendship, and who at her death left him a legacy of 400*l*. He refused in 1654 the office of the mastership of his college, when his friend Cudworth was consequently elected. He refused also many offers of church preferment, limiting his desires to a life of quiet at Cambridge, and to the pursuit of philosophy. He was one of the first Fellows of the Royal Society. He died in 1687, in the seventy-third year of his age.

More's chief works, in addition to those which have been mentioned, are, 'The Mystery of Iniquity,' 'A Key to the Revelations,' 'Enchiridion Ethicum,' 'Enchiridion Metaphysicum,' 'An Apology for Descartes,' and 'The Immortality of the Soul.'

'More was strongly under the bias of the opinion so common among his contemporaries, that the wisdom of the Hebrews had been transmitted to Pythagoras, and from him to Plato; and consequently that the true principles of divine philosophy were to be found in the writings of the Platonists. At the same time he was persuaded that the antient Cabalistic philosophy sprung from the same fountain, and therefore endeavoured to lay open the mystery of this philosophy by showing its agreement with the doctrines of Pythagoras and Plato, and pointing out the corruptions which had been introduced by the modern Cabbalists. The Cartesian system, which sprung up at this time, was embraced by More, as on the whole consonant to his ideas of nature; and he took much pains to prove that it was not inconsistent with the Cabbalistic doctrine. His penetrating understanding however discovered defects in this new system, which he endeavoured to supply. In short the writings of this great man, though not without a deep tincture of mysticism, are eminently distinguished by profound erudition, an inventive genius, and a liberal spirit.' (Enfield's *Hist. of Philosophy*, b. viii., c. 3, s. 3.)

MORE, HANNAH, born 1745, died 1833, a lady who gained no small share of distinction in the world, and for many of the latter years of her life an extensive and powerful influence, by her numerous writings and by her exertions in other ways to improve the moral and religious character of her country. She was the daughter of a village schoolmaster, one of the humbler persons of his class, who had the care of the charity-school at Stapleton near Bristol, but who, some time after the birth of his daughter Hannah, removed to Bristol, where he had a private school. There were other daughters, and the family soon began to be taken notice of as one in which there was a display of talent that was unusual, so that some exertions were made by persons to whom they were known, and the sisters became early in life established in a school for the education of girls, which continued for many years the most flourishing establishment of the kind in the west of England.

Hannah was from the beginning the most remarkable of the group. She wrote verse at a very early age, and in 1773 was prevailed upon to publish a pastoral drama, which was entitled 'The Search after Happiness.' In the next year she published a regular tragedy on the story of Regulus, and two Tales, in verse, and her turn being then thought by her friends to incline to the drama, means were taken to obtain an introduction for her to Garrick, by whom she was very kindly received. This introduced her to the acquaintance of Dr. Johnson, Burke, Sir Joshua Reynolds, and other persons who at that time formed what was considered the best literary society of London. During this period of her life she produced two tragedies, 'Percy' and 'The Fatal Falsehood,' with other poems.

Such was the beginning of the life of Miss Hannah More. But educated as she had been with a deep impression of the truths of the Christian religion, the life which she now led began to appear to her as something unlike that which befitted a creature with such glorious prospects before it as those which Christianity opens to man. She therefore determined on forsaking the drama and retiring from London to devote herself to a life befitting better, as she thought, the child of God and heir of immortality. In this her transitive state she produced her 'Sacred Dramas,' a publication more favourably received perhaps than her former works. By the year 1786, when she was full forty years of age, she had effected her plan for retiring into the country. She chose the part of the kingdom, Gloucestershire and Somersetshire, in which she had been best known in her youth, and there the rest of her long life was passed in circumstances made easy by the profits of her various publications, which were considerable, and in the enjoyment of the pleasures which arise from literary exertion, and from efforts to raise the condition, by means of education, of the labouring population.

We cannot undertake to enumerate all the publications of Miss More in this the larger of the two portions into which her life may be divided. But we shall mention most of them. The work in which the serious turn which her mind had taken first manifested itself was her 'Thoughts on the Manners of the Great,' 1788; which was followed in 1791 by her 'Estimate of the Religion of the Fashionable World.' In 1799 appeared her 'Strictures on the Modern System of Female Education.' Not long after the appearance of this work there was an intention, which Porteus, then bishop of London, is supposed to have greatly promoted, of committing to her the education of the Princess Charlotte of Wales. This however was not effected, but it led to the publication of her 'Hints towards forming the Character of a young Princess,' 1805. Then came what has perhaps been her most popular work, 'Cœlebs in Search of a Wife,' very entertaining as a novel, and full of striking remarks on men and manners, and in which we find fully displayed the kind of character which, to the mind of Miss More, it appears desirable that our young countrywomen should possess. In 1811 her 'Practical Piety' appeared; in 1812 her 'Christian Morals;' in 1815 her 'Essay on the Character and Writings of Saint Paul,' a far bolder undertaking than any in which she had previously been engaged, and if she failed to satisfy those who wish to see so grand a subject treated by a masterly mind, full as it must be of various learning and possessing the powers of a rare discrimination, and of literary analysis, such as is rarely granted, she has failed only where no one hitherto has been successful.

We ought not to omit that she was the writer of one of the first of what were called the 'Cheap Repository' tracts. She called it 'The Shepherd of Salisbury Plain.' It may be regarded as, if not the best, one of the best of its class.

Age had now come upon her with some of its infirmities. In 1828 she left Barleywood, the place in which many years had been spent, and took up her abode at Clifton. Here she continued till her death on the 7th of September, 1833, with very many to honour her and many also to love her; who looked up to her as one of the great reformers of the manners of English society, one who had asserted very successfully the right of Christianity, or, in other words, the right of the Christian scriptures to have a larger share than it had been the wont to allow them in forming the character and directing the course of human beings while in this state of their probation. She was buried at Wrington, near to the grave of Locke.

MORE'A, the antient Peloponnesus, a large peninsula forming the southern part of Greece, and united to the mainland by the isthmus of Corinth. Its shape has been compared to that of a mulberry leaf, and its coast, being deeply indented by numerous gulfs and inlets, forms a multitude of small peninsulas and promontories. It is bounded on the north by the gulfs of Lepanto and Patras, on the west by the sea of Cephalonia and Zante, and farther south by the gulf of Arcadia, on the south by the Messenian and Laconian gulfs, and on the east by the gulfs of Nauplia and Ægina, which latter divides Morea from Attica. The greatest length of Morea from the point of Drepanum on the straits of Lepanto, to Cape Matapan, its most southern promontory, is 140 miles, and its greatest breadth, from the coast opposite Zante to the easternmost coast of Argolis, near Poros, is about 125 miles, but the breadth is much less in other parts. Its area has been vaguely estimated at 8800 English square miles (Thiersch, *Etat actuel de la Grèce*), but it probably exceeds considerably 9000 miles.

The centre of Morea forms an elevated table-land traversed by numerous ridges of hills, which enclose spacious basins, some of them like craters, being so surrounded by mountains, that the water at the bottom, being unable to find a visible outlet, forms marshes and small lakes, some of which have however a subterraneous outlet. [ARCADIA.] The surface of the land has been compared to a number of saucers with snipped borders placed by the side of each other on a table. This is especially the case in the eastern part of the table-land; but on the opposite side the valleys have a long slope to the westward, following the course of the Alpheus and its tributaries, until they merge into the low maritime plains of Elis. Towards the south the long valley of the Eurotas slopes down to the coast between two ranges of mountains, which detach themselves from the central highland, and, projecting into the sea, form the promontories of Malea and Tænarum. Westward of the valley of the Eurotas is the valley of the Pamisus, in Messenia, running likewise from north to south between the ridges of the Taygetus on the east and Mount Ægaleon on the west.

On the north side the table-land of Morea is separated from the maritime district of Achæa by a range of mountains known to the antients by the names of Erymanthus, Lampe, and Cyllene. North-east of these the land slopes down to the level part of the isthmus of Corinth, where the town of that name was built. To the eastward a chain of mountains, detaching itself from the central high land, runs through the peninsula of Argolis, which stretches far into the sea between the Saronic and Argolic gulfs. South of this range is the plain of Argos, watered by the Inachus. Farther south a narrow strip of land extends between the central high land and the sea, along the western coast of the Argolic gulf. The slope of the table-land is much more abrupt on the eastern than on the western side of Morea. For a further description of the surface of the county, see ACHÆA, ARCADIA, ARGOLIS, ELIS, LACONICA, and MESSENIA.

The highest summits of Morea, Taygetus in the south and Cyllene in the north, are reckoned to be somewhat above 5000 feet; snow remains on the highest points of the Taygetus till the month of June. The table-land of Arcadia is often covered with snow in March, while the maritime districts enjoy warm and genial weather. The perennial rivers of Morea are the Alpheus, Eurotas, Pamisus, and Peneus; the other numerous streams along the northern and eastern coasts are dry, or nearly so, in summer, but form rapid torrents in the winter. The atmosphere of Morea is generally pure, the landscape beautiful, and the ground in the valleys and low plains fertile. The mountains afford good pasture, and although the forests have been sadly wasted, still many parts of the mountains are covered with fine pines and oak trees. The country, imperfectly cultivated as it is, produces corn of various kinds, wine, oil, flax, currants and most other fruits; and feeds numerous flocks of sheep. There are no roads, properly speaking, through the peninsula, but only tracks for horses, and some narrow Turkish causeways through the low grounds. The principal towns are—Patras, on the north coast; Gastouni, Arkadia, Navarino, and Modon, on the west coast; Koron and Kalamata, on the south coast; Monembasia, Nauplia, and Argos, besides the islands of Spezzia, Hydra, and Poros, on the east coast; and the towns of Mistra, Tripolitza, Karitena, Kalavrita, and Andritzena, in the interior. For the actual statistics of Morea see GREECE, KINGDOM OF.

The antient history of Peloponnesus forms part of the history of Greece. After the destruction of the Achæan league by the Romans, B.C. 146, the peninsula formed part of the Roman province of Achaia. It remained subject to Rome till the division of the empire. It afterwards belonged to the Eastern or Byzantine emperors till the beginning of the thirteenth century, when the Latins or Franks having conquered Constantinople, the Venetians obtained for their share several islands of Greece and a considerable part of the Peloponnesus, with the towns of Coron, Modon, Argos, Nauplia, Corinth, &c. It was then that they gave the peninsula the name of Morea, from the quantity of mulberries ('more' in Italian) which it produces.

Towards the end of the fifteenth century the Morea was conquered by the Ottomans, and the Venetians were expelled from it. In 1684, war having broken out between Venice and the Porte, the Venetians sent an armament, which conquered the peninsula [MOROSINI], to which they gave the name of a kingdom, subject to Venice, and its flag was hoisted on the square of St. Mark. In 1715 the Turks, after an arduous struggle, reconquered the peninsula. In 1770 an insurrection broke out amongst the Greek inhabitants, at the instigation of Russia, but the Porte marched into it a large body of Albanians, who devastated and reduced the country. In 1820-21 the Moreotes joined in the general revolt of the Greeks, and, after a long struggle, the battle of Navarino (1829) delivered the Morea from the yoke of the Ottomans. The Morea forms now an essential part of the kingdom of Greece.

(Coronelli, *Memorie Storiche e Geografiche del Regno di Morea;* Leake, *Travels in the Morea*, an excellent description of the country; Sir William Gell's *Morea*.)

MOREAU, JEAN VICTOR, a general who rose to celebrity in the wars of the French revolution, was born in 1763, at Morlaix in Brittany, of highly respectable parents, who designed him for the legal profession. But at the age of eighteen years, he had conceived such a passion for military service, that he enlisted as a private soldier; and though his father purchased his discharge, and sent him to study law at Rennes, where he soon made himself conspicuous and popular in defending the privileges of the provincial parliament against the government, he never cordially followed this profession. When therefore the Revolution burst forth, his spirit also broke its fetters; and, accepting the command of a volunteer legion of the Breton youth, he joined at its head the army of the North. From that hour he devoted himself so ardently to the science and practice of arms, that he soon attracted the favourable notice of Pichegru, and rose in two years, by his recommendation, to the rank of general of division. In this capacity, in the campaign of 1794, he signally distinguished himself at the head of a separate corps of 25,000 men, by the rapid reduction of several strong places in Flanders. Moreau himself was politically attached to the Girondists: yet, though the Jacobins brought his unoffending father to the guillotine, he continued to serve under the government of that detestable faction until its overthrow.

After assisting Pichegru in the conquest of Holland, Moreau was appointed commander-in-chief of the army of the Rhine and Moselle, and opened the campaign of 1796 by the defeat of the Austrian general Wurmser, whom he drove across the Rhine, and pursued into Germany. The archduke Charles of Austria, who attempted to arrest his course, met, for some time, with no better success; until the Austrians were so largely reinforced, that Moreau was compelled to yield to numbers, and he then finished this memorable campaign by a masterly retreat through the defiles of the Black Forest, in which, though assailed on all sides by a hostile peasantry, and with a superior army hanging on his rear, he triumphantly fought his way to the Rhine, and covered himself with more glory than by his preceding victories.

At the commencement of the next campaign, Moreau was placed in a most embarrassing situation, by the discovery, through some intercepted despatches, that his old friend Pichegru was in correspondence with the Bourbon princes. He concealed the fact, for four months, until Pichegru had been arrested on other information; when he made a show also of denouncing the plot to the republican government. But he found himself so justly an object of suspicion, that he solicited and obtained leave to retire from the army. His services however were too necessary to be long dispensed with; and he was again actively employed, both in Italy, where he distinguished himself in the campaign of 1799, so disastrous to the French, and also on the Rhine, whither he was recalled to oppose the Austrians.

On Bonaparte's return from Egypt, Moreau proffered and rendered him his services in effecting the revolution of the 18th of Brumaire, and almost immediately afterwards received the command of the armies of the Danube and Rhine; at whose head, at the close of the year 1800, he won from the Austrians the sanguinary and decisive battle of Hohenlinden. The first consul loaded him, on his return to Paris, with eulogy· but Bonaparte and Moreau were each too eager on the same career of ambition, to pursue it without dangerous collision. Bonaparte affected to speak of the victor of Hohenlinden as 'the retreating general;' Moreau retaliated with bitter justice by terming the first consul 'a general at ten thousand men a day.' And when he was invited to become a member of Napoleon's new legion of honour, he openly refused, with the contemptuous sarcasm—'The fool! does he not know that I have been enrolled in the ranks of honour these twelve years!'

But the impatient spirit of Moreau was no match for the ascendant genius and fortune of his rival; and in the beginning of 1804 a charge which pretended to implicate him in the royalist conspiracy of Pichegru and Georges Cadoudal was sufficient to decide his fate. He was condemned, without a shadow of evidence, to an imprisonment for two years, which, by his own request, was commuted into banishment. He retired to America, where he lived tranquilly, with his wife and child, for several years, until, in an evil hour for his fame and his fortunes, he accepted, in 1813, a proposal from the Russian emperor Alexander to assist the allied armies by his counsels against his country. He had scarcely arrayed himself in their ranks when he was mortally wounded at the battle of Dresden, and died in a few days, after bearing the amputation of both legs without a groan.

The admirable retreat through the Black Forest and the brilliant campaign of Hohenlinden must ever be sufficient to place Moreau among the ablest commanders of a period which produced every variety of military talent. He will be remembered however rather as a skilful tactician, at once active and wary, than as a general of very daring and enterprising genius. His mental qualities in other respects partook of the same characteristics; and he wanted the necessary decision to cope with the energy of his great rival, as much as he lacked the skill to conceal his own ambition and envy under the shallow pretext of opposing a republican virtue to the despotic projects of the First Consul. In person Moreau has been described to us as rather under the middle height, and of dark complexion; his manners were simple and unaffected; his morals were pure, and his nature was courageous, humane, and benevolent. The only blot on his honourable career was his junction with the enemies of his country. For this shameful step, to which he was probably seduced by ambition or revenge, excuses have been attempted by those who suppose that he might have identified the cause of the allies with that of French liberty, and who forget that he had never been a royalist; that if he had any political principles, he was professedly a republican; that he could have no dreams of democratic freedom to indulge for his country in the camp of the allied sovereigns; and finally, that he had pledged himself to afford his aid in shedding the blood of his fellow-countrymen and antient companions in arms. 'What singular chance,' said he, to the Swiss general Jomini, in whose company he had formerly fought under the tricoloured flag, and whom he now found in the Russian service, 'has brought you and me together under the banners of the Czar?' 'Singular it doubtless is,' answered Jomini; 'but there is this difference between us—that *I* am not a Frenchman.'

MOREL is an eatable fungus, called by botanists Morchella esculenta. It springs up in orchards, woods, and cinder-walks, early in the spring and summer, and is believed to be most plentiful in places where fires have been made; the country people in Germany are so persuaded of this, that they formerly set fire to woods in order to obtain a crop of morels, of which they are very fond: at last the practice was put down by law. This fungus has a stalk from one to three inches long, and a spherical cap, from the size of a pigeon's egg to that of a swan's, hollow, pale brown or even grey, and deeply pitted all over its surface, the depressions being separated by raised anastomozing lines. The plant has a slight smell and an agreeable taste, and is employed for various purposes of cooking, both fresh and dried. In the former state it is most commonly stewed or stuffed with forcemeat; in the latter it is employed as an ingredient in sauces. In this country it is of rather rare occurrence.

MORE'LES. [MEXICAN STATES.]

MORELL, THOMAS, born at Eton in 1703, studied first at Eton College, then at Cambridge, where he became a fellow of King's College, and in 1743 took his degree of D.D. He was a distinguished classical scholar; he edited several tragedies of Æschylus and Euripides with notes, and made English translations of the 'Prometheus' of the former, and of the 'Hecuba' of the latter. He also edited improved editions of the Greek Lexicon of Hederick, and of Ainsworth's Latin Dictionary. His other works are—1, 'Thesaurus Græcæ Poëseos, sive Lexicon Græco Prosodiacum,' 4to., 1762; republished since, with considerable additions, by Dr. Maltby, Cambridge, 1815; 2, 'Annotations on Locke's Essay on the Human Understanding, 8vo., 1793; 3, 'A Sermon on the Death of Queen Caroline, consort of George II.,' 8vo., 1739, and other Sermons. Dr. Morell died in 1784.

MORE'NA, SIERRA. [SPAIN.]

MORE'RI, LOUIS, born in Provence in 1643, studied at Aix and Lyon, and became doctor of divinity. He conceived the idea of compiling a universal Dictionary, biographical and geographical; for the accomplishment of which he had collected a considerable stock of literary information. He knew also several languages, and was assisted by several friends, who procured him materials for his work, which he published in 1673, in one vol. fol., 'Grand Dictionnaire Historique et Critique de Louis Moreri.' Although its contents are miscellaneous, the biographical part, both in respect of quantity and execution, exceeds the rest. Moreri's Dictionary may be considered as having suggested the idea of subsequent biographical dictionaries. Moreri undertook a new and enlarged edition of his Dictionary, of which he published the first volume, but the second was not entirely printed when the author died in 1680. His constant application hastened his death.

Numerous editions of his Dictionary, considerably altered, revised, and enlarged by several editors, among others by Leclerc and Bayle, have appeared; the last is that of Paris, 1759, in 10 vols. fol. Notwithstanding its many imperfections, Moreri's Dictionary is still a useful work; the genealogical articles are the most complete; the geographical are the most defective. Moreri published also 'Rélations Nouvelles du Levant, ou Traité de la Religion, du Gouvernement, et des Coutumes de Perses, Arméniens, et Gaures, composées par le P. G. D. C. C.' (Père Gabriel du Chinon Capucin).

MORETON HAMPSTEAD. [DEVONSHIRE.]

MORGAGNI, GIOVANNI BATTISTA, was born at Forli in 1682. He studied medicine at Bologna under Albertini and Valsalva, and in 1701 obtained his doctor's degree. He afterwards went to Venice and to Padua, to study chemistry and natural philosophy, and in 1715 he was appointed chief professor of anatomy in the University of Padua. He died in 1771, having been elected a member of all the chief scientific societies in Europe, and having received the highest honours from the contemporary popes and the sovereigns of adjacent nations.

Morgagni's chief works are, 'Adversaria Anatomica prima,' Bononiæ, 1706, a small work in which Haller (*Bibl. Anat.*, ii. 34) says there is scarcely anything which is not new, or at least more clearly described than it had been previously. Five similar collections of miscellaneous observations were afterwards published under similar titles, and in 1719 they were all printed together at Padua—'Epistolæ Anatomicæ' —amounting altogether to twenty, which were published together at Venice in 1762. He edited also the life and works of Valsalva, his former preceptor and friend, whose opinions he constantly and warmly maintained. But Morgagni's most celebrated work was that which he first published in his eightieth year, 'De Sedibus et Causis Morborum per Anatomen Indagatis,' Venice, 1761, in 2 vols. folio, which contains records of an immense number of observations on morbid anatomy, and which conferred nearly as great benefit on pathology as the contemporary works of Haller conferred on physiology. It has been since frequently republished and translated, and is still a standard work of reference.

MORGARTEN. [ZUG.]

MORILLON, one of the names of the *Golden Eye*, *Clangula vulgaris*. [FULIGULINÆ, vol. xi., p. 8.]

MO'RIO, De Montfort's name for *Cassidaria Echinophora*. [ENTOMOSTOMATA, vol. ix., p. 456.]

MORISCOES is the name given by the Spaniards to the descendants of the Western Arabs or Moors, who, after the taking of Granada (January, 1492) [MOORS], preferred remaining in Spain and embracing Christianity, to leaving the country of their fathers. Hence they were called *Cristianos Moriscos* (Moorish Christians), or *Cristianos nuevos* (new Christians), to distinguish them from the rest of the Spanish population, who styled themselves *Cristianos viejos* (old Christians). The adjective *Moriscos* is derived from *Moros*, and has a meaning expressive of contempt.

The terms granted to the city of Granada on its surrender were rather favourable. The inhabitants were to preserve, besides the peaceable and undisputed possession of their property, the use of their religion and laws, the latter to be administered by their own elective magistrates, and the former to remain under the direction of their native priests and theologians. They were to retain also their customs, manners, language, and national dress, and by two express articles of the capitulation no Moslem was ever to be compelled to embrace Christianity, and no attempts were to be made on the part of the Spanish sovereigns to induce the people to forsake the Mohammedan religion. The capitulation was also extended to all the Moors of Aragon and Castile, who had lived for centuries under the sway of the Spanish kings, and Ferdinand and Isabella pledged their royal word, not only in their own name, but in that of their successors, never to violate the capitulation.

A treaty containing two such articles was soon deemed incompatible with the interests of the Christian religion, and scarcely had two years passed when it was openly infringed by Ferdinand. Fray Hernando de Talavera, a monk, was appointed archbishop of Granada (1492), and received instructions not to spare any means for bringing the followers of Mohammed to the Christian faith, and the famous Ximenez de Cisneros was named to assist him in the undertaking. At first the two prelates began their task with comparative moderation; they preached the Christian doctrine, they published and circulated religious tracts, and used every means of persuasion to convert the Mohammedans. But these proving ineffectual, they had recourse to the device of claiming as members of the Christian community all those Mohammedans whose ancestors could in any manner be traced to have been Christians; and as their number was very considerable, thousands were seized and subjected to a compulsory baptism (1499). The Moors, seeing their capitulation violated, flew to arms in the Albaycin and other places of the kingdom of Granada (1500), but they were everywhere overpowered, and their rebellion becoming the pretext of a new and more decided persecution, orders were issued throughout the kingdom that all the Moors should leave the country in a given time or receive baptism. The majority readily submitted to these terms, hoping to be freed in future from violence and persecution. The order was further extended to the Moriscoes of Aragon, a province in which, owing to the mildness of the law and the more liberal tendency of the institutions, the Moriscoes had enjoyed comparative freedom, and the sentence was carried into execution, but not without resistance, especially in Valencia.

Once made Christians, at least in appearance, the descendants of the Arabs had to encounter a new and more formidable enemy. The Inquisition, instituted in 1232, under the pontificate of Gregory IX., had hitherto been confined to Ferdinand's dominions in Aragon. The simulated conversion and frequent relapse of the Moors of Andalusia were pleaded as an excuse for its establishment in Castile. The tribunal was invested with new and unusual powers, and its jurisdiction extended to the rest of the monarchy, so as scarcely to leave a corner of the Peninsula free from fire and faggot.

To detail the horrors, the persecutions, to which that execrable tribunal subjected its victims, would take us far from our object. The reader may consult Llorente's *History of the Spanish Inquisition*, and Dr. Puigblane's *Inquisition Unmasked*, in both which works he will find ample information on this subject. According to the former writer the number of victims who in the first thirty-seven years experienced the rigour of that tribunal amounted to 204,413, of whom 13,000 were publicly burned.

During the reign of Charles V. the Moriscoes enjoyed comparative tranquillity. The attention of that monarch was too much absorbed by the foreign wars in which Spain was at the time engaged, to give him leisure to meditate reforms of internal policy. But under Philip II., his son and successor, the forced converts had again to encounter a most violent persecution. It was suggested that as long as the Moriscoes preserved their manners, dress, and language, different from the Spaniards, their conversion could not be deemed sincere. Accordingly by the *pragmatica* (royal decree), dated September, 1566, it was declared that the new Christians should in three years learn the Spanish language and entirely forsake their native tongue; that all books written in Arabic should be seized and burnt; that instead of their national costume they should adopt the Spanish dress; that all their baths should be pulled down; that their wives should walk the streets unveiled; and that the men themselves should forsake their Arabic names and surnames, and call themselves after some saint of the Roman calendar, in the Christian fashion.

This outrageous injustice and violation of everything which is dear to man again drove the Moriscoes to despair and resistance. They rose in the Alpuxarras and proclaimed Fernando de Valor, a descendant of the royal family of Umeyyah; and the rebellion, which lasted three years, was only put down by the talents and abilities of John of Austria (1570). As a punishment for their revolt, the baptized infidels were transported from Andalucia and dispersed among the Christian inhabitants of the interior of Spain. They were more closely watched; they were subjected to all sorts of humiliation and indignities, and when it was perceived that neither force nor persuasion was sufficient to make them sincere converts, their general expulsion from the kingdom was decreed. In 1610, under Philip III., and during the administration of his favourite the duke of Lerma, the Moriscoes, to the number of about eight hundred thousand, others say one million (not to mention such as, by assuming the disguise of Christians, spread over Catalonia and Southern France), were put on board the royal galleys prepared for them, and landed on the coast of Africa, without being allowed to take with them any property except what they could carry about their persons. The loss which Spain sustained by this rash measure must have been immense, since the ruin of her agriculture and trade may be partly attributed to the banishment of so large a part of the industrious population.

Literature.—It cannot be supposed that the descendants of a people who had been the passionate lovers of science should be entirely devoid of a literature of their own. There is every reason to suppose that books on all subjects were written and circulated among them; and the discovery lately made (see an article in the *British and Foreign Review*, No. XV.) in the libraries of Spain of several works written in Spanish, but with the Arabic character, all belonging to the Moriscoes, proves to what extent literature was cultivated even among that persecuted and degraded race.

We are told that the libraries of the Escurial and Madrid contain upwards of a hundred of these manuscripts, which are also said to exist in other public libraries of Europe confounded with the Arabic manuscripts, owing to the circumstance of their being written in the same characters. Their contents are poems, chiefly on sacred history; descriptions in prose of Cordova, Granada, Seville, and other cities of Spain, such as they were under the sway of the Mohammedans; books on religion and law; translations of the Korân into Spanish; collections of recipes for the cure of all diseases, secrets of husbandry, complaints against the Inquisition and the clergy, and itineraries showing the road to be taken, and the disguise and stratagems to be employed in order to leave Spain and take refuge in the countries where the Mohammedan religion was prevalent.

The language in which these books are written is a peculiar dialect or mixture of Spanish and Arabic, varying according to the age of the writers, and the parts of Spain where they were composed. Some of the earliest specimens (fourteenth century) are almost pure Arabic words with Spanish terminations and Spanish constructions.

Many reasons influenced the Moriscoes thus to write a foreign language, using their own characters: first, and principally, that sort of superstitious reverence which all Eastern people have for their letters, it being well known that Syrian Christians use their own characters to write

Arabic, and that the Jews of our days write Portuguese and German with their own letters; 2ndly, the respect in which Arabic characters are held by all Mohammedans, owing to the Korân being written in them; and 3rdly, the wish to conceal from the eyes of monks and inquisitors their prayers and tracts concerning the Mohammedan religion, in which they persevered notwithstanding their outward show of Christianity. It is likely also that books were written in this dialect for fear that Arabic would not be understood by the people for whom they were designed; since it is well known that, owing to their long stay among the Christians, and to orders prohibiting them from conversing in Arabic, the Moriscoes at first corrupted their language, and finished by entirely forgetting their native tongue, for which they substituted a mixture of Spanish and Arabic called *aljamia*, which in aftertime became so similar to the Spanish, as to be easily understood by any person unacquainted with Arabic.

(Bleda, *De la Justa Expulsion de los Moriscos*, Valencia, 1618; Marmol Carvajal, *Rebelion y Castigo de los Moriscos del Reyno de Granada*, fol., Malaga, 1610; Guadalajara, *Expulsion de los Moriscos de España*, 8vo., Pamplona, 1614; *Notices et Extraits des MSS. de la Bibliothèque du Roi*, vol. iv., Paris; *British and Foreign Review*, No. XV.)

MORLAIX, a town in France, in the department of Finistère, situated at the junction of the little rivers Relec or Ossen, and Jaclo or Jarlo, on the road from Paris to Brest, 328 miles from Paris and 34 from Brest.

Morlaix (in Breton, Montroules) is of antient but unknown origin. At an early period it was an object of contest between the dukes of Bretagne and the viscounts of Léon, and was subsequently taken and retaken by the English and French in the civil contests of Bretagne in the fourteenth century. It suffered in the religious wars of the sixteenth century, and submitted to Henri IV., A.D. 1594.

The town is agreeably situated on the side of two hills, and is cleaner than the generality of the Breton towns. It has some wide and good streets. The united stream of the Ossen and Jaclo is called the Morlaix river, and is navigable up to the town. It is a tide river, with a rise of 12 feet at high-water. Vessels of 400 tons can come up to the quays, which are faced with granite. The houses on the quays are well built, and have a colonnade, which serves for an Exchange. The river, above the quays, passes through a covered channel under the town-hall (a large building of the age of Louis XIII.) and the grand place or great square. There is a castle to guard the entrance of the river; and at the mouth of the river is a safe roadstead. The church of St. Martin is in modern style; that of St. Mathieu is remarkable for its steeple. There are baths and a theatre.

The population of Morlaix in 1831 was 7797 for the town, or 9596 for the whole commune: in 1836 it was 9740 for the commune. The townsmen manufacture linens, woollen cloth, hats, paper, and glue; there are tan-yards and sugar-houses, and an extensive government snuff manufactory. Considerable trade is carried on in linens of every kind, butter, tallow, hides (raw and dressed), honey, wax, paper, flax, hemp, corn, seed, and cattle. It is the chief trading port of the department. There are twelve yearly fairs, one of which lasts eight days. There are several judicial and fiscal government offices, and a free-school for navigation. General Moreau was a native of Morlaix.

The arrondissement has an area of 596 square miles, and comprehends fifty-eight communes; it is divided into ten cantons or districts, each under a justice of the peace. The population in 1831 was 131,580; in 1836 it was 136,535.

MORLAND, SIR SAMUEL. Samuel Morland was the son of the Rev. Thomas Morland, of Sulhamstead-Bannister, near Reading in Berkshire, and born somewhere about the year 1625. He received his education at Winchester school and Cambridge. He remained at Cambridge for ten years, but never took a degree. Soon after his departure from college, we find him sent on the famous embassy to to the queen of Sweden in company with Whitelocke and a retinue of other gentlemen. Whitelocke, in his Journal, calls him 'a very civil man, and an excellent scholar.' On his return, Morland became assistant to Thurloe, the secretary of Oliver Cromwell. He also took a prominent part in the attempt to relieve the sufferings of the poor people of Piedmont, being appointed 'commissioner extraordinary for the distribution of the collected moneys' by the Protector, who also made him one of the clerks of the signet, in March, 1665.

Morland is said to have been privy to the plot usually known as Sir Richard Willis's plot, and, as it is so intimately connected with Morland's history, we give an abstract of the narrative as arranged by Birch in his 'Life of Thurloe,' although we think that it is far from being altogether supported by proper evidence.

In the beginning of the year 1659, Thurloe, Cromwell, and Sir Richard Willis formed a design of ruining King Charles at one blow, by sending over messengers with plausible letters 'to invite him to come over in a single ship, with only his two brothers and a few more, to a certain port in Sussex, upon an appointed day, where they were promised to be received and supported by 500 feet at their first landing, and 2000 horse within one day after.' This plot was discussed in Thurloe's office, when Morland was at his desk apparently asleep: Welwood says that Cromwell, when he saw him, drew his sword, and was only dissuaded from despatching him on the spot by the earnest solicitation of Thurloe, who assured him that Morland had sat up two nights together, and was certainly fast asleep. Disgusted at this proceeding, Morland immediately determined to divulge the plot to the king, which he did by means of one Major Henshaw, who was then imprisoned in the Tower. The king, being thus cautioned, answered, that 'he could not be ready so soon as the appointed day,' which gave the three projectors some apprehension and suspicion of the discovery. Not being satisfied however with this answer, Willis was appointed to contrive other letters, urging his majesty 'to use expedition, and not lose so fair an opportunity for his happy restoration.' The king answered, that he was not very well, or something that appeared so frivolous, that they justly concluded their whole project was discovered, and Willis was suspected of having divulged it. Under these circumstances Willis sent for Morland, who went, not considering it safe to decline the meeting, but took two pistols with him. At the appointed place, he was met by another person, by whom he was conducted with the utmost caution into a dark deep cellar, where, by the light of a candle, he saw Sir Richard by himself with a Bible before him. Sir Richard told him plainly that 'he had sent for him on account of the discovery of a secret of the highest importance, which could not possibly be known to more than three persons beside himself.' Then, recounting the particulars, he laid his hand upon the Bible, and solemnly swore that he had not been the discoverer, and requested him to do the same. Morland told him, 'he was ready to do so, if he would give him a reason why he should suspect him.' All this he did with such a remarkable presence of mind, that Willis was completely damped, and Morland escaped from further interrogation. In May, 1660, he went to the king at Breda, in Holland, who received him kindly, made him a knight, and soon afterwards a baronet.

Echard, in his 'History of England,' produces a letter from Sir Samuel to Willis, dated March 10, 1660, in which he expressly denies the whole of the above statement; but Morland's own testimony in his autobiography is to the contrary: if he did write it at all, it was probably intended merely as a means of safety from the wrath of Sir Richard Willis.

On the restoration of Charles he was made master of mechanics to his majesty, who also presented him with a medal as an 'honourable badge of his signal loyalty.' He was soon afterwards made a gentleman of his majesty's privy-chamber.

In 1677 he took a lease of a house at Vauxhall, for twenty-one years, from the heirs of Jane Vaux, the daughter of Guy Vaux, of gunpowder celebrity. This house was situated where Vauxhall Gardens now are. Two years afterwards, he had a pension of 400*l.* settled upon him, but embarrassments in his affairs, owing to an imprudent marriage, obliged him to dispose of it. He afterwards removed to a house at Hammersmith, near the water-side, where he died, December 30, 1695, and was buried in Hammersmith chapel on January 6 of the following year. The three last years of his life were spent very wretchedly. Poverty and loss of sight compelled him to rely almost solely on the charity of archbishop Tenison. In a letter dated March 5, 1694, he returns him thanks for his kindness, 'which was far greater' says Sir Samuel, 'than such a poor wretch as

I could ever hope for.' This letter, written when he was blind, is a very curious relic, and is now preserved in the library at Lambeth Palace. John Evelyn, in his Diary, gives an interesting description of him when suffering under this accumulated load of misfortunes:—'25th Oct., 1695. The archbishop and myself went to Hammersmith to visit Sir Samuel Morland, who was entirely blind, a very mortifying sight. He showed us his invention of writing, which was very ingenious, also his wooden calendar, which instructed him all by feeling, and other pretty and useful inventions of mills, pumps, &c., and the pump he had erected, that serves water to his garden, and to passengers, with an inscription, and brings from a filthy part of the Thames, near it, a most perfect and pure water. He had newly buried 200*l.* worth of music-books, being, as he said, love songs and vanity. He plays himself psalms and religious hymns on the theorbo.' The inscription which Evelyn refers to was on a stone tablet fixed in the wall, and is still preserved; the following is a copy of it: 'Sir Samuel Morland's well, the use of which he freely gives to all persons: hoping that none who shall come after him will adventure to incur God's displeasure by denying a cup of cold water (provided at another's cost and not their own) to either neighbour, stranger, passenger, or poor thirsty beggar. July 8, 1695.'

Sir Samuel married three times; he was divorced from his last wife in 1688. The monuments of his two first wives are in Westminster Abbey.

It now remains briefly to notice his writings and mechanical inventions. From some correspondence between Morland and Dr. John Pell, preserved in Birch's collection of manuscripts in the British Museum, it appears that Sir Samuel, as early as 1666, had intended to publish a work on the quadrature of curvilinear spaces, and had actually proceeded to print a portion of it, when, by the advice of the latter, he was persuaded to lay it aside altogether. In the rough draft of a letter to Morland, dated April 7, 1666, in giving his opinion on the portion of the work already printed, Pell says, 'The love which I bear to truth and to the author of those papers does constrain me to desire that they may rest awhile unpublished.' Morland not only yielded implicitly to his directions, but, in a letter written shortly afterwards, he furnishes arguments against some propositions in his own treatise: 'I should desire,' says he to Pell, 'to bee altogether mute, and to submitt to your judgement in all things.' Pell, in another place, informs us that two sheets of the work were actually printed.

It was about this period that he invented his arithmetical machine, which he makes mention of in a letter dated May 13, 1666. He did not however publish an account of it before the year 1673, when, 'by the importunity of his very good friends,' it was made public. The little work in which it is described is illustrated with twelve plates, in which the different parts of the machine are exhibited. Its operations are conducted by means of dial-plates and small indices, moveable with a steel pin. By these means the four fundamental rules of arithmetic are very readily worked, and, to use the author's own words, without charging the memory, disturbing the mind, or exposing the operations to any uncertainty.' His 'Perpetual Almanac' is given at the end, which was often printed separately. One copy of Morland's little book, now in the possession of Professor Davies of Woolwich, contains a very beautiful portrait of the author, but, with this exception, we have never seen an exemplar so distinguished.

We are indebted to Morland for the speaking-trumpet in its present form, an account of which useful instrument he published at London in 1671, under the title of 'A Description of the Tuba Stentorophonica, an instrument of excellent use as well by sea as by land.' In this rare tract, consisting of eight leaves, he gives an account of the various experiments that he made before his instrument attained a certain degree of perfection. The first trumpet that he constructed, 'although,' says Sir Samuel, 'the invention had been long before digested in my thoughts,' was made in glass in the year 1670, being about 2 feet 8 inches in length, the diameter of the greater end 11 inches, and that of the other end 2½ inches: 'with this,' he says, 'I was heard speaking at a considerable distance by several persons, and found that it did very considerably multiply the voice.' After giving a description of some experiments with other trumpets, he enters into a philosophic disquisition on the nature of sound, and the best form of the speaking-trumpet, which he leaves doubtful, and concludes with 'an account of the manifold uses' of his instrument, which are very excusably exaggerated: he appears also to have overrated the power of his trumpet; for, in his 'Urim of Conscience,' he says that he has no doubt but that it might be improved so as to carry the voice for the distance of ten miles. A French translation of Morland's treatise was published at London in 1671; and, in an advertisement prefixed, it is stated that Morland's tubes were sold by Moses Pitt, a bookseller in St. Paul's Churchyard, at the price of 2*l.* 5*s.* The invention excited much general interest at the time so Butler makes Hudibras say,

> 'I heard a formidable voice,
> Loud as the Stentophonic noise.'

There is one of Morland's original trumpets, now preserved in Trinity College Library, Cambridge, about six feet long: it is in bad condition, and no one knew what it was till very lately, when it was identified by a member of the college.

All former biographers have asserted that he invented the fire-engine, but he ought to be considered rather an improver than an inventor of that machine. As early as 1590, Cyprian Lucar, in his treatise named 'Lucar-Solace,' gave a description of a rude fire-engine, which he designated by the name of a squirt, and which acted precisely on the principle of that instrument. Evelyn also mentions a fire-engine invented by Greatorix in 1656, which was ten years before he saw the 'quench-fires' of Sir Samuel.

The principal objects of Sir Samuel's study were water-engines, pumps, &c., which he carried to a high degree of perfection: his pumps brought water from Blackmore Park, near Winkfield, to the top of Windsor Castle. A bill to enable him 'to enjoy the sole benefit of certain pumps and water-engines by him invented,' was read the first and second times in the House of Commons on the 12th and 13th of February, 1674, but it did not pass; he obtained however a patent for them in the course of the following year. In 1697, two years after his death, a tract by him was published at the expense of his son. It is entitled 'Hydrostatics, or Instructions concerning Waterworks,' and contains an account of his various methods of raising water, besides tables of square and cube roots: from the close of Joseph Morland's preface, it appears that many of his father's works were left unpublished. There is also a treatise by Sir Samuel, in the Harleian collection of manuscripts, which is entitled 'Elevation des Eaux, par toute sorte de Machines, reduite à la mesure, au poids, et à la balance: Presenteé à sa majeste tres Chrétienne,' 1683: at page 25 commences a very short tract on the steam-engine, entitled 'The Principles of the New Force of Fire invented by Chev. Morland in 1682, and presented to his most Christian Majesty, 1683,' and these principles are explained as follows:—

'Water being converted into vapour by the force of fire, these vapours shortly require a larger space (about 2000 times) than the water before occupied, and, rather than be constantly confined, would split a cannon. But being duly regulated according to the rules of statics, and by science reduced to measure, weight, and balance, then they bear their load peacefully (like good horses), and thus become of great use to mankind, particularly for raising water, according to the following table, which shows the number of pounds that may be raised 1800 times per hour to a height of six inches by cylinders half filled with water, as well as the different diameters and depths of the said cylinders:' then follows his table of the effects of different sized cylinders. This evidently indicates a perfect knowledge of the subject, and, to his great credit also, let it not be forgotten that he has correctly stated the increase of volume which water occupies in a state of vapour, which must have been the result of experiment: his researches however seem to have had little influence on the progress of the practical application of steam.

In 1658 he published his 'History of the Evangelical Churches of Piedmont,' which was drawn up at the request of Archbishop Usher, but it is not a very creditable performance. According to Beughem, in his 'Bibliographia Mathematica,' he wrote 'articles and rules for the better government of his majesty's forces by land during this present war.' His 'Doctrine of Interest, both Simple and Compound,' published in 1679, is a very praiseworthy little volume, and the tables are very accurately calculated; but his 'New Rule for the Equation of Payments' is erroneous. Another tract by him, consisting of four leaves, and entitled 'The Count of Pagan's Method of Delineating all manner of Fortifications (Regular and Irregular) from the exterior Poligone reduced to English Measure and converted into Hercotectonic Lines,' was published in 1672, in Venn's 'Military and Martial Discipline.' The 'Urim of Conscience' was written during his blindness, and is a very singular piece of composition: it contains reflections on the fallen state and insignificance of man, and the uncertainty of life. By one of his letters to Archbishop Tenison, dated 28th of July, 1688, and preserved in the archiepiscopal library at Lambeth, it appears that he once had an intention of publishing the first six books of Euclid for the use of public schools.

Morland is said to have written a treatise on the barometer, which was answered by Lord North in another tract on the same subject. He is also said to have invented the capstan to heave up anchors, but he must be considered rather an improver than the inventor of that machine: the same remark will apply to various other performances, which have elsewhere been attributed to him.

In the library at Lambeth Palace is an autobiography of Sir Samuel Morland, written by him in the latter part of his life, together with several other letters and papers: it is from this original source that we have here given several particulars never before published. We have also made use of the biography of Sir Samuel in Chalmers's 'Biographical Dictionary,' which is a good piece of biography, considering that he had no foundation to rest on; as also of a separate account of his life, writings, and inventions, by J. O. Halliwell, Esq., which was published at Cambridge a short time ago.

MORLAND, GEORGE, was the son of Henry Robert Morland, an indifferent painter, from whom he received his first instructions, but very soon surpassed his master. He first painted landscapes and one or two small conversation pieces: his favourite subjects however were domestic animals, horses, dogs, pigs, &c., which he painted in a masterly manner. In the exhibition of the Royal Academy in 1791 he had a picture representing the interior of a stable, with horses, draymen, &c., larger than a half-length: it is an excellent performance, and may perhaps be considered as his masterpiece. Morland was a perfect master of the mechanism of the art. With a correct eye for effect, he observed and executed with equal rapidity; and though without imagination, rendered his subjects interesting by faithful expression of their essential character and picturesque arrangement. Edwards regrets that 'his low and vulgar propensities led him into society ill calculated to improve his mind or manners.' But Fuseli says, 'It is surely one of the favourite paradoxes of the age to wonder at the association of a man's favourite objects of amusement with his favourite objects of study. It would be a disgusting idea, if it were a possible one, that the man who, with congenial satisfaction, spends the day in pencilling, to a degree of deception, a sow amid her litter, could long for the recreation of elegant society in the evening.' Morland was born in 1764, and died in 1804, at the early age of 40.

MORLEY, THOMAS, one of the most distinguished of our early composers, and author of the first regular treatise on the art of music that appeared in the English language, was born probably about the middle of the sixteenth century, but the exact time is unknown; indeed, our information concerning him is remarkably scanty, the celebrity of his works being considered. All that is known of this eminent professor is gathered from Wood, who, in his *Athenæ Oxonienses*, tells us that he was a disciple of Birde, to whom he dedicated his book in very reverential and affectionate terms; that he obtained a bachelor's degree in 1588, and was sworn into his place as gentleman of the royal chapel in 1592. He died, Dr. Burney supposes, in or near the year 1604.

Morley produced many compositions that are still well known, among which are, canzonets of different kinds, particularly for two voices, madrigals for five voices, and services and anthems, including the fine *Funeral Service* published in Dr. Boyce's collection, the first that was set to the words of our reformed Liturgy. He also published *Consort Lessons, made by divers exquisite authors, for six different instruments to play together, viz., the Treble Lute, Pandora, Citterne, Base-Viol, Flute, and Treble-Viol*, 2nd edition, 1611. He likewise collected and edited that collection so familiar to madrigalists, *The Triumphs of Oriana*, 1601. In Queen Elizabeth's *Virginal Book* are five sets of lessons by Morley. But the work on which his fame is chiefly built is that alluded to above, *A Plaine and Easie Introduction to Practical Musicke*, fol., 1597, which continued in use above a century and a half, and is still read and esteemed by most well educated musicians; for though it contains much that is become obsolete, and the language has all the quaintness, amounting often to obscurity, of the period at which he wrote, yet it exhibits a full knowledge of the subject, great acumen, a bold spirit, and much curious learning. It was translated into the German language by John Caspar Trost, a profound musician of the 17th century; and the scientific Florentine patrician, Doni, mentions the author as *il erudito musico Inglese*.

Morley obtained of Queen Elizabeth an exclusive patent for the printing of music, under which William Barley published most of the music books that appeared during its continuance. This was granted in 1598, in lieu most probably of some bounty which ought to have been forthcoming from the privy-purse of the discerning but parsimonious queen.

Hawkins and Burney, it has been truly remarked, have in their histories failed to do justice to the compositions of Morley; indeed each of these writers is at variance with himself in criticising the productions of one of the earliest and greatest of our musicians. Neither has selected as specimens of his works the most original and agreeable of them, a fact only to be accounted for by supposing that Hawkins had a taste for what is now thought uncouth, and that Burney's prejudice against the early English masters occasionally blinded his judgment.

MORMON, Illiger's name for a genus of *Alcadæ*, *Fratercula* of Brisson. [Auk, vol. iii., pp. 100, 10.

MORMOPS, Dr. Leach's name for a genus of *Vespertilionidæ*. [Cheiroptera, vol. vii., p. 24.]

MORNINGTON, GARRET, EARL OF, whose claim to be numbered and ranked high among the composers of the British Isles is freely acknowledged, was born in the county of Meath in or about the year 1720, and advanced from the dignity of an Irish baron, which he inherited, to that of an earl, in 1760. Devoting much of his time to his favourite art, his life seems to have been quite domestic and devoid of those incidents which contribute so largely to the page of biography; but success of a very decided kind attended his chief pursuit, and 'small indeed,' it has truly been said, 'is the number of professors who, by their works, have arrived at the same rank in the art as that so fairly gained and so incontestably possessed by the noble earl.'

All that we know of the early history of this distinguished nobleman is from a paper printed among the *Miscellanies* of the Honourable Daines Barrington, whence we derive the following curious particulars. The earl's father played tolerably well on the violin, and by his performance delighted the babe while yet in the nurse's arms. But even at that infantine period he seemed to be capable of distinguishing the difference between tolerable and excellent; for Dubourg, a celebrated violinist, being on a visit at the family seat, 'the child would not permit him to take the violin from his father, till his little hands were held;' but having heard the professor, he did his utmost to prevent the return of the instrument to his father. Nearly at the same age he could beat time to every piece of music, and the most sudden changes in the measure were immediately perceived and followed by him. From sheer indolence he never attempted to perform on any instrument till his ninth year: he then took up the violin, and soon was able to play the second part in Corelli's sonatas. Shortly after he attempted composition, and achieved a minuet, which however evinced more enterprise than genius At fourteen he discarded the violin for the harpsichord. About that time his father ordered an organ for his chapel, telling his son that he should at once have been appointed organist, had he been qualified. The instrument was finished in eighteen months, when it was found that the young dilettante had fully prepared himself for the situation which his noble parent had jocosely wished he could fill. Unrelaxing in his musical studies and labours, Lord Mornington so distinguished himself, that the University of Dublin conferred on him the degree of Doctor in Music, and subsequently elected him professor of that faculty. He died in 1781, and was succeeded by Richard, the present marquis of Wellesley.

Lord Mornington's compositions are chiefly vocal: some are for the church, and are to be found in the choir-books of St. Patrick's Cathedral. But he excelled most in what is undeniably our own national music, the glee. His four-voiced glee, 'Here in cool grot,' which gained the gold prize-medal given by the Catch Club in 1779, is a work of first-rate genius—is a masterpiece. 'Gently hear me, charming maid!' another of the same kind, published in Warren's 25th collection, is, it has been truly said, 'overflowing with taste and feeling.' 'Come, fairest nymph,' likewise for four voices, has always been, and most likely will continue to be, admired for its brilliancy and skill; and 'O, bird of eve,' a glee for five voices, is, though short, one of the most elegant effusions that vocal harmony can boast.

'But,' it is remarked by a writer in the *Harmonicon*, 'honourable to Lord Mornington, considered as a man of genius, as were the praises bestowed on what we venture to call the offspring of his muse—praises wherein the succeeding age joined, and which the present has repeated—the glory that encircles his name derives its highest lustre from the acts of his own immediate progeny: one of the most accomplished statesmen of the period in which we live, and the greatest general that this or any age ever produced, owe to him their existence.' And it may fairly be presumed, we will add, that probably to the forming of their minds, to his care of their education, they are indebted for that correctness of judgment and energy of action which have so much distinguished both.

MOROCCO. [Marocco.]

MOROSI'NI, an illustrious family of Venice, which had several doges and other distinguished individuals among its members. Paul Morosini, born in 1406, wrote an 'Apology' for the Venetian government, and other works. Andrea Morosini, who died in 1618, wrote a continuation of Paruta's 'History of Venice,' down to the year 1615. But the most illustrious of the family is Francesco Morosini, who was born in 1618, served in the navy of the republic against the Turks, and was appointed commander of the fleet in 1651, and general-in-chief for the defence of Candia against the Turks. He made a most gallant resistance against very superior forces, and at last concluded an honourable capitulation with the grand-vizier Coprogli in 1669. [Candia.] On his return to Venice, his conduct, having been made the subject of an inquiry, was fully justified.

In 1684, war having broken out again between Venice and the Porte, Morosini was appointed captain-general of all the forces of the republic. After sailing to Corfu, he attacked and took the island of Santa Maura, and also the town of Prevesa on the coast of Epirus. In the following year he landed in the Morea with 10,000 men, took Coron by storm, and, being joined by the Mainotes, took Calamata, and defeated a Turkish army which was sent against him. In the year after he took Navarino and Modon, defeated the seraskier, and gained possession of Napoli after an obstinate defence. In 1687 he again defeated the seraskier in a pitched battle near Patras, and seized his standard. This victory was followed by the reduction of Patras, Lepanto, Corinth, and the whole of the Morea. Morosini then landed at the Piræus and attacked the Acropolis of Athens. It was in this siege that a shell, thrown by the Venetians, fell on the Parthenon, where the Turks had deposited their powder, and partly destroyed it. The Turkish garrison then surrendered.

In 1688 Morosini landed on the island of Eubœa, but was obliged to re-embark his troops, owing to the malaria fever having broken out in his camp. That same year the doge Giustiniani died, and Morosini, though absent, was elected in his place, retaining his command in the Levant, a thing unusual in the suspicious aristocracy of Venice. In 1689 Morosini returned to Venice; the senate in a body went to meet him at sea, and escorted him in triumph to the landing-place at the square of St. Mark, amidst the acclamations of the whole population. This was a proud day for Venice, the last day of triumph in her history of a thousand years. A few years after, Morosini, then old and infirm, was sent again to the Morea, when illness terminated his glorious career, at Nauplia, in 1693. A statue of bronze was erected to him in the hall of the Council of Ten. In imitation of the great captains of antiquity, the adjunct 'Peloponnesiacus' was added to his name. His tomb is in the church of S. Stefano at Venice, with the inscription, 'Francisci Mauroceni Peloponnesiaci Venetiarum Principis Ossa.'

MOROXYLIC ACID, or **MORIC ACID**, was discovered by Klaproth, combined with lime, on the bark of the *Morus Alba*, or white mulberry. It is obtained by decomposing the natural moroxylate of lime by acetate of lead; and then decomposing this salt by sulphuric acid; sulphate of lead being precipitated, the moroxylic acid remains in solution. Some doubts are however entertained whether it is a peculiar acid.

MO'RPHIA, the first discovered of a numerous and important class of vegetable products, or alkalis, sometimes termed alkaloids. It was obtained in 1803 by Sertuerner, a German chemist, from opium, in which it exists in combination with a peculiar vegetable acid, the meconic acid, and probably also with sulphuric acid.

Various processes have been proposed for obtaining morphia: the 'London Pharmacopœia' directs a solution of opium to be decomposed by chloride of lead, by which meconate of lead and a little sulphate are precipitated, and hydrochlorate of morphia remains in solution: by evaporation it is obtained in crystals, which are to be decoloured by treatment with animal charcoal; when again crystallized, and decomposed by ammonia, the precipitate obtained, which is morphia, is to be again converted into hydrochlorate by dissolving it in hydrochloric acid; and this, when again decomposed by ammonia, yields morphia in a state of considerable purity.

Another process consists in adding ammonia to a concentrated aqueous solution of opium, by which meconate of ammonia is formed, and remains in solution; while the morphia, mixed with narcotina, is precipitated: these are separated by digestion in proof spirit at a temperature of about 120° or 130°, which dissolves most of the narcotina and colouring matter: the morphia is then dissolved in boiling alcohol, from which it crystallizes as the spirit cools.

Another method, proposed by Drs. Gregory and Robertson, is that of decomposing the aqueous solution of opium by means of chloride of calcium. Meconate of lime is thus precipitated, and hydrochlorate of morphia left in solution; this, by treatment with animal charcoal and repeated crystallization, is rendered pure, and morphia may be obtained from it by ammonia.

The properties of morphia are, that it is precipitated in a flocculent state, which, on standing and stirring, assumes a crystalline appearance: it is colourless, and its taste is bitter. According to Berzelius, it is insoluble in cold water; and boiling water dissolves rather more than 1-100th of its weight, the solution on cooling yielding crystals; the hot solution possesses the alkaline property of turning turmeric paper brown. Morphia is soluble in 40 parts of cold anhydrous alcohol, and in 30 parts when it is boiling; it is dissolved also by the volatile and fixed oils, but in æther it is nearly insoluble. Solution of potash and soda take it up in considerable quantity, but ammonia in small proportion. When heated strongly, it emits a resinous smell, smokes, and burns with a lively red flame, and leaves charcoal.

The alcoholic solution yields crystals by spontaneous evaporation; they have a pearly lustre, and their primary form is a right rhombic prism.

Morphia has been several times subjected to analysis; the results are not very different from each other: in its anhydrous state it appears to consist of—

Eighteen equivalents of hydrogen .	18 or	6·33
Thirty-four equivalents of carbon .	204	71·83
Six equivalents of oxygen . . .	48	16·90
One equivalent of azote . . .	14	4·94
Equivalent . .	284	100·

The crystals contain two equivalents of water, or consist of—

One equivalent of morphia . .	284 or	94·04
Two equivalents of water . . .	18	5·96
Equivalent . .	302	100·

Morphia is probably the most active principle of opium, but being so very slightly soluble in water, it is never used alone medicinally; having however, like other alkalis, affinity for acids, it readily combines with them and forms salts, which are now extensively used in medicine.

The acetate and hydrochlorate of morphia are those salts which are usually employed medicinally; the hydrochlorate, as has been just stated, is prepared by dissolving the alkal.

in dilute hydrochloric acid, and, after evaporation, allowing the salt to crystallize.

Hydrochlorate of morphia, frequently called muriate of morphia, is a colourless, inodorous, bitter salt, which crystallizes in plumose acicular crystals: it is soluble in 16 to 20 times its weight of water; and when boiling water is saturated with it, a crystalline mass is formed as it cools; it is also dissolved by alcohol. When exposed to a red heat, it is totally decomposed and dissipated. It consists of—

One equivalent of hydrochloric acid	37	or	11·52
One equivalent of morphia . .	284		88·48
Equivalent .	321		100·

In the state of crystals it contains water, and appears to consist of

One equiv. of hydrochlorate of morphia	321	or	85·6
Six equivalents of water . .	54		14·4
Equivalent .	375		100·

Acetate of morphia is prepared by dissolving the alkali in the acid, and evaporating the solution so that crystals may form; these are not however very readily procured, and by the evaporation of the solution a part of the acid is sometimes dissipated, and a portion of the acetate, suffering partial decomposition, is rendered insoluble in water.

The crystals are in the form of colourless radiating needles, which are very readily dissipated by exposure to heat; and, like the other salts of morphia, the acetate is decomposed by ammonia, potash, and soda, &c., the morphia being precipitated.

Acetate of morphia, supposing it to be anhydrous, is probably composed of

One equivalent of acetic acid .	51	or	15·23
One equivalents of morphia .	284		84·77
Equivalent .	335		100·

It has not been determined whether the crystals contain water.

Morphia combines with other acids to form salts; the meconate of morphia, which is the natural salt existing in opium, does not crystallise; it is soluble in water and in alcohol. Sulphate of morphia crystallises in needles accumulated in bundles; it is soluble in about twice its weight of water. Bisulphate of morphia is procured by supersaturating the neutral salt with sulphuric acid; the excess of acid is to be removed by æther, which does not dissolve the bisalt. Nitrate of morphia is obtained by dissolving the alkali in the acid; it assumes at first a fine deep orange colour, which afterwards becomes yellow, and, by the continued action of the nitric acid, oxalic acid is procured; when however dilute acid is used, a neutral salt is procured in the form of stellated crystals. It is soluble in 1½ part of water. Phosphate of morphia crystallizes in cubes, or in radiating bundles, when the acid is in excess.

The general properties of the salts of morphia and the means of detecting their presence are, first, when nitric acid is dropped on crystallized morphia, a bright red or orange colour is the result; when morphia or any of its salts are acted on by a neutral solution of sesquioxide or sesquichloride of iron, a fine blue colour is the result, which disappears when an excess of acid is added, and reappears when it is saturated. Lassaigne proposes to detect the presence of the salts of morphia by evaporating the suspected solution at a temperature of 212°, and the residue treated with alcohol dissolves the salt of morphia, and probably some other matters which may have been mixed with it; by spontaneous evaporation of the alcoholic solution the salt of morphia crystallises; from these, redissolved, ammonia throws down a precipitate which is recognised to be morphia by its bitter taste, alkalinity, solubility in alcohol, and loss by the action of iodic acid. Other vegetable alkalis combine with iodic acid to form iodates; but when a solution of iodic acid is brought into contact with morphia or its salts, the liquid assumes a reddish brown colour, and exhales the peculiar smell of iodine, and its presence may also be detected by starch. According to Serullas, who proposed this test, a grain of morphia in 7000 grains of water may be detected by it. [Papaver.]

MORPHNUS, Cuvier's name for a genus of *Falconidæ*. [Falconidæ, vol. x., p. 176.]

MORPHOLOGY. [Metamorphosis of Plants.]

MORRIS DANCE. Douce, in a dissertation on the antient English Morris Dance at the end of the second volume of his 'Illustrations of Shakspere,' affirms that both English and foreign glossaries uniformly ascribe the origin of this dance to the Moors; although the genuine Moorish or Morisco dance was, no doubt, very different from the European Morris. Strutt, in his 'Sports and Pastimes of the People of England,' has cited a passage from the play of 'Variety,' 1649, in which the Spanish Morisco is mentioned; and this, Mr. Douce adds, not only shows the legitimacy of the term Morris, but that the real and uncorrupted Moorish dance was to be found in Spain, where it still continues to delight both natives and foreigners under the name of the fandango. The Spanish morris was also danced at puppet-shows by a person habited like a Moor, with castanets; and Junius has informed us that the morris-dancers usually blackened their faces with soot, that they might the better pass for Moors.

It has been supposed that the morris-dance was first brought to England in the time of Edward III., when John of Gaunt returned from Spain (Peck's *Memoirs of Milton*, p. 135); but it is more probable that we had it from our Gallic neighbours, or even from the Flemings. Few if any vestiges of it can be traced beyond the reign of Henry VII., about which time, and particularly in that of Henry VIII., the churchwardens' accounts of numerous parishes show that the morris-dance made a considerable figure at parochial festivals.

The hobby-horse, which once performed the principal character in the dance, was a light frame of wicker-work, furnished with a pasteboard head and neck of a horse. This was buckled round the waist, and covered with a foot-cloth which reached to the ground, and concealed at once the legs of the performer and his juggling apparatus. Thus equipped, he pranced and curvetted in all directions, neighing, and exhibiting specimens of boisterous and burlesque horsemanship. Besides the hobby-horse, there were, the fool or buffoon of the party; May or maid Marian, and her paramour a friar; a serving-man, a piper, and two Moriscoes. The dress of these personages is described by Fletcher in his 'Women Pleased,' when he says,—

> 'Where are your bells then,
> Your rings, your ribbands, friend, and your clean napkins,
> Your nosegay in your hat, pinn'd up?' &c.

The napkins are still used in what remains with us of the morris-dance. Gifford remarks, 'When the right good-will with which these persons capered is taken into consideration, the clean napkin, which was never omitted, will not appear the least necessary part of the apparatus.' Thus Clod, in the masque of 'The Gipsies,' observes, 'They would be morris-dancers by their gingle, but they have no napkins.' Maid Marian was the lady or queen of the May.

(Douce's *Illustrations of Shakspere and of Antient Manners*; Brand's *Popular Antiquities*, 4to. ed., vol. i., pp. 208, 209; Strutt's *Sports and Pastimes*, 4to.; Gifford's *Ben Jonson*, vol. ii., pp. 50, 51.)

MORRISON, ROBERT, the first Protestant missionary to China, was born at Morpeth, Northumberland, January 5, 1782. His parents were respectable and worthy persons in humble life. After receiving some elementary instruction in English, writing, and arithmetic, in a school conducted by a maternal uncle at Newcastle, he was apprenticed at a very early age to his father. In 1799 he commenced a course of religious reading and study. In 1801 he studied Hebrew, Latin, and theology, under the superintendence of a Presbyterian minister of the town, by whom he was introduced, in 1803, to the committee and tutors of Hoxton (now Highbury) Academy, as a fit person to be received into that institution. In May, 1804, he offered his services as a missionary to the London Missionary Society, and being accepted, he removed from Hoxton to the Mission College at Gosport. In August, 1805, he commenced the study of Chinese under a native teacher. In January, 1807, he was ordained as a missionary, and in September of the same year he arrived at Canton. Before leaving England he had procured from the British Museum a 'Harmony of the Gospels,' and the 'Pauline Epistles,' translated into Chinese by an unknown Roman Catholic Missionary; and the Royal Asiatic Society lent him a manuscript Latin and Chinese dictionary. In 1808 Mr. Morrison was appointed translator to the East India Company's factory at Canton. In 1810 the Acts of the Apostles in Chinese, which he had brought with him, were printed, after he had carefully revised and amended the text. In 1811 a Chinese grammar, which he had prepared about three years before, was sent to Bengal to be printed, but after many delays, it did not issue from the press until 1815, when it was printed at Serampore, at the expense of the East India Company. In 1812 the Gospel of St. Luke in Chinese was printed, and by the beginning of 1814, the whole of the New Testament being ready for the press, the East India Company sent out a press and materials, and a printer to superintend the printing of the work. In 1813 the London Missionary Society sent out the Rev. (afterwards Dr.) Milne to assist Morrison, and they proceeded with the translation of the Old Testament. In 1815 the Book of Genesis and the Psalms were printed. In the following year the Chinese dictionary was finished, and before the end of 1821 was printed by the East India Company at a cost of 15,000*l.* In 1817 the university of Glasgow conferred upon Mr. Morrison the degree of D.D. The Anglo-Chinese College, for Chinese and English youth, which he had projected, was also commenced. He published in the same year 'A View of China for Philological Purposes' in English, and a translation of 'Morning and Evening Prayers of the Church of England' into Chinese. The translation of the Bible was completed in 1818. From 1810 to 1818 the British and Foreign Bible Society had voted the sum of 6000*l.*, at seven different times, to assist in the printing and publication. The Old Testament formed 21 vols. 12mo. The Book of Job and the Historical Books were translated by Dr. Milne, and the other portions by Dr. Morrison. Of the New Testament Dr. Morrison had translated the four Gospels, and from Hebrews to the end. In 1824 Dr. Morrison came to England, and was introduced to King George IV., to whom he presented a copy of the Scriptures in Chinese. During his visit he endeavoured to promote the study of Chinese literature in England. His first wife, whom he married in 1808, having died in 1821, he married Miss Armstrong, of Liverpool, in 1826, and soon afterwards sailed for China. His time was now occupied in preaching, translating, superintending the distribution of printed works, and promoting education. In 1832 he wrote to his friends in England:—'I have been twenty-five years in China, and am beginning to see the work prosper. By the press we have been able to scatter knowledge far and wide.' In the midst of these occupations Dr. Morrison died, August 1, 1834, at Canton. His coadjutor, Dr. Milne, who died some time before, said of Morrison, that 'his talents were rather of the solid than the showy kind; fitted more for continued labour than to astonish by sudden bursts of genius; and his well-known caution fitted him for a station where one false step, at the beginning, might have delayed the work for ages.'

The translation of the scriptures, the great object of Dr. Morrison's life, was given to the world 'not as a perfect translation.' Dr. Morrison says he studied 'fidelity, perspicuity, and simplicity;' 'common words being preferred to classical ones.' The authorised English version was followed. Dr. Morrison always explicitly stated that the Chinese manuscript in the British Museum was 'the foundation of the New Testament;' which, he says, 'I completed and edited.'

The translators contemplated the improvement of their work at some future period, 'expecting that they should be able to sit down together and revise the whole.' This expectation was never realised; Dr. Milne died in 1822, and the correction of errors and the verbal alterations made by Dr. Morrison were not of great importance. The New Testament remains in much the same state as it was in 1814, and the Old Testament as it was in 1820. Towards the latter part of his life, Dr. Morrison became more and more confirmed in the necessity of a thorough revision, and he anticipated the probability of this being effected by his son, who however, on the death of his father, was selected to succeed him as the translator to the Superintendents of British Trade at Canton, and could not therefore devote his time to this object. It is no disparagement to Dr. Morrison to assert, that this revision of his work is necessary: it is a first version into the most difficult language in the world.

Two converted Chinese of literary abilities have given the following opinions of its merits. One of them says it exhibits a great number of redundancies and tautologies which render the meaning obscure.' The other finds it 'exceedingly verbose, containing much foreign phraseology so contrary to the usual style of our books, that the Chinese cannot thoroughly understand the meaning, and frequently refuse to look into it.' These opinions are taken from a work entitled 'China, its State and Prospects,' by Mr. Medhurst, an active missionary who succeeded Dr. Morrison. The reader is referred for a complete view of the subject to Professor Kidd's 'Critical Essay' on Dr. Morrison's literary labours. In December, 1836, a committee of the British and Foreign Bible Society passed a resolution 'requesting the Directors of the London Missionary Society to take the necessary steps for procuring such a revision of Dr. Morrison's work as appears to have been contemplated by the Dr. himself;' with a promise of defraying all the reasonable expenses of the work. In February, 1837, the directors resolved upon taking 'the recommendation of the Bible Society into their serious consideration, in the hope of securing a careful revision of the existing version, at as early a time as may be practicable.' Here the matter at present (August, 1839) rests.

From 1810 to 1836, 751,763 copies of works, consisting of eight million pages, were printed in the Chinese and Malay languages at Canton, Malacca, Batavia, Penang, and Singapore. This includes 2075 complete Chinese Bibles, 9970 New Testaments, and 31,000 separate portions of Scripture in Chinese.

(Medhurst's 'China;' 'Evangelical Magazine,' March and April, 1835. 'Memoirs of the Life and Correspondence of Robert Morrison, D.D., compiled by his widow,' to which is appended, 'A Critical Essay on the Literary Labours of Dr. Morrison,' by the Rev. S. Kidd, Professor of Chinese in the University College, 2 vols. 8vo., Lond., 1839.)

MO'RRHUA, a genus of fishes of the order *Malacopterygii* and section *Subbrachiales*.

The Common Cod-fish may be regarded as the type of this genus, which also contains the Haddock and several other species, all of which have the ventral fins pointed and situated under, or rather in advance of, the pectorals, three dorsal fins, two anal fins, and the chin furnished with a barbule.

The Common Cod (*Morrhua vulgaris*, Cuv.; *Gadus Morrhua*, Linn.) is usually about three feet in length, but sometimes attains a much larger size, and weighs from sixty to seventy pounds. The upper parts of the head and body are of an olive brown colour, mottled with yellowish; the under parts and the lateral lines are white, and the fins are dusky. The proportions of a specimen three feet in length are as follows:—The length of the head compared with that of the body (not including the tail-fin) is as one to two and a half; the depth of the body is equal to the length of the head; the first dorsal fin commences in a vertical line just behind the origin of the pectorals; the second dorsal commences in a line over the anal opening, and terminates opposite the hinder point of the first anal fin; the third dorsal and the second anal both commence and terminate in the same vertical line; the tail is truncated.

The Cod-fish is an inhabitant of the northern seas. In this country it is found on all parts of the coast; and 'in the United Kingdom alone this fish, in the catching, curing, the partial consumption, and sale, supplies employment, food, and profit, to thousands of the human race.'

The account of the mode of fishing, &c., given in that most excellent work the 'History of British Fishes,' is as follows:—'The Cod-fish is very voracious, a favourable circumstance for the fishermen, who experience little difficulty in taking them with almost any bait, whenever a favourable locality is ascertained. As these fishes generally inhabit deep water, from twenty-five to forty and even fifty fathoms, and feed near the ground on various small fishes, worms, crustacea, and testacea, their capture is only attempted with lines and hooks. Two sorts of lines, adapted for two very different modes of fishing, are in common use. One mode is by deep-sea lines, called bulters, on the Cornish coast; these are long lines, with hooks fastened at regular distances along their whole length by shorter and smaller cords called snoods; the snoods are six feet long each, and placed on the long line twelve feet from each other, to prevent the hooks becoming entangled. Near the hooks these shorter lines, or snoods, are formed of separate threads loosely fastened together, to guard against the teeth of the fish. Some variations occur at different parts of the coast as to the number of hooks attached to the line, as well as in the length of the snood; but the distance on the long line between two snoods is always double the length of the snood itself. Buoys, buoy-ropes, and anchors or grapples, are fixed one to each end of the long line. The hooks are baited with sand-launce, limpet, whelk, &c. The lines are always laid, or, as it is termed, shot, across the tide, for if the tide runs upon the end of the line, it will force the hooks together, by which the whole tide's fishing is irrecoverably lost: they are deposited generally about the time of slack water, between each ebb and flow, and are taken up or hauled for examination after having been left for about six hours, or one flood or ebb.

'An improvement upon this more common plan was some years ago suggested by Mr. Cobb, who was sent to the Shetlands by the Commissioners appointed for the Improvement of the Fisheries. He fixed a small piece of cork within a certain distance of the hook (about twelve inches), which suspended and floated the bait so as to prevent its falling on the ground, by which method the bait was more freely shown to the fish, by the constant and variable motion produced upon it by the tide. In the old way the bait was frequently hid from the fish by being covered with seaweed, or was consumed by some of the numerous star-fish and crabs that infest the ground.

'The fishermen, when not engaged in shooting, hauling, or rebaiting the long lines, fish with hand-lines, armed with two hooks kept apart by a strong piece of wire: each fisherman manages two lines, holding one line in each hand; a heavy weight is attached to the lower end of the line, not far from the hooks, to keep the bait down near the ground, where the fish principally feed. These two modes of line-fishing are practised to a great extent nearly all round the coast; and enormous quantities of cod, haddock, whiting, coal-fish, pollack, hake, ling, torsk, and all the various flat-fish, usually called by the general name of white-fish, are taken.

'Of cod-fish alone the number taken in one day is very considerable; from four hundred to five hundred and fifty fish have been caught on the banks of Newfoundland in ten or eleven hours by one man; and a master of fishing-vessels trading from the London market told me that eight men fishing under his orders off the Dogger Bank, in twenty-five fathoms water, have taken eighty score of cod in one day. These are brought to Gravesend in stout cutter-rigged vessels of eighty or one hundred tons burthen, called store-boats, built for this traffic, with a large well, in which the fish are preserved alive; and of these a portion is sent up to Billingsgate market by each night tide.

'Well-boats, for preserving alive the fish taken at sea, came into use in this country early in the last century: they are said to have been first built at Harwich about 1712. The store-boats remain as low down as Gravesend, because the water there is sufficiently mixed to keep the fish alive. If they were to come higher up, it would kill them.

'A change has lately taken place from the Cod having shifted their ground. Formerly the Gravesend and Barking fishermen obtained no Cod nearer than the Orkneys or the Dogger Bank; but for the last two or three years the supply for the London market has been obtained by going no farther than the Lincolnshire and Norfolk coasts, and even between that and London, where previously very few fish could be obtained. . . .

'In a natural state the Cod spawns about February; and nine millions of ova have been found in the roe of one female. The Cod is in the greatest perfection as food from the end of October to Christmas. It may, in fact, be said of the whole of the family of *Gadidæ*, that they are in the best condition for the table in the cold months of the year. The young of the Cod, about six inches long, abound at the mouth of the Thames and Medway throughout the summer: as autumn advances they gain size and strength, and are caught, from twelve to sixteen inches in length, by lines, near the various sandbanks in the channel. When of whiting size, they are called Codlings and Skinners; and when larger, Tamlin Cod.'

The Haddock (*Morrhua æglefinus*, Cuv.), a common fish in our markets, is of a smaller size than the cod, which it greatly resembles. In a specimen twenty inches long, the length of the head, compared with that of the body, without including the tail, is as one to two and a half; the depth of the body is less than the length of the head: the fins are situated nearly as in the cod, but they are proportionally higher, especially the anterior dorsal, which is pointed: the tail fin has its posterior edge emarginated. Its colour is usually paler than the common cod, the back is palish brown, the belly is silvery white, and the lateral line is black; a blackish patch is situated on the side of the body behind the pectoral fins, and sometimes extends over the back and unites with the corresponding spot on the opposite side; the dorsal fins and tail are greyish, and the pectoral and ventral fins are paler.

This fish frequents for the most part the same localities as the common cod, being found in the northern seas. It occurs all round the coast of Great Britain and Ireland, but is said not to exist either in the Baltic or Mediterranean. It is chiefly caught with long lines baited with pieces cut from a herring or sand-launce.

In the 'Règne Animal,' it is said that when the haddock is salted, it is called *hadou*, after the English name *hadok*; and in the 'History of British Fishes,' Mr. Yarrel states, that 'the French fishermen call the haddock hadot, whence probably our name was derived.

Besides the two above-mentioned species of *Morrhua*, the following are enumerated and described as species occurring on the British coast:—The Dorse (*Morrhua Callarias*), the Bib or Pout (*M. lusca*), the Poor or Power Cod (*M. minuta*), and the Speckled Cod (*M. punctata*). (Yarrell's *History of British Fishes*.) [FISHERIES.]

MORSE, a name for the *Walrus*.

MORTAGNE. [ORNE.]

MORTAIN. [MANCHE.]

MORTALITY, BILLS OF. [BILLS OF MORTALITY.]

MORTALITY, LAW OF. In this article we intend to confine ourselves to some account of our present knowledge, theoretical and practical, of the laws which are found to regulate mortality among mankind in this country.

Uncertain as is the life of any one individual, it is now very well known that if two different numbers of individuals, at or near the same age, be taken, the number that will be left at the end of a few years will be nearly the same, if they exist during that time under similar circumstances. No tables, however different the station and circumstances of the persons from whose lives they are made, differ from one another by anything like the amount which might be supposed likely by one who turns his thoughts rather to the existence of one individual than of a large number. A little consideration will make the probability of something like permanence in the distribution of mortality very great *à priori*. That harvests fluctuate in goodness is very well known; but it is also obvious that if the fluctuations upon a whole country had been as great as those upon an individual field, the human race must long ere this have been starved off the face of the earth. If, in the same manner, the mortality of races had varied as much as that of families, it is impossible that the population of any country could have gone on in a gradual and regulated state of increase; or supposing that large fluctuations had compensated each other, the consequence must have been such a disproportion of the numbers living at different ages as it never has occurred to any one to imagine possible.

The law of mortality, theoretically speaking, is a mathematical relation between the numbers living at different ages; so that, having given a large number of persons alive at one age, it can be deduced by the law what number shall survive any given number of years: practically speaking, it is, in the absence of such a mathematical law, the exhibition in a table of the numbers surviving at the end of each year. Thus DE MOIVRE'S HYPOTHESIS (namely, the supposition that out of 86 persons born one dies every year, till all are extinct) is an asserted theoretical law of mortality; while the Carlisle table, presently given, is a practical one.

If y represent the number of persons living at the age of x, out of a certain number a at a certain previous age (usually the time of birth), then if a line varying with x be made the abscissa of a curve, and another varying with y its ordinate, this curve may be called the curve of mortality. Its form, as deduced from a given set of observations, may lead, by comparison with known curves, to an equation which, more or less accurately, connects y and x.

Besides De Moivre's hypothesis, others have been given, the principal of which we shall notice in order.

A curve following a mathematical law may be drawn through any points, however great their number, or irregular their distribution; but the greater the number of points, the more complex will be the equation of the curve. With an equation of a high degree (the tenth perhaps, or the twelfth), any given table of mortality might be very nearly represented; but such complexity would be useless, and it has therefore never been attempted. Similarly, by using arcs of different curves, a near representation might be attained; but such a method, being practicable in many different ways, would not possess the interest attaching to one simple and uniform law, and would only attract attention by offering facilities for the actual calculation of life-contingencies.

In 1765 Lambert presented an equation of the following form, as representing very closely the London table (ϵ is the base of Napier's logarithms):—

$$y = 10000\left(\frac{96 - x}{96}\right)^2 - 6176\left\{\epsilon^{-\alpha x} - \epsilon^{-\beta x}\right\}$$

α being $= 1 : 13·682$, and $\beta = 1 : 2·43114$, and y being the number surviving at the age of x, out of 10,000 born. This form, if it could be made to represent other tables, by an alteration in the constants, would be one of great practical utility; but we are not aware of any attempt having been made to extend it.

Mr. Benjamin Gompertz, in 1825, presented to the Royal Society a memoir 'On the Nature of the Function expressive of the Law of Human Mortality.' As this ingenious paper contains a deduction from a principle of high probability, and terminates in a conclusion which accords in a great degree with observed facts, it must always be considered as a very remarkable page in the history of the inquiry before us. We enter into some detail of it the more readily, that it is necessary as an act of justice to Mr. Gompertz, whose ideas have been adopted by a recent writer on the subject, without anything approaching to a sufficient acknowledgment.

There is in the human constitution a power of resisting the effects of disease, which increases from birth up to a certain age, and diminishes from that time forwards; the evidence of such diminution being the increased proportion of deaths in a given time. The proportion is found, in most tables, not to be altered by equal quantities in equal times, but to diminish in a greater ratio as life goes on. Mr. Gompertz assumes that the 'power to oppose destruction' loses equal proportions[*] in equal times; so that the intensity of mortality, supposed inversely proportional to this power, must be represented by the formula aq^x, where a is its value at the commencing age from which x years are reckoned, and q a constant depending on the rate of increase of the intensity. If therefore y be the number living at the end of x years, $y . aq^x dx \times b$ is the decrement of that number in the time dx, where b is another constant; and this gives $dy = -abq^x y dx$, which integrated is of the form

$$y = lg^{(q^x)}$$

where q, l, and g are to be determined. This can be done by three values of y out of the given table; and the result, hitherto purely hypothetical, can then be compared with the other parts of the table, by calculation of the values of the formula for different ages. The more convenient form of the above is

$$\log y = \log l \pm \text{no. wh. log. is (log. } \log g + x \log q$$

where log log g is taken without reference to the sign of log g, and the upper or lower sign is used according as g is greater or less than unity.

Among other comparisons, Mr. Gompertz has made one with the Carlisle table from the age of 10 to that of 60, and another (deducing different values of l, g, and q) from 60 to 100. The two formulæ obtained are, using $\log^{-1}$ for the phrase 'no. whose logarithm is,' and x meaning the age of the parties,

$$\log y = 3·88631 - \log^{-1}\{2·75526 + ·0126\ x\}$$
$$\log y = 3·79657 - \log^{-1}\{\bar{3}·74767 + ·02706\, x\}$$

In the first set of ages the discordance between the formula and the table is only in one instance as great as half a year; that is, there is only one instance in which the number deduced from the formula as alive at a given age represents the number living in the table at an age so distant from the given age as half a year. Several other comparisons, with other tables and different constants, give equally satisfactory results. Few who know the best tables of mortality will be inclined to think that their probable error is within half a year; so that, as we now stand, Mr. Gompertz's principle, namely, 'that equal proportions of the "power to oppose destruction" are lost in successive small equal times,' is as well established for a large portion of life as any of the tables.

We now come to the practical exhibition of the law of mortality in tables. A very good account of the history of the subject, by Mr. Milne, appears in the 'Encyclopædia Britannica' (new edition), article 'Mortality,' the references in which may be consulted by those who desire information on the state of the question in foreign countries. We shall in this article confine ourselves principally to English tables.

The obvious and simple mode of forming a table of mortality would be to take a large number of infants born alive, all of the same sex and in the same station of life. If the numbers left alive at the end of every year were noted, until all had become extinct, a column of ages, accompanied by an opposite column noting the number of survivors, would be a table of mortality in the most usual form. Such a table might be called a table of decrements. Let l_0 represent the number born, and l_x the number who survive to the age x.

The formation of such a table might require a century of observation. To avoid this, the law of mortality must be assumed stationary; that is, it must be presumed that, out of those who reach, say age 70, the proportion who die in a year is now what it will be when an infant new-born reaches that age. This being assumed, let the members of a community be counted, and their ages registered; at the end of a year it will appear what proportion of each age has died. If the process be repeated in succeeding years, other sets of events are obtained, which may all be put together into one table, when the number has become large enough to secure the observed events representing the average, and to destroy the effects of accidental fluctuations. If then altogether k_x persons have attained the age x, of whom k_{x+1} have survived to the age $x + 1$, it follows that the proportion who die in a year is $(k_x - k_{x+1}) : k_x$, which may be represented by m_x. A table of the values of m_x might be called a table of the yearly rates of mortality.

A table of yearly rates may be converted into a table of decrements, as follows. Assume a number l_0 to be born, then from the table of yearly rates,

$$l_1 = (1 - m_0)\, l_0,\ l_2 = (1 - m_1)\, l_1, \text{ \&c.}$$

If the population, say of a town, remained unaffected, or sensibly unaffected, by immigration or emigration, that is, if all who were born in the place, and no others, were registered in the burials of the place, the burial registers would form a mortality-table, provided the rate of increase of the population were steady and known. For, firstly, if the population had remained stationary for a long time preceding the commencement of registration, the yearly deaths and births being equal, and if the mortality had also remained stationary, the burials of any one year, the parties being distributed according to age, would show the law of mortality as follows:—Suppose the registers of a year showed that M_0 died in their first year, M_1 in their second year, and so on, the equality of births and deaths shows that $M_0 + M_1 + M_2 + \dots$ must have been born in that year, and the stationary character of the law of mortality being assumed, it follows that of $M_0 + M_1 + \dots$ persons born, it is the law of the mortality that M_0 die in their first year, or that $M_1 + M_2 + \dots$ survive; similarly that $M_2 + M_3 + \dots$ survive two years, and so on. But if the population be in a state of increase, and if the annual ratio of increase be that of $1 : 1 + \mu$, those who die at the age $x - 1$ and x cannot be incorporated in the same table, since the first are a portion of a table beginning with a larger number of births. The former then must be reduced, or the latter increased, in the proportion of $1 : 1 + \mu$: so that if M_0, M_1, &c. be the deaths in the first, second, &c. years of age by the register, the table must run thus: of

$$M_0 + M_1\,(1 + \mu) + M_2(1 + \mu)^2 + \dots$$

persons born, M_0 die in their first year, $M_1\,(1 + \mu)$ in their second, and so on.

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[*] The word in the eighth page of the memoir cited is *portions*, which is a misprint or an oversight, as the formula immediately following shows. If x be the time, $a - bx$ loses equal portions in equal times, and $a . b^{-x}$ equal proportions.

A table of mortality may also be given in the form of a table of the mean durations of life, calculated as in LIFE, MEAN DURATION OF. Or the table of mean durations may be calculated from the table of yearly rates, as follows:—Let e_n be the mean duration of the lives aged n, and m_n the yearly rate at the same age: then

$$e_n - \tfrac{1}{2} = (1 - m_n)\,(e_{n+1} + \tfrac{1}{2})$$

by which, beginning from the end of life, the mean duration at each age may be computed from that at the age next higher.

Various tables of these several kinds have been constructed, beginning with that made by Halley from the town of Breslau, and ending with that formed by the Equitable Insurance Office from its own materials. If we were to look to the wants of the subject, whether as a physical investigation or a statistical one, we should find that it is everywhere in the merest infancy. The fact of a difference of mortality between the two sexes is established, and it also seems to be known that where the occupations of females are not above their strength, their mortality is less than that of males; but no settled determination of the amount of difference has been obtained. As to whether married or single life is the longest, whether the age of the parents, or the relative age, affects the mortality of the children, whether the earlier children of a marriage differ in their law of mortality from the later, &c., we have no information at all. In some foreign countries, as in Sweden and Belgium, the attention paid by the government to statistical subjects has produced some results which are worth a good deal; the reader may consult the article in the *Encyclopædia Britannica* already cited for reference to them. We shall now give merely the dates and titles of the most remarkable earlier tables connected with the subject.

A.D. 1538, parish registers first kept in England.

1540-41. The statute 32 Henry VIII., c. 28, enabling ecclesiastical persons and corporations to grant leases for *three lives*, or *twenty-one years*. From this permission springs, we think, much of the attention which has been paid to the subject of life leases in England. It gave rise to certain tables of the value of leases which were called 'Æcroid's Tables,' and which were put together, as was thought by later writers, about the end of the reign of Henry VIII. They assume a rate of interest greater than 11 per cent. After the Restoration, when the interest of money had very much fallen, the ecclesiastical lessors began to raise their fines. This occasioned great dissatisfaction, and frequent representations to the House of Commons, which, though it passed no law, in several cases recommended to particular bishops, &c. an adherence to the old rule. Attention began to be turned towards the actual value of life. In 1662 John Graunt published his 'Natural and Political Observations on the Bills of Mortality,' often reprinted. In 1674, Sir William Petty, in a paper in the 'Philosophical Transactions,' proposed a law of mortality of the following kind: the probability of one life surviving another, after the age of 16, is inversely as the square roots of the ages. In 1685 were published the well known 'Tables for renewing and purchasing the leases of Cathedral Churches and Colleges,' the methods of which were certified to be correct by Newton, and which therefore have been frequently called Newton's Tables. About 1720, if not before, a letter called 'The Value of Church and Colleges Leases considered,' was appended to these tables, and a very sharp controversy took place, which produced a great many pamphlets; the party of the lessees appealing to custom, the lessors showing from the value of life and interest of money that the church landlord dealt more leniently with his tenant than the layman, as was indeed the case. Among the writings which arose out of this controversy was 'The Gentleman's Steward instructed,' 1730, by John Richards, containing the most complete tables of annuities which had been published.

The work of Graunt and the political essays of Sir William Petty preceded, and probably stimulated the attempt of Halley to construct (A.D. 1692) a table from the bills of mortality at Breslau, which was published in 1693. In 1699 came Dr. Davenant's 'Essay,' &c., containing extracts from some tables by Gregory King (afterwards published entire), which Mr. Milne states to represent tables since made with great accuracy. Kerseboom's tables of lives (constructed from Dutch registers of annuitants) appeared in 1738, 1740, and 1742. De Moivre's 'Treatise on Annuities,' containing his celebrated hypothesis, was published in 1724; and Thomas Simpson's work on the same subject, containing a table deduced from London observations, in 1742. Deparcieux, in 1746, published his 'Treatise on Annuities,' containing his tables deduced from the lives of French annuitants, as well as from monks and nuns. These were the first tables in which male and female life were distinguished from each other.

The works of Price, Baily, Milne, &c., contain altogether a large number of tables, which we shall here no further notice than to give references to the works in which they may be found, with other matters connected with the same subject.

'Observations on Reversionary Payments,' by Richard Price, D.D., seventh edition, edited by William Morgan, London, Cadell and Davies, 1812.

'The Doctrine of Annuities and Assurances,' by Francis Baily, London, Richardson, 1816. This work, now out of print, has been lately translated into French, under the title 'Théorie des Annuités Viagères,' traduit de l'Anglais per Alfred de Courcy, Paris, Bachelier, 1836.

'A Treatise on the Valuation of Annuities and Assurances,' by Joshua Milne, London, Longman and Co., 1815.

'On the Natural and Mathematical Laws concerning Population, Vitality, and Mortality,' by Francis Corbaux, London, 1833. This work contains a large number of tables.

Reports (two in number) of Select Committees of the House of Commons on the Laws respecting Friendly Societies. Ordered to be printed, July 5, 1825, and June 29, 1827.

'Report of John Finlaison, actuary of the national debt, on the evidence and elementary facts on which the tables of life annuities are founded.' Ordered by the House of Commons to be printed, March 31, 1829.

'Library of Useful Knowledge,' treatise 'On Probability.'

'Treatise on Friendly Societies,' by Charles Ansell, &c., London, Baldwin and Cradock, 1835.

'Tables showing the total number of persons insured in the Equitable Society,' &c., by Arthur Morgan, London. 1834.

Mr. Rickman's various Reports on the Population Census contain tables deduced from them.

'Recherches sur la Reproduction et la Mortalité,' &c., par MM. Quetelet et Smits, Bruxelles, 1832; and 'Sur l'Homme, &c., ou Essai de Physique Sociale,' 2 vols., par A. Quetelet, Paris, Bachelier, 1835. These works exhibit for Belgium what we could wish to see imitated in England.

We shall now proceed to give some tables of mortality, namely, the Northampton and Carlisle tables, those of the Equitable Insurance Office, and Mr. Ansell's Friendly Societies' table. We shall give a brief description of each.

1. Northampton Table. This table was formed by Dr. Price from the burial registers at Northampton, between 1741 and 1780. He has not distinctly described the process by which he formed it. This table was for a long time the only one used by the insurance offices. It is now known to give the probabilities of life too low at the younger and middle ages. Some of this (but probably not all) is due to the increased value of life in England since the middle of the last century. This table contains both males and females in nearly equal numbers. The accordance of the Northampton Table with De Moivre's Hypothesis at the middle ages of life is remarkably close. (Price, *Obs. on Rev. Paym.*, vol. ii., p. 94.)

2. The Carlisle Table. The materials of this table were obtained by Mr. Milne from a tract published by Dr. Heysham of Carlisle in 1797, containing the bills of mortality from 1779 to 1787, both inclusive. The proportion is ten females to nine males. From the verifications which this table has since received, it must be considered as the most correct representative of healthy life in England which exists. (Milne *On Annuities*, p. 404.)

3. The Equitable Table. The tract in which this is found is cited above. It represents the experience of the Equitable Society from 1760 to 1829, and agrees closely at the middle ages with the Carlisle Table. The agreement would be a little closer in most parts but for the following circumstance. In the formation of this table it is presumed that all those who discontinued their insurance lived, one with an-

other, one-half of their year of discontinuance in the Society. Now (throwing aside short insurances, which are always very small in number) the modes of discontinuance are only abandonment by neglect to renew the premium, and sale to the Society. In the former case the parties live the whole year of discontinuance in the Society, since their intention not to renew would be no bar to a claim on the part of their executors if their death took place during a year at the beginning of which premium had been paid; and it is well known that in the earlier history of every insurance office, abandonments were much more frequent than sales. And even in the case of sales to the office, it may reasonably be assumed, unless proof to the contrary were shown, that they take place, for the most part, shortly before a new premium becomes due, parties frequently choosing to take the benefit of the insurance as long as they can, and to sell when a new payment is approaching. It must therefore be supposed (unless, as before hinted at, specific proof from the records of the office be produced to the contrary) that the discontinuants, or a very large majority of them, lived the whole year of discontinuance in the office. This will make the mortality a little less than that represented in the table, though not much.

There is also a point on which, if our information be correct, the method of forming this table has been misapprehended. Those who study the subject are aware of the thing to which we refer (*Enc. Metr.*, article 'Mortality,' part ii., § 53, note), and will therefore comprehend the following. It is, we understand, the practice of the Society in question to make up the registers on the first day of January, at which period every person insured during the previous year is put down as being of the *office age* which he had at his entrance. Now this office age means the age at the next birthday; that is, one with another, parties do not attain their office age till they have lived half a year in the Society. But on each first of January the parties insured during the previous year have, one with another, lived half a year in the Society, so that they are correctly stated as being of their office age when the registers are made. The preface of this very valuable table is not sufficiently explicit on this and several other points.

4. The Friendly Societies' Table. The materials for this table were collected by the Society for the Diffusion of Useful Knowledge, and were discussed by Mr. Ansell in the work cited above, which should be in the hands of every one interested in the excellent institutions of which it treats. It embraces the history, as to mortality, of 24,323 years of life, among the labouring classes, from all parts of England indiscriminately, and from 1823 to 1828.

I. *Decrements of Human Life, according to the Northampton, Carlisle, Equitable, and Friendly Societies' Tables.*

Age.	Northampton.	Decrements.	Carlisle.	Decrements.	Equitable.	Decrements.	Friendly Societies.	Decrements.	Age.
0	11650	3000	10000	1539	..				0
1	8650	1367	8461	682	..				1
2	7283	502	7779	505	..				2
3	6781	335	7274	276	..				3
4	6446	197	6998	201	..				4
5	6249	184	6797	121	..				5
6	6065	140	6676	82	..				6
7	5925	110	6594	58	..				7
8	5815	80	6536	43	..				8
9	5735	60	6493	33	..				9
10	5675	52	6460	29	5000	36			10
11	5623	50	6431	31	4964	36			11
12	5573	50	6400	32	4928	36			12
13	5523	50	6368	33	4892	36	8669	52	13
14	5473	50	6335	35	4856	36	8617	54	14
15	5423	50	6300	39	4820	36	8563	56	15
16	5373	53	6261	42	4784	36	8507	58	16
17	5320	58	6219	43	4748	36	8449	60	17
18	5262	63	6176	43	4712	36	8389	62	18
19	5199	67	6133	43	4676	35	8327	64	19
20	5132	72	6090	43	4641	34	8263	66	20
21	5060	75	6047	42	4607	33	8197	68	21
22	4985	75	6005	42	4574	33	8129	70	22
23	4910	75	5963	42	4541	33	8059	71	23
24	4835	75	5921	42	4508	33	7988	73	24
25	4760	75	5879	43	4475	34	7915	75	25
26	4685	75	5836	43	4441	34	7840	77	26
27	4610	75	5793	45	4407	34	7763	79	27
28	4535	75	5748	50	4373	34	7684	81	28
29	4460	75	5698	56	4339	34	7603	83	29
30	4385	75	5642	57	4305	35	7520	85	30
31	4310	75	5585	57	4270	35	7435	87	31
32	4235	75	5528	56	4235	36	7348	89	32
33	4160	75	5472	55	4199	37	7259	91	33
34	4085	75	5417	55	4162	38	7168	93	34
35	4010	75	5362	55	4124	38	7075	95	35
36	3935	75	5307	56	4086	39	6980	98	36
37	3860	75	5251	57	4047	40	6882	100	37
38	3785	75	5194	58	4007	42	6782	102	38
39	3710	75	5136	61	3965	43	6680	105	39
40	3635	76	5075	66	3922	43	6575	107	40
41	3559	77	5009	69	3879	44	6468	109	41
42	3482	78	4940	71	3835	44	6359	111	42
43	3404	78	4869	71	3791	44	6248	113	43
44	3326	78	4798	71	3747	45	6135	115	44
45	3248	78	4727	70	3702	47	6020	117	45
46	3170	78	4657	69	3655	47	5903	118	46
47	3092	78	4588	67	3608	48	5785	120	47
48	3014	78	4521	63	3560	49	5665	122	48
49	2936	79	4458	61	3511	50	5543	124	49
50	2857	81	4397	59	3461	52	5419	126	50
51	2776	82	4338	62	3409	55	5293	129	51
52	2694	82	4276	65	3354	58	5164	131	52
53	2612	82	4211	68	3296	62	5033	134	53
54	2530	82	4143	70	3234	64	4899	136	54
55	2448	82	4073	73	3170	66	4763	140	55
56	2366	82	4000	76	3104	70	4623	143	56
57	2284	82	3924	82	3034	75	4480	145	57
58	2202	82	3842	93	2959	79	4335	148	58
59	2120	82	3749	106	2880	84	4187	150	59
60	2038	82	3643	122	2796	88	4037	152	60
61	1956	82	3521	126	2708	90	3885	153	61
62	1874	81	3395	127	2618	91	3732	155	62
63	1793	81	3268	125	2527	93	3577	156	63
64	1712	80	3143	125	2434	95	3421	158	64
65	1632	80	3018	124	2339	100	3263	158	65
66	1552	80	2894	123	2239	105	3105	159	66
67	1472	80	2771	123	2134	108	2946	160	67
68	1392	80	2648	123	2026	111	2786	161	68
69	1312	80	2525	124	1915	115	2625	161	69
70	1232	80	2401	124	1800	115	2464	160	70
71	1152	80	2277	134	1685	115	2304	160	71
72	1072	80	2143	146	1570	115	2144	160	72
73	992	80	1997	156	1455	115	1984	160	73
74	912	80	1841	166	1340	115	1824	160	74
75	832	80	1675	160	1225	114	1664	160	75
76	752	77	1515	156	1111	109	1504	154	76
77	675	73	1359	146	1002	105	1350	146	77
78	602	68	1213	132	897	101	1204	136	78
79	534	65	1081	128	796	96	1068	130	79
80	469	63	953	116	700	93	938	126	80
81	406	60	837	112	607	90	812	120	81
82	346	57	725	102	517	85	692	114	82
83	289	55	623	94	432	83	578	110	83
84	234	48	529	84	349	73	468	96	84
85	186	41	445	78	276	61	372	82	85
86	145	34	367	71	215	50	290	68	86
87	111	28	296	64	165	42	222	56	87
88	83	21	232	51	123	34	166	42	88
89	62	16	181	39	89	22	124	32	89
90	46	12	142	37	67	18	92	24	90
91	34	10	105	30	49	14	68	20	91
92	24	8	75	21	35	11	48	16	92
93	16	7	54	14	24	8	32	14	93
94	9	5	40	10	16	7	18	10	94
95	4	3	30	7	9	5	8	6	95
96	1	1	23	5	4	3	2	2	96
97			18	4	1	1			97
98			14	3					98
99			11	2					99
100			9	2					100
101			7	2					101
102			5	2					102
103			3	2					103
104			1	1					104

The explanation is as follows:—Of 10,000 infants born at Carlisle, 1539 would die in their first year, and 8461 would survive, while 4000 would live to 56 and upwards. In the Equitable Table, of 3922 persons attaining the age of 40, 43 and 44 die in the two succeeding years, leaving 3835 surviving at their 42nd birthday.

Of the three species of tables, this is the most useful for mathematical deduction, and the least adapted for a com parative view. The best way of using them for the examination of their relative bearings is to compare the *probable life*, as it is called, of the two, that is, the time in which the numbers living are reduced one-half. Thus taking the age of 31, we see that the numbers living in the Northampton table are halved at the age of 59, while in the Carlisle table this does not happen till the age of 67.

II. *Yearly Rates of Mortality upon* 10,000 *lives according to the Northampton, Carlisle, Equitable, and Friendly Societies' Tables.*

Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.	Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.
0	2575	1539			0	56	347	190	225	309	56
1	1560	789			1	57	359	209	247	325	57
2	689	649			2	58	372	242	267	341	58
3	494	379			3	59	387	283	291	358	59
4	306	287			4	60	402	335	315	376	60
5	294	178			5	61	419	368	332	395	61
6	231	123			6	62	432	374	347	415	62
7	186	88			7	63	452	382	368	437	63
8	138	66			8	64	467	398	390	461	64
9	105	51			9	65	490	411	428	485	65
10	92	45	72		10	66	515	425	469	513	66
11	89	48	72		11	67	543	444	506	543	67
12	90	50	73		12	68	575	465	548	578	68
13	91	52	74	60	13	69	610	491	601	614	69
14	91	55	74	63	14	70	649	516	639	649	70
15	92	62	75	66	15	71	694	588	682	694	71
16	99	67	75	69	16	72	746	681	733	746	72
17	109	69	76	71	17	73	806	781	790	806	73
18	120	70	77	74	18	74	877	902	858	877	74
19	129	70	75	77	19	75	962	955	931	962	75
20	140	71	73	80	20	76	1094	1030	981	1024	76
21	149	69	72	83	21	77	1081	1074	1048	1081	77
22	150	70	72	86	22	78	1130	1088	1126	1130	78
23	153	70	73	89	23	79	1217	1184	1206	1217	79
24	155	71	73	91	24	80	1343	1217	1329	1343	80
25	158	73	76	95	25	81	1478	1338	1483	1478	81
26	160	74	77	98	26	82	1647	1407	1644	1647	82
27	163	78	77	101	27	83	1903	1509	1921	1903	83
28	165	87	78	105	28	84	2051	1588	2092	2051	84
29	168	98	78	109	29	85	2204	1753	2210	2204	85
30	171	101	81	112	30	86	2345	1936	2326	2345	86
31	174	102	82	117	31	87	2523	2162	2545	2523	87
32	177	101	85	121	32	88	2530	2198	2764	2530	88
33	180	101	87	125	33	89	2581	2155	2472	2581	89
34	184	102	91	130	34	90	2609	2606	2686	2609	90
35	187	103	92	135	35	91	2941	2858	2857	2941	91
36	191	106	95	140	36	92	3333	2800	3143	3333	92
37	194	109	99	145	37	93	4375	2593	3333	4375	93
38	198	112	105	151	38	94	5556	2500	4375	5556	94
39	202	119	108	156	39	95	7500	2333	5556	7500	95
40	209	130	110	162	40	96	10000	2174	7500	10000	96
41	216	138	113	168	41	97		2222	10000		97
42	224	144	115	175	42	98		2143			98
43	229	146	116	181	43	99		1818			99
44	235	148	120	187	44	100		2222			100
45	240	148	127	194	45	101		2857			101
46	246	148	129	200	46	102		4000			102
47	252	146	133	207	47	103		6667			103
48	259	139	138	215	48	104		10000			104
49	269	137	142	223	49						
50	284	134	150	233	50						
51	295	143	161	243	51						
52	304	152	173	254	52						
53	314	161	188	266	53						
54	324	169	198	279	54						
55	335	179	208	293	55						

Thus, of 10,000 persons attaining the age of 40, 130 die in the following year according to the Carlisle tables; while of 10,000 who attain the age of 41, 138 die in the next year. This species of table is the only one of the three which is immediately applicable to the comparison of two sets of data at and near a given age; while the one to which we now come serves to compare the total character of two sets of data from and after a given age. It also unites the fluctuations of different years, by compensation: thus looking at tables II. we should hardly suspect that closeness of resemblance between the Carlisle and Equitable tables, in the value of life, which is obvious in those marked III.

III. *Mean Duration of the lives of* 100 *individuals of every age, according to the Northampton, Carlisle, Equitable, and Friendly Societies' Tables.*

Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.	Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.
0	2518	3872			0	56	1510	1689	1634	1539	56
1	3274	4468			1	57	1463	1621	1571	1496	57
2	3779	4755			2	58	1415	1555	1509	1434	58
3	3955	4982			3	59	1368	1492	1449	1383	59
4	4058	5076			4	60	1321	1434	1391	1333	60
5	4084	5125			5	61	1275	1382	1335	1283	61
6	4107	5117			6	62	1228	1331	1279	1233	62
7	4103	5090			7	63	1181	1281	1223	1185	63
8	4079	5024			8	64	1135	1230	1168	1136	64
9	4036	4957			9	65	1088	1179	1113	1089	65
10	3978	4882	4832		10	66	1042	1127	1061	1042	66
11	3914	4804	4767		11	67	996	1075	1011	995	67
12	3849	4727	4701		12	68	950	1023	962	950	68
13	3783	4651	4635	4274	13	69	905	970	915	905	69
14	3717	4575	4569	4199	14	70	860	918	870	861	70
15	3651	4500	4503	4125	15	71	817	865	826	817	71
16	3585	4427	4436	4052	16	72	774	816	783	774	72
17	3520	4357	4370	3979	17	73	733	772	741	733	73
18	3458	4287	4303	3908	18	74	692	733	700	693	74
19	3399	4217	4235	3836	19	75	654	701	661	654	75
20	3343	4146	4167	3756	20	76	618	669	624	619	76
21	3290	4075	4097	3696	21	77	583	640	586	584	77
22	3239	4004	4027	3626	22	78	548	612	549	548	78
23	3188	3931	3956	3557	23	79	511	580	512	512	79
24	3136	3859	3884	3488	24	80	475	551	475	476	80
25	3085	3786	3812	3420	25	81	441	521	441	442	81
26	3038	3714	3741	3352	26	82	409	493	409	410	82
27	2982	3641	3670	3285	27	83	380	465	379	390	83
28	2930	3569	3598	3218	28	84	358	439	357	358	84
29	2879	3500	3526	3152	29	85	337	412	339	338	85
30	2827	3434	3453	3086	30	86	319	390	321	319	86
31	2776	3368	3381	3021	31	87	301	371	303	301	87
32	2724	3303	3308	2956	32	88	286	359	289	286	88
33	2672	3236	3236	2892	33	89	266	347	280	266	89
34	2620	3168	3165	2828	34	90	241	328	256	241	90
35	2568	3100	3093	2764	35	91	209	326	232	209	91
36	2516	3032	3022	2701	36	92	175	337	204	175	92
37	2464	2964	2950	2639	37	93	137	348	175	139	93
38	2412	2896	2879	2577	38	94	105	353	138	106	94
39	2360	2828	2809	2516	39	95	75	353	106	75	95
40	2308	2761	2740	2455	40	96	50	345	75	50	96
41	2256	2697	2669	2395	41	97		328	50		
42	2204	2634	2599	2335	42	98		307			
43	2154	2571	2529	2276	43	99		277			
44	2103	2509	2458	2217	44	100		228			
45	2052	2446	2387	2158	45	101		179			
46	2002	2382	2317	2100	46	102		130			
47	1951	2317	2247	2042	47	103		83			
48	1900	2250	2177	1984	48	104		50			
49	1849	2181	2107	1926	49						
50	1799	2111	2036	1869	50						
51	1750	2039	1966	1813	51						
52	1702	1968	1898	1757	52						
53	1654	1897	1830	1701	53						
54	1606	1828	1764	1646	54						
55	1558	1758	1699	1592	55						

To avoid decimal points, 100 persons are supposed at each age: thus, 100 persons aged thirty enjoy among them 3086 years, according to the Friendly Societies' tables, or each of them, on the average, 30·86 years. This sort of table is much the best for a running comparison of two laws of mortality.

It must be observed that the two first of the preceding sets of tables attempt a degree of minuteness which cannot be supposed to be attainable with existing data. To distinguish between the decrements of two successive years, and the percentages of the two sets of deaths, would require much greater numbers of living at the two ages than ever have been found in the materials of a table. Nor is the regularity observable in these tables also observable in the observations which produced them; this result being obtained by hypothetical adjustments, so as to attain the nearest representation, in the main, of the materials under investigation. This applies particularly to the old lives, which are but few in number, and present various diversities of fluctuation. Almost all the tables which have been constructed present some general results of utility; and we cannot but think that writers on this subject, by attending too much to minute comparison, and not enough to general indications, have not made all the legitimate deductions which the materials before them would have afforded. We proceed to some general account of the state of mortality, restricting ourselves to the last and present centuries, to life in England only, and to the general variations of mortality and the relative mortality of the sexes.

The circumstance which must strike every one as most remarkable, is the great increase which has taken place in longevity. To put this in a clearer light, we shall collect various tables of the mean duration of life, specifying the epochs of their collection. The tables formed from male lives only, have a capital letter; from female lives only, a small letter; from both, a capital and a small letter. At the bottom of each table is given the period in which all or most of the lives became extinct. The number in the table is the number of years enjoyed by ten individuals: thus in table T, at the age of 20, the mean duration of a single life is the tenth part of 293 years, or 29·3 years.

T t,	King William's Tontine	(Finlaison).
L l,	London Table .	(Simpson).
O o,	Norwich Table . .	(Price).
R r,	Chester Tables[*] .	(Price).
H h,	Holy Cross Table . .	(Price).
N n,	Northampton Table .	(Price).
A,	Amicable Society's Table.[†]	
C c,	Carlisle Table .	(Milne).
E,	Equitable Table . .	(A. Morgan).
G g,	Government Annuitants	(Finlaison).
P,	Chelsea Pensioners .	(Finlaison).
F,	Friendly Societies' Table	(Finlaison).

Age.	T	t:	l,	O o,	R,	r,	H h,	N n,	A:	C c:	E:	G·	g:	P:	F:	Age.
0	376	..	192	232	281	333	339	252	..	387	..	502	555	..	..	0
5	390	424	360	402	432	474	463	408	..	513	..	489	542	..	..	5
10	357	404	348	403	419	452	460	398	..	488	483	456	511	..	..	10
15	320	373	319	375	381	414	423	365	..	450	450	418	472	..	413	15
20	293	343	289	344	349	381	387	334	366	415	417	384	440	318	376	20
25	280	317	261	316	320	348	356	309	341	379	381	359	408	311	342	25
30	263	290	236	289	293	323	327	283	311	343	345	332	376	295	309	30
35	241	263	215	261	260	293	294	257	277	310	309	302	343	279	276	35
40	217	237	196	232	229	264	264	230	244	276	274	270	311	260	246	40
45	192	206	178	203	202	235	234	205	211	245	239	238	278	237	216	45
50	169	178	160	176	176	206	204	180	179	211	204	203	244	212	187	50
55	145	155	142	149	151	175	175	156	151	176	170	172	208	186	159	55
60	116	133	124	124	124	142	149	132	125	143	139	144	173	160	133	60
65	93	102	105	101	108	119	123	109	99	118	111	116	140	132	109	65
70	72	78	88	81	81	88	100	86	78	92	87	92	110	105	86	70
75	56	56	72	64	70	71	79	65	62	70	66	71	85	..	65	75
80	49	38	50	52	54	52	58	48	50	55	48	49	65	..	48	80
85	36	38	..	35	43	48	..	34	40	41	34	31	48	..	34	85
90	20	25	..	15	25	35	..	24	29	33	26	20	28	..	24	90
95	12	16	..	..	..	..	..	8	14	35	11	12	16	..	8	95
	Tontine commenced 1693.		1728 to 1737	1740 to 1769	1772 to 1781		1751 to 1780	1735 to 1780	1740 to 1820	1779 to 1787	1760 to 1829	1780 to 1820		1813 to 1821	1823 to 1828	

Comparing tables made from the same sex, or from the mixture of both, that is, looking at T, R, A, E, and G together for the males (P and F are made from the labouring classes exclusively), at t, r, and g for females, and at L l, H h, N n, and C c for both together, the general increase of longevity is sufficiently apparent. The older tables, made from burial-registers, will not prove more than the general fact, uncorrected as they are both for increase of population and migration. The great excess of the Carlisle Table, it must be remembered, is partly owing to the deaths from small-pox having been allowed for, which, though necessary in a table intended for subsequent use among a vaccinated population, prevents the comparison between the Carlisle and preceding tables from being altogether fair. The tables A and F are very similar, and show that the life of the more provident class of labourers (who resort to Friendly Societies) is now as good as those of the Amicable Insurance Office in the last century. That Society is supposed not to have been, in former times, so careful in the selection of lives as the modern institutions of the same kind. This was probably the case, though another circumstance may have operated still more on the table. Up to the year 1808, or thereabouts, no lives older than 45 were taken; so that, while the registers of the Equitable Society have been constantly recruited with selected lives from 45 to 60, as well as at the lower ages, those of the Amicable Society have not had the same advantage above the age of 45. We think however that much of the difference between the two arises from the earlier period which the tables of the latter Society represent.

That the life of a Chelsea pensioner, who is presumed to be a worn-out soldier, should be better than that of the most provident class of labourers, may seem startling at first; but it must be observed that this is only after the age of 40; and the explanation of this circumstance hangs upon another which it is essential to notice.

Let us compare the *relative* lives of the young and old in the different tables; that is, for instance, dividing the life of a person aged 20 into 1000 parts, we ask how many such parts there are found in the life of 60. Ranging the results in order of magnitude, we find that, the life of 20 being 1000 in every table, the life of 60 is as follows:—

P:	503	t:	388	R,	355
L l,	429	H h,	385	F:	354
T:	396	G:	375	C c	345
N n,	395	r,	372	A:	342
g:	393	O o,	360	E:	333

To show that this distribution does not arise from the method of forming the tables, we have put the comma after all symbols of tables formed from burial-registers (except the Carlisle, which has been in every point too carefully corrected to allow it to rank in method of formation with the rest) and subject to errors of population, and the colon after those tables which have been formed in such a manner that no errors of the preceding kind can appear. It will then readily be seen, as a general result, that old life is relatively longest in those tables in which life in general is absolutely shortest, and that tables formed from female life exclusively hold a mean rank. We have observed the same thing in many other tables, and we think a general explanation can be given. It is well known that the admirers of nature (many of them, at least) formerly included savage life in their panegyrics, and contrasted the uniform good shape and activity of many wild tribes with the frequent deformity and debility of the civilised man: this opinion however has declined since it was remarked that such uniformity of strength was probably a consequence of its being impossible for a disabled or weakened individual to subsist where the highest strength and activity are required to procure common necessaries. Something of the same sort seems to take place with regard to mortality: where the predisposing causes of death are strong and inadequately met, the weaker constitutions swell the table of mortality at the younger ages, leaving a relatively stronger class to face the chances of more advanced life. Thus in the case of a disabled soldier, he who can last to 60 is half as good, in point of duration, as he was at 20; while the insurer in the Equitable is only one-third as good relatively, and absolutely not nearly so good as the former.

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[*] Mr. Lubbock's corrected table ('Libr. Usef. Kn.,' 'Probability') would have been preferable, but the mean duration is not computed.

[†] Formed some years ago, from the experience of the Society, which has existed since 1706. Their records however can only be said to begin from 1740.

It is sufficiently obvious that female life is better than male, from every comparison of the preceding tables, and almost at every age. To compare these durations, let us suppose ten individuals at every age in T and t, R and r, G and g. If we then take the united amounts of their average lives from 15 to 85, we find that, one age with another, and for equal numbers of males and females similarly distributed,

For 1000 years of male life there are in the	King William's Tontine	1104	Years of female life.
	Chester Tables .	. 1112	
	Government Tables	. 1163	

There appears then to have been a slight increase in the comparative goodness of female life: from which those who admit it must conclude that improved medical science and greater accessibility of comforts lengthen the life of females more than that of males. At any rate the other extreme is tolerably well proved by foreign tables, Belgian and Swedish (we have none in this country to settle the point), namely, that when the lives of women are employed in laborious occupations in the open air, they are materially shortened in duration. In Belgium the lives of women living in the country are, on the whole population in the country (mostly labourers, of course), shorter than those of men; while in the towns they are longer, the proportion above-mentioned being that of 1000 to 1071.

On the mortality of the infant periods of life there is but little information. All tables, except the Government Annuitants, unite in showing that the value of life improves up to a period which differs in different tables; being six years of age in the Northampton Table, and five in the Carlisle. With respect to the Government Table it must be observed, that the numbers in the first years of life are small, and also that all the lives are selected. If then it be more easy to select the best lives from among infants than from among grown people, the anomaly of these tables is explained; and the explanation is not difficult to admit, if we remember that the selection is made in most cases by the relations of the party selected, who are perfectly aware both of the state of health of the infant (generally more marked than that of a grown person) and the longevity of its ancestors. We consider the Carlisle Table to contain, at this time, the best information on the period of life preceding years of discretion, for the middle and higher classes.

We are also of opinion that the Carlisle Table is more likely to represent truly the very old periods of life, not from any greater quantity of materials, but from a better theory having been applied in their formation. It has been very common to end tables with the oldest lives observed in them: thus the Equitable Table ends at 97, because the latest of the deaths from which it was formed (5144 in number) took place at that age. This is not correct in principle, and is the same thing as if, a pair of dice having been thrown a large number of times (say 10,000), it should be inferred that no runs of doublets should ever be calculated on of longer duration than those observed during the course of the throws. In the case of the dice we can calculate beforehand what was the chance of longer runs; and in the table of mortality we have no *à priori* calculation, but only observation of instances: this throws a difficulty in the way, but that difficulty is not properly met by exclusion of all that has not happened as impossible. For the calculations connected with annuities, &c. it is of little consequence, because cases rarely occur in which the purchasing parties are above 80; at which age the chance of living twenty years is so small, that it would not much affect the pecuniary results if those who could get over the period between 80 and 100 years were afterwards supposed to live for ever. But for the determination of the physical laws of the duration of life, such termination of the tables at the oldest age of observed death is wholly inadmissible.

Mr. Babbage has published ('Comparative View of Institutions for the Assurance of Lives,' London, 1826; Table XII., Appendix, from Easton's *Human Longevity*, Salisbury, 1799) a table formed from 1751 persons who attained the age of 100, which we subjoin, with such additions as will make it correspond with those given before:—

Age.	No. living.	Decrement.	Yearly Rate on 1000.	Mean Duration. 100 Persons.	Age.	Age.	No. living.	Decrement.	Yearly Rate on 1000.	Mean Duration. 100 Persons.	Age.
100	1751	164	94	809	100	126	71	8	113	767	126
101	1587	145	91	786	101	127	63	7	111	758	127
102	1442	162	112	762	102	128	56	6	108	746	128
103	1280	154	120	751	103	129	50	6	120	730	129
104	1126	150	133	745	104	130	44	5	114	723	130
105	976	140	143	755	105	131	39	4	102	709	131
106	836	120	144	772	106	132	35	4	115	694	132
107	716	94	131	794	107	133	31	3	100	666	133
108	622	80	129	806	108	134	28	3	107	632	134
109	542	69	127	817	109	135	25	3	120	582	135
110	473	57	120	830	110	136	22	3	136	577	136
111	416	48	115	836	111	137	19	3	158	561	137
112	368	40	108	839	112	138	16	2	125	556	138
113	328	34	104	835	113	139	14	2	143	529	139
114	294	31	106	826	114	140	12	2	167	508	140
115	263	29	110	817	115	141	10	1	100	500	141
116	234	25	107	813	116	142	9	1	111	450	142
117	209	24	115	804	117	143	8	1	125	400	143
118	185	22	112	801	118	144	7	1	143	350	144
119	163	20	123	803	119	145	6	1	166	300	145
120	143	17	119	808	120	146	5	1	200	250	146
121	126	14	111	811	121	147	4	1	250	200	147
122	112	13	116	805	122	148	3	1	333	150	148
123	99	11	111	804	123	149	2	1	500	100	149
124	88	9	102	799	124	150	1	1	1000	50	150
125	79	8	101	784	125						

This table is the necessary consequence of that very large amount of dubious testimony which exists, in various places, upon instances of particular longevity. Looked at separately, there are no means of refuting any one instance; but their united effect is beyond all credibility. The ages of many of these parties must have been ascertained by their own statements of the earliest public events within their memory, and it is not unlikely that very old persons frequently confuse what they have heard talked about in their infancy with what they have seen themselves. There is also a natural tendency to exaggerate great age. Enough however remains, when every possible allowance has been made for error, to show that the remaining life of a person aged 100 years is not so very small as it is generally believed to be; and we strongly suspect that the last 25 years of the Carlisle Table are no exaggeration, but really considerably short of the actual law which prevails among the middle classes of society.

MORTAR. Common mortar is the substance placed between the stones or bricks of a building to cement them together, and thus cause them to retain their places and give strength and stability to the edifice. Mortar is essentially composed of lime and siliceous sand, the first being in the state of hydrate or slacked lime: the sand is used of different degrees of fineness. The hardness which mortar acquires is owing to the gradual conversion of the hydrate of lime into carbonate of lime, which takes place very slowly by the absorption of carbonic acid gas from the atmosphere; in this state it adheres very firmly to the particles of silica diffused through it, and both are strongly united with the material employed in the building.

In order that this change may occur with advantage, certain conditions are requisite: if the mortar dries too quickly, the carbonate formed will remain much divided, and will not acquire the necessary adhesive property; if, on the other hand, the mortar be placed under water, a portion of the lime will gradually dissolve, what remains will become carbonate with great difficulty, and the particles of sand will be isolated. If, on the contrary, the mortar be long kept moist and exposed to the air, the carbonic acid gas acts slowly but incessantly on the lime, the water of which becomes gradually saturated with it, and this being transferred to the lime, it is converted into an almost crystalline carbonate, in successive portions or layers, and these adhere with great force to the particles of sand. It follows, from what has been stated, that buildings erected when the weather is too hot are less stable than those which are constructed later in the year; but it is to be observed, that during frost, owing to the freezing of the water, the absorption of carbonic acid is not only stopped, but the solidity of the mortar is destroyed by the freezing or crystallization of the water.

The proportions of lime and sand employed are subject to considerable variation; those most commonly used are said to be a bushel of lime to a bushel and a half of sand; but where lime is dear, the quantity used is frequently smaller. The method of making the mortar is perfectly simple; the lime is either first slacked by the addition of water, and then the sand and more water are mixed with it, or the lime and sand are first mixed, and water is added to them in the requisite quantity.

Much has been said as to the extreme hardness of antient mortar, and it is supposed that some secret method was adopted in its preparation; but the fact may probably be accounted for by merely referring to the circumstance, that the long exposure which it has undergone in considerable masses has given it the opportunity of slowly acquiring the carbonic acid from the air, upon which its hardness and durability depend. It is to be observed that lime which is not sufficiently burnt, or lime which has been slacked by the moisture which it has acquired by exposure to the atmosphere, cannot form good mortar; the first has not been deprived of the carbonic acid which it is requisite to regain slowly from the air, and the latter has re-acquired it under circumstances which diminish instead of increase the solidity of the mortar.

When limestones contain considerable portions of silica and alumina, they form what has been termed of late years *hydraulic lime*, and the mortars made with them are called hydraulic mortars. Of these, Parker's cement is a well known kind: it will *set*, as it is termed, or become solid, in a quarter of an hour, either in the air or under water. In France artificial hydraulic lime has been prepared, and appears to answer the purpose extremely well. The limestone from which Parker's cement is made contains about 62 per cent. of carbonate of lime, 6 of carbonate of iron, 15 of silica, 5 of alumina, 6 of water, and some oxide of iron.

MORTAR, a vessel in which substances are either reduced to fragments, pulverised, or dissolved by beating or trituration with a pestle. Mortars are made of different materials and various sizes and forms, according to the use to which they are to be applied. For the purpose of breaking large masses into smaller, or for pulverising ores, metals, and coarse or heavy matters, a large cast-iron mortar with a pestle of the same material is generally preferred: it is placed upon a block, the pestle being attached to a spring, which greatly relieves the operator. Mortars made of Wedgewood or stone ware are extensively employed for pulverising, mixing, and dissolving, and they are generally used by apothecaries and chemists in preparing medicines. In some cases glass mortars are used, but this is only for solution or mixing, and not for pulverising.

For nice chemical uses, such as the reduction of substances to fine powder, an agate, flint, or porphyry mortar is used, care being taken that the mortar is of a sufficiently hard material to prevent abrasion by the substance pulverised in it.

MORTA'RA, The Province of, in the Sardinian territories, north of the Po, forms part of the great plain of Lombardy, and is bounded on the north by Novara, on the west by Vercelli, on the south by the Po, which divides it from Alessandria, and on the east by the Ticino, which separates it from the Milanese territory. The Agogna and the Terdoppio, both affluents of the Po, cross the province from north to south. The length of the province is 25 miles from east to west, and its breadth is about 22 miles from north to south. The products of the country are rice, corn, Indian corn, wine, and silk; there are also pastures for cattle. This district was formerly, and is still now occasionally, called Lomellina, from the small town of Lomello. It constituted a fief of the empire, with the title of marquisate. The towns are,—1, Mortára, with 4000 inhabitants; 2, Vigévano, the largest town in the province, near the right bank of the Ticino, which is a bishop's see, has several churches and convents, manufactories of gauze, hats, and soap, a poorhouse and workhouse opened in 1832, and 12,000 inhabitants. (Neigebaur, *Calendario Sardo*.)

MORTARS are pieces of ordnance which, compared with guns, are very short, and which are employed to throw shells or carcasses at considerable elevations (generally at 45°, but sometimes as much as 70°), in order that the missile may range to a great distance, and, by falling nearly vertically upon the object (a barrack, magazine, or casemate), may crush it by the momentum acquired in descending. Mortars are either of iron or brass; they rest upon solid beds, and the trunnions or cylinders upon which they turn, in giving the required elevation, are placed at the lower extremity of the piece. A mortar platform, in a battery, should be very strong, in order that it may bear the great recoil or shock of the piece when fired; and it should be carefully laid in a horizontal position.

The calibres of mortars in the British service are 4⅖, 5½, 8, 10, and 13 inches. All these different kinds of mortars are used on land, and the two last are also employed in the navy; but in this latter service the pieces are about 16 inches longer than the land-service pieces of the same calibre. The two first are sometimes called royal mortars.

By varying the charge of powder in the same mortar, it has been found that there is a particular elevation which, with each charge, gives a longer range than is obtained from an equal charge at any other elevation. It has also been found that the elevations which give the longest ranges differ much in two mortars of different calibres, but of like proportions, even when charged with quantities of powder bearing the same proportion to the weights of the shells.

It has been supposed that mortars were employed in the year 1495, at the siege of the castle of Naples, but on no other ground than a statement that artillery of considerable magnitude was conveyed into Italy with the army of Charles VIII. In 1588 however the use of mortars must have been well known; since, in the Appendix to the 'Colloquies of Tartaglia,' which was published in that year, the method of filling and projecting carcasses is fully described; and it appears that, in the same year, shells were thrown from ordnance at the siege of Wachtendonk. [BOMB.] Red-hot shot were thrown from mortars at the siege of Bremen, by the Swedes, in 1665.

The first artillerists were somewhat capricious in the formation of their great ordnance; and among the various kinds which they devised may be mentioned what were called Partridge mortars. These had one great central bore for the reception of a shell; and about it, on the face of the muzzle, were sunk thirteen chambers, each of which contained a grenade. The shell and grenades were discharged at the same time, and in the air they must have appeared like a flight of birds; from which circumstance, no doubt, the name of the mortar was taken.

The Dutch engineer Coehorn invented a small mortar for throwing grenades into the covered-ways of places. They were capable of being carried about and served by one man; consequently they could be readily brought up to a convenient spot, and rapidly fired when it was intended to drive the defenders from behind the parapets. In the French service *Pierriers* (small mortars loaded with stones) are still employed for the same purpose.

In the year 1771 an experiment was tried at Gibraltar on the discharge of stones from an excavation in the rock. The figure of the excavation is a parabolic conoid, whose axis is 4 feet long, and whose diameter at the muzzle is 3 feet. It was charged with 27 lbs. of powder and 1470 stones; and, on the explosion taking place, nearly one-fourth of the stones were projected to the distance of 100 yards. There are several rock-mortars, as they are called, at Malta, and such may on some occasions be useful for the defence of a pass.

MORTGAGE. A general notion of a mortgage may be collected from the following passage in Littleton (§ 332), who treats of mortgages, as then in use, under the general head of estates upon condition

'If a feoffment be made upon such condition, that if the feoffor pay to the feoffee, at a certain day, 40*l.* of money, that then the feoffor may re-enter, &c.,—in this case the feoffee is called tenant in morgage, which is as much to say, in French, as *mortgage;* and in Latin, *mortuum vadium.* And it seemeth that the cause why it is called mortgage is, for that it is doubtful whether the feoffor will pay, at the day limited, such sum or not: and if he doth not pay, then the land, which is put in pledge upon condition for the payment of the money, is taken from him for ever, and so dead to him, upon condition, &c. And if he doth pay the money, then the pledge is dead as to the tenant,' &c.

The money thus agreed to be paid by the feoffor must be supposed to be money borrowed from the feoffee, or the amount of a debt due from the feoffor to the feoffee, though Littleton does not expressly say so. According to the terms of this contract, if the feoffor or the feoffor's heir did not pay the money at the time appointed, the land became the absolute property of the feoffee.

The mortuum vadium of Glanville (book x.) is evidently a different thing from the mortuum vadium of Littleton, and Glanville's explanation of the term seems more applicable to his mortuum vadium, than Littleton's is to the mortgage which he describes. 'When an immovable thing, says Glanville, 'is put into pledge, and seisin of it has been delivered to the creditor for a definite term, it has either been agreed between the creditor and debtor that the proceeds and rents shall in the meantime reduce the debt, or that they shall in no measure be so applied. The former agreement is just and binding; the other unjust and dishonest, and is that called a mortgage, but this is not prohibited by the king's court, although it considers such a pledge as a species of usury.' (Beames' *Transl.*)

Littleton describes the old and strict law of mortgage; but the courts of equity gradually introduced such modifications as to convert a mortgage from its antient simplicity into a very artificial and complicated arrangement. A mortgage is a contract, and therefore requires two persons at least, one of whom borrows and the other lends money. The borrower is the owner of land which he conveys or transfers as a security to the lender of the money: the borrower is called the mortgager, and the lender is called the mortgagee. The *whole* transaction is properly termed a mortgage; but the name is sometimes applied simply to the debt. The nature of this contract, as it is now understood, will best appear from a brief enumeration of the essential terms of the instrument called a mortgage deed. For the sake of simplicity, the case of a mortgage in fee may be taken as the example; and the remarks which follow must be considered as applicable to that description of mortgage.

The instrument of mortgage is a deed indented. It commences by reciting that the mortgager is the owner in fee simple of the lands which it is intended by the deed to convey to the mortgagee, and that the mortgagee has agreed to lend him a certain sum of money on the security of the lands. It is then declared that, in pursuance of the said agreement, the mortgagee has paid to the mortgager the sum of money which he (the mortgagee) has agreed to lend. The mortgager then conveys to the mortgagee and his heirs the lands in question, with a condition that if the mortgager, his heirs, executors, administrators, or assigns, shall pay to the mortgagee, his executors, &c., the sum of money borrowed, with interest for the same at the rate in the instrument mentioned, upon a future day, which is named in the deed (generally a year from the date of the mortgage deed), without any deduction or abatement whatsoever, the deed shall then cease and be void to all intents and purposes. In addition to this conveyance of the lands, the mortgager promises and undertakes to pay the principal money borrowed, and interest on the same, at the rate and at the time before mentioned in the instrument; and he also covenants (as the legal phrase is) that he has full right to convey the lands in the manner expressed in the previous part of the instrument. It is further agreed that, after the mortgager shall have failed to pay the principal sum of money, and interest, or any part thereof, as before agreed, the mortgagee, his heirs, or assigns, may take possession of the lands so conveyed as aforesaid, and use and enjoy them, and take the rents and profits, without any hindrance or interruption from the mortgager, his heirs, executors, administrators, or assigns, or any other person or persons. It is also provided that until the mortgager shall have made such default in payment as aforesaid, he, his heirs, or assigns, shall hold and enjoy and receive the rents and profits of the lands without any interruption or hindrance from the mortgagee, his heirs, or assigns. In many mortgage deeds it is also provided, that if the principal money and interest, or any part thereof, are not paid at the time agreed on, the mortgagee may sell the mortgaged lands (giving proper notice to the mortgager of such his intention, if notice is provided for by the instrument): it is also provided that after paying out of the proceeds of the sale, and out of any rents or profits which he may have received from the lands, the costs and expenses of the sale, and all other expenses incurred in the execution of the trust for sale, and retaining what is due to him for principal and interest, the mortgagee must pay the surplus, if any, to the mortgager, his heirs, executors, administrators, or assigns, or as he or they shall direct. In deeds which contain a power of sale, it is usual to insert a proviso, that such power of sale is not to destroy or prejudice the mortgagee's right of foreclosure.

These are the essential parts of a mortgage-deed, which is varied according to the estate or interest in the lands which the mortgager conveys to the mortgagee, and according to the special agreement of the parties. By the execution of the deed, the estate of the mortgager in the lands mortgaged is conditionally transferred to the mortgagee, but the mortgager's estate is not forfeited till he makes default in payment of the money borrowed and interest at the time named in the deed. The money borrowed is however seldom paid at the time agreed on, the consequence of which is that the mortgager's estate is forfeited by his not fulfilling the condition, and the mortgagee becomes the absolute legal owner of the land, or of such estate in it as was conveyed to him. He can then bring an action of ejectment against the mortgager, if the mortgager is in possession of the land, without giving him notice; and he can do this even before default in payment, unless it is agreed by the mortgage-deed that the mortgager shall remain in possession till he makes default, and a clause to this effect is commonly inserted in the deed. After the mortgage is made, the mortgager cannot make a lease of the lands without the mortgagee's consent, for he has no interest in the land out of which he can create a legal estate; and if any such lessee gets possession of the land, the mortgagee may eject him. But the lessee who claims by a title prior to the mortgage is not affected by the mortgage transaction, though, after default is made and he has notice from the mortgagee, he is bound to pay to him the future rents and those which are then due.

There has been considerable discussion as to the nature of the relation of the mortgager in possession and the mortgagee; and this relation has been supposed to be that of tenant and landlord, the nature of the tenancy varying according as we contemplate it before or after default. But this seems an erroneous view of the legal effect of the contract, and the supposition of a tenancy is perfectly useless for the explanation of the rights either of the mortgager or mortgagee, which are determined by the instrument of mortgage, and by the well-established jurisdiction of courts of equity in matters of mortgage.

From the time of default being made, the several interests of the mortgager and the mortgagee in the land must be considered as chiefly belonging to the jurisdiction of equity. When the mortgagee, by default of the mortgager, has become the absolute legal owner of the lands, the mortgager possesses what is called the equity of redemption. This equity of redemption is considered by courts of equity as an estate in the land: it may be devised by the mortgager, and, in case of his intestacy, it will descend to his heir; it may be sold, or it may be mortgaged; it is subject both to dower (in equity, by 3 and 4 W. IV., c. 105) and curtesy; and it may be settled like a legal estate.

By a recent statute (1 Vic., c. 28), made for the purpose of explaining the statute of limitations (3 & 4 W. IV., c. 27), it is enacted, That any person entitled to or claiming under any mortgage of land (as defined by the last-mentioned act) may make an entry or bring an action at law or suit in equity, to recover such land, at any time within twenty years next after the last payment of any part of the principal money or interest secured by such mortgage, although more than twenty years may have elapsed since the time at which the right to make such entry or bring such action or suit in equity shall have first accrued. This act was passed to protect the mortgagee who allows the mortgager to continue in possession of the land or in the receipt of the rents and profits; and it secures to him his rights for twenty years after the last payment of principal or interest by the mortgager. By the 3 & 4 W. IV., c. 27, when a mortgagee has got possession of the land or receipt of the profits, the mortgager, or the person claiming through him, can only bring a suit to redeem the lands within twenty years next after the commencement of such possession or receipt, or within twenty years from the time when the mortgagee or the person claiming through him last acknowledged in writing to the mortgager, or some person claiming his estate, or to the agent of such mortgager or person, his title of mortgager or right to redemption. The mortgager, or the person claiming under him, may therefore, at any time within the limits above-named, tender to the mortgagee his principal money and interest, and claim a reconveyance of the lands; and if the mortgagee will not accept the tender and reconvey, the mortgager may compel him by filing a bill in equity for the redemption of his lands.

A mortgagee can transfer his mortgage to another. The transfer or assignment, as it is generally called, consists of two parts expressed in one deed, the transfer of the debt, and the conveyance of the land, which is the security for the debt. If the mortgager is not a party to the assignment, the assignee takes the mortgage exactly on the terms on which the assignor held it at the time of the assignment. If therefore the mortgager should happen to have paid the whole or any part of the debt, the assignee, in coming to a settlement with him, must submit to allow such payment in diminution of the original debt which the assignor affected to assign to him.

Though the mortgagee, after the mortgager's default in payment of the principal money and interest, has the absolute legal estate, he is still considered by courts of equity only to hold it as a security for his debt. The legal estate in the land will descend to the mortgagee's heir, or will pass by his will, if duly executed; but the heir or devisee takes only the legal estate in the land, and the money or debt (as a general rule) belongs to the mortgagee's administrator or executor.

If the principal money and interest are not paid at the time agreed on, the mortgagee may file a bill of foreclosure against the mortgager. By such bill the mortgagee calls on the mortgager to redeem his estate forthwith, by payment of the principal money, interest, and costs; and if the mortgager does not do this within the time named by the decree of the court (which is generally within six months after the master in chancery has made his report of what is due for principal, interest, and costs), he is for ever foreclosed and barred of his equity of redemption, and the mortgagee becomes the owner of the land in equity, as he was before at law. If the money is paid at the time named, the mortgagee must reconvey the land, and deliver up to the mortgager all the deeds and writings in his possession relating to the land.

If both the mortgager and mortgagee are living at the time when the lands are redeemed, and nothing has been done by either party to assign or transfer his interest to any other person, the transaction is a very simple one: the mortgager pays his debt and interest, and the mortgagee reconveys the lands. The settlement of accounts between the mortgager and mortgagee may be rendered more difficult by the circumstance of the mortgagee having received the rents, for which the decree for redemption provides that he must account. It may however happen that the mortgager or mortgagee is dead, or that they have severally disposed of their interests in the lands, or all these events may have happened, which renders the settlement much more complicated.

To take the case of mortgager and mortgagee being dead. As every mortgage transaction implies a debt from the mortgager to the mortgagee, which he is bound to pay, even if there are no covenants for payment in the mortgage-deed, it follows that, according to the general rule of law, his personal estate is in the first instance liable to pay the mortgage debt, unless he has by his will made a different provision for payment of it. Thus the heir or devisee of the equity of redemption may be entitled to call on the administrator or executor to pay the mortgage debt. If however the lands in question were not mortgaged by the intestate or devisor, but the equity of redemption descended or was devised to him from or by the mortgager, or if he purchased the equity of redemption, his personal estate is not liable to pay the mortgage debt; but the person who derives his title to the land from such intestate, devisor, or purchaser, must take it subject to the burden of the mortgage debt.

When a mortgage deed contains a power of sale, which is exercised in the lifetime of the mortgager, the surplus money is personal estate; but if the sale is effected after the mortgager's death, the money belongs to his heir or the devisee of the lands.

The person entitled to receive the debt is the administrator or executor of the mortgagee; for, as already observed, the land is only considered as a security for the debt, which the mortgager has bound himself, his heirs, executors, and administrators, to pay to the mortgagee, his executors, administrators, and assigns. Thus whether the mortgagee dies without having or after having assigned his mortgage, the money is a debt due to the personal representative of the mortgagee, or to his assignee, or to the personal representative of the assignee, if the assignee is dead. When the debt is received by the person entitled to receive it, the person who has the legal ownership of the land, whether he be heir or devisee, is bound to convey it to the person who, on the payment of the debt, becomes entitled to the legal estate. In such case, on payment of the debt to the person entitled to receive it, the heir or devisee is by a fiction converted into a trustee for the person entitled to the land. The mortgagee may however, by express declaration, convert the mortgage debt into land (according to the technical expression), and make it pass as land by his will; in which case the devisee will have the same title to the money as he would have had to the land if it had been absolutely the property of the mortgagee.

When the mortgager has mortgaged his equity of redemption (which he may do as often as he pleases), every new mortgagee has his claim on the land as a security for his debt, according to the order in which his mortgage stands. This is the general rule; but it is subject to various exceptions, which depend on particular circumstances. Thus a mortgagee of the equity of redemption will be postponed, as to his security, to a subsequent mortgagee who has advanced his money without notice of the prior mortgage, if such subsequent mortgagee should be able to obtain the legal estate.

If a second mortgagee obtains the title-deeds of the estate, this will not give him a preference over a prior legal mortgagee, unless the prior mortgagee has parted with or failed to get possession of the title-deeds for fraudulent purposes, or through gross negligence. But though the second mortgagee has no priority, when there is neither fraud nor negligence, he will not be compelled to give up the title-deeds to the first mortgagee, unless the first mortgagee pays him his debt and interest.

A legal mortgage is effected by an instrument which transfers the legal estate. When a mortgager makes a second mortgage, and uses the form of a legal conveyance, this also is called a legal mortgage, though there is no transfer of any legal estate, for the legal estate is already conveyed to another person. This kind of mortgage may be called a mortgage of an equity of redemption, by way of distinguishing it from the equitable mortgage next mentioned. An agreement in writing to transfer an estate as a security for the repayment of a sum of money, is called an equitable mortgage, because it gives the intended mortgagee a right to have a legal mortgage, and in a court of equity gives him in fact all the rights of a legal mortgagee. A deposit of the title-deeds of an estate, or of the copy of court roll, as a security for a debt contracted at the time of the deposit, or previously to the deposit, constitutes an equitable mortgage. An equitable mortgagee by deposit of title-deeds, has a preference over a subsequent purchaser or mortgagee who obtains the legal estate with notice of the equitable mortgage.

If the mortgager is not seised in fee, but has only a limited interest in land, as a lease for years, the mortgager, by taking an assignment of the lease, becomes liable for the rent, and to the covenants contained in the lease, though he has never taken possession of the premises included in it. The same rule was for a time held to apply to an equitable mortgagee by deposit of title-deeds [LEASE]; but in a very recent case it has been decided that the equitable mortgagee is not liable to such covenants (*Moore* v. *Choat*, 8 Sim., 508; and so the matter stands at present.

The preceding remarks apply to mortgages of land only, in which there are many peculiarities which arise from the condition of legal ownership of land in this country. But other kinds of property may be mortgaged, such as chattels personal, a life-interest in a sum of money, or a policy of insurance, or a ship, or shares in a ship. The subject of pawning or pledging of goods is treated under Pledge, and also the rules of the Roman law as to Hypotheca and Pignus. The equitable lien on land, which is classed among mortgages by some writers, is briefly noticed under Lien; and mortgages of ships under Ship.

No attempt has here been made to lay down all or the greater part of the rules applicable to mortgages. The explanation of these rules would fill a large volume. The general principles of all mortgages are however here laid down, and the reader must consult professional books for particular cases.

MORTIFICATION (in Medicine) is the death of any tissue. It may occur from a variety of causes, as intense inflammation [Inflammation], or from anything which is followed by a cessation of the circulation of blood through a part, as diseases of the arteries and veins, the pressure of tumours and foreign bodies, excessive debility, &c., or from any sudden and violent chemical or mechanical agent, as strong acids or other corrosive substances, excessive heat or cold, violent blows, &c. The process of reparation consists in the separation of the living tissues from the dead, the removal of the latter by absorption or by being thrown off externally, and the granulation and cicatrization of the exposed surface of the former.

MORTIFICATION. [Mortmain.]

MORTIMER, JOHN HAMILTON, an artist of great talent and of high repute in his day, was born in 1741, and was the son of a miller who afterwards became a collector of the customs at Eastbourne. John was the youngest of four children, and having discovered a taste for drawing, which he is supposed to have acquired from an uncle who was an itinerant portrait-painter, he was, at about the age of eighteen or nineteen, placed under Hudson, who had been the instructor of Reynolds. With him however he did not continue long, but, after having studied awhile in the gallery of the Duke of Richmond, began to make himself known by his productions. One of his earliest works, founded on an incident in the life of Edward the Confessor, painted in competition with Romney, obtained from the Society for the Encouragement of Arts a premium of fifty guineas, and that of St. Paul preaching to the Britons one hundred guineas. He was further distinguished by the notice and friendship of Reynolds, which friendship has been attributed not to the sympathy but to the opposition of their tastes in art. Certainly there was little room for jealousy or rivalry between them: Mortimer was no colourist, and but an indifferent portrait painter, although he produced many admirable heads and likenesses in black and white chalk. His talent lay in design, and in wild and fantastic quite as much as in historical subjects. His groups of banditti are masterly; and his 'King John signing Magna Charta,' 'The Battle of Agincourt,' &c., show him to have possessed great and original powers in the higher walk of art; and in his knowledge of the human figure he has rarely been surpassed. The 'Brazen Serpent in the Wilderness,' in the great window of Salisbury cathedral, and the cartoons for that in Brazenose College, Oxford, were designed by him.

In person Mortimer was handsome, his figure of athletic mould, and his constitution was naturally very strong, but he greatly impaired it by the excesses of what is called free living. About the year 1775 his health began to decline, his former exuberant gaiety abandoned him, and he became altogether an altered man; but though he in some degree recovered, and was able to employ his pencil both industriously and profitably, realising by it nine hundred pounds in the course of a single year, his life was soon cut short, for he died on the 4th of February, 1779, in the thirty-eighth year of his age. He was buried in the church at High Wycombe, near the altar; where is his painting of 'St. Paul preaching to the Britons.'

MORTMAIN. By the 9 H. III., c. 36 (Magna Charta), it was declared that it should not be lawful for the future for any person to give his land to a religious house, so as to take it back again and hold it of the house; and any such gift to a religious house was declared to be void, and the land was forfeited to the lord of the fee. The reason of this provision is obvious, if we consider the nature of the feudal tenure; and indeed it is distinctly expressed in the preamble of the statute of the 7 Edward I., sometimes entitled 'De Religiosis,' as follows: 'Whereas of late it was provided that religious men should not enter into the fees of any without the licence and consent of the chief lords (capitalium dominorum) of whom such fees are immediately held; and whereas religious men have entered as well into fees of their own as those of others, by appropriating them to their own use and buying them, and sometimes receiving them of the gifts of others, by which means the services due from such fees, and which were originally provided for the defence of the realm, are unduly withdrawn, and the chief lords lose their escheats of the same,' &c. The statute then forbids any religious person or any other to buy or sell lands or tenements, or under colour of a gift or term of years, or any other title whatever, presume to receive from any one, or by any other means, art, or contrivance, to appropriate to himself lands or tenements, so that such lands and tenements come into mortmain in any way (ad manum mortuam deveniant), under pain and forfeiture of the same. The statute then provides, that if it is violated, the lord of whom the lands are holden may enter within a year; or if he neglect to enter, the next lord may enter within half a year; and if all the chief lords of such fees, being of full age, within the four seas, and out of prison, neglect to enter, the king may enter.

The general notion of mortmain may be collected from the words of this statute, the term being used to express lands belonging to any corporate body, ecclesiastical or temporal, sole or aggregate. Various explanations have been offered as to the reason why lands of this description were said to be in mortmain, or in mortua manu, that is, in a dead hand. Under the feudal system lands held by any corporate body or person might not inappropriately be said to be in a dead hand as to the lord of the fee, for as a corporation has perpetual continuance and succession, the lord lost the profits in his lands which, under the strict system of tenures, he derived either from the services of the tenant, while alive, or from the death of the tenant and other circumstances incident to such event. Accordingly the best explanation of the meaning of this term seems to be that offered by Coke, that 'the lands were said to come to dead hands as to the lords, for that by alienation in mortmain they lost wholly their escheats; and in effect their knights' services for the defence of the realm, wards, marriages, reliefs, and the like, and therefore was called a dead hand, for that a dead hand yieldeth no service.' Similarly, the old mortuum vadium seems to have been so called, because the land in pledge was for the time dead to the pledger. [Mortgage.]

Before the 9th Hen. III., c. 36, was passed, a man might give or sell his lands to religious as well as any other persons, unless it was forbidden in the gift of the lands to himself; and accordingly the great lords, on making a grant of land, used to insert a clause preventing the sale or gift to religious and also to Jews: Licitum sit donatorio rem datam dare vel vendere cui voluerit, exceptis viris religiosis et Judeis. (Bracton, fol. 13.)[*]

This statute of Edward I. prevented gifts and alienations between corporate bodies or persons and others, but it was eluded by a new device, apparently invented by the clergy, and probably most used by the religious houses. These bodies, pretending a title to the land which they wished to acquire, brought an action for it by a Præcipe quod reddat against the tenant, who collusively made default, upon which the religious house had judgment, and entered on the land.

The statute of the 13 Edward I, (Westminster, 2), c. 32, provided against these recoveries of lands obtained by collusion; for it was enacted, that after the default made, it should be inquired whether the demandant had any right in his demand or not; and if the demandant were found to have no right, the land was declared to be forfeited to the lords mediate and immediate, similarly as was provided by the previous statute of Edward I. Another provision of this statute (c. 33) furnishes curious evidence as to the devices practised for the purpose of eluding the statutes of mortmain. The words of the enactment will best explain the allusion:—'Forasmuch as many tenants set up crosses or permit them to be set up on their tenements, to the prejudice of their lords, in order that the tenants may defend themselves by the privileges of Templars and Hospitallers against the chief lords of the fees, it is enacted, that such tenements be forfeited to the chief lords, or to the king, in the same way in which it is enacted elsewhere with respect to tenements alienated in mortmain' (de tenementis alienatis ad mortuam manum).

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[*] Viner (art. 'Mortmain'), quoting Coke, who writes this passage 'Licitum sit *donatori*,' says, 'Quære if it should not be *donato*, donee.' Such a blunder might have been avoided by looking at the original, or might have been corrected even without doing so.

Various other statutes were passed in the reigns of Edward I. and Edward III. relating to mortmain; but the next important statute is that of the 15 Richard II., c. 5. As corporations could not now acquire lands by purchase, gift, lease, or recovery, they had contrived another new device, said to be mainly the invention of or mainly practised by ecclesiastical bodies or persons. The device consisted in this: the lands in question were conveyed to some person and his heirs to the use of the ecclesiastical body or person and their or his successors. In this way the legal estate was not in the possession of those who could not legally hold it, but in a person who had such legal capacity; and the use or profit of the land, the beneficial interest in it, was secured to the ecclesiastical body or person, contrary to the spirit of the previous statutes, though not contrary to their expressed provisions. The statute of Richard, after declaring that this use was also mortmain, further declared all such conveyances to be void, and that the lords might enter on lands so conveyed, in the manner provided for by the statute De Religiosis. This distinction of the ownership of land into the legal and beneficial was undoubtedly derived by the clergy from the like distinction in the Roman law between Quiritarian and Bonitarian ownership, which is briefly and distinctly expressed by Gaius (ii. 40).

Though the statute De Religiosis was in its terms comprehensive enough to include all alienations to corporate bodies or persons, it is clear that this statute was mainly directed against the clergy, both regular and secular. The ecclesiastical corporations were more numerous than any other, and had been more active in getting lands into their hands. This statute of Richard II. however expressly extends the statute De Religiosis to lands purchased to the use of gilds or fraternities; from which it has been inferred that the doctrine of mortmain had not, before the date of this statute, applied to gilds or fraternities. The statute De Religiosis is by this statute of Richard II. expressly declared to apply also to what we now call municipal corporations, and the statute places such bodies in all respects on the same footing, as to the purchase of lands, with 'people of religion.' If such bodies as these had been considered within the statute De Religiosis, it seems clear from the statute of Richard II. that their acquisitions of land had only recently become of such magnitude as to make it seem expedient to make a special declaration by statute as to them.

A statute of Henry VIII. (23 Henry VIII., c. 10), commonly called an act against superstitious uses, is perhaps hardly a statute against mortmain in the strict sense of the term. The statute enacted that feoffments, fines, recoveries, and other estates, made of lands and hereditaments to the use of parish churches, chapels, gilds, fraternities, commonalties, &c., erected and made of devotion or by common consent of the people without any corporation, or to uses for perpetual obits, or a continual service of a priest, were declared to be void as to such gifts as were made after the first of March in the year in which the statute was passed, for any term exceeding twenty years from the creation of such uses. From the words 'by common consent of the people, without any corporation,' it can hardly be inferred that a number of individuals could take in perpetual succession without being incorporated, as some writers suppose; for 'to take by perpetual succession without being incorporated' involves a contradiction. Nor can the statute be construed as admitting by implication such a power of perpetual succession in unincorporated individuals. The statute destroys all such estates and interests in land as in any way or by any persons were held to the use of the establishments or collections of individuals mentioned and described in the statute.

The subsequent statutes passed in the reign of Henry VIII. (27 H. VIII., c. 28; 31 H. VIII., c. 13; 37 H. VIII., c. 4), together with the statute passed in the first year of Edward VI. (1 Edw. VI., c. 14), put an end to religious houses and many other establishments which had been the special objects of the statutes of mortmain and superstitious uses. The consideration of what are now legally called superstitious uses properly comes under the head of USES, SUPERSTITIOUS AND CHARITABLE.

The king could always grant a licence to alien in mortmain, or, more correctly speaking, he could remit the forfeiture consequent upon alienation, so far at least as concerned himself; but such remission could strictly only affect his own rights, and not those of the mesne lords, unless they also consented. It was the practice, before the king granted his licence, to sue out a writ of *ad quod damnum*, in order that inquiry might be made and the king informed what damage himself or others might sustain from the licence. This practice however fell into disuse long before the statute of the 7 & 8 Will. III., c. 37, which authorises the king to grant to any person or persons, corporate or not, licence to alien in mortmain, and to purchase and hold in mortmain any lands or hereditaments, and that such lands shall not be subject to forfeiture. When a licence to hold lands in mortmain is granted, it generally specifies the amount in value of the lands to be held by the corporation to which it is granted; and if the corporation should be ever found to acquire lands beyond this value, such lands are forfeited to the lord.

Until the statute of 9 Geo. II., c. 36, presently mentioned, though lands could not be aliened in mortmain, yet certain gifts to corporate bodies were held good. Thus, if a feoffment was made to a dean and chapter to perform a charitable use (within the 43 Eliz., c. 4), it was good, though they could not be seised to another's use; and a devise to a college to a charitable use within this statute was also good. (Hob., 136; 1 Lev., 284.)

The statute of the 9 Geo. II., c. 36, is now commonly, though not correctly, called the Statute of Mortmain. It applies only to England and Wales. It is entitled 'An Act to restrain the Disposition of Lands, whereby the same become inalienable.' The provisions and object of this enactment cannot be otherwise expressed than by stating the first section at full length:—'Whereas gifts or alienations of lands, tenements, or hereditaments, in mortmain, are prohibited or restrained by Magna Charta and divers other wholesome laws, as prejudicial to and against the common utility; nevertheless this public mischief has of late greatly increased by many large and improvident alienations or dispositions made by languishing or dying persons, or by other persons, to uses called charitable uses, to take place after their death, to the disherison of their lawful heirs: for remedy whereof be it enacted, that from and after the 24th day of June, 1736, no manors, lands, tenements, rents, advowsons, or other hereditaments, corporeal or incorporeal whatsoever, nor any sum or sums of money, goods, chattels, stocks in the public funds, securities for money, or any other personal estate whatsoever, to be laid out or disposed of in the purchase of any lands, tenements, or hereditaments, shall be given, granted, aliened, limited, released, transferred, assigned, or appointed, or any ways conveyed or settled to or upon any person or persons, bodies politic or corporate, or otherwise for any estate or interest whatsoever, or any ways charged or encumbered by any person or persons whatsoever, in trust or for the benefit of any charitable uses whatsoever, unless such gift, conveyance, appointment, or settlement of any such lands, tenements, or hereditaments, sum or sums of money, or personal estate (other than stocks in the public funds), be made by deed indented, sealed, and delivered, in the presence of two or more credible witnesses, twelve calendar months at least before the death of such donor or grantor (including the days of execution and death), and be enrolled in His Majesty's High Court of Chancery within six calendar months after the execution thereof; and unless such stocks be transferred in the public books usually kept for the transfer of stocks, six calendar months at least before the death of such donor or grantor (including the days of the transfer and death); and unless the same be made to take effect in possession for the charitable use intended immediately from the making thereof, and be without any power of revocation, reservation, trust, condition, limitation, clause, or agreement whatsoever, for the benefit of the donor or grantor, or of any person or persons claiming under him.' The act provides that what relates to the time before the grantor's death for sealing the deed and making the transfer shall not extend to any purchase to be made really and bonâ fide for a full and valuable consideration, actually paid at or before the making of such conveyance or transfer without fraud or collusion. The two universities of Oxford and Cambridge, and the colleges within them, were excepted from the operation of the act; and the colleges of Eton, Winchester, and Westminster, but in favour of the scholars only, were also excepted. This act limited the number of advowsons which any college or house of learning (before referred to in the act) could hold; but this restriction was removed by the 45 Geo. III., c. 101. By the 5 Geo. IV., c. 39, the British Museum is excepted from the statutes of mortmain; and various other public bodies have been in like manner excepted by act of parliament. The judicial interpretation of this act, called the Mortmain Act, has prevented a large amount of property from being given to charitable uses. A bequest of money for charitable purposes, to arise from the sale of land, is void; or of money due on mortgages; or of money to pay off the mortgage on a chapel; or of money to build a chapel, unless some land already in mortmain is distinctly pointed out by the terms of the bequest; or of mortgages both in fee and for years; or of money to be laid out on mortgage security. This act can only be called a Mortmain Act with any propriety so far as it relates to corporate bodies, and even with regard to them with no strict propriety, inasmuch as the Mortmain Acts were intended to prevent corporate bodies holding lands to their own use, or to prevent other persons holding them to the use of corporate bodies. The act is in fact intended to limit the power of giving property for charitable purposes to any person or persons, and is very improperly called a Mortmain Act, if we consider that many gifts of land for charitable purposes were not considered, before the passing of this act, as within the old statutes of mortmain.

The history of mortmain is intimately connected with the ecclesiastical and civil history of this country. The jealousy which all mankind feel against rich and powerful bodies of men, who are combined in a perpetual brotherhood and fraternity, and the constantly increasing wealth and power of the ecclesiastical bodies in this country, doubtless contributed strongly to the passing of the enactments called the statutes of mortmain; and this, independently of the solid reasons against such bodies having large possessions, so long as the strict system of tenures continued. In modern times, when the lord can lose nothing by land being conveyed to a corporation or to a charitable use, except the remote contingency of escheat, a new notion lies at the foundation of the restraints upon such transfers or gifts of land, which, as Lord Hardwicke expressed it, was this:—

'The mischief which the legislature had in view in the Mortmain Act (as appears from the recital, and which is agreeable to the title) was to restrain the disposition of lands whereby they become inalienable.' In another place he observes that 'the particular views of the legislature were two: first, to prevent locking up land and real property from being aliened, which is made the title of the act; the second, to prevent persons, in their last moments, from being imposed on to give away their real estates from their families.'

It will be perceived that the provisions of the act very imperfectly correspond with this explanation of its object. Thus money may be given by will (if unaccompanied with a direction to lay it out in land) to an eleemosynary corporation which is empowered to hold land in mortmain, and it may be laid out in land, or, if necessary, a licence may be obtained from the crown for that purpose. The judicial exposition, that money given by will, to arise from the sale of lands, is within the act, involves a direct contradiction; it being expressly provided by the mode of donation, in the case just mentioned, that the land shall *not*, so far as the donor can prevent it, come into hands in which it will be inalienable.

The act, which is but a clumsy contrivance, and the exposition of it, are in fact directed against gifts for charitable uses; though it is probable that the notion of the impolicy of allowing lands to be for ever set apart, or 'locked up,' had also some influence on the legislature. If this however had been the leading idea, a repeal of the statute which allows the crown to grant a licence to hold lands in mortmain would have been a proper addition to the act. But the legislature or the promoters of the act were apparently anxious to find out some reason or excuse for passing such an act in a country where gifts for charitable uses have been so long established and approved by popular opinion. The exceptions made in this act in favour of the universities and colleges also show that there was a party in the legislature strong enough to prevent the operation of this act being extended to those corporate bodies.

It should be borne in mind that the terms charities and charitable uses have a legal meaning very different from the popular meaning of the term charity.

The great amount of property in England and Wales which is appropriated to charitable uses, and the importance of many of those establishments which are supported by such property, render it necessary to give some exposition of the nature and administration of charities in this country, which is most conveniently done under the head of USES, CHARITABLE.

The term *Mortification* in Scotland expresses pretty nearly what mortmain does in England.

According to Stair (book ii., tit. iii., 39, ed. Brodie), 'infeftments of mortified lands are those which are granted to the kirk or other incorporation having no other *reddendo* than prayer and supplications and the like: such were the mortifications of the kirk lands granted by the king to kirkmen, or granted by other private men to the provost and prebendars of college kirks founded for singing; or to chaplainries, preceptories, altarages, in which the patronage remained in the mortifiers.' The act of 1587, c. 29, passed in the eleventh parliament of James VI., began by reciting that the king 'and his three estaites of parliament perfitely understood the greatest part of his proper rent to have bene given and disponed of auld to Abbaies, Monasteries, and utheris persons of Clergie,' &c.: it further recited that 'his Hienes, for the great love and favour quhilk he bearis to his subjectes, was nawaies minded to greeve them with unprofitable taxations, specially for his royal support.' The act then went on to declare that it was 'founde maist meete and expedient that he sall have recourse to his awin patrimonie disponed of before (the cause of the disposition now ceasing) as ane helpe maist honorable in respect of himselfe and least grievous to his people and subjectes.' The act then proceeded to unite and annex to the crown (with the exceptions after specified in the act) all the lands, &c., belonging to the ecclesiastical and religious personages therein mentioned. This act was in effect more extensive than the similar acts of Henry VIII. in England.

Since the Reformation, lands given in Scotland for charitable purposes are given to the trustees of the charity, to be held either in blanch or feu holding. (Bell's *Dict. of the Law of Scotland.*)

MORTON, JAMES DOUGLAS, Fourth EARL OF, and Regent of Scotland, was a younger son of the great family of Angus, which, besides other honours, had more than once held the office of lord-high-chancellor of Scotland, and by the marriage of the sixth earl of Angus with Margaret of England (widow of King James IV.) had recently been brought into intimate connection with Henry VIII., the brother of that princess. Morton was nephew to the above earl, being second son of the earl's younger brother, Sir George Douglas of Pittendreich. These two brothers had mutually assisted each other in their struggle for power during the minority of King James V.; and on the earl's fall in 1528, Sir George fled and remained an exile during the remainder of James's reign. He then returned to his native country, and in 1543 was appointed a privy-counsellor to the Regent Arran.

Previous to this period, but at what precise time is uncertain, the younger son of Sir George had married Lady Elizabeth Douglas, daughter of the third earl of Morton, by a natural daughter of King James V.; and on that occasion the earl, having no male issue, obtained a new reversionary clause to his patent, transferring the earldom to this fortunate son-in-law. In consequence of this provision he was styled the Master of Morton; and on his father-in-law's death, in 1553, he became earl of Morton. Up to this time he followed undoubtedly the footsteps of his father, who was an active promoter of the Reformation, and a friend of King Henry VIII. in the designs of that monarch in reference to Scotland. His name however does not often appear in the public transactions of the period; and although one of the original lords of the congregation in 1557, yet afraid perhaps of the consequences, in a personal point of view, of casting off the queen regent, from whom he had already received considerable favours, he long held a doubtful and irresolute course. It was this which made Sadler, the English envoy, describe Morton as 'a simple and fearful man.' From the time of the queen regent's death however that description was inapplicable to him; and on the 7th January, 1563, he was constituted lord-high-chancellor of the kingdom, in the room of the forfeited Earl of Huntly, who had been the great head of the Catholic party in Scotland. He had been only a few years in that office however when he was obliged to lay it down, and fly into England, on occasion of Rizzio's murder, in which cruel and lawless affair he took an active and prominent part. He remained in England, under the protection of the English monarch, till the end of the year, when he was restored to Mary's favour by the intercession of Bothwell, whose ambitious designs needed all the aid which could be drawn together from every quarter. Bothwell soon opened to him the plot which he meditated for the murder of Darnley, expecting, no doubt, his ready acquiescence. In this however Bothwell was mistaken; Morton refused to concur. But neither did he inform Darnley of the plot, nor take any measures to prevent its being executed; and he was one of those who subscribed the famous bond, to protect Bothwell against the charge of being concerned in the murder, and to use every endeavour to promote his marriage with the queen. Yet when this latter event took place, and when Bothwell became odious to the nation, Morton was the great leader in opposition to him; and it was to the castle of his relative, the lady of Lochleven, that Mary was conducted when she delivered herself up at Carbery Hill. When Mary was securely lodged in this place of confinement, the earl of Murray was made regent of the kingdom, and Morton reinstated in the office of lord chancellor. He continued in this situation during the regencies of Murray, Lennox, and Mar, and was indeed a principal actor in all matters of importance which took place in their time; and on Mar's death at the end of the year 1572, Morton was himself appointed regent of the kingdom. Here his ability and vigour indeed, but at the same time his ambition, his avarice, and rapacity, and his general want of principle, became apparent to all; he was now at once feared and hated; and finding himself becoming odious to the nation, he conceived the idea of retrieving his reputation by resigning, or rather offering to resign, the government into the king's (James VI.) own hands, his majesty being now in his twelfth year. Accordingly on the 12th September, 1577, he made resignation of his office, and the king, by the advice of Athol and Argyl, accepted it, to the great joy of the people. Morton, thus unexpectedly taken at his word, retired in a sort of pet to Lochleven, which, from his formidable character, was then commonly called the *Lion's Den;* and from this retreat he watched a favourable moment to regain his power. An opportunity presented itself, and he immediately became master both of Stirling Castle and of the king's person. He then resumed power, and by the help of Queen Elizabeth retained it for some time, but at length the king's new favourite, Captain Stewart, who, as Robertson says, shunned no action however desperate, if it led to power or favour, charged him, in the king's presence, with being accessory to the murder of Darnley. Upon this charge Morton was committed first to his own house, then to the castle of Edinburgh, (2nd January, 1581), and then to Dumbarton, of which Lennox, the father of Darnley, had the command. Elizabeth used every endeavour in favour of Morton, but the greater the solicitude which she showed for his safety, the more eagerly did his enemies urge his destruction; and being carried by Captain Stewart, then earl of Arran, into Edinburgh, he was, on the 1st of June, 1581, brought to trial, found guilty, and condemned. When that part of the verdict was read which, besides finding that he had concealed, found that he was also accessory to the murder, he repeated the words with vehemence, and then exclaimed, 'God knows it is not so.' The next morning, speaking of the crime for which he was condemned, he admitted that on his return from England, after the death of Rizzio, Bothwell had informed him of the conspiracy against Darnley, which the queen, as he told him, knew of and approved, but that he had no hand in it. And as to revealing the plot, 'To whom,' said he, 'could I reveal it? To the queen? She was aware of it. To Darnley? He was such a babe, that there was nothing told to him but he would tell to her again; and the two most powerful noblemen in the kingdom, Bothwell and Huntly, were the perpetrators. I foreknew and concealed the plot, but as to being art and part in its execution, I call God to witness, I am wholly innocent.' When his keepers told him that the guards were attending, and all was in readiness, he replied, 'I thank my God, I am ready likewise.' On the scaffold his behaviour was calm, his countenance and voice unaltered, and after some time spent in acts of devotion, he was beheaded by the instrument called the Maiden, on the 3rd June, 1581. His head was placed on the public gaol; and his body, after lying till sunset on the scaffold, covered with a beggarly cloak, was carried by common porters to the usual burial-place of criminals. None of his friends accompanied it to the grave—they did not venture to discover their gratitude or respect by any expressions of sorrow. Public opinion was unanimous in his condemnation.

MORTON, JOHN, cardinal and archbishop of Canterbury, was the eldest son of Richard Morton, of Milbourne St. Andrew's, in Dorsetshire, and was born at Bere in that county, in 1410. He received his earliest education at the abbey of Cerne, whence he removed to Baliol College, Oxford. Of his progress in that university we know but little, till he became principal of Peckwater Inn. His practice as an advocate in the Court of Arches subsequently recommended him to the notice of Cardinal Bourchier. The cardinal, beside conferring upon him various preferments, introduced him to King Henry VI., who made him one of his privy-counsel. He adhered to this unfortunate prince with so much fidelity, that even his successor Edward IV. could not but admire his attachment, which he rewarded by taking Morton into his councils. In 1473 Morton was appointed master of the rolls; and between this time and 1477 the list of his promotions to prebendal stalls and other preferments in different quarters of the kingdom proves the high esteem in which he was held. In 1478 Edward IV. made him bishop of Ely and lord chancellor of England, and at his death appointed him one of his executors. He was viewed in no favourable light by Richard III., who, at the same time that Lord Stanley was arrested, gave Morton in ward to the duke of Buckingham. He escaped however from the duke's castle at Brecknock, and concealed himself for a time in the Isle of Ely; soon after which, passing in disguise to the Continent, he joined the earl of Richmond, and is said to have been the person who first proposed the coalition of the two houses of York and Lancaster by the marriage with the eldest daughter of Edward IV. As soon as Henry VII. was seated on the throne, he also made Morton one of his privy-counsel, and on the death of Cardinal Bourchier, in 1486, joined with the pope in promoting him to the archbishopric of Canterbury. In August, 1487, if not earlier, he was again constituted lord chancellor, and in 1493 created a cardinal by pope Alexander VI. He died September 15th, 1500. Morton was a man of great talents, learning, and probity. The cut or drain from Peterborough to Wisbeche, known by the name of Morton's Leame, was made entirely at his expense while he was bishop of Ely; and the opinion seems well founded that the English Life of Richard III., usually attributed to Sir Thomas More, was really written by Morton. (Tanner, *Bibl. Brit. Hib.*, pp. 532, 533; Bentham's *Hist. of Ely*, 4to., Cambr., 1771, p. 179-181; Chalmers's *Biog. Dict.*)

MORTUARY, from the Latin *mortuarium*, by our Saxon ancestors called ꞅaul-ꞅceaꞇ, soul-shot, or money paid at death. The mortuary was really a gift left by a man to his parish church, as a recompense for his personal tithes and offerings not duly paid. Dugdale, in his 'History of Warwickshire,' p. 679, enters minutely into the reason and original occasion of such bequests, the earliest mention of which he finds in the 'Council of Ænsham,' in the year 1009, and in the 'Laws of King Canute.' Mortuaries were afterwards distinguished into dead mortuaries, and *mortuaria viva*, or live mortuaries: the former consisting of money, or any other goods or chattels; the latter of live-stock: Blount says the second-best beast, after the first had been paid to the lord for his heriot. After the Conquest we find the mortuary sometimes called a *cors-present*, because the beast was presented with the body at the funeral. John Arden, in his will dated 4th of June, 17th Hen. VIII., says, 'Item, I bequeath for my mortuary, or cors-presenté, a black gelding ambling, that Almighty God may the rather take my soul unto his mercy and grace.' Dugdale quotes several antient wills from the time of Hen. III. to that of Hen. V., in which horses, caparisoned and bearing the military weapons of the defunct, are directed to be led before the corpse at his funeral, and delivered as mortuaries. This was the origin of the practice of leading horses at the funerals of persons of distinction. Mortuaries, in time, were found oppressive to the yeomanry and poorer inhabitants of parishes: they were regulated, and converted into a money payment by stat. 21 Hen. VIII., chap. 6, A.D. 1530. Kennett, in the Glossary to his 'Parochial Antiquities,' says that a mortuary was sometimes paid to the lord of a fee, as well as to the priest of the parish.

(Selden, *Hist. of Tythes*, p. 287; Dugd., *Hist. Warw.*, ut supr.; Jacob's *Law Dict.;* Manning and Bray's *Hist. of Surrey*, i., pp. 386, 388; Kennett's *Paroch. Antiq.*, i., p. 101, and *Glossar.*)

MORVEAU. [GUYTON DE MORVEAU.]

MORUS ALBA, or the White Mulberry, is a native of China, where it forms a small tree, and whence it has been gradually carried westward, till it has become a common plant in most of the temperate parts of the Old World, forming in the south of Europe a pollard-tree by road sides. Its leaves are smooth and shining, usually heart-shaped at the base, and on old trees ovate or oblong, but on young vigorous shoots as frequently divided into deep lobes. The fruit is white, insipid, and of little value, except for feeding poultry; in this country it is seldom formed. It is on this species that the silkworm is chiefly fed; and in silk countries many varieties are cultivated for the purpose, some of which are said to be much better than others. The common wild kind is said to suit the silkworm as well as or even better than any other kind; but as it yields only a small quantity of foliage, compared with other sorts, it is principally employed as the source of seeds from which stocks are raised for grafting more productive varieties. Of the latter each silk country has its own fancy kinds, which there would be little advantage in noticing here; but there is among them an exception of importance, the value of which has been recognised wherever it has been cultivated. Some years since a mulberry was introduced into France from Manilla, whence it has gained the name of the Philippine Mulberry, the great excellence of which seems universally acknowledged. It has straight smooth branches, oval heart-shaped leaves tapering to a point, thin, rather soft, a little blistered and puckered in the middle, often drooping, and sometimes more than six or even nine inches broad in the dry climate of the south of France. It grows much faster than the white mulberry, and strikes from cuttings as freely as a willow, which is not the case with the latter. The abundance of its leaves is much greater than any other known variety, and, what is most important, it is not only freely eaten by the silkworms, but perfectly agrees with them. Its culture is now superseding that of all others in the south of Europe, and it is even taken as a stock on which to graft the common white mulberry, when the latter is wished for. According to M. Bonafous this may be done either upon layers of the Philippine Mulberry, headed down to one or two eyes above the ground, or upon cuttings seven or eight inches long, which may be planted immediately after having been grafted: the young plants will be five or six feet long the first year, and three or four inches in circumference. This mulberry is sometimes called *Morus multicaulis.*

In this country the white mulberry and all its varieties suffer a good deal from our winters, but not so much as to prevent its cultivation. Some years ago an attempt was made to introduce it and the rearing of silkworms into Great Britain; but the attempt failed, owing partly to unskilful management, but more to the soft juicy condition of the leaves in this damp climate, which rendered them unfit for the food of the worm. For a full and excellent account of the varieties, &c. of the White Mulberry, see Loudon's *Arboretum Britannicum*, vol. iii., p. 1348.

MORUS NIGRA. [MULBERRY.]

MORVAN or **MORVANT, LE**, a district in France, partly in Nivernois and partly in Bourgogne. As this district does not appear to have been recognised for any administrative purpose, it is difficult to define its limits: it is from 16 to 18 miles long, and 10 to 12 broad. It consists for the most part of a table-land of granite or other primitive rocks, traversed by narrow valleys and watered by numerous streams. It is barren on the whole, though affording in some parts good pasturage, on which a vast number of cattle are kept: other parts are clothed with wood, which affords a great supply of fuel for Paris. [AVALLON.] Buckwheat, oats, and a little rye are the only kinds of grain raised. The towns of Avallon, Saulieu, and Château Chinon are within the district. The Yonne and several of its tributaries are within the border. The origin of the name is not known. Morvan is now included partly in the department of Nièvre, partly in that of Yonne.

MORYSON, or **MORISON, FYNES**, was a native of Lincolnshire, and born in 1566. He wrote an 'Itinerary, containing twelve years' travels through Germany, Bohmerland, Switzerland, Netherland, Denmark, Poland, Italy, Turkey, France, England, Scotland, and Ireland, in 3 parts,' London, 1617, fol. This work was first written in Latin, and then translated by himself into English. It contains some minute and interesting details of early English manners. He also wrote a 'History of Ireland, from the year 1599 to 1603, with a short Narration of the State of that Kingdom from 1169; to which is added a Description of Ireland,' Dublin, 1735, 2 vols. 8vo. He died about 1614.

MOSAIC, or more correctly **MUSAIC** (the term being a corruption of *Opus Musivum*), a species of inlaid or tessellated work, made with minute pieces of coloured substances, generally either marble or natural stones, or else glass more or less opaque, and of every variety of hue which the subject may require. The former mode was that chiefly employed by the antients for their costly tessellated pavements, many of which have at various times been discovered in this island, and which prove, more than any thing else, the opulence and luxury in building displayed by the Romans in this distant part of their empire; and further, the time and labour bestowed on the structures, of which they are the remains; since it may fairly be taken for granted that decoration, attended with such difficulty and tediousness of execution, and requiring artificers of a superior class, if not artists, was not introduced except in sumptuous edifices.

Mosaics of this description, that is, for pavements, generally consist only of a series of ornamental borders enclosing one or more compartments containing some figure or device, or occasionally a group or subject. Others consist entirely of a pattern, generally in two colours, sometimes in three—black, white, and red. Examples of pavement mosaics in each of these modes have been discovered at Pompeii, and in many of them the borders very much resemble those upon Greek fictile vases.

Mosaic continued to be used both for pavements and ornamenting walls to a late period in the middle ages, and was greatly practised in Byzantine buildings, and by Byzantine artists, who were also employed in Italy, whence it was sometimes termed *opus Græcum*, or *Græcanicum*. Hessemer gives in his work many specimens of the kind, and among others one from a pavement in the baptistery of Pisa (begun in 1153), which is remarkable, as the compartments form precisely the same pattern as that of the window in the mosque of Hakim at Cairo, represented in the cut, page 383, in MOORISH ARCHITECTURE. In the pavement the lines are a dark green on a white ground, and the spaces, which are perforated in the window, are filled up with *tesseræ* of different forms and colours, placed alternately upon a dark and a white ground.

Ornamental patterns of a similar character, executed in mosaic, and frequently having a considerable intermixture of gold, were frequent, and of embellishment thus executed there are splendid examples in the cathedral of Monreale near Palermo; and it is remarkable that in their geometrical patterns and devices they display a taste very much akin to that of Arabian architects. [MOORISH ARCHITECTURE.] Beautiful specimens of decorative mosaic or inlaid pavements, in a different style from the preceding, occur in the church of San Miniato at Florence, consisting of squares filled up with bold foliage or flower-work in black and white, and which again partake not a little of the character of corresponding decoration in the Moorish and Arabian styles. Patterns very similar to those of such mosaics were also frequently employed for painting walls, of which kind specimens from the church of San Francesco at Assisi, as well as others in mosaic in the same building, may be seen in Hessemer's *Arabische und Alt-Italienische Bau-Verzierungen.*

Something akin to mosaic or coloured inlaid-work was occasionally employed in Italy during the middle ages for external decoration also; as an instance of which the façade of the Duomo at Pisa may be mentioned, where, though the pattern is chiefly in black and white, brilliant reds and blues are intermixed at intervals, a species of external decoration supposed by some to have been derived from the practice of *polychromy* among the Greeks. [POLYCHROMY.]

Although nearly similar as to their process, mosaic pictures, especially some of those of later times, may be considered as a distinct branch of the art. Whether actually employed as pavements or inserted in walls, mosaics of the class just described consist chiefly of ornament and pattern, executed in few and simple colours, with hardly any attempt at variety of tints and due graduation of tones, even in the figures, human or animal, occasionally introduced in them. The outlines are everywhere distinct and hard; the joints between the *tesseræ*, or separate pieces of material, plainly visible; in short, there is no attempt at pictures; scarcely anything more, in fact, than the suggestions of them, if we may so express it. All these however are rather proprieties than defects, because a direct imitation of nature—any picture, according to the modern idea of the term—would be altogether incongruous and in bad taste applied as the decoration of a pavement or floor. Even for ceilings they are objectionable enough, but for floors pictures would be almost intolerable. It has been conjectured by some however that mosaic-work first suggested the idea of painting, or of describing objects by means of outline and colours upon a plane surface, and confining the composition to figures alone, without any intermixture of pattern-work or arbitrary ornament; and if founded upon nothing better than conjecture, such supposition is highly plausible, the transition from the one to the other being both obvious and easy. Further, such hypothesis is greatly strengthened by our finding that nearly all the specimens of antient painting which have been preserved to us or yet discovered have in them a striking resemblance to the character of mosaic, and but a partial imitation of nature, the figures being in many of them upon a uniform ground, and very few indeed exhibiting more than a partial background and a slight indication of distances.

For a long period after the decline of the arts, mosaic painting continued to be employed in Italy, both externally and internally, for the decoration of churches, as for instance, on the façade as well as within the basilica of St. Mark at Venice. Some have supposed that such productions were entirely the work of Byzantine or Greek artists, but the contrary opinion is firmly maintained by Cicognara, who asserts that mosaic was practised by native Italians, that it was well known to the earliest Venetians, and that consequently it is altogether an error to call Andrea Tafi, a Florentine who lived in the thirteenth century, the first Italian who obtained instruction in the art from Greeks practising it at Venice. The works however, both of Constantinopolitans and Italians of those ages, are more curious than beautiful, rude and uncouth in design, and exhibiting very little of the principles of painting. In fact they bear a far greater resemblance in every respect to the glass-painting in Gothic windows than they do to pictures, and that species of painting may itself be termed a kind of transparent mosaic-work. In neither case is a direct imitation of nature aimed at, but merely a sort of conventional and more or less symbolical representation. The outlines are hard and cutting, the colours forcible and unbroken, nor is there any effect of light and shade. Besides which pictorial imitation is further repudiated by the figures being frequently represented upon a gold ground, a practice afterwards followed by some of the earlier German painters, and in the present day in some of the modern frescoes at Munich.

Pictures in mosaic are comparatively of recent origin, dating not further back than the commencement of the seventeenth century, when copies of celebrated works by Raphael and other masters were for the first time thus executed. Mosaics of this kind are facsimiles of the originals, and have merely the effect of paintings produced in the usual way, although attended with infinitely greater cost, and beyond all comparison more laborious and tedious in their process. As each separate piece of glass is of the same colour throughout, the graduation of tints, the melting off of any one colour from its highest light to its darkest shadow, can be obtained only by an immense number of small pieces, of which those contiguous to each other exhibit scarcely any perceptible difference to the eye. It is said that no fewer than forty thousand different tints, all of which must be kept methodically sorted and arranged, are requisite for this kind of mosaic-work; the preparation of such a palette therefore, for anything upon an extensive scale, must of itself be a task of great labour and time, as well as expense; besides which the execution is so entirely mechanical, that it is fit only for copyists. The sole advantage in any degree proportionate to the cost attending it, is the extreme durability of the work when once accomplished, as its colours can hardly be changed by any length of time; nor is it liable to the slightest decay, or any injury except what may happen to the structure in which it is fixed The mosaics in St. Peter's, which are *chefs d'œuvre* of their kind, will last as long as the building itself stands.

Similar mosaic is frequently employed, or rather misapplied, on a miniature scale, for pictures on the lids of snuff-boxes and articles of that kind, or tablets in chimney-pieces, which are at the best mere curiosities and very laborious trifles. *Florentine-work* may also be mentioned as a species of mosaic, chiefly used for inlaying or veneering marble slabs for tables, and decorative purposes of that sort, upon a moderate scale.

The recent adoption of asphalt for pavements may perhaps lead to ornamental decoration for such purposes, somewhat in the style of mosaic in regard to patterns. The floor of the Rotunda in the Bank of England is now thus ornamented in black and white, with compartments radiating from the centre; and such pavements certainly recommend themselves for conservatories, terraces, &c. Although mosaic itself is by far too expensive for any but very rare occasions, the effect of it may be obtained, and the beauty of its patterns produced, in stain-cloth flooring; and the same style of design might also be shown in carpets, and were these more sober in their colours, and more *à l'antique* in their design, the furniture and other decorations of rooms would generally show themselves to greater advantage.

MOSAISK, or **MOSHAISK**, is the chief town of a large circle of the same name in the government of Moscow. Stein, in 1820, assigns it to the government of Kaluga; but Hassel, in 1821, and all the later authorities, place it in the government of Moscow. It is situated at the junction of the Moshaiska and the Moskwa. It is chiefly celebrated for the events which took place in its vicinity in 1812. On the 5th September the French under Napoleon attacked the Russian army under General Kutusow, and carried a strong redoubt which was the key of the Russian position. On the 7th was fought the great battle in which the loss of both armies was immense; that of the Russians was stated at 30,000 men: the loss of the French was in all probability at least equal; but the battle opened to Napoleon the way to Moscow. These two engagements are called by the French, respectively, the battle of Borodino and the battle on the Moskwa: the Russians generally call both engagements the battle of Borodino. Almost the whole of the town was reduced to ashes on the occasion; but it has since been rebuilt, and is much handsomer than it was before. The inhabitants, above 4000 in number, carry on a considerable trade in corn and timber.

MOSAMBIQUE. [MOZAMBIQUE.]

MOSASAURUS, Mr. Conybeare's name for a gigantic extinct aquatic Saurian, *Saurochampsa* of Wagler, considered by Faujas St. Fond to be a crocodile, but whose true position among the Saurians was pointed out by Camper and confirmed by Cuvier. Indeed, previous to their investigations, the nearly perfect head of this Saurian, known as the great animal of Maastricht, and found near that city in the calcareous freestone forming the most recent deposit of the cretaceous formation, was a stumbling-block to naturalists, some of whom were of opinion that it was a whale. The zoologists last named, and especially Cuvier, have satisfactorily proved that it was a great marine reptile, and very nearly allied to the Monitor. [MONITORS.] The teeth are without true roots, not hollow as in the crocodile, but solid throughout, and joined to the sockets by a broad bony basis, the result of the hardening of the pulp from which the teeth were formed, and likewise attached to the jaw by the ossification of the pulp that had furnished the enamel. 'This indurated capsule,' writes Dr. Buckland, in his 'Bridgewater Treatise,' 'passed like a circular buttress around its base, tending to make the tooth an instrument of prodigious strength. The young tooth first appeared in a separate cell in the bone of the jaw, and moved irregularly across its substance, until it pressed against the base of the old tooth; causing it gradually to become detached, together with its base, by a kind of necrosis, and to fall off like the horns of a deer. The teeth in the roof of the mouth are also constructed on the same principle with those in the jaw, and renewed in like manner.'

The last-mentioned writer places its organization and its zoological and geological relations in so interesting a point of view in the treatise above mentioned, that we select his account as the best calculated to inform the general as well as the philosophical reader on these points.

The geological epoch at which the Mosasaurus first appeared, seems to have been the last of the long series during which the oolitic and cretaceous groups were in process of formation. In these periods the inhabitants of our planet seem to have been principally marine, and some of the largest creatures were Saurians of gigantic stature, many of them living in the sea, and controlling the excessive increase of the then extensive tribes of fishes. From the lias upwards to the commencement of the chalk formation, the Ichthyosauri and Plesiosauri were the tyrants of the ocean; and just at the point of time when their existence terminated, during the deposition of the chalk, the new genus Mosasaurus appears to have been introduced, to supply for a while their place and office, being itself destined in its turn to give place to the Cetacea of the tertiary periods. As no Saurians of the present world are inhabitants of the sea, and the most powerful living representatives of this order, viz. the Crocodiles, though living chiefly in water, have recourse to stratagem rather than speed for the capture of their prey, it may not be unprofitable to examine the mechanical contrivances by which a reptile, most nearly allied to the Monitor, was so constructed as to possess the power of moving in the sea, with sufficient velocity to overtake and capture such large and powerful fishes as, from the enormous size of its teeth and jaws, we may conclude it was intended to devour. The head and teeth point out the near relations of this animal to the Monitors; and the proportions maintained throughout all the other parts of the skeleton warrant the conclusion that this monstrous Monitor of the antient deep was five and twenty feet in length, although the longest of its modern congeners does not exceed five feet. The head here represented measures four feet in length, that of the largest Monitor does not exceed five inches. The most skilful anatomist would be at a loss to devise a series of modifications by which a Monitor could be enlarged to the length and bulk of a Grampus, and at the same time be fitted to move with strength and rapidity through the waters of the sea; yet in the fossil before us, we shall find the genuine characters of a Monitor maintained throughout the whole skeleton, with such deviations only as tended to fit the animal for its marine existence.

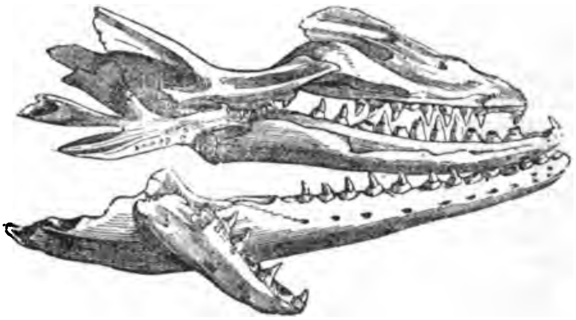
'The Mosasaurus had scarcely any character in common with the Crocodile, but resembled the Iguanas in having an apparatus of teeth fixed on the pterygoid bone, and placed in the roof of its mouth, as in many serpents and fishes, where they act as barbs to prevent the escape of their prey.

'The other parts of the skeleton follow the character indicated by the head. The vertebræ are all concave in front and convex behind; being fitted to each other by a ball and socket joint, admitting easy and universal flexion. From the centre of the back to the extremity of the tail, they are destitute of articular apophyses, which are essential to support the back of animals that move on land: in this respect they agree with the vertebræ of Dolphins, and were calculated to facilitate the power of swimming; the vertebræ of the neck allowed to that part also more flexibility than in the Crocodiles.

'The tail was flattened on each side, but high and deep in the vertical direction, like the tail of a Crocodile; forming a straight oar of immense strength to propel the body by horizontal movements analogous to those of skulling. Although the number of caudal vertebræ was nearly the same as in the Monitor, the proportionate length of the tail was much diminished by the comparative shortness of the body of each vertebra; the effect of this variation being to give strength to a shorter tail as an organ for swimming; and a rapidity of movement, which would have been unattainable by the long and slender tail of the Monitor, which assists that animal in climbing. There is a further provision to give strength to the tail, by the *chevron*-bones being soldered firmly to the body of each vertebra, as in fishes.'

The total number of vertebræ was one hundred and thirty-three, nearly the same as in the Monitors, and more than double the number of those in the Crocodiles. The ribs had a single head, and were round, as in the family of Lizards. Of the extremities, sufficient fragments have been found to prove that the Mosasaurus, instead of legs, had four large paddles, resembling those of the Plesiosaurus and the Whale: one great use of these was probably to assist in raising the animal to the surface, in order to breathe, as it apparently had not the horizontal tail by means of which the Cetacea ascend for this purpose. All these characters unite to show that the Mosasaurus was adapted to live entirely in the water, and that although it was of such vast proportions compared with the living genera of these families, it formed a link intermediate between the Monitors and the Iguanas. However strange it may appear to find its dimensions so much exceeding those of any existing Lizards, or to find marine genera in the order of Saurians, in which there exists at this time no species capable of living in the sea; it is scarcely less strange than the analogous deviations in the Megalosaurus and Iguanodon, which afford examples of still greater expansion of the type of the Monitor and Iguana into colossal forms adapted to move upon the land. Throughout all these variations of proportion, we trace the persistence of the same laws which regulate the formation of living genera, and from the combinations of perfect mechanism that have, in all times, resulted from their operation, we infer the perfection of the wisdom by which all this mechanism was designed, and the immensity of the power by which it has ever been upheld.

'Cuvier asserts of the Mosasaurus, that before he had seen a single vertebra, or a bone of any of its extremities, he was enabled to announce the character of the entire skeleton, from the examination of the jaws and teeth alone, and even from a single tooth. The power of doing this results from those magnificent laws of co-existence which form the basis of the science of comparative anatomy, and which give the highest interest to its discoveries.'



Head of Mosasaurus Camperi. (Lacerta gigantea of Sömmering.)

The noble specimen from which the cut is taken was discovered in 1780, and is in the Museum at Paris. At the capture of Maastricht by the French army it was given up to them for the purpose of being placed in the Museum, according to Cuvier, by Goddin, dean of the chapter of that town, which, in virtue of some droits of the chapter, had taken it from Hoffman, of whose collection it formed the principal feature. It is said that the French cannoneers had directions not to point their artillery towards that part of the town in which this precious specimen was deposited. Casts are preserved in the British Museum, and in the museums of the Geological Society and of the Royal College of Surgeons.

Localities.—Maastricht, upper chalk in England (Mantell, near Lewes), green-sand of Virginia (Morton), Sandy Hook and Woodbury, New Jersey. [Maastricht Rocks.]

MOSCHA'TA, a name proposed by M. Renieri for a genus of *Actiniæ*, or soft *Zoantharia*, which a little resembles *Holothuria*, and lives in the sea, wherein it floats free.

Example, *Moschata rhododactyla.*

Localities.—Mediterranean and Adriatic seas.

MOSCHEROSCH, JOHANN MICHAEL, a German writer of the seventeenth century, generally known under the pseudonym of Philander von Sittewald, was born 5th of March, 1600, at Willstadt, a small town in Hanau-Lichtenberg, where his father was preacher. Respecting his life few particulars of any interest are known, for all may be comprised in the statement that, after studying at Strasburg, he filled successively a variety of appointments, until, in 1656, he was made president of the consistory at Hanau; and that he died, April 4, 1669, at Worms, while upon a journey to visit his son at Frankfort on the Main.

As a writer he obtained much popularity in his time by his 'Wünderliche und wahrhafte Gesichte Philanders von Sittewald,' in two vols., 1650, a collection of satirical pieces in the form of visions, a species of fiction greatly in vogue at that period as the vehicle of satire and allegory. Moscherosch may in fact be termed the German Quevedo, his *Gesichte* being to a certain extent a paraphrase of the Spaniard's *Sueños*, with adaptations to the manners and foibles of his own countrymen. Notwithstanding too that his style falls short of the concise terseness and energy which mark his original, he may be considered one of the best German prose-writers of the seventeenth century, gifted with great humour, and displaying not only considerable knowledge of the world, but also great force of satire and ridicule, both serious and comic.

MO'SCHIDÆ, a family of ruminant quadrupeds familiarly known as *Musk Deer.*

Linnæus defines the genus *Moschus*, which he places between *Camelus* and *Cervus*, under his order *Pecora*, as having no horns, and the upper canine teeth solitary and exserted—'Cornua nulla. Dentes Laniarii superiores solitarii exserti.'

Pennant, in the Systematic Index, gives it nearly the same position, the only difference being that the Deer precedes it, and the Camel follows it.

Cuvier, in his last edition of the 'Règne Animal,' gives it the same position that Linnæus assigned to it; the Llamas (among the Camels) immediately preceding it, and the Deer (*Cervus*, Linn.) being next in succession to it. The French zoologist states that the Musks are much less anomalous than the Camels, and only differ from the other Ruminants in the absence of horns, in having a long canine tooth on each side of the upper jaw, which comes out of the mouth in the males, and finally, in having in their skeleton a slight fibula, which has no existence in the Camels. He adds that they are charming animals in regard to their elegance and lightness. The distinction of the exserted upper canine tooth, noticed by Cuvier, is not confined to the Musks; such a conformation exists in some of the males of the *Cervidæ*, the Munjak for instance.

Mr. Swainson is of opinion that the *Moschidæ*, or Musk Deer, constitute the most aberrant group of the Ruminants, and he places them between the *Cervidæ* and the *Camelopardæ*, the last family being the terminating group of his fourth tribe, or Ruminants.

M. F. Cuvier enumerates *Moschi moschiferus*, *Meminna*, *pygmæus*, *Javanicus*, and *Napu*, as the only species known at present.

Mr. Gray, in his *Disposition of the Mammalia* (*Annals of Phil.*, 1825) divides the family *Bovidæ* into two sections, the first with persistent horns, and the second with either no horns or deciduous horns. He makes *Moschina* the fourth subfamily, and arranges it between *Camelina* and *Cervina*, in the second section. The genera of *Moschina*, in this arrangement, are *Moschus* and *Meminna*. The same author, in June, 1836, read to the Zoological Society of London some observations 'On the genus *Moschus* of Linnæus, with descriptions of two new species.' He remarked that the only character by which this genus, as established by Linnæus and others, differs from the genus *Cervus*, consists in the absence of horns; for the elongated canines are common to it and most of the Indian species of *Cervus*, especially the *Cerv. Muntjac.* [DEER, vol. viii., pp. 362, 363.]

The character of the fur, the degree of hairiness or nakedness of the *metatarsus*, and the presence or absence of the musk-bag of the male, offer however, he observed, good characters for the subdivision of the group into three very distinct sections or subgenera.

The first of these divisions, for which Mr. Gray would retain the name of *Moschus*, comprehends only the *Thibet Musk*, *Moschus moschiferus*, Linn. In common with the *Deer* and *Antelopes*, it has, he pointed out, the hinder and outer side of the *metatarsus* covered with close erect hair, and, like many of the *Deer* also, its fur is quill-like and brittle; the throat moreover is entirely clothed with hair, and the males are provided on the middle of the abdomen with a large pouch secreting musk. Its young, like those of most of the *Deer*, are spotted, whilst the adult animal is plain-coloured.

Mr. Gray further stated that the division to which, in the year 1821, in a paper in the 'Medical Repository,' he gave the name of *Meminna*, also consists of but a single species, the *Moschus Meminna*, Linn. In this group the hinder edge of the *metatarsus* is, he observed, covered with hair; and there is no musk-bag in either sex. The false hoofs, he remarked, are distinct, although Linnæus and Buffon denied their presence.

The third and last subdivision is characterised by Mr. Gray, under the name of *Tragulus*, as having the hinder edge of the metatarsus nearly bald and slightly callous, a character which distinguishes them at once from all other Ruminants; the fur is soft, and adpressed like that of *Meminna*, but not spotted even when young; the throat is provided with a somewhat naked, concave, sub-glandular, callous disk, placed between the rami of the lower jaw, from which a band extends to the fore part of the chin; and they have no musk-bag. Like all the other species of the Linnean genus *Moschus*, they have false hoofs; and most of them have the edges of the lower jaw, three diverging bands on the chest, and the under surface of the body, more or less purely white. The species of this division scarcely differ in colour in the various stages of their growth, the young fawn resembling the adult in every particular except in size.

In this division, the synonymy of which is stated to be extremely confused, Mr. Gray reckons four species, two of which he describes as new. Mr. Gray stated that he was unable to identify with any of the four species mentioned by him on this occasion, or to separate from them as distinct, the *Palendoc*, figured in Marsden's 'Sumatra,' or the *Pygmy Musk* of Sumatra, figured in Mr. Griffith's edition of Cuvier's 'Animal Kingdom,' on which Fischer has established his *Moschus Griffithii.* The *Moschus pygmæus* of Linnæus, in Mr. Gray's opinion, belongs to the genus *Antilope;* the hinder part of the tarsus being covered with hair, and the false hoofs very small and rudimentary, and entirely hidden under the hair of the feet. He thinks that the *Moschus Americanus* appears by its spotted livery to belong to a species of *Deer;* and that the *Moschus delicatulus*, or *Leverian Musk* of Shaw, is undoubtedly the fawn of a deer. Mr. Gray further observed that it is curious that Dr. Shaw quotes as a synonym of the last-named species the figure of Seba, on which alone the *Moschus Americanus* is founded, while at the same time he enumerates the *Moschus Americanus* as a distinct species. (*Zool. Proc.*, 1836.)

In the same year Mr. Ogilby, in his paper on the *Ruminantia*, read before the Zoological Society, makes the *Moschidæ* the third family of that order, with the following character:—

Feet bisulcate; horns none; incisor teeth (primores), above none, beneath eight. Two genera.

1. *Moschus*. Rhinaria large. Lachrymal sinuses none; interdigital fossæ none; inguinal follicles none; teats four. Type *Moschus Moschiferus.*

2. *Ixalus?* Rhinaria none. Lachrymal sinuses small and distinct. Interdigital fossæ none. Inguinal follicles small. Teats two. Type, *Ixalus Probaton.* (*Zool. Proc.*, part iv., p. 119.)

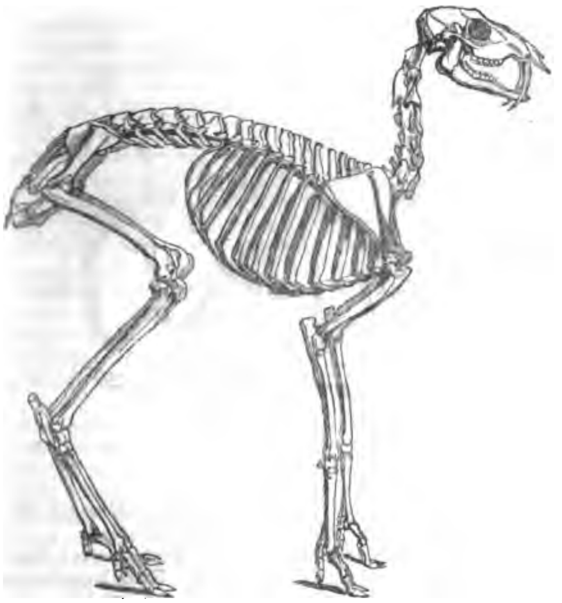
Mr. Ogilby goes on to state that the genus *Ixalus*, founded upon the observation of a single specimen, may eventually prove to belong to a different family: and indeed he observes that it differs little from the true antelopes; but even supposing it to be correctly placed among the *Moschidæ*, other forms, Mr. Ogilby remarks, are still wanting to fill up the chasms which evidently exist among the characters of that group. 'Two,' continues Mr. Ogilby, 'are more especially indicated, and our knowledge of the laws of organic combination, and of the constituent parts of other groups, gives us every reason to believe in their actual existence, and to anticipate their discovery.' He then proceeds to characterise the genera *Hinnulus* and *Capreolus*, observing that they will probably be found, one in the tropical forests of the Indian archipelago, and the other on the elevated table-lands of Mexico or South America.

'It may appear a bold, perhaps a presumptuous undertaking,' says Mr. Ogilby, 'thus to predict the discovery of species and define the characters of genera, of whose actual existence we have no positive knowledge; but, as already remarked, all the analogies of nature, whether derived from organic combination, or from the constituent members of similar groups, are in favour of the supposition; and I may observe further, that the recent discovery of the genus *Ixalus*, if indeed it eventually prove to be a genus, of which I had long previously defined the characters, as I have here done for the presumed genera *Hinnulus* and *Capreolus*, strengthens my belief in the actual existence of these forms, and increases the probability of their future discovery.' The family is placed by Mr. Ogilby between the *Cervidæ* and *Capridæ*.

The same author makes *Tragulus* (type *Antilope pygmæa*) the first genus of his family *Bovidæ*.

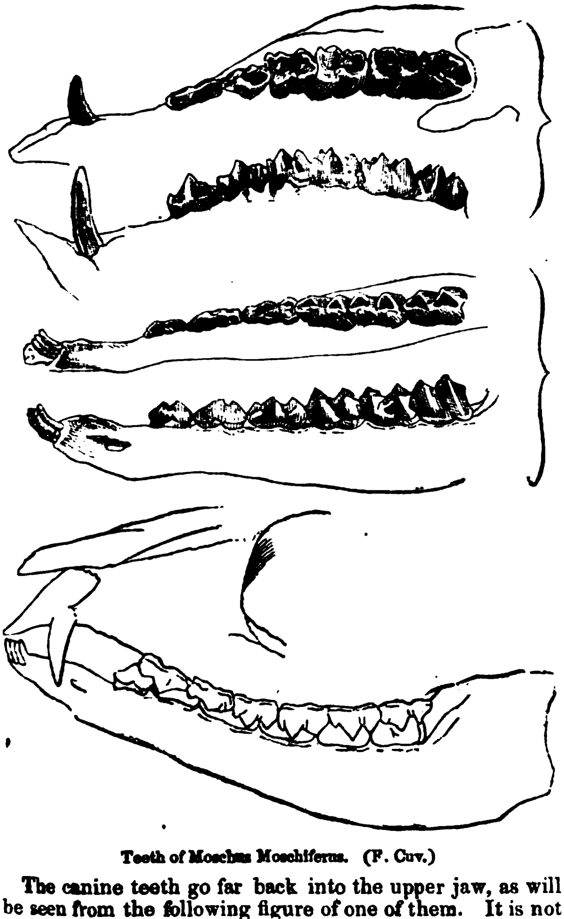
Organization.

The *Moschidæ* do not differ much from the other Ruminants; the leading differences are given above, and the general osseous structure of the form may be collected from the following cuts.



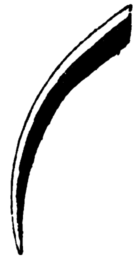
Skeleton of Moschus Moschiferus.*

Dental Formula:—Incisors, $\frac{0}{8}$; canines, $\frac{1-1}{0-0}$; molars $\frac{6-6}{6-6}=34$.

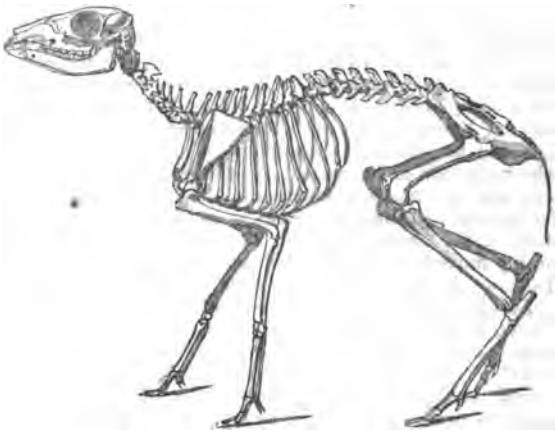


Teeth of Moschus Moschiferus. (F. Cuv.)

The canine teeth go far back into the upper jaw, as will be seen from the following figure of one of them. It is not impossible that the so-called canine teeth of *Ursus cultridens* may be the canine teeth of an extinct ruminant allied to this family, or that of the *Cervidæ*. [Machairodus.]



Canine Tooth of Moschus Moschiferus



Skeleton of Meminna.*

Genera. Moschus.

Generic Character.—See above.

Example, *Moschus moschiferus*, the *Musk* or *Tibet Musk*.

Description.—Somewhat of the form of a roebuck; but higher behind than it is at the shoulder, from the upper part of which to the sole of the foot it measures about two feet three inches; whilst from the top of the haunches to the soles of the hind feet the measurement is about two feet nine inches. Ears long and rather narrow, in the inside pale-yellow and dark-brown outside. Hair on the body suberect, long, each hair marked with short waves from top to bottom, ash-coloured near the base, black or blackish near the end, and rusty at the tips. Chin yellow. The colours vary. Most of the adults are plain-coloured. In some, and such is the individual figured by Pennant, the fore part of the neck is marked on each side with long white stripes from the head to the chest, the back striped transversely with pale brown reaching to the sides, which are also dappled with a lighter colour.† Hoofs very long and deeply divided, spurious hoofs very long. Tail about an inch long, concealed in the hair. Scrotum rutilum. Penis vix percipiendus. (Pennant.)

Female less than the male and wants the two tusks.

Young, spotted.

Habits; Food; Utility to Man.—The *Musk* is a mountain-animal, timid and shy, and a lover of solitude. Precipices covered with pines and almost inaccessible crags are its favourite haunts; and the musk-hunter often perils his life in the dangerous chase, for when hotly pursued, the animal takes refuge frequently in the highest fastnesses, leaving men and dogs with scarcely the possibility of access to the precipitous summits to which it flies. And yet the slaughter made among them must at one time have been great, and the animals abundant; for Tavernier bought in one journey 7673 musk-bags. The bag, or tumor, containing this well known drug is peculiar to the male: it is kidney-shaped, pendulous, of the size of a hen's egg, and situated beneath the abdomen. There are said to be two apertures, the larger oblong, the smaller round, and covered with hair: and on the application of pressure, the musk may be forced through the apertures. It is brown and unctuous. This bag the hunters cut off, and tie it up for sale, but, like everything that is calculated for the use of man and is the object of commerce, it is said to be adulterated by the admixture of foreign matter, and pieces of lead are stated to have been found enveloped in it, for the purpose of increasing the weight. The musk which comes from Tibet is considered the best, and used to bear the highest price; the bag is more or less full, and the quality more or less good, according to the age and health of the animal. When dry, musk is dark-brown, inclining to red, or rusty-black, and appears more or less granulated. To the taste it is rather bitter and somewhat acrid. It is perhaps the strongest and most pungent of perfumes, and so subtle that everything near it becomes infected, and for a long time retains the odour; vessels of silver even, a metal which, as much as, if not more than others, readily becomes purified from odorous substances, do not part with the scent of musk, which may have been placed in them, for a long time. When fresh or exposed in large quantities, its effects upon the nervous system are said to be absolutely violent; and it is stated that blood has been forced from the nose, eyes, and ears of those who have imprudently inhaled the vapour of a considerable quantity. When Chardin made his purchases, he secured himself from the sudden effects of the smell by covering his face with a handkerchief several times folded. The mere skin of the animal fills the place where it is kept with the perfume for a long period. In medicine it is used for nervous and convulsive cases in considerable doses. The flesh of the animals, though that of the males is rather highly flavoured with musk, is eaten by the Russians and Tartars. In rutting-time this flavour is most predominant.

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* These figures are taken from specimens in the museum of the College of Surgeons by permission of the Museum Committee.

† But note, this may have been a young animal.

Localities.—Tibet. The province of Mohang Meng in China, Tonquin, and Bootan; about the lake Baikal, and near the rivers Yenesei and Argun. Found from lat. 60° to 44° or 45°; but never wanders so far south, except when forced through hunger, by great falls of snow, when it migrates to feed on corn and new-grown rice. (Pennant.)

Moschus Moschiferus.

The description given by Linnæus of this species is an example of his great neatness. He describes the Tibet musk as Moschus *folliculo umbilicali;* and this is the distinction of the species, as far as we yet know. It does not appear to have been known to the antients, but seems to have been first mentioned by the Arabians. Serapion described it in the eighth century.

Meminna.

Generic Character.—See above.

Example, *Moschus Meminna,* Linn. The only species known.

Description.—Length about 17 inches. Ashy-olive; throat, breast, and belly white, sides and haunches spotted and barred transversely with white: ears large and open, tail very short. Weight about five pounds and a half.

Locality.—Ceylon and Java. (Pennant.) Col. Sykes informs us that it is the *Peesoreh* of the Mahrattas, and that it is found in considerable numbers in the dense woods of the Western Ghauts, but never on the plains. (*Zool. Proc.*, 1831.) Pennant described it from a drawing communicated by Governor Loten, of Ceylon.

Meminna.

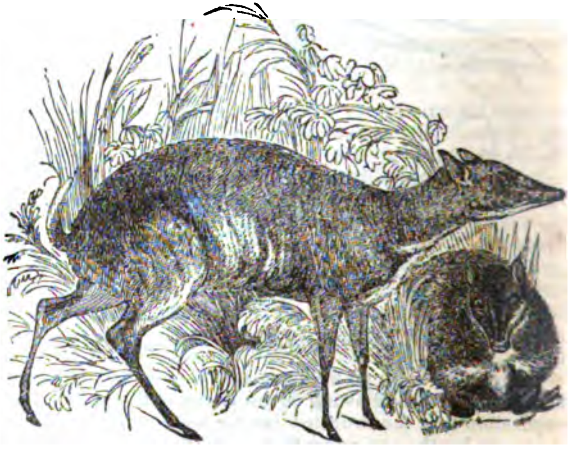
Tragulus.

Generic Character.—See above.

Example, *Tragulus Javanicus*, Pallas; *Moschus Javanicus*, Gmel., Raffles; *Moschus Napu*, F. Cuvier.

Description.—Size of a large hare. Body heavy. Limbs very delicate. Head arched and long. Eyes large but not expressive. General colour brown mixed with blackish-grey or yellow reflections; yellow predominating along the back and tail, on the legs, the neck, and head; the grey and black prevail on the lower part of the shoulders, on the sides, and thighs. These different tints are the result of the colouring of the hairs, which on those parts which are yellow are of that colour for the greatest part of their length and black at the point, and where the hairs lie very thick and one on the other, some of the parts appear black. Lower jaw white; two white lines which spring from it, extend from thence beyond the cheeks; two other white bands spring from the same point as the first, and terminate at the shoulders; a middle band descends on the breast, widening in its descent, and is lost in the white of that part. The upper edge of the two first white bands is bordered with black, and the other bands are all separated from each other by hairs of a brownish-black colour. Belly, anterior and upper part of the hind legs, posterior and upper part of the fore legs, and the under part of the tail white. End of the muzzle naked. Eyes surrounded with a naked part, from which springs a band without hairs which goes to the muzzle. These naked parts are black with a slight tint inclining to violet. The toes are united, by a rather loose membrane, nearly to the origin of the hoofs, which are very long and pointed; the spurious hoofs are also long, cylindrical, and pointed. Length about 24 inches. Height to the shoulder rather more than nine inches, to the top of the haunches rather more than a foot.

Mr. Bennett observes that M. F. Cuvier regards five ra-



The Napu.

diating bands as the distinctive character of the *Napu*, and three as that of the *Kanchil;* whereas, in truth, the number is the same in both, and the difference is only in their disposition.

Localities.—Java and Sumatra.

Habits.—Sir Stamford Raffles states that this species frequents thickets near the sea-shore and feeds principally upon the berries of a species of *Ardisia.* He adds that it can be easily trained, when taken young, and will become quite familiar.

Mr. Gray refers also to this genus *Moschi Kanchil* (*Javan Musk* of Shaw, *Le Chevrotain de Java* of Buffon); *fulviventer* (*Le jeune chevrotain* of Buffon); and *Stanleyanus*, of which last, in 1836, there were four living specimens in the magnificent collection of the Earl of Derby at Knowsley; and two others, consisting of a specimen of each of the varieties, in that of the Zoological Society of London, the gift of her present majesty. With the exception of the last, whose locality is not known, these are Oriental, the *Kanchil* being an inhabitant of Java, and the *Tragulus fulviventer* a native of the Malacca Islands and the East Indian Peninsula, but the habitat of *Tragulus fulviventer* is given by Mr. Gray with a query.

FOSSIL MOSCHIDÆ.

The following species are recorded: *M. antiquus*, Kaup (Epplesheim sand). *M. Bengalensis*, (Tertiary, north-east border of Bengal, Pentland). *M. Prattii* (Tertiary, Isle of Wight, Pratt). Dr. Schinz also mentions the teeth of these ruminating animals as occurring in the Tertiary coal of Zürich; of which, one, he says, is scarcely larger than the teeth of the small musk; the other belongs to a species of deer. Remains of Moschus are also mentioned by Jaeger (Tertiary, Bean iron-ore (Bohnerz) of the Rauh Alp).

MOSCHOPU'LUS, MANUEL. Several treatises on grammar, attributed to a Greek writer of this name, are extant; but there is some difficulty in saying who he was and when he lived. The opinion generally received appears to be that there were two of the name: an elder, called Moschopulus of Crete, or the Grammarian; and a younger, who is called his nephew. The elder probably lived under Michael VIII., Palæologus, about 1270. Some writers have spoken of a third Moschopulus, who taught Greek in Italy in the latter part of the fifteenth century; but this fact does not seem well established, and we may perhaps attribute all the works extant under the name of Moschopulus to the uncle and nephew above mentioned.

Among these works, are, 'Erotemata, or Grammatical Questions,' Basel, 1540; 'A Collection of Atticisms;' 'On Grammatical Exercise;' 'A new Epitome of Grammar;' 'On the Construction of Nouns and Verbs;' 'On Prosody;' 'Scholia on Hesiod and Pindar;' &c. Titze published at Leipzig and Prague, in 1822, 'Manuelis Moschopuli Cretensis Opuscula Grammatica,' 8vo., which contains several pieces attributed to Moschopulus which were never before printed. See also Bachmann's 'Anecdota,' vol. ii.

MOSCHUS, a native of Syracuse, and a pastoral poet, probably lived in the third century B.C., and was the friend, and, some say, the disciple, of Bion of Smyrna, whose death he deplores in pathetic strains in one of his compositions, entitled the 'Epitaph of Bion.' We know nothing more of Moschus. There remain of his compositions four Idylls and a few other small pieces. The Idylls are characterised by great elegance and delicacy, but are perhaps somewhat too highly polished, and overloaded with ornament. The Idyll entitled 'Cupid Runaway' is a lively little composition. The Idylls of Moschus were published, together with those of Bion, at Bruges, 1565. There have been other editions of Moschus: one of the best is by Manso, 1784 and 1807. Bion and Moschus have been inserted in most editions of Theocritus, and are also in the collections of Brunck, Gaisford, and Boissonade. Moschus has been translated into German by J. H. Voss and others.

MOSCOW (in Russian, MOSKWA), one of the eight governments of Great Russia, is situated nearly in the centre of European Russia, between 54° 40′ and 56° 30 N. lat., and 35° 10′ and 38° 40′ E. long. It is bounded on the north-west by Twer, on the north-east by Wladimir, on the south-east by Riäsan, on the south by Tula, on the south-west by Kaluga, and on the west by Smolensk. Its area, according to Stein, Schubert, and Cannabich, is 10,000 square miles, but Hermann makes it 11,000, and Hörschelmann 12,000 square miles. The population is now nearly 1,500,000, so that, though one of the least extensive, it is one of the most populous provinces of the empire. It is divided into thirteen circles.

The face of the country is an undulating plain, here and there broken by groups of low hills and the steep banks of the rivers; it is not indeed quite uniform, but nowhere presents any grand or romantic scenery: only the environs of the immense capital have any attractive spots, most of which however owe their beauties to art. The soil is for the most part loam and sand, with some heath and marsh: and on the whole the land is but moderately fertile. Boulders of various kinds of rock are everwhere met with in more or less abundance on the surface, or in the beds of clay and sand, and granite in large blocks (erratic blocks?), as in the north of Germany.

This government is most amply provided with water, there being, according to Storch, 109 lakes, none of which however are of any great extent, and 2610 rivers and streams. The principal rivers are, the Wolga, which indeed only just touches the province for a short distance in the north; the Oka, which flows in the south; and the Moskwa, which gives its name to the government and to the capital. The rivers are in general frozen about the middle of November, and thaw by the end of March. The whole length of the winter, including the more genial days of the autumn and the spring, is reckoned to be five months.

Agriculture is the chief occupation of the inhabitants, and Moscow is one of the best cultivated as well as one of the most populous provinces of the whole empire. As the soil is but moderately fertile, and the immense capital consumes a vast quantity of corn, the crop is never sufficient, even in good years, for the supply of the inhabitants, and large quantities are therefore imported. Flax, hemp, and hops are cultivated by the farmers for their own use, but the manufacturers must obtain their supplies elsewhere. Horticulture is carried on to a great extent, and the produce is nearly adequate to the consumption; most vegetables flourish, especially those which the Russians prefer, such as turnips, carrots, onions, garlick, cabbages, cucumbers, and gourds; but the better kinds of garden vegetables are cultivated in the environs of Moscow, especially asparagus, which is celebrated all over the empire for its size and fine flavour. Fruit is scarce, and though apples, pears, and cherries thrive, in fact only apples are attended to. The best sort of apple is of Chinese origin; it is called Naliwy; is transparent, juicy, and pretty well flavoured. There are likewise many plums.

In general there is no want of wood for timber or fuel. The breed of cattle, like the agriculture, is not sufficient for the supply of the province, which requires a great importation, not only of cattle, but of wool, tallow, &c. What the inhabitants chiefly attend to are domestic poultry and calves, for which they are sure of obtaining a good price in the capital. Some attempts have been made of late years t improve the breed of sheep, but with little success, as th climate does not agree with the Merinos. More attention has been paid to the breed of horses, and there are ten considerable studs, some of which belong to the crown. Game is not abundant; the sportsman finds only hares and birds. Bears and wolves have not yet been extirpated in the great forests. Most of the rivers and lakes abound in fish, but are far from yielding sufficient for the consumption of the people. The minerals are freestone, potters' clay, brick-clay, lime, gypsum, alabaster, and bog-iron.

Manufactures of various kinds are carried on to a great extent, both by the country-people for their own supply as well as for sale, and also in the villages and towns, and especially in the capital. The number of manufactories has increased rapidly. In 1808 there were 394 large manufactories of woollen cloths, hats, silks, leather, chintz and calico, linen, cotton, paper, china, earthenware, &c. &c. There are many distilleries and breweries, and numerous small manufactories; in fact almost every family in the country has some kind of manufacture. In 1830 the number of large manufactories had increased to 750.

The province has of course no maritime commerce, but its inland trade is very extensive; Moscow, from its wealth and industry, being necessarily one of the greatest emporia in the interior. Moscow may indeed be called the centre of the internal trade of Russia, as St. Petersburg is of its maritime commerce. Other towns of this province, are—1 *Kolomna*, on the river Kolomenka at its junction with the Moskwa. The town, which is divided by the Kolomenka into two parts, contains 17 churches, an ecclesiastical seminary and a population of 10,200 inhabitants, who have manufactures of silk, cotton, linen, woollen cloths, and leather. There are several tanneries, and malt and brick kilns; above 400,000 poods (the pood at 36 lbs.) of tallow are annually melted here. The inhabitants have a very extensive trade in tallow, hides, leather, corn, hemp, oil, hops, and fruits from the Ukraine, all which find their way to Moscow; and they supply the neighbouring country with colonial produce, wines, and manufactures. The fairs are much frequented. 2. *Serpuchow*, on the rivers Nara and Oka, over the latter of which there is a bridge of boats. The citadel, on an eminence, is surrounded by a high wall, now fallen into decay; the town has 16 churches, a lazaretto, and other public buildings, and 6000 inhabitants, who have manufactures of sailcloth, woollens, leather, and paper. They have a good trade in corn, cattle, tallow, hemp, linen, and timber, which go partly to Petersburg and partly to Moscow. There are two fairs. 3. *Wereja*, on both sides of the Protwa, over which there is a wooden bridge. The inhabitants, 6000 in number, have a brisk export trade in the same articles as Serpuchow, with Moscow, Petersburg, Riga, and Königsberg.

The roads are excellent. The navigation of the Oka and the Moskwa is a great advantage to this province.

The inhabitants are all of Russian origin; in the city of Moscow itself indeed there are not only persons from all parts of the Russian empire, but strangers from the remotest countries of Asia and Europe. The Russians are of the Greek religion, of which there are in this province above 1300 churches, under the archbishop of Moscow. The Roman Catholics, Lutherans, and Calvinists have churches in Moscow.

MOSCOW (in Russian, MOSKWA), the antient and original capital of the Russian empire, formerly the residence of the czars, till Peter the Great made St. Petersburg the seat of government, is, in comparison with other capitals, a city of modern origin. On comparing all the authorities, it seems most probable that it was founded in 1147, by the grand-duke Yury II., or George, surnamed Dolgorucky, or Long-hand. Thus nearly seven centuries have elapsed since the foundation of Moscow, during which period it has suffered very severely from invasion and fire.

Moscow is situated in 55° 45′ 45″ N. lat. and 37° 33 E. long., in a fertile and richly cultivated country on the banks of the river Moskwa (pronounced Moskva) and of the rivulets Yausa and Neglina (or Neglinnaya), the latter of which is in fact only a brook. The form of the city is a sort of irregular rhomboid, and its circumference is generally stated at about 25½ English miles. In this space however there are above 1000 gardens, besides 235 kitchen-gardens, some of them of very great extent, and a number of fields or parks called Poles, which are unenclosed fields used for promenades, for holding festivals, and for exercising troops; there are likewise 253 ponds or small lakes, on the banks of some of which there are public walks and fine gardens laid out with much taste.

Moscow is divided into—1. The central part, containing the Kremle or Kremlin. 2. The Kitai-Gorod or Chinese town. 3. The Beloi-Gorod, or white town, surrounding the central part. These divisions lie on the north or convex side of the Moskwa, like a crescent. 4. The Zemlianoi-Gorod, or earthen town, so called from the earthen ramparts with which it is surrounded. This part encloses the preceding parts on the north side of the river, but extends to the south side, so as to fill up the circle. 5. The Slobodi, or suburbs, which are 35 in number.

The view of Moscow at a distance has excited the admiration of all travellers. The countless number of towers, some with cupolas either gilt or painted green, and others rising in the form of minarets, and the many gardens and trees intermixed with the houses, give the city quite an Oriental appearance. The number of towers in Moscow is said to be 600, nearly every church having several, besides the steeple. They have in general, like most Russian churches, a peculiar appearance, being surmounted with what we have called cupolas or domes, but which the Russians call glavas or heads, which are in the form of a bulb or onion, not unlike those of the Pavilion at Brighton; on the top is a crescent, with the cross above it. With a general similarity of appearance, the forms of the towers vary considerably, striking the eye by the irregularity of their forms and their gay diversity of colours. It is to those towers in particular that Moscow owes its remarkable appearance. They are all of stone, and most of them situated in open squares, in consequence of which they escaped the fire of 1812. Hence Moscow has lost little or nothing of its original aspect by that fire, especially as the part of the Kremlin which was blown up by order of Napoleon has been rebuilt in the same style. The roofs of the houses are composed of iron plates, painted dark green, so that at a distance they are lost among the tall groups of trees which rise from the gardens. The gilded cupolas are in general relieved by the green background. The best view of the city is from the Ivan Velikii, or great tower of Ivan in the Kremlin, which is in the centre of the city. Before we say any more of the present state of the city, it may be as well to revert to the fire, by which so large a portion of it was destroyed during the invasion in 1812. After all that has been said and written on the authors of this dreadful conflagration, it seems now to be generally allowed that it was contrived by the Russians themselves. Count Rostopschin, the governor of Moscow, who was generally looked upon as the author of it, never acknowledged it, and even published, in 1823, a pamphlet which he called 'La Vérité sur l'Incendie de Moscow,' in which he positively denies that he had any share in it. But it must be remembered that the destruction of the city served the Russian cause in two ways: by depriving the French of the immense resources which they would have found there; and by inflaming the passions of the people against the invaders, who were represented as the destroyers of the holy city. Several Russian writers have since partly acknowledged that the Russians were the authors of the fire. The French are unanimous in ascribing it to them; and in fact no motive can be assigned for the destruction of the city by the French, at least before they had plundered it. It is probable that the Russians themselves never considered the burning of Moscow in the same light as the nations of Western Europe. Devastating fires have been common occurrences in the history of Moscow, from its foundation to the beginning of the nineteenth century, and though many accounts of such visitations in the earlier periods are doubtless lost, we have accounts of no fewer than seven conflagrations, which totally destroyed the city, and most of which were the work of foreign invaders. Accordingly we may easily understand why the Russian writers look on the last burning of the capital not as a crisis giving a turn to the course of the war, but as a concomitant event of subordinate importance. Perhaps they consoled themselves with the reflection that it had always risen from its ashes with increased splendour and beauty, as it has in fact done in the present instance. With respect to the extent of the destruction, it appears that Moscow contained nearly 10,000 of what are called numbers or courts, each consisting of a principal house and two or more dependent outbuildings. Of these, about 7000 courts were destroyed. Some say that of 2600 stone houses only 525 escaped, and of 6000 wooden houses only 1797 were left. 'Innumerable palaces,' says Dr. Lyall, 'crowds of noble mansions, and thousands of houses, bazars, shops, and warehouses, containing the wealth and luxuries of the world, the depositories of science, of literature, and taste, the cabinets and galleries, were destroyed. The total loss by fire and the war in the city and government of Moscow was estimated at 321 millions of rubles. The government appointed a commission of indemnity, but several rich individuals did not present any statement of their losses. Thus the loss sustained by the two counts Rasumowsky, by Count Apraxin, by Count Boutourlin, whose library, valued at a million, was wholly consumed, and by Countess Rostopschin, amounted in houses and furniture to five millions of rubles. But immense and irreparable as the mass of individual suffering undoubtedly was, the memory of it gradually fades away as the Russians see their venerated city rise with increased beauty from its ruins.' We cannot here trace the rapid progress of renovation and improvement since the year 1815, which has so greatly changed the appearance of Moscow. 'The extraordinary mixture and contrast of magnificent palaces and petty huts, so often noticed by foreigners, though still occurring in a few places, no longer strikes the eye as formerly; Moscow is daily losing its Asiatic features, and assuming the appearance of the capitals of Western Europe. Happily for the lover of venerable antiquity, the Kremlin, which suffered comparatively little, notwithstanding the attempts of the French to blow it up, retains unimpaired its antient irregularity and grandeur.' (Lyall.)

According to the latest detailed account that we have obtained, Moscow contained in 1835 above 10,000 houses, of which more than 2000 were of stone, seven cathedrals, 21 monasteries, 245 Greek, 2 Roman Catholic, and 3 Protestant, besides 2 English churches, 3 Armenian chapels, and a Turkish mosque. The emperor Alexander had intended to build on the Sparrow Hill a church to our Saviour, and he actually laid the first stone in 1817. This prodigious edifice was to consist of three distinct churches one above the other, and the total height to be 770 feet, but the design has been abandoned by the present emperor, who ordered a large infirmary to be built instead.

I. *The Kremlin.*—The Kremlin, which was first built of stone in 1367, in a commanding situation on the banks of the Moskwa, taken as a whole, is a most singular, beautiful, and magnificent object. It is surrounded with walls from 12 to 16 feet thick, and of different heights, 28, 30, 35, 45, and 50 feet, with battlements, embrasures, numerous towers, and five gates. The palace contains what remains of the antient palace of the Czars, and the new palace, founded in 1743, burned in 1812, rebuilt in 1816, and since that time successively altered and enlarged. It is not remarkable for its architecture or magnificence. The cathedral of the Assumption of the Virgin, founded in 1326, is esteemed the most splendid in Moscow. It is by no means a large edifice compared with the cathedrals of other countries, but the interior is adorned with extraordinary profusion and splendour. Besides numerous paintings, representing events in the life of our Saviour, there are on the walls 249 full-length images, and 2066 half-lengths and heads, of angels, apostles, saints, martyrs, male and female sovereigns, and patriarchs. Many highly venerated relics are preserved in this cathedral. The Russian sovereigns are here crowned and anointed. The cathedral of St. Michael contains the tombs of the Russian sovereigns, the grand-dukes and czars, from the time that Moscow became the capital till the death of Peter the Great, and, besides those of many male members of the imperial family (the females are deposited elsewhere), that of Peter II. The cathedral of the Annunciation is smaller than the preceding, but built in better taste, and being splendidly ornamented, is a pleasing and magnificent object, forming as it were a wing to the palace. The cathedral of the Transfiguration is a very plain and nearly square edifice, founded in 1328, and rebuilt in 1527. Including the cathedrals, there are 32 churches in the Kremlin.

After the cathedrals, the Ivanovskaya belfry claims attention for its size, its elegance, and magnificent appearance. When the French took Moscow in 1812, they blew up the whole of this belfry, which was laid in ruins, except the tower called Ivan Velikii, which was rent from top to bottom and otherwise injured. Napoleon caused the cross, which was highly venerated by the Russians, to be taken down, intending to place it as a trophy on a church in Paris, but it was left behind in the retreat. The belfry has been entirely rebuilt nearly in the same style as before, but it is now more beautiful and splendid. This tower is 269 feet 6 inches high from the bottom to the top of the cross, which is 18 feet 8 inches. Besides many other bells, there is in this belfry the celebrated bell said to be the largest in the world. It was cast in 1736, but fell in consequence of a fire in 1737, and is now sunk by its weight to some depth in the ground. It has been said to weigh 480,000 lbs., but an inscription states the weight at 10,000 poods, or 360,000 lbs. English. The Kremlin contains likewise the imperial museum, the arsenal, the palace of the patriarch, the Chadof monastery, and the Vosnesenskoi nunnery, in the cathedral belonging to which a great number of grand-duchesses and empresses are interred. It now contains the crowns, sceptres, thrones, arms, and drinking-vessels of the grand-dukes and czars, forming a collection partly valuable for antiquity and workmanship, and partly for the jewels with which the several articles are adorned. The value is said to exceed even that of the treasures in the Jewel-office of London.

II. The *Kitai-Gorod*, surrounded by a wall with 12 towers and 5 gates, is properly the city. The houses, which are mostly of stone or brick, are built close to each other, contrary to the usual mode. It is the centre of the trade of Moscow; and contains the bazars, the magazines, and the richest shops. Among the public buildings are—1, the Pokrovskoi cathedral, built in 1554, which was originally so constructed as to have nine separate churches or chapels, to which eleven more have been since added, so that there are now twenty-one places of worship joined together, in which divine service may be performed at the same time. 2. The house of the town council, a handsome edifice, formerly the university. 3. The printing-office of the holy synod, a very fine building, in which there are thirty presses for printing ecclesiastical books in Slavonian, and books in Greek, Latin, French, and German, for the spiritual schools under the synod. The Kitai-Gorod contains the splendid monument erected by the emperor Alexander in honour of Minin and Pogarskii, who delivered the country from usurpers and foreign invaders in the seventeenth century, and placed on the throne Michael Romanof, the first sovereign of the reigning family. This monument consists of the colossal bronze statues of the two heroes, fourteen feet high, on a pedestal of a single block of red granite, adorned with bas-reliefs. It was designed by M. Martos, an eminent Russian artist.

III. The *Beloi-Gorod*, or white town, the third grand division of the city, forms above two-thirds of a circle, enclosing the Kremlin and Kitai-Gorod on the north side of the Moskwa river, which forms the southern boundary of these divisions. Besides many fine palaces of the nobility, the Beloi-Gorod contains several remarkable edifices, such as the university, the medico-chirurgical academy, the foundling-hospital, the post-office, college of foreign affairs (which might be called the state-paper office), the residence of the governor-general, the exercise-house, the assembly-rooms of the nobility, three monasteries, three nunneries, and numerous churches. The palace of the governor stands in a fine elevated situation, and is a princely edifice of three immense stories, besides the basement, in a simple style of architecture. The internal arrangement, the size and elegance of the apartments, as well as the rich furniture and decorations, correspond with the external magnificence of the building. The university suffered severely in consequence of the French invasion, before which it was very flourishing. The fine library, and valuable collection of all kinds, fell a prey to the flames. The building has since been repaired, and great exertions made to replace the collections. The number of professors and students has varied very considerably; there were in the years

	Professors and Masters.	Students.
1808	49	135
1824	59	820
1830	79	754
1831	78	814
1832	78	719
1833	117	531
1834	168	456
1835	120	419

The exercise-house, an enormous edifice, was built in 1817. In Russia, where the cold in winter is so severe, and the heat in summer frequently so intense, the inconvenience and sometimes the impossibility of training and exercising troops out of doors render such buildings as this absolutely necessary. The government has therefore provided both the capitals and some of the chief towns with these edifices. This at Moscow is, we believe, the largest in Russia. It has two fronts precisely similar, and two similar ends. The length of each front is 560 feet, and the breadth of each end 168 feet; the height is 43 feet. Each front has 32 and each end 8 plain Ionic columns, with fine arched windows between, the frames of which, and the doors of oak, not painted, make an agreeable contrast with the white walls. In this building 2000 infantry and 1000 cavalry may be exercised at the same time. It was designed by Lieutenant-General Betancourt, and the execution of the plan superintended by General Charbonnier. The roof rests entirely on the walls. The foundling-hospital, founded in 1763, is an immense quadrangle, four stories high, besides the basement. It is situated on the north elevated bank of the Moskwa, and on the west side of the Yausa. It is a very plain and inelegant edifice. It is said that it has been productive of great benefit in Moscow in preventing the crime of infanticide, which was very prevalent in Moscow, where that and the barbarous practice of exposing children are now unknown. It is to be regretted that no lists of the mortality are published. Storch could procure none. Dr. Lyall could only obtain a Report, dated January, 1819, from which it appeared that the number of foundlings out of the hospital was 7642, and in the hospital 1138—in all 8780; t in the preceding year 4340 had been received, being an average of very nearly 12 in a day. The assembly-house of the nobility is a large pile of building, or rather a number of buildings, the effect of which is not agreeable. The interior is fitted up with great splendour: the grand hall is large enough to contain 2000 persons. It was burnt in 1812, and has since been rebuilt: the emperor contributed 100,000 rubles. The palace of General Apraxin far exceeds in length any other private edifice in Moscow; it was almost totally consumed in 1812, but was rebuilt with remarkable rapidity. The palace of Pashkof is reckoned one of the finest specimens of architecture in Moscow. The college of mines, the college of foreign affairs, containing an immense mass of valuable state papers, perfectly well arranged, among which are several English state papers, splendidly ornamented, from 1557 (Philip and Mary) to 1663 (Charles II.), the post-office, and the house of the Bible Society, are more remarkable for their use than for their style of architecture. Several of the churches and monasteries are worthy of notice.

IV. The *Zemlianoi-Gorod*, or earthen town, was so called from the earthen rampart, which was erected in 1618; but of which, though it was repaired in 1783, not a trace now remains. This rampart, forming a pretty regular circle, enclosed the four divisions of the city. In its place there are promenades planted with trees. In this division are the dépôt of the commissariat, a handsome building, consisting of a large central structure three stories high, adorned with Doric columns, with a balcony at their base, and two wings. The dépôt for spirits, which occupies an immense space forming two squares, is chiefly remarkable for its length and its use, it being the dépôt for the spirits, or votke, made at the distilleries belonging to the crown, and from which all Moscow and the neighbourhood are supplied. The Imperial Philanthropic Society, the Moscow Commercial School (an excellent institution), are plain edifices; the Medico-Chirurgical Academy is a large building three stories high, with a portico of six Doric columns, and has two detached advanced wings. It possesses a very respectable anatomical museum, and a fine collection of specimens from the three kingdoms of nature. The Zatchateisko monastery is a great ornament to this part of the city. This monastery derives its name from the church dedicated to the *Zatchatiyé*, or conception of St. Ann, a handsome building in the Gothic style, the interior of which is very elegant and splendid.

V. The *slobodi*, or suburbs, thirty-five in number, form an immense ellipse, or rather irregular polygon, completely surrounding the Zemlianoi-Gorod. Part of the suburbs, like the Zemlianoi-Gorod, consist of a mixture of stone and wooden houses, intermixed with superb mansions and mean hovels; but many of them are like villages, with much unenclosed pasture, some corn-fields, and waste land. In many parts of this division a stranger might fancy himself as far from Moscow as from London. Many of the monasteries and churches in the suburbs are worthy the attention of visitors. It is to be observed that a Russian monastery occupies a large piece of ground, which is surrounded with high walls, enclosing, besides the monastery, a principal central church, and three, four, five, six, or even more churches. Galitzin Hospital is a very fine building, and a noble institution, founded at the end of the eighteenth century by Prince Galitzin. Sheremetof's Hospital is an extensive, noble, and magnificent edifice, resembling a fine Grecian temple. Count Nicholas Sheremetof, desiring to erect an hospital at Moscow, obtained an ukase of the emperor Alexander in 1803, approving the plan. The sum allotted to the building and support of the establishment was two millions and a half of rubles, which, at that time, might be equal to at least 150,000*l.* sterling. The count died in 1809, and the institution was opened in 1810 with 180 beds. His son added 40 beds more. Since that time further additions have been made. The establishment is not merely for the relief of the sick: a large annual sum is assigned for other charitable purposes, such as giving portions to twenty-five female orphans, allowing pensions to fifty indigent females, &c. There are many other hospitals and infirmaries. The chief military hospital is an immense establishment, founded by Peter the Great, and capable of receiving 1500 patients. A fine building, now called Catharine's Barracks, was a magnificent palace, built by the empress Catharine II. It was converted into barracks by the emperor Paul.

Moscow is the residence of two archbishops, and contains, besides the several government offices and public institutions specified in this article, the most important manufactories in the empire. It is the centre of the whole internal trade, and is the depository of immense quantities of merchandise of every description. The value of articles imported here amounts to five millions of rubles in a year. It is also the residence of the great Russian nobles, who live here, especially in the winter. On the whole, Moscow is one of the richest and most magnificent cities in the world, and that in which the national manners and the character of the people have been least changed. The population, which has been variously stated, is supposed to amount to 340,000, including the military (25,000); in the winter this number is increased by 50,000 or 60,000 more.

(Lyall, *History of Moscow;* Hassel; Hörschelmann; Erman, *Reise*, vol. i., 1833; Humboldt, Ehrenberg, and Rose, *Reise nach dem Ural*, &c., vol. i., 1837; Krusenstern, *Précis du Système de l'Instruction publique en Russie*, 8vo., 1837.)

P.S. Since the above was written, we have seen a letter from Moscow, dated the 1st of August, stating that the emperor has caused the antient palace of the Czars to be thoroughly repaired, gilded within and without, and furnished as nearly as possible conformably to antient chronicles and traditions: he has caused the palace of Alexander, after scarcely twenty years' existence, to be levelled with the ground, and a new palace of immense dimensions to be commenced opposite to the old palace of the Czars, which is to form a part of it. As many thousand workmen are constantly employed, it is probable that the work will soon be completed. Another gigantic work is the building of a magnificent church for all Russia, instead of that which the emperor Alexander intended to erect on the Sparrow hill.

MOSELLE, an important river belonging to the system of the Rhine, which has the upper part of its course in France, and the lower on the border of Luxembourg, and in the Rhenish provinces of Prussia. The Moselle rises on the western slopes of the Vosges, near the southern extremity of that range, at an elevation of 372 French toises, or about 2380 English feet, above the level of the sea. At first its course is in the mountainous tract occupied by the ramifications of the Vosges; but at Charmes, below Epinal, it enters the great plain of Lorraine, which is wholly watered by this river and its tributaries, of which the principal are the Meurthe and the Seille, both on the right bank. The course of the Moselle is at first north-north-west for 87 miles to Toul: from Toul it flows north-east in a winding channel of 17 miles to the junction of the Meurthe, where the navigation commences. From the junction of the Meurthe it flows north, or north by east, 56 miles, till it quits France, and, after skirting Luxembourg, enters the Prussian territory. After leaving France it flows 118 miles in a winding channel north-east past Trèves, Berncastel, and Trarbach, to its junction with the Rhine at Coblenz. In the Prussian territories it receives its principal tributary, the Sarre, which is partly a French river. The whole course of the Moselle is about 280 miles, for 170 or 180 of which it is navigable.

The Moselle is subject to frequent inundations, which cause considerable damage. It is used for floating timber for 85 miles above the junction of the Meurthe. The navigation, especially in the French part of the river, is subject to considerable difficulties; in some parts, from the rocks which straiten the channel; in others, from the shallows produced by too great an expansion of the waters: with all these impediments however it serves as the outlet for the produce of a considerable district, especially for timber and deals, charcoal, pit-coal, freestone, slate, corn, wine, and manufactured goods.

MOSELLE, a department of France, on the north-eastern frontier; bounded on the north and north-east by the grand-duchy of Luxembourg and the Rhenish provinces of Prussia, on the south-east by the department of Bas Rhin, on the south by that of Meurthe, and on the west by that of Meuse. Its form is that of an irregular oblong, having its greatest length from west by north to east by south, from near Longuion, on the Chiers, to the neighbourhood of Bitche, amid the slopes of the Vosges, 104 miles; and its greatest breadth, at right angles to the length, from the bank of the Seille, below Nomeny (Meurthe), to the neighbourhood of Sierk, on the Moselle, 41 miles. It lies between 48° 55′ and 49° 33′ N. lat., and between 5° 28′ and 7° 43′ E. longitude.

The area of the department is estimated at 2063 square miles, which is considerably below the average area of the French departments, and is a little greater than the area of the English county of Norfolk. The population in 1831 was 417,003; in 1836 it was 427,250, showing an increase in five years of 10,247, or about 2·5 per cent., and giving 207 inhabitants to a square mile. In amount and density of population the department is considerably above the average of France, and in both respects rather above the English county with which we have compared it. Metz, the capital, is in 49° 6′ N. lat. and 6° 12′ E. long., 172 miles in a direct line east by north of Paris, or 191 miles by the road through Châlons-sur-Marne and Verdun.

The highlands of the department are at the extremities. The eastern extremity is traversed by the chain of the Vosges, and the western by the heights of Ardennes, which are not so elevated as the Vosges. The intermediate part belongs to the broad valley, or rather plain, of Lorraine, which is watered by the Moselle and its tributaries. The Vosges consist in this department not of the primitive rocks, but of the formations which overlie them, to the new red or saliferous sandstone inclusive. The rest of the department is occupied by the formations superior to these, and which intervene between the red-sandstone and the chalk. The minerals are iron, the ores of which are found in every part, but not always in sufficient quantity to make them worth working; copper and lead, the mines of which have been abandoned; coal; rock salt, in which some mines are wrought; manganese; abundance of gypsum; excellent freestone; together with sandstone, quartz, limestone, potters' earth, and crucible clay. The principal mines of iron-ore are in the arrondissements of Briey and Thionville. There are in the department eighteen establishments for working iron: in these establishments are fifteen furnaces for making pig-iron, in eleven of which charcoal alone is used; in four, charcoal mixed with coke or other fuel; sixty-nine forges for making wrought-iron; and three for the manufacture of steel. There is one coal-pit in the department, which, a few years since, gave employment to 160 or 170 persons, three-fourths of them in the mine, and produced annually nearly 900 tons of ordinary coal: in 1835 the produce rose to more than 3000 tons.

The department is included almost entirely in the basin of the Moselle: a few of the streams which rise on the eastern slopes of the Vosges, and flow immediately into the Rhine, have their sources just within the eastern boundary of the department; and the Chiers, and its tributary, the Crune, which belong to the system of the Meuse, water the western part. The Moselle enters the department on the south, near Pont-à-Mousson, and flows northward, 41 miles through the department, by Metz, Thionville, and Sierk. It is navigable in all this part. The Sarre, the principal tributary of the Moselle, enters the department on the south side, but soon after quits it for the department of Bas Rhin; and entering again, crosses the department into the Prussian territory, but at a considerable distance to the eastward of the Moselle. The navigation of the Sarre commences soon after it passes the southern boundary, at the junction of the Albe, which also belongs in great degree to this department. Two other tributaries of the Sarre, the Rossel and the Nied, which latter is formed by the junction of two streams, called respectively Nied Française and Nied Allemande, belong almost entirely to this department; also the Ornes, a feeder of the Moselle. The Seille, which joins the Moselle at Metz, has the greater part of its course in the department of Meurthe. The navigation of the Moselle is given in the official accounts at 50 miles; that of the Sarre, at 22 miles. The Canal des Salines, which was formed to convey the produce of the salt-works of Meurthe to the Sarre, has part of its course in this department. It follows the valley, first of the Rode, a small feeder of the Albe, and then of the Albe itself till its junction with the Sarre. There are a considerable number of pools or small lakes, and some marshes.

The number of Routes Royales, or government roads, is twelve; their aggregate length (Jan. 1, 1837) was 276 miles, viz. 231 miles in repair, 26 miles out of repair, and 19 miles unfinished. The principal road is that from Paris to Metz, and from thence onward into the Prussian and other German states. It enters the department on the south-west side, and runs first east, and then east-north-east, by Metz, Sarreguemines, Hombourg, and Forbach. The road from Paris to Luxembourg crosses the western side of the department through Longuion and Longwy. Roads run from Metz to Longwy, with a branch to Thionville; to Sarrelouis in the Prussian states; to Nancy and to Château Salins, in the department of Meurthe. There are roads from Sarreguemines by Château Salins to Nancy, by Saar Union (Bas Rhin) to Phalsbourg (Meurthe), and Strasbourg (BasRhin); and to Sarrebruck, in the Prussian territory. The Routes Départementales, or departmental roads, had (Jan. 1, 1837) an aggregate length of 216 miles, viz. 182 in repair and 34 out of repair. The aggregate length of the bye-roads and paths (chemins vicinaux) was above 3000 miles. In the means of communication, both by land and water, this department is better provided than the French departments generally are.

The temperature of the department varies with the elevation of the surface: in the plain of the Moselle it is mild; in the hilly and mountainous tracts the cold is of longer duration and more severe. In the neighbourhood of Sarreguemines and of Bitche, amid the Vosges, the snow lies long on the ground, and the transition from winter to summer is very rapid. Agriculture is better understood and practised in this department than in most parts of France, and the peasantry are distinguished by their activity and superior knowledge. Fallows are gradually passing into disuse; and the employment of marl, and especially gypsum, as manure, is common. About 750,000 acres, nearly three-fifths of the whole surface, are under the plough. The quantity of wheat raised exceeds by a third the average produce of the French departments; and in barley, oats, rye, and maslin (or mixed corn), the preponderance is about the same; but from the number of horses, the supply of oats is not sufficient to meet the demand. A considerable quantity of pulse is grown; also of flax and hemp; and of linseed, rape, and colza, from which abundance of oil is produced. Potatoes are cultivated, but not so extensively as in other parts; maize is little grown, and buckwheat not at all. About 30,000 acres are occupied as orchards or gardens, especially the former; and some villages are so surrounded by orchards, that they appear as if built in a wood. The melons, peaches, pears, and especially the Mirabelle plums of Metz, are in high repute. The drying of the fruit, and the preparation of confectionary and syrups from them, is an important branch of industry. The nursery-grounds of the department are in high repute, and young trees are sent to a considerable distance. The vineyards occupy about 13,000 acres. The wine is chiefly of middling quality, the vignerons (vine-dressers) finding their account in the production of a large quantity of ordinary wine, from the hardy Lorraine grape, rather than in the uncertain vintage of grapes which, though they produce better wine, are less able to withstand the frosts of winter and spring. Some of the growths are however fine, and are sent into Germany; the commoner sorts are consumed at home. The quantity of woodland is consider, able, about 230,000 acres, and affords a supply of fuel for domestic use, and for the iron and other works: the trees are chiefly, oak, beech and hazel: a considerable trade is carried on in walkingsticks, made from the thorn and the cornel.

The meadow-land amounts to 110,000 or 120,000 acres: a small portion of it is devoted to the cultivation of the artificial grasses. The number of horses is more than twice as great as in the average of the departments, but they are of a very ordinary breed. The number of horned cattle is rather above the average; but they are of small size, and do not readily fatten. The number of sheep is comparatively small, and the breed for the most part very inferior. Considerable efforts have however been made of late years for its improvement: the Merinos have been introduced on the model farm of Moncey, in the arrondissement of Briey; and the English breeds and the Cashmere goat in some other establishments. Swine are numerous; their flesh affords a substitute for the deficient supply of beef. Bees are pretty extensively kept.

The forests abound with game: the wild boar is rarely found; but the roebuck and the hare, as well as the wolf, the fox, and wild cats, are common. Redbreasts abound in the neighbourhood of Metz, where they are taken in autumn in great numbers, being esteemed a delicacy. The rivers abound with fish; the Sarre and the Moselle yield the salmon and the shad, which ascend them thus far. the crayfish of the Sarre are excellent.

The department is divided into four arrondissements as follows:—

		Area in sq. Miles.	Population in 1831.	Population in 1836.	No. of Communes.
Metz,	S.	622	150,840	150,811	218
Thionville,	N.	405	83,227	87,520	117
Briey,	W.	459	60,297	62,946	126
Sarreguemines,	E.	577	122,639	125,973	143
		2063	417,003	427,250	604

The number of cantons or districts, each under a justice of the peace, is twenty-seven.

In the arrondissement of Metz are—Metz (pop. in 1831, 44,416 for the commune; in 1836, 42,793), on the Moselle; Gorze (pop. 1740 town, 1781 commune), at some distance from the left bank of that river; Boulay (pop. 2643 town, 2689 whole commune), near the Nied; and Faulquemont, on the Nied Allemande. Gorze is in a narrow valley of the most picturesque character. It has several fountains, supplied by springs in the town. There are several tan-yards at Gorze. There are the ruins of an old abbey, and of the abbot's house; also of some subterranean conduits of Roman erection, which convey the waters of this neighbourhood to the aqueduct which ran from the neighbourhood of the Roman fortress of Arx (now Ars-sur-Moselle) across the Meuse, and then to Divodurum (now Metz), where it furnished a supply of water to the baths and naumachia. Of this aqueduct there are considerable remains, partly in the bed of the Moselle, and partly on the right bank, near the village of Jouy: the foundation of it is ascribed to Drusus by antiquaries, but the popular name is the Devil's Bridge. At the village of Ars, just mentioned, are two paper-mills, a manufactory of velvet, and one of woollen cloth for clothing the troops. Boulay has considerable manufactures of swords and bright steel weapons; of saws, anvils, and all kinds of joiners' and locksmiths' tools; of cotton yarn and woollen cloths; of copperas, alum, soap, and glue. There are also breweries, lime-kilns, fulling-mills, oil-mills, dye-houses, and tan-yards, besides a mill for grinding plaster, and two mills for grinding cutlery and tools.

In the arrondissement of Thionville are—Thionville (pop. in 1831, 4142 town, 5645 whole commune; in 1836, 5680 for the commune) and Sierk (pop. 1624 town, 2028 whole commune), on the Moselle; Rodemarck, a short distance from the left bank of that river; and Bouzonville (pop. 1817 town, 2325 whole commune), on the Nied. Thionville was probably founded in the eighth century. It was fortified by the Spaniards, from whom it was taken by the Prince of Condé, after the great battle of Rocroy, A.D. 1649. It is a fortress of some strength, on the left bank of the river, and was vainly besieged by the Prussians in A.D. 1792. It has an old wooden bridge remarkable for the facility with which it can be taken down. There are in the place several potteries and brewhouses, two corn-mills, two bark-mills, and an oil-press. There is a school of mutual instruction; courses of instruction are given in geometry and mechanics applied to the arts.

Sierk is situated at the foot of a rocky eminence, crowned by a fortress. This place has several tan-yards; glue is made, and stones for oil-mills and presses are cut from one piece. The stone with which Metz is paved is quarried near this town. Sierk is the mart for the hardwares and laces of the duchy of Berg, the silks of Crevelt, the needles of Aix-la-Chapelle, and the copper wares of Stolberg. There is a custom-house (the town being close on the frontier), the revenue collected at which is above 50,000*l.* per annum.

At Bouzonville are corn-mills and oil-presses, several tan-yards, glue manufactories, and cabinet-makers' shops; a brewery, and two lime-kilns. There are a school for mutual instruction and an outline drawing-school. At Cattenom, a village between Thionville and Sierk, is held the principal cattle-fair of this district, and at Hayange, Moyeuvre Grande, and other villages in the neighbourhood of Thionville, are the vast iron-works established by the late M. Wendel, for the preparation of iron by the English methods.

In the arrondissement of Briey are—Briey (pop. in 1831, 1755 commune; in 1831, 1730), on the Woigot, or Voigot, a small feeder of the Ornes and Longwy (pop. 2483), and Longuion or Longwyon (pop. 1612), on or near the Chiers. Briey consists of several narrow streets on the slope of a steep hill, and commands the prospect of a pleasant valley, well wooded and watered. Longwy consists of two parts, the upper and lower town. The upper town is on a rock, and was fortified by Vauban. In the lower town there was antiently a fortress, on the site of which Roman medals have been dug up. It has been supposed that the town occupies the site of a Roman camp. The principal square is large and regularly formed; the principal public buildings are the town-hall and the hospital. The inhabitants have an oil-press and a brewery; they manufacture earthenware from pipe-clay, and trade in hams and bacon. Longwy was besieged by the Prussians in 1815, and though garrisoned only by 200 soldiers, was not taken without the loss of 3000 men. There is a school of mutual instruction.

In the arrondissement of Sarreguemines are—Sarreguemines (pop. in 1831, 4142 town, 4189 whole commune; in 1836, 4113 for the commune) and Sarralbe (pop. 2302 town, 3544 whole commune), on the Sarre; Morhange, near the Rotte, which flows into the Nied Française; Petelange, or Puttelange (pop. 1797 town, 2290 whole commune), on a feeder of the Albe; St. Avold (pop. 3298 town, 3451 whole commune) and Hombourg, on the Rossel; Forbach (pop. 2958 town, 4281 whole commune), between the Rossel and the Sarre; and Bitche (pop. 2867 town, 3132 whole commune), amid the slopes of the Vosges. Sarreguemines is a well built town; its principal street leads to the bridge over the Sarre. There are considerable potteries here, in which earthenwares of every quality are manufactured, and sent to Paris, Strasbourg, Nancy, and other places. Admirable imitations of the Etruscan vases, and an artificial porphyry of great beauty, are made here. Snuff-boxes of papier-maché are made round this town to the yearly value of more than 30,000*l.* There are several corn-mills and breweries, a bark-mill and a tile-kiln. There is a high school at Sarreguemines. Sarralbe derives its name from its situation at the confluence of the Sarre and the Albe. The inhabitants manufacture linen; the weavers work, not in factories, but, as in Ireland, in their own houses. Near the town are salt-works which furnish annually 900 to 1000 tons of salt. Near St. Avold are several flour-mills and a tile-kiln. Bitche is built at the foot of a rock of red-sandstone, on which is situated a fortress deemed impregnable. The ascent to the fortress up the face of the rock is very steep, and the whole interior of the rock is vaulted and formed into casemates. There is a well dug in the rock 270 feet deep and protected by a bomb-proof covering. There are in the town an hospital, a small barrack, and three public walks; it is surrounded by a wall with battlements. In the war of 1792-3 the Prussians attempted in vain to surprise the fortress of Bitche. Several of the villages in the country round Bitche are the seat of considerable manufactures; the iron-works of Monterhausen employ 400 workmen; and at the glass-works of Maisenthal and Goetzenbruck, watch and clock glasses, to the annual value of 8000*l.*, are manufactured; and the flint-glass works of Munsthal produce goods to the yearly value of 24,000*l.* or 25,000*l.*

The manufactures of the department are various and important. Cloth, especially for army clothing, flannel, and various other woollen fabrics; linens, calicoes, velvet, silk neckerchiefs, and other silk goods, hats, paper, and snuff-boxes are made. Beside the works for making pig or wrought iron, there are factories for making iron goods, as nails, saw-plates, files, rasps, and other tools, and steel ornaments. There are several glass-works, potteries, tan-yards, breweries, and brandy distilleries; many kilns for lime and gypsum, and mills for pulverising the latter. About 800 women are employed in embroidery and tambour-working. The exports consist of the productions of these several works, wine, wool, timber, preserved fruits, liqueurs, honey, hams, and bacon.

The department constitutes the bishopric of Metz, the bishop of which is a suffragan of the archbishop of Besançon. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Metz; and in the third military division, of which the head-quarters are at Metz. It returns six members to the Chamber of Deputies.

In respect of education this department is considerably in advance of the average of the French departments: but is inferior to the adjacent departments of Meuse, Meurthe, and Bas Rhin. Of every 100 young men enrolled in the military census for 1828-29, 57 could read and write. The number in the other departments was, Meuse 74, Meurthe 68, Bas Rhin 62; average of France 39.

This department antiently constituted part of the territory of the Mediomatrici, whose capital was Divodurum, afterwards Mediomatrici or Mettis, now Metz, and of the territory of the Verodunenses and the Treveri or Treviri. These people were, in the Roman division of Gaul, comprehended in the province of Belgica Prima. The Romans called the Moselle, Mosella (*i.e.* the little Meuse, a diminutive of Mosa, the Meuse), and the Sarre, Saravus. In the territories of the Mediomatrici, beside Divodurum, were—the town of Ibliodurum, which D'Anville fixes on the river Yron, on the border of this department and that of Meuse; Caranusca, somewhere near Thionville; and Ad Duodecimum, on the border of this department and that of Meurthe. There do not appear to have been any other Roman or Gallic towns mentioned by antient authors within the boundary. From the Romans the department passed to the Franks; in the middle ages it was known as part of the country of Les Trois Evêchés; and before the Revolution was included in the province of Lorraine.

MOSES (מֹשֶׁה, Μωυσῆς, Μωσῆς), the lawgiver of the Hebrew people, was an Israelite of the tribe of Levi, and the son of Amram and Jochebed (*Exod.*, ii. 1; vi. 20). He was born in Egypt, in the year 1571 B.C., according to the common chronology. To evade the edict of Pharaoh, the king of Egypt, that all the male children of the Hebrews should be killed (*Exod.*, i. 22), he was hid by his mother three months, and then exposed in an ark of rushes on the banks of the Nile. Here the child was found by Pharaoh's daughter, who adopted him for her son, entrusting him to his own mother to nurse, by which circumstance he was preserved from being entirely separated from his own people. He was probably educated at the Egyptian court, where he became 'learned in all the wisdom of the Egyptians.' (*Exod.*, ii. 1-10; *Acts*, vii. 20-22; *Heb.*, xi. 23.) At the age of forty years Moses conceived the idea of freeing his Hebrew brethren from their bondage in Egypt, and on one occasion, seeing an Egyptian (probably some officer) maltreating an Israelite, he interfered, slew the Egyptian, and buried him in the sand. The next day, upon his attempting to reconcile two Hebrews who had quarrelled, his services were scornfully rejected, and he was upbraided with the murder of the Egyptian. Finding that his secret was known, he fled from Egypt, and took refuge with a tribe of Midianites in Arabia Petræa [MIDIANITES], among whom he lived as a shepherd forty years, having married the daughter of their priest Jethro or Reuel. (*Exod.*, ii. 11-22; *Acts*, vii. 23-30; *Heb.*, xi. 24-27.)

As Moses fed his father-in-law's flocks in the desert of Sinai, God appeared to him at Mount Horeb in a bush which burnt with fire, but was not consumed—an emblem of the state of the Israelites—and commanded him to return to Egypt and lead out his people thence into the land of Canaan. His elder brother Aaron was joined with Moses in this mission, and the power of working certain miracles was conferred upon him. On his arrival in Egypt, the Israelites accepted him as their deliverer, and after bringing ten miraculous plagues upon the land of Egypt before he could gain Pharaoh's consent to the departure of the people, he led them out through the Red Sea, which was miraculously divided for their passage, into the peninsula of Sinai. (*Exod.*, iii., xv.) [EXODUS; JEWS.] While the people were encamped at the foot of Sinai, God delivered to them, through Moses, the law which, with some additions and alterations, was ever after observed as their national code. (*Exod.*, xx.) After leading the Israelites through the wilderness for forty years [JEWS], Moses appointed Joshua as his successor in the command over them, and died at the age of 120 years, on Mount Pisgah, on the east side of the river Jordan, having first been permitted to view the land of Canaan from its summit. God buried him in the valley of Bethpeor in the land of Moab, but his tomb was never made known. (*Deut.*, xxxiv.; *Jude*, v. 9.)

The following points in the history of Moses require further explanation.

1. The name of Moses (מֹשֶׁה) was given him by the Egyptian princess, 'because,' she said, 'I *drew him out* (מְשִׁיתִהוּ from מָשָׁה *to draw out*) of the water.' (*Exod.*, ii. 10.) Now, under the circumstances of the case, the name is much more likely to be Egyptian than Hebrew, and its real derivation is probably that given by Jablonsky (*Opuscula*, i. 152-7), from the Coptic *Mo*, 'water,' and *Oudsche*, 'saved.' This is confirmed by the form Μωυσῆς, which is always used in the Septuagint, and by the testimony of Josephus (*Antiq.*, ii. 9, 6) and Philo (*De Vita Mosis*, ii. 83).

2. The gap left by the Scripture narrative in the early history of Moses has been filled up by Josephus, Philo, and other writers, with various legends, some of them highly improbable, of which an outline is given in Milman's *History of the Jews*, vol. i., p. 61, &c.

3. The miracles of Moses have been made the subject of much discussion, and many divines of the Rationalist school have attempted to explain them as an advantage cleverly taken of natural phenomena, or as ingenious jugglery. Even if it were admitted that most of the ten plagues were visitations to which Egypt was subject, they would still retain all the essential characters of miracles in their increased extent and the unusual time of their occurrence, in the exemption of the Israelites in Goshen from most of them, and in their immediate cessation at the prayer of Moses. The imitation of the first three plagues by the Egyptian magicians has generally been ascribed by Jewish and some antient Christian writers to diabolical agency, and some modern writers have considered that it can be satisfactorily accounted for by the known skill of the Egyptian priests in legerdemain. But assuredly their inability to imitate the later plagues, when they confessed, 'This is the finger of God' (*Exod.*, viii. 18, 19), is a much stronger argument for the miraculous character of these visitations, than their imitation of the earlier ones is against it. Several writers have shown how greatly the sufferings of the Egyptians from these plagues were aggravated by their physical circumstances and religious opinions. (Bryant's *Observations upon the Plagues inflicted on the Egyptians*; Rosenmüller's *Scholia*, *Exod.* vii., &c.; Milman's *History of the Jews*, vol. i., p. 68, &c.) Other difficulties connected with this part of the life of Moses are mentioned under EXODUS, and in Winer's *Biblisches Realwörterbuch*, vol. ii., p. 133-139. Respecting the king of Egypt in whose reign Moses led out the Israelites, and the destruction of the Egyptians in the Red Sea, see Wilkinson's *Manners and Customs of the Antient Egyptians*, vol. i., c. 2, p. 54.

The part which Moses took as leader of the Israelites is stated in the Scripture record to have been owing to the direct command of God (*Exod.*, iii.), and the laws which he gave them are asserted to have emanated from God himself. (*Exod.*, xx. 1, 22, &c.) As the truth of these facts, or, as theologians express it, of the 'Divine Legation of Moses,' depends chiefly on the authority of the books ascribed to Moses, this part of the subject is referred to PENTATEUCH.

The Legislation of Moses.—The chief authority for the following account of the Mosaic legislation is the 'Mosaisches Recht' of Michaelis. The references are to the English translation of that work by Dr. Alexander Smith. Other works on the subject are mentioned at the end of the article.

The Law is laid down in the books of Exodus, Leviticus, and Numbers, and repeated with modifications in the book of Deuteronomy, but in neither case in any systematic order. (*Exod.*, xx.-xxiii., xxv.-xxxi., xxxiv., xxxv.; *Levit.*, i.-viii., xi.-xxv., xxvii.; *Numb.*, v.-x., xviii., xix., xxvii.-xxx.; *Deut.*, iv., &c.)

The Mosaic laws must be viewed throughout as enacted for a people who stood in the peculiar situation of having been chosen by Jehovah out of the nations to preserve the knowledge and worship of the true God, and to exhibit in their history the providential dealings of God with his people.

The whole law rested on two fundamental principles, one of which was religious, and the other partly religious and partly political.

The first fundamental principle of the Mosaic law is the worship of Jehovah as the one true God; and consequently an uncompromising opposition to polytheism and idolatry, which were at that time the prevailing religious errors. Other nations, while acknowledging the supreme God as the creator, associated with him subordinate deities, to whose agency they looked for temporal blessings. All such worship was prohibited by the first words of the Law, 'I am Jehovah, thy God, which brought thee out of the land of Egypt, out of the house of bondage. Thou shalt have no other Gods *with* me.' (*Exod.*, xx. 2, 3; *Deut.*, iv. 35, 39.) The second commandment is an equally decisive prohibition of idolatry of every kind. (*Exod.*, xx. 4, 6.) To render this fundamental law the more binding, Jehovah, who was already the founder of the nation of Israel by delivering them from Egypt, was represented as their king, with the consent of the people themselves, and thus idolatry became high-treason. (*Exod.*, xix. 4-8; *Deut.*, vi. 22-24, xxxiii. 5; 1 *Sam.*, viii. 7; x. 18, 19; xii. 12; 1 *Chron.*, xxix. 23; *Isaiah*, xxxiii. 22.)

The land of Palestine too was represented as the property of God, held under him by the people, who consequently had not the power to alienate it for ever. (*Levit.*, xxv. 23.) This fundamental principle was carried out in the form of government which is commonly called a *theocracy*, that is, a government under the direct superintendence of God. The laws were given by God, and could only be repealed by his command (*Deut.*, iv. 2; xii. 32); the judges were selected usually from the caste of the priests, and are represented as holy persons, sitting in the place of God, to whose decision they submitted difficult cases by means of the Urim and Thummim. (*Deut.*, i. 17; xix. 17.) God often made known his will concerning state affairs through the prophets, of whom a constant succession was promised (*Deut.*, xviii. 15-22); and he promised to reward the people with prosperity if they kept the law, and threatened to punish them with calamity if they broke it. In these particulars the Israelites were distinguished from other nations as being under the more direct government of God; but nevertheless they had a well-defined civil constitution, as we shall presently see.

The second fundamental principle of the Mosaic law is the discouragement of intercourse between the Israelites and other nations. This principle was not carried so far as to prohibit the settlement of foreigners in Palestine, or of Israelites in foreign countries; but both practices were discouraged, and the latter much more than the former. Each man had his hereditary possession in land, which, as he could not sell it, he of course forfeited upon settling in a foreign country; and many of the practices enjoined upon the people were such as could hardly be observed in a strange land. To prevent their indulging in conquest, and thus running the risk of becoming subject to foreign powers, Moses confined them within certain boundaries, and also prohibited their choosing a foreigner as king. (*Deut.*, xvii.)

This state of isolation was well suited to a nation who were sufficiently numerous to people the country assigned to them without the aid of foreigners, and who had neighbours, such as the Sidonians, who were able to conduct their commerce for them. But above all this arrangement was necessary for the preservation of the worship of Jehovah among them, prone as their history proves them to have been to follow the idolatry of the surrounding nations.

The nature of the occupations followed by the citizens of any state affects the whole complexion of its institutions. Among the Israelites, trades do not appear to have been followed to any extent as the means of gaining a livelihood. Mechanical labour was probably left to the slaves, who, in the houses of the wealthy, appear to have carried on extensive manufactures (1 *Chron.*, iv. 21), and to the women (*Prov.*, xxxi.); though in the building of the tabernacle we find some of the more noble mechanical arts practised by freemen. Hence it followed that there were no cities dependent on trade or manufactures, and no separate classes of citizens, or burghers, and peasants. The cities of Palestine were only fortified villages, and most of them appear to have been small.

Neither was commerce the occupation of the Hebrew people. The necessary internal commerce was provided for by the three great feasts, to celebrate which all the men were assembled at Jerusalem thrice a year, and which, in this respect, answered the purpose of modern fairs. But foreign and maritime commerce was not at all encouraged by the Mosaic institutions, many of which tended directly to obstruct it, especially the making each man a landholder and cultivator, and the law against lending money on interest. Besides the example which Moses had before him in the case of Egypt, of a powerful and civilised nation flourishing almost without foreign commerce, he was probably influenced by the following reasons in discouraging it. It would tend to introduce idolatry, to tempt many citizens to leave the country, to foster luxury, and to involve the Israelites in quarrels with other nations; while on the other hand they had all the advantages of commerce within their reach through the Sidonians and the Asiatic trading caravans. In later times Solomon pursued commerce to a great extent, though his seamen were not Israelites, but Phœnicians.

The practice of freebooting to obtain a livelihood, so common among the Arabs, and by no means unknown among their Hebrew brethren (*Judges*, ix., xi.), was discouraged by Moses, both by the allotment of land to every citizen, and by the little encouragement which he gave to hunting.

The real foundation of the Mosaic polity was in agriculture. The whole territory of the state was so divided that every Israelite (that is, every head of a family except those of the tribe of Levi) received a portion of land, which became the inalienable property of himself and his heirs. They had previously been a nomadic people, and a trace of that condition was long after preserved in the extent to which they pursued the breeding of cattle.

This freehold basis, as we may call it, prevented the formation of classes of burghers and nobility. There was no distinction of *caste*, except in the case of the Levites (the descendants of Levi), who were devoted to the offices of religion and learning; but even they could not be said to form a class of nobility, for they had no landed property, but were supported by the tithes of all the land.

In consequence of the equality of the citizens, the *constitution of the republic* had a democratic character. When Moses made known any laws, he called together the whole 'congregation of Israel.' When we consider that the number of adult males was then about 600,000, it becomes probable that those whom Moses addressed on such occasions were certain persons deputed to represent the rest. Such persons are mentioned in *Exod.* xix. 7, 8, and *Numb.* i. 6; and in other passages there are enumerations of the classes of persons of whom these representatives consisted, namely, *elders*, *heads* or *captains of tribes*, *judges*, and *officers* or *scribes*. (*Deut.* xxix. 10; *Josh.* xxiii. 2; xxiv. 1.)

The lowest rank of officers in the republic were the *heads of tribes* and *heads of families*. These orders were a remnant of the patriarchal state, and are still kept up among the Beduin Arabs. Each of the twelve tribes had its chief. (*Numb.* ii.) The tribes were subdivided into greater and lesser families, called *families* and *houses of fathers*, which had their respective heads. (*Numb.* i. 2; *Josh.* vii. 14.) These heads of families are in all probability the persons called *elders* in *Deut.* xix. 12; xxi. 1-19; and *Josh.* xxiii., xxiv. It is uncertain whether the elders were chosen with reference to their age, as the word would seem to denote if it were not constantly used in other languages as a title of office or of honour, without reference to age, as in the Roman *senator*, the Greek πρεσβύτερος, and the Arabic *sheik*. It is equally uncertain in what way the heads or princes of tribes were chosen. The princes of tribes are found as late as the reign of David.

Thus the twelve tribes formed twelve distinct commonwealths, governed by the princes of tribes, and under them by the heads of families; and they sometimes acted as separate states, carrying on war independently of each other, even as late as the time of the kings. (*Josh.* xvii. 11-15; *Judges* iv. 10; xviii.-xx.; 1 *Chron.* iv. 41-43; v. 18-23.) The descendants of Levi were not reckoned among the twelve tribes, but were scattered over the territory of their brethren; and the number of the tribes was made up by the division of the descendants of Joseph into two tribes, which were named after his sons Ephraim and Manasseh. (*Numb.* i.) A certain number of persons appears to have been necessary to constitute tribes and families. (1 *Chron.* xxiii. 11.)

These twelve tribes were united in one republic, which generally, though not always, had a chief magistrate, whether a lawgiver as Moses, or a general as Joshua, or a judge as those whose history is recorded in the book of *Judges*, or a king as Saul and his successors. With regard to the judges however, it is highly probable that some of them ruled not over all Israel, but only over single tribes. The twelve tribes met in general diets (*Josh.* xxiii., xxiv.), and united in war against a common enemy. We have striking instances of the independence of the separate tribes in the fact that David reigned several years over the tribe of

Judah alone; in the revolt of ten of the tribes from Rehoboam; and in the standing rivalry between the tribes of Judah and Joseph, which led to that revolt.

The next rank of officers, the *judges*, did not represent their tribes. Before their appointment Moses was sole judge, and it was to relieve him from the burthen of that office that a class of judges was instituted. (*Exod.* xviii.) There was a judge over every ten persons, another over every hundred, and another over every thousand. From each of these orders there was an appeal to the one above, and from the last to Moses himself. Moses further ordained that when the people were settled in Palestine, judges should be appointed in every city. The choice of them appears to have been left to the people, as Moses lays down no rules for their election. In subsequent ages it generally happened that they were Levites.

In *Numb.* xi. 16, we have an account of the appointment of seventy men out of the elders of the people to assist Moses. These are commonly supposed to have been judges; and the foundation of the Sanhedrim, so well known in the later Jewish history, is traced to their appointment. Michaelis takes a very different, and, we think, more correct view of their office. He considers that they were a senate chosen to take part with Moses in the government, and that the institution was but temporary. We do not find them mentioned in the subsequent history of the people, and the real Sanhedrim was not founded till after the Babylonish captivity.

The *scribes* were an order of officers quite distinct from the judges. This office was instituted during the Egyptian captivity. (*Exod.* v.) They were to be appointed in every city. (*Deut.* xvi. 18.) In the time of the kings they were generally taken, like the judges, from the tribe of Levi. Their name (שׁוֹטְרִים) is derived from a root, which still exists in Arabic (*satar*), meaning *to write*. From this and other circumstances it is concluded that they were the officers who kept the genealogical registers and apportioned the public burdens to every individual. They also conveyed to the people the general's orders in time of war. (*Josh.* i. 10.)

Such was the Israelitish state, consisting of the congregation of the people, governed by the heads of families, the princes of tribes, the judges, and the scribes. To this democratic constitution the tribe of Levi formed a counterpoise. They had no landed property, but received the tithes of all the other tribes. Besides these they received the first fruits of all produce, probably about a sixtieth part of the whole crop; they had a part of every sacrifice; and while the people were in the wilderness every beast killed for food was offered as a sacrifice, and afterwards the priest received a portion of every slaughtered beast that was not brought to the altar; they had everything that was devoted to God, and the redemption fees of the first-born of men and unclean cattle, a share of the spoils taken in war, and some minor articles. A calculation of these items would show that their revenues were enormous, and far more than is needed for the support of a body of religious instructors. But this was not the office of the Levites; and the circumstance of their living in cities of their own made the discharge of such an office impossible. They were indeed, in a different sense, the ministers of religion; for they performed all religious ceremonies, preserved copies of the law, explained it in doubtful cases, and were bound to read it over to the people once every seven years; but a body of religious teachers or *doctors* did not exist till after the Babylonish captivity. The Levites were the *literary class* of the nation, and filled all the learned professions. Difficult questions of law were to be referred to them for judgment. (*Deut.* xvii. 8-13; xxi. 5.) In the wilderness they formed a guard to the tabernacle and to Moses. The occasion of their obtaining the priest's office is related in *Exod.* xxxii. 25-29.

The head of the Levitical order was the high-priest, who was always taken from the family of Aaron. He possessed great influence in the state. He was the supreme legal authority. In *Deut.* xvii. 12, he is placed on a level with the judge or chief magistrate; and when there was no king or judge, the high priest was the chief magistrate, as in the case of Eli.

Moses did not determine what should be the nature of the *supreme magistracy*. Before his own death he appointed a successor in the person of Joshua, who was a *military leader*, and whose office it was to put the people in possession of Palestine. Joshua was succeeded by the *judges** at intervals of time. The office is mentioned by Moses (*Deut.*, xvii. 12), but he gives no command for the appointment of the judge. The judges seem to have been somewhat analogous to the Carthaginian suffetes. They were not the ordinary and permanent magistrates, but they governed Israel in times of trouble. There was no regular succession of them, and it is by no means clear that all of them governed the whole nation.

The judges were succeeded by *kings*, of whom there was a regular succession from Saul to the Babylonish captivity.

Though Moses evidently desired that the state should remain a free republic under the supreme government of Jehovah, and though when the people actually asked for a king, God, by Samuel, represented their desire as both foolish and sinful (1 *Sam.*, viii.); yet as Moses foresaw that they would wish for a king, in imitation of the surrounding nations, he gave the people power to choose one, and prescribed his duties (*Deut.*, xvii. 14-20). This is one of the many instances in which Moses shows one of the highest qualities of a good legislator, in making the best provisions which the circumstances allowed, instead of attempting to carry out his views of what was best where the character of the people made those views impracticable. The following are the chief laws respecting the king. The election of the king was left to the people (*Deut.*, xvii. 14), with the restriction that he must be an Israelite by birth, not a foreigner (ver. 15); the appointment must be one which had the sanction of God (ver. 15), whose will on this subject was made known through a prophet, as we find from history (1 *Sam.*, ix., x.). He was not to keep a strong body of cavalry, nor a great number of horses (ver. 16). This law was well suited to the physical condition of Palestine, a mountainous country, which could be defended without cavalry, and where the keeping up of such a force could only arise from a spirit of conquest. This, like some others of the Mosaic laws, was disregarded by Solomon, who had an enormous number of horses. The king was forbidden to lead the people back to Egypt (ver. 16), which probably means that he was not to attempt to reconquer the land of Goshen. (Michaelis, vol. i., p. 64-67.) He was not to take many wives, 'that his heart turn not away' (ver. 17), as happened to Solomon, whose wives seduced him to idolatry. Another reason of this law was probably to discourage polygamy by the example of the king. This law was constantly broken by the kings of Israel. He was not to collect excessive quantities of gold and silver (ver. 17). He was to be well acquainted with the law, of which he was to have a copy written out at his accession, which he was to read daily (ver. 18, 19). On his obedience to these commandments depended the continuance of his kingdom (ver. 20). Besides this fundamental law, there was an agreement or covenant between the king and the people, which was sworn to by every king at his accession. (1 *Sam.*, x. 25; Michaelis, *Art.* 55.) The kingly power was therefore not unlimited; but we find that the government of the kings had always a tendency to despotism, which may be ascribed to the want of an hereditary military noblesse, and to the notion which prevailed among the Israelites, in common with other Oriental people, that it was the office of the king in person to be supreme judge. As to the latter point, it certainly was not the intention of Moses that the burden of deciding causes should rest upon the kings, and very mischievous consequences resulted from their assuming the office.

The king had the power of enacting new laws, provided they were not at variance with the fundamental principles of the constitution, and of dispensing with the punishments prescribed by Moses. He had the power of life and death over the priest, even the high-priest; and it was part of his duty to reform abuses in religion. These powers, which are not mentioned in the Mosaic code, are inferred from the constant exercise of them by the kings. Such matters probably formed part of the covenant between the king and people mentioned above. It is uncertain whether he had the right to declare war at his own pleasure.

On the subject of the royal revenues Moses left no ordinance. They consisted of presents (1 *Sam.*, x. 27; xvi. 20) of tithes from all the land (1 *Sam.*, viii. 15), and of a demesne which was probably acquired by confiscations. The kings had a right to demand bond-services of the people

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* This supreme magistracy must not be confounded with the ordinary judges mentioned above.

(1 *Sam.*, viii. 12-16; 1 *Kings*, v. 13-18), which at first however were chiefly performed by the Canaanites who remained in the land. In later times a poll-tax was exacted on pressing occasions. They took advantage of the neighbouring Arabian deserts to rear cattle. (1 *Chron.*, xxvii. 29-31.) Solomon derived a considerable revenue from foreign commerce.

The monarchy was hereditary, for the election by the people mentioned above referred not to every individual, but to the family from which the king was to be taken. The crown did not necessarily descend to the eldest son; thus David appointed which of his sons should succeed him, and the people evidently expected him to do so. (1 *Kings*, i. 20.) But this right of selection was afterwards abrogated.

The *foreign relations* of the Israelites were of a simple character. Although, as stated above, it was a fundamental principle of the Mosaic law to avoid foreign intercourse, yet alliances with foreign nations were not forbidden. The alliances which were afterwards made, in the time of the kings, with Assyria and Egypt were sufficiently imprudent in their own nature to account for their being opposed by the prophets. There were however some nations whom the Israelites were commanded to exterminate—those Canaanites, namely, who dwelt in the land which they were to possess; this command was never perfectly obeyed, and in later times it was mitigated. Other nations, as the Amalekites, Ammonites, and Moabites, were represented by Moses as the hereditary enemies of the people of Israel, on account of injuries which they had done them, and which it was their duty to revenge when an opportunity occurred. The laws regulating war against other nations (*Deut.*, xx.) were exceedingly severe, but not more so than the international law then recognised is sufficient to account for, and the cruelties exercised by their heathen enemies are known to have been greater than any that the Israelites can be charged with. If a city resisted after being summoned to surrender, all the men in it were to be put to death, and the women and children made slaves. This law however only applied to the cities 'which were very far off;' but as to the cities of the Hittites, Amorites, and others, which were given as an inheritance to them by God, they were commanded to save alive nothing that breathed. The spoil was to be divided among the soldiers, except in some cases, when it was devoted to God and destroyed. Horses were to be hamstrung. The fruit-trees in the enemy's country were to be spared.

During the three great festivals, when every male went up to Jerusalem, there was a suspension of arms, the assurance being given by God that during these periods no man should desire their land. (*Exod.*, xxxiv. 24.) Michaelis endeavours to show that this truce was observed by all the surrounding nations except the Canaanites, who were therefore destroyed.

Embassies were only resorted to on particular occasions, and the persons of ambassadors were sacred. When the Israelites wanted to pass through the territories of other people, Moses asked permission of the inhabitants.

The foundation of the *civil law* of Moses is laid in the command, 'Thou shalt love thy neighbour as thyself.' (*Levit.*, xix. 18.)

1. *Laws relating to Property.*—Moses ordained that after the conquest of Canaan the land should be divided by lot in equal portions among the Israelites, and should then be inalienable for ever. This law was invested with a religious sanction, by representing God as the proprietor of the whole land, which the people only held as tenants under him. (*Levit.*, xxv. 23.) The land might be sold *nominally*, but as it reverted to the original owner or his heirs in the year of *jubilee*, which was every fiftieth year, such a sale amounted only to the sale of the crops for fifty or fewer years. Land so sold might be redeemed on certain conditions before the year of jubilee. (*Levit.*, xxv. 25, &c.) The law against the alienation of land admitted of exceptions, the chief of which was that land vowed to God, if not redeemed before the jubilee, became the property of the priests. (*Levit.*, xxvii. 16.) Moses however plainly intended that land sold or vowed should always be redeemed before the jubilee.

A provision was made for avoiding litigation respecting the crops upon the ground at the jubilee, by the institution of the *sabbatical year*, during which there was to be neither sowing nor reaping, but all the land was to lie fallow. Every seventh year, and likewise the year of jubilee, was a sabbatical year. A promise was annexed to the law, that the crop of the sixth year (or perhaps we should read of the *six years*) should be sufficient to afford food while the land lay fallow. (*Levit.*, xxv. 20-22.) Michaelis is of opinion that the tendency of this law was to increase the national wealth by affording a strong inducement to store up corn during the six years of plenty, part of which might be sold at an increased price to the neighbouring commercial nations in the seventh year; but this seems a very unsatisfactory explanation of the matter. He also mentions other incidental advantages, as he considers them, of this institution. (Mich., *Arts.* 74, 75.)

The laws of the jubilee and sabbatical years do not appear to have been long observed; indeed it is plain from *Levit.*, xxvi. 34, that Moses expected them to be disregarded. From 2 *Chron.*, xxxvi. 21, it appears that up to the Babylonish captivity there had been seventy sabbatical years neglected. This would carry us back nearly 500 years, namely, to the reign of Saul or David, as the time at which the observance ceased.

A man's property descended to his sons, of whom the eldest had a double share. (*Deut.*, xxi. 17.) The exclusion of daughters from the inheritance was established long before the time of Moses. (*Gen.*, xxxi. 14.) No provision is made in the law for the support of unmarried daughters. On the occurrence of a case in which a man died leaving only daughters, Moses made the law that in all such cases the daughters should inherit their father's property, but that they must not marry out of their own tribe. The husbands of such heiresses were reckoned as the sons of their father-in-law, and took his name. Failing daughters, the inheritance passed to a man's brethren; failing them, to his father's brethren; and failing them, *to the next of kin* of the deceased. (*Numb.*, xxvii. 1-11.) But the law gives no directions as to determining *who* are the next of kin: probably this was already determined by custom. The Mosaic law contains nothing on the subject of wills; but we find that the right of bequeathing property other than land existed both before and after his time, and he nowhere prohibits it.

2. *Laws relating to Persons.*—The laws of Moses inculcate the most complete filial obedience. (*Exod.* xx. 12; compare *Ephes.* vi. 1-3.) The power of fathers over their sons was great, and does not appear to have ceased as they grew up. We have here a remnant of the patriarchal state. Flagrant acts of disobedience were punished with death (*Exod.*, xxi. 17; *Levit.*, xx. 9), which however could only be inflicted by a judicial process, and not at the pleasure of the father (*Deut.*, xxi. 18-21). Fathers, and even mothers, chose wives for their sons. Next to the father, the first-born had the greatest power over the family, though it does not clearly appear in what this consisted, nor whether it was exercised in his father's lifetime. Though whatever opened the womb was *a* first-born (*Exod.*, xiii. 12), yet it is clear from *Deut.* xxi. 15, and 1 *Chron.*, v. 1, 2, that *the* first-born of a family was the first born to a man of all his children, and not the first born by each of his wives.

Marriage Laws.—Among the Hebrews, as among other Oriental nations, wives were generally bought (*Gen.*, xxix. 15-30; xxxiv. 12; *Hosea*, iii. 1-2), and in certain cases their price was fixed by law (*Exod.*, xxii. 16, 17; *Deut.*, xxii. 28, 29). Some wives were not bought, and these enjoyed greater freedom than the others. In certain cases concubines were allowed. (*Exod.*, xxi. 7-11; Michaelis, *Arts.* 87, 88.)

The marriage law of Moses had in general a tendency to promote marriage, and this chiefly by his sanctioning the notion, which he found already prevailing among the people, that it was highly honourable for a man to have posterity who might perpetuate his name, and by his engrafting upon this notion the law of *levirate marriages*, by which it was enacted that when a man died leaving a widow, his brother should marry her, and raise up children to his brother; that is, children who were to be accounted as belonging to the first husband, and who were enrolled in the genealogical registers in his name.

The Mosaic law prescribes no marriage ceremonies. We may conjecture from history (*Gen.*, xxix. 22-28) that ceremonies much resembling those of the Arabians in the present day (Lane's *Modern Egyptians*, vol. i., c. 6) were already in use, which Moses left as he found them. He connected no religious ceremony with the solemnization of matrimony. The bridegroom might put away his wife if the *signa virginitatis* were wanting (*Deut.*, xxii. 13-21). A right understanding of this law is very important to the explanation of the doctrine of Christ concerning divorce (*Matt.*, v. 31-32), which has had no small influence on the marriage laws of Christian countries. (Michaelis, *Arts.* 92, 93.)

Moses permitted polygamy, as is proved by the laws in *Exod.*, xxi. 9, 10, *Levit.*, xviii. 18, *Deut.*, xxi. 15-17, by the constant practice of it both before and after his time, connected with the fact that he nowhere prohibits it, and by the small number of the first-born compared with the whole number of males, namely, about 1 in 42 (*Numb.*, iii. 43). But he permitted it only as a matter of policy, 'on account,' as Christ said, 'of the hardness of the people's hearts,' that is, the difficulty of rooting out inveterate customs, and perhaps for other reasons, which are pointed out by Michaelis (*Art.* 96). Some of his laws have a strong indirect tendency to prevent it, for example, the buying of a wife; and notwithstanding some striking examples of its practice, as that of Solomon, it does not appear to have prevailed extensively among the Israelites. (Mich., *Art.* 95.) After the Babylonish captivity it ceased entirely. Moses however set limits to the practice of polygamy, not allowing *many* wives. (*Deut.*, xvii. 17.) Moses prohibited marriages between certain near relations, some of which, those namely between parents and children, brothers and sisters, he considered as opposed to natural morality, for he calls them *abominations*, and represents them as sinful in themselves. Other marriages between relations were probably forbidden only for reasons connected with the character and habits of the people. (*Levit.*, xviii. 20; Michaelis, book iii., c. 7.)

Of *divorce* Moses was no favourer, at least if we may judge by the way in which he speaks of the marriage bond in *Gen.*, ii. 24; but he allowed it to a greater extent than he altogether approved, 'because of the hardness of their hearts' (*Matt.*, xix. 8). The law of divorce is in *Deut.*, xxiv. 1-4. If a man disliked his wife, he might put her away by giving her a writing of divorcement. She might then marry again; but if her second husband put her away or died, she might not return to her first husband. (Mich., *Arts.* 119, 120.) No provision is made for the support of the divorced wife. In certain cases the husband forfeited his right of divorce (*Deut.*, xxii. 19, 29). The support of a widow after her husband's death was provided for, if she had no children, by the law of levirate marriages; if she had children, it was left to filial piety.

Laws respecting Slaves and Servants.—Moses found slavery already existing among the Israelites and their neighbours. He permitted it to continue, under certain restrictions, and his laws on this subject are conceived in the most merciful spirit (see especially *Deut.*, xxiii. 15, 16). Slaves were acquired by capture in war, by purchase, and by the marriage of slaves. Of purchase there were four kinds: 1, when a slave was transferred from one master to another; 2, when a man under the pressure of poverty sold himself for a slave; 3, when parents sold their children; 4, when an insolvent debtor, or a thief unable to make restitution, was sold as a punishment. The value of slaves was of course variable, but in two cases it was fixed by law (*Exod.*, xxi. 32; *Levit.*, xxvii. 1-8). Besides the slaves of private individuals, there were others who belonged to the public; these were employed in menial labours for the service of the sanctuary. Slaves might have property of their own. A master might beat his slave, but not so as to kill him (*Exod.*, xxi. 20, 21); if he even maimed him, the slave was to be set free (*Exod.*, xxi. 26, 27). A Hebrew slave possessed this advantage over a foreign one: he was entitled to his freedom in the sabbatical year and in the year of jubilee, and he might be redeemed before the year of jubilee, while the stranger might be held in slavery for ever. The manumitted slave received presents from his master (*Exod.*, xxi. 2-11; *Levit.*, xxv. 39-55; *Deut.*, xv. 12-18). Slaves had to conform to some of the principal religious ceremonies observed by the Israelites.

Besides the slaves, there were day labourers, who were to share in the rest of the seventh day, and in the spontaneous produce of the sabbatical year, and whose hire was to be paid every day before sunset (*Levit.*, xix. 13; xxv. 6; *Deut.*, xxiv. 14, 15). The statute in *Deut.*, xxv. 4, besides its literal meaning, probably meant also that servants were to share in the food they prepared for their masters.

The Goël, or Blood-Avenger.—There was a custom of antient standing among the Israelites, and which exists to this day among the Arabs, which made it the duty of the nearest relation of a murdered person to pursue the murderer and kill him with his own hands. This relation is called in Hebrew *Goël*, in Arabic *Taïr*. This usage, which was probably of high antiquity, is dangerous to any state, from the haste and passion in which vengeance is exercised, and from the hereditary feuds which it causes between families. Moses dealt with this as he dealt with other long established customs of which he disapproved, not making the vain attempt to root it out, but surrounding it with provisions calculated to mitigate its evils. Six cities of the Levites were appointed as cities of refuge for the manslayer, and every facility of access to them was provided. If he escaped to one of these, he was safe from the avenger of blood (*Exod.*, xxi. 12, 13; *Numb.*, xxxv.; *Deut.*, xix. 3) But these cities afforded no asylum to the wilful murderer, who, when proved to be guilty, might be torn even from the altar (*Exod.*, xxi. 14; *Deut.*, xix. 11-13). At the death of the high-priest, the person who had taken sanctuary might leave the city of refuge in safety. These laws seem to have acted as an effectual check on the practice of blood-avenging, for an instance of it rarely occurs in the later history of the Israelites.

The Mosaic law commanded kindness to be shown to strangers, who, unless they belonged to certain nations that had been guilty of flagrant outrages against the Israelites, might 'enter the congregation of Jehovah,' that is, might be naturalised in Israel. Moses inculcates veneration for old age, and kindness to the deaf and blind (*Levit.*, xix. 14, 32; *Deut.*, xxvii. 18). He made laws in favour of the poor (*Deut.*, xv. 11), besides adopting usages already in existence for their benefit; though many of his laws discourage begging. He recommended the people to lend to them (*Deut.*, xv. 7-11), he gave them the right of gleaning, and of collecting the spontaneous produce of the earth during the sabbatical year (*Levit.*, xix. 9, 10; xxv. 5, 6; *Deut.*, xxiv. 19-21; *Ruth*, ii. 2-19), and the remains of the second tithes and firstlings, which were sacrificed as thank-offerings, were given as entertainments to the poor (*Deut.*, xii. 5-12, 17-19; xiv. 22-29; xvi. 10, 11; xxvi. 12, 13).

Personal Rights and Obligations.—*Vows to God* were declared binding, though the making of them was neither encouraged nor discouraged. They were remissible in certain cases (*Levit.*, xxvii.; *Numb.*, xxx.; *Deut.*, xxiii. 21-23).

On many points relating to *debt*, the Mosaic law is silent. An insolvent debtor was liable to have his hereditary lands seized, also his houses and other property, his clothes (but with a humane restriction, *Exod.*, xxii. 26, 27), and his person; he might be sold into slavery with his wife and children (*Levit.*, xxv. 39). Of imprisonment for debt the Mosaic law knows nothing, and still less of torture, though both have been attributed to it from a misunderstanding of some passages in the New Testament (*Matt.*, v. 26; xviii. 30, 34).

Pledges were allowed to be taken, under certain regulations which were meant to secure the debtor from the rapacity of his creditor (*Deut.*, xxiv. 6, 10-13; *Exod.*, xxii. 26, 27). Of *suretyship* the Mosaic law says nothing, but it is frequently referred to in the 'Proverbs of Solomon.' *Interest* on loans, whether of money or produce, was forbidden to be taken from Israelites, but it might be received from strangers (*Exod.*, xxii. 25; *Levit.*, xxv. 35, 37; *Deut.*, xxiii. 19, 20). The reasons for this prohibition appear to be founded entirely on the peculiar polity of the Israelites. (Michaelis, *Art.* 155.) Loans are regarded by Moses as alms. In the seventh year a poor debtor could not be sued, as there were no crops on the ground (*Deut.*, xv. 1-11). It does not appear to be the meaning of this law, that debts were *cancelled* in the seventh year, though perhaps such a release took place in the year of jubilee. Injuries done to property were to be compensated, and things found were to be restored to the owners; there are several laws on the details of these cases. (*Michaelis*, book iii., c. 12, pt. 3.)

The Mosaic law contains several enactments on behalf of beasts, many of which have a tendency to preserve the breed of such as are useful to man.

Police Law.—1. *Civil Police.*—The population was to be ascertained by a periodical census, the time of which is not specified in the statute. Every individual numbered paid a capitation tax of half a shekel. (*Exod.*, xxx. 11-16.)

2. *Military Police.*—Every man above 20 years old was liable to be called out to war. (*Numb.*, i. 3-46; xxvi. 2.) But generally a selection was made by the Scribes, who

also appointed the officers. Under the kings permanent officers were appointed. Exemption from military service was allowed to the man who had built a house and not yet occupied it, to him who had planted a vineyard or oliveyard and not yet enjoyed its fruit, to him who had betrothed a wife, and to him who had married within a year. (*Deut.*, xx. 5-7.) Cowardice was also a ground of exemption, but attended with disgrace. The spoil taken in war was divided into two parts; that in persons and cattle was collected and distributed among the people, those who went to war and those who remained at home having equal portions, and that in effects was the property of the soldier who seized it. Many regulations are made to promote cleanliness and discipline in the camp, which with this object was declared to be sacred.

3. *Ecclesiastical Police*, or the *Ceremonial Law*.—In this part of the Mosaic law many ceremonies are ordained which appear frivolous and unmeaning, unless we keep in view the fact asserted both in the Psalms and in the New Testament, and fully explained in the Epistle to the Hebrews, that most of the Levitical rites were only types of the blessings to be enjoyed under the Christian dispensation. We do not enlarge on this subject, as we are not here regarding the Mosaic laws in their theological aspect.

Circumcision, which had long before been given by God to Abraham, was adopted in the Mosaic law as the ceremony by which every male was admitted to the civil and religious privileges of the people of Israel. (*Gen.*, xvii. 9-14; *Levit.*, xii. 13.) Every bond-servant among the Israelites was obliged to submit to this rite, and also every stranger who wished to be naturalised among the people and to partake of the passover.

Offerings were of three kinds: 1. Bloody, consisting of slaughtered animals, which must be those regarded by the law as *clean*. They were either *burnt-offerings*, which were wholly consumed on the altar; *sin-offerings*, made on account of any sins committed through ignorance, of which only a part was laid on the altar; or *feast-offerings* or *peace-offerings*, of which only the fat parts were burnt and the rest eaten. 2. Unbloody, or *meat-offerings*, consisting of meal, bread, &c. 3. *Drink-offerings*, consisting of wine, of which part was poured on the victim and part given to the priests. Sacrifices might only be offered at the place which God might appoint, which in the Wilderness was the tabernacle; this law was doubtless intended to prevent idolatry. Besides their typical significance, these sacrifices had important moral and physical advantages, which are pointed out by Michaelis (*Arts.* 189-191).

Two *tithes* of all the produce of the land were due to God. The first was paid to the Levites for their support, and the second went to provide the feast-offerings. In addition to the tithes, the *first-born* of all animals, including man, were sacred to God, and belonged to the priests. This law had its origin in the sparing of the first-born of the Israelites when those of the Egyptians were slain. The first-born of beasts that might be offered in sacrifice were not to be redeemed, but those of other beasts and of man might be redeemed at a fixed price. (*Exod.*, xiii. 1, 2, 11-16; *Levit.*, xxvii. 26; *Numb.*, xviii. 15-19.) The first-fruits of crops and other produce belonged also to the priests (*Levit.*, xxiii. 9-14; *Numb.*, xv. 19-21; xviii. 11-13; *Deut.*, xviii. 4-5). There was another sort of firstlings which were employed for feast-offerings (*Deut.*, xii. 6; xiv. 23; xv. 19-23).

The Sabbath.—Every seventh day was a day of rest and of religious worship. This was no new law of Moses; it had been enjoined upon man, at the creation of the world, to celebrate the resting of God on the seventh day. (*Gen.*, ii. 3.) In the Mosaic law it was also a commemoration of the deliverance of the Israelites from Egypt, and some of the peculiarities in the Jewish observance of the day are undoubtedly connected with that fact. No servile work whatever was to be done on the Sabbath, except what was necessary for the service of the sanctuary. The punishment for transgressing this law was death. (*Exod.*, xvi. 22-30; xx. 8-11; xxiii. 12; xxxi. 12-17; xxxiv. 21; xxxv. 1-3; *Numb.*, xv. 32-36; *Deut.*, v. 12-15.) [SABBATH.]

There were three *annual festivals*, each lasting seven days, during which all the males in Israel were obliged to assemble at the place where the sanctuary stood. (*Exod.*, xxiii. 14-17.) These were—1. The passover, to commemorate the *passing over* of the Israelites by the destroying angel when he slew the first-born of the Egyptians. It fell on the evening after the 14th day of the first month of the year, that is, very near the vernal equinox, and at the beginning of harvest. 2. The feast of pentecost was held at the end of harvest, on the 50th day after the 16th of the first month. It was a feast of thanksgiving for the harvest. 3. The feast of tabernacles began on the evening of the 14th day of the seventh month, about October. It was a feast of thanksgiving for the fruitage and vintage. Remarks on the uses of these festivals and an account of the other feast days will be found in Michaelis (*Arts.* 197-201). He reckons that in the whole year there were 30 feast days, besides the 52 Sabbaths.

Many circumstances of the *private life* of the Israelites are regulated by the Mosaic law with great precision. The laws on this subject may be divided into two classes. 1. Regulations respecting meats, and their distinction into clean and unclean, with the prohibition against eating blood. 2. Laws relating to defilements, including those concerning leprosy. Both these classes of laws conduced greatly to the preservation of health and morality, and formed a strong barrier against idolatry. (Michaelis, *Arts.* 202-217.) For an account of several miscellaneous precepts of the Mosaic police law the reader is referred to Michaelis, book iv., c. 5.

Respecting the *criminal law* of Moses we have not space to enter into details. It is ably treated by Michaelis (book v.). This part of the Mosaic institutions is distinguished by equal justice, and by a careful gradation of punishment according to the enormity of crimes. Some offences, especially those of a religious character, were punished with a severity which to us may appear excessive; but this is only the carrying out of the principle by which the people were regarded as set apart to preserve the worship of the true God, and according to which it was a matter of the first importance to remove every defilement from among them. The Mosaic penal law introduced a vast improvement, by abolishing the practice of punishing children for the crimes of their fathers, and fathers for those of their children. (*Deut.* xxiv. 16.) The punishments are not cruel. They were—1. Death by the sword, or by stoning, followed in some cases by inflictions on the corpse of the criminal. There were no capital punishments which inflicted torture. 2. Exile, or excision from 'the congregation of God.' 3. Corporal punishments. 4. Fines. 5. Offerings to make atonement for sin: these kept up the idea that all offences were committed against God. None of the punishments for the living were degrading; for stripes are not considered so by Oriental nations, nor were they by the Hebrews.

Of the form of judicial procedure little is known, except that it was extremely simple. The purity of the judgment-seat is guarded by several statutes against bribery and partiality. Causes were heard in the gate of the city, according to immemorial usage in the East; and thus publicity was secured, as the city-gate was the common place of resort. Moses makes no mention of advocates. Witnesses, of whom *two or three* were necessary in capital cases, were examined upon oath. (*Levit.* v. 1; *Numb.* xxxv. 30; *Deut.* xvii. 6, 7.) In some cases oaths of purgation were required from the accused. (*Levit.* vi. 2, 3.) Sometimes a reference was made to God by lot in civil cases; and in criminal cases the lot was occasionally resorted to, but only for the discovery and not the conviction of the criminal. A criminal's confession might convict him capitally. (*Josh.* vii. 14-21; 1 *Sam.* xiv. 37-45; 2 *Sam.* i. 13-16.) Moses nowhere appeals to rewards and punishments in another life as a sanction for his laws.

The greatest care was taken to preserve the law. One copy of it was written in a book which was deposited in the sanctuary beside the ark of the covenant (*Deut.* xxxi. 26), and another copy was engraven on stones, which were fixed on Mount Gerizim or Mount Ebal (probably the former) with solemn ceremonies, in which the people swore to keep the law, blessings were invoked on the obedient, and curses denounced on the transgressors. (*Deut.* xxvii., xxviii.)

Viewed as a whole, the laws of Moses seem perfectly adapted to the character of the people for whom he legislated, and to the physical and political condition of the country they were to inhabit. No mistake can be greater than that which is made by many people when they suppose that because these laws came from God, therefore they are the best code that can ever be formed. Had they possessed this ideal excellence, they would have been really bad laws, because they would have been unsuited to the nation they were intended to govern. They were not meant to be unalterable; indeed some of them were altered by Moses himself. They were only intended to last for a time, and therefore, when considered with reference to our present experience of human affairs, they appear to have many imperfections.

The *origin* of the Mosaic legislation is declared in Scripture to be from God, by which we must understand that these laws were sanctioned by God and published by his command. It has already been observed that many of the laws did not originate with Moses, but were antient observances which he adopted in his code by the command of God. (See also Iken, *Diss. II. de Institutis et Ceremoniis Legis Mosaicæ ante Mosem;* Reimar, *Cogitationes de Legibus Mosaicis ante Mosem.*) And moreover, when we remember that he was brought up in Egypt, and was 'learned in all the wisdom of the Egyptians' (*Acts*, vii. 22), when we compare various parts of his laws with similar institutions which existed in Egypt (for example, the freehold basis of the constitution, the separation of the caste of priests from the rest of the community, the discouragement of commerce, and the measures resorted to for keeping the Israelites distinct from other nations), it becomes highly probable, if not certain, that the Mosaic institutions were largely modelled on those of Egypt. This opinion, which is held by nearly all the best critics who have examined the laws of Moses, has been unaccountably regarded as opposed to the divine character of these laws, as if divine inspiration must necessarily deprive a legislator of the wisdom which he already possesses, and prevent him from adopting, under the sanction of that inspiration, whatever good he may find in the institutions of other nations. On the other hand there are many points of opposition between the Mosaic and Egyptian laws which it is impossible to overlook. Several of these are adduced by Michaelis, in a paper in the 'Comment. Soc. Götting.,' vol. iv., 'De legibus quibusdam a Mose eo fine latis, ut Israelitis Ægypti cupidis Palæstinam caram faceret.' The *spirit* of the whole law was, as Moses himself asserts (*Levit.* xviii. 3), diametrically opposed to that of the Egyptian as well as the Canaanitish institutions. For these reasons it is impossible to regard the Hebrew legislation as a mere copy of the Egyptian.

Some divines of the Rationalist party have maintained that Moses was not the author of the whole of the legislation of the Pentateuch. This opinion is opposed to the evidence which exists in favour of the genuineness and authenticity of the books of Moses. [PENTATEUCH.]

The following very useful table of reference is taken from Wilson's *Archæological Dictionary*, where it is said to be 'taken from a MS. in the library of St. John Baptist's College; given by Archbishop Laud, and probably either compiled by his Grace, or by his direction.'

THE FIRST CLASS.

The Moral Law written on the Two Tables, containing the Ten Commandments.

	Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap.
The first Table, which includes				
The First Commandment,	20. 13	..	..	5. 6
The Second Commandment,	20. 23. 34	19. 26. 18	..	4. 5. 6. 7 8. 10. 11 12. 13
The Third Commandment,	20 23	..	..	5
The Fourth Commandment,	20. 23 31 34 35.	19. 23 26	..	..
The second Table, including				
The Fifth Commandment,	20. 22	19	..	5
The Sixth Commandment,	20	19	..	5
The Seventh Commandment,	20	18. 19	..	5. 23
The Eighth Commandment,	20 22	19	..	5
The Ninth Commandment,	20. 23	19	..	5
The Tenth Commandment,	20	..	..	5
The Sum of both Tables,	..	19	..	6

THE SECOND CLASS.

The Ceremonial Law may be fitly reduced to the following heads, viz.:—

	Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap.
Of the Holy Place,	20	17	..	12
Of the Matter and Structure of the Tabernacle,	25. 26. 27. 35	..	..	..
Of the Instruments of the same, viz.,				
The Laver of Brass,	30	..	..	..
The Altar of Burnt Offering,	27	..	..	..
The Altar of Incense,	30	..	..	..
The Candlestick of pure Gold,	25	..	..	..
The Table of Shew-Bread,	25. 26	..	..	..
Of the Priests and their Vestments for Glory and Beauty,	28	..	..	..
Of the choosing of the Levites,	..	..	13. 3. 8	..
Of the Priest's Office in general,	..	..	8. 18	..
Of their Office in Teaching,	..	19. 10	..	18. 12. 17. 31
Of their Office in Blessing,	..	..	6	..
Of their Office in Offering, which Function, largely spreading itself, is divided into these Heads, viz.,				
What the Sacrifice ought to be,	..	22	..	15. 17
Of the continual Fire,	..	6	..	..
Of the Manner of the Burnt Offerings,	..	6. 7	..	..
Of the Manner of the Peace Offerings,	..	3. 7	..	..
Of the Manner of the Sacrifices according to their several kinds, viz.,				
For Sin committed through ignorance of the Law,	..	4	5	..
For Sin committed through ignorance of the fact,	..	5. 7	..	..
For Sin committed wittingly, yet not through Impiety,	..	6	5	..
The Special Law of Sacrifices for Sin,	..	6. 7	..	..
Of things belonging to the Sacrifices,	..	2. 6. 7	15	..
Of the Shew-Bread,	..	24	..	..
Of the Lamps,	27	24	8	..
Of the Sweet Incense,	30	..	..	..
Of the use of ordinary oblations, whereof there were several kinds observed by the Priests,				
Of the Consecration of the High Priest and other Priests,	29. 30	6. 8	..	..
Of the Consecrations and Office of the Levites,	..	..	8	..
Of the Dwellings of the Levites,	..	..	35	..
Of the Anointing the Altar and all the Instruments of the Tabernacle,	29. 30	..	..	..
Of the continual Daily Sacrifices,	29	..	28	..
Of the continual Sabbath Day's Sacrifice,	..	..	28	..
Of the Solemn Sacrifice for Feast Days, which were diverse and had peculiar rites distinguished into these, viz.,				
Of Trumpets,	..	..	10	..
Of Kalends or beginning of Months,	..	..	28	..
Of the three most Solemn Feasts in general,	23. 34	23	..	16
Of the Feast of Passover,	12. 13. 25. 34	23	9. 28	16
Of the Feast of Pentecost,	23. 34	23	28	16
Of the Feast of Tabernacles,	23. 24	23	29	16
Of the Feast of Blowing the Trumpets,	..	23	29	..
Of the Feast of Expiation,	30	16. 13	29	..
Of the First Fruits,	22. 23. 34	2	15	26
Of Tythes,	..	21	18	12. 14. 26
Of Fruits growing and not eaten of,	..	19	..	..
Of the First-Born,	13. 22. 34	..	..	15
Of the Sabbatical Year,	23	25	..	..
Of the Year of Jubilee,	..	25	..	..
Of Vows in general,	..	27	30	13
What Persons ought not to make Vows,	..	..	30	..
What things cannot be Vowed,	..	27	..	23
Of Redemption of Vows,	..	27	..	..
Of the Vows of the Nasarites,	..	..	6	..
Of the Laws proper for the Priests, viz.,				
Of Pollutions,	..	22	..	..
Of the High-Priest's Mourning,	..	21	..	..
Of his Marriage,	..	21	..	..
Of the Mourning of the Ordinary Priests,	..	21	..	..
Of their Marriage,	..	21	..	..
Of their being forbid the use of Wine, &c.,	..	10	..	..
Of Sanctified Meats,	..	6. 17. 19. 22	5. 18	12. 15. 18
Of the Office of the Levites, viz.,				
Teaching,	..	..	..	17. 27. 31.
Offering,	..	..	3. 4. 18	18
Other Promiscuous Ceremonial Laws, viz.,				
Of Uncleanness in general,	..	15. 19	5	..
Of Uncleanness in Meats, viz.,				
Of Blood, Gen. ix.	23	7. 17. 19	..	12
Of Fat,	..	3. 7	..	..
Of Dead Carcasses,	22	17	..	14
Other Meats and divers Living Creatures,	..	11. 20	..	14
Of Uncleanness in the Issue of Seed and Blood,	..	15. 12	..	23
In the Dead Bodies of Men,	..	..	19	..
In the Leprosy,	..	13. 14	5	24
Of Circumcision, Gen. xvii.	..	12	..	..
Of the Water of Expiation,	..	..	19	..
Of the Mourning of the Israelites,	..	19	..	14
Of mixtures,	..	19	..	22
Of their Garments and Writing the Law privately,	..	..	15	6. 11. 22
Of Young Birds not to be taken with the Dam,	..	..	..	22
Of their Paddle Staves,	..	..	..	23

THE THIRD CLASS.

The Political Law.

N.B. The magistrate is the Keeper of the Precepts of both Tables, and to have respect to human society; therefore the Political Laws of the *Israelites* are referred to both the Tables, and are to be reduced to the several Precepts of the Moral Law.

	Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap
Laws referred to the First Table, namely,				
1st. To the First and Second Commandments, viz.,				
Of Idolators and Apostates,	22	20	..	13 17
Of Abolishing Idolatry,	23. 24	..	..	7. 12
Of Diviners and False Prophets,	22	19. 20	..	18
Of Covenants with other Gods,	23. 24	..	..	7
2nd. To the Third Commandment, viz.,				
Of Blasphemies,	..	24	15	..
3rd. To the Fourth Commandment, viz.,				
Of breaking the Sabbath,	31.35	..	15	..
Political Laws referred to the Second Table,				
1st. To the Fifth Commandment, viz.,				
Of Magistrates and their authority,	18. 30	..	11	1. 16. 17. 23
Of the Power of Fathers,	21	20	..	21
2nd. To the Sixth Commandment, viz.,				
Of Capital Punishments,	..	..	..	21. 24
Of Wilful Murder,	21	24	35	19
Of Manslaughter unwittingly Committed, and of the Cities of Refuge,	21	..	35	19. 21. 22.
Of Heinous Injury,	21	24	..	25
Of Punishments not Capital,	..	..	..	25
Of the Law of War,	..	..	..	20. 23
3rd. To the Seventh Commandment, viz.,				
Of Unlawful Marriages,	..	18. 20	..	7. 22
Of Fornication,	..	19	..	23
Of Whoredom,	22	21	5	22
Of Adultery and Jealousy,	..	19. 20	..	..
Of Copulation against Nature,	22	18. 20	..	..
Of Divorcements,	..	..	..	24
Other Matrimonial Laws,	21	18. 20	..	21. 22. 24. 25.
4th. To the Eight Commandment, viz.,				
Of the Punishment of Thefts,	22	..	5	..
Of Sacrilege, Joshua, vii.	..	..	..	..
Of not Injuring Strangers,	22.23	19	..	10
Of not Defrauding Hirelings.	..	19	..	26.25
Of Just Weights,	..	19	..	25
Of Removing the Landmark,	..	..	..	19
Of Lost Goods,	22	..	..	..
Of Stray Cattle,	22. 23	..	..	22
Of Corrupted Judgments,	23	19	..	16. 24
Of Fire breaking out by chance,	22	..	..	..
Of Man-stealing,	..	..	.	24
Of the Fugitive Servant,	..	..	..	23
Of Gathering Fruits,	..	19. 23	..	23. 24
Of Contracts, viz.,				
Borrowing,	..	..	..	15
Of the Pledge,	22	..	..	24
Of Usury,	22	25	..	23
Of Selling,	21	25	..	15
Of the thing Lent,	22	..	..	..
Of a thing Committed to be kept,	22	..	..	..
Of Heirs,	..	..	26. 27. 33. 36	21
5th. To the Ninth Commandment, viz.,				
Of Witnesses,	..	5	..	17. 19
The Establishing the Political Law,	..	..	..	4
The Establishing the Divine Law in general,	..	..	..	6. 11. 29 30. 31
From the Dignity of the Lawgiver,	..	19. 20. 22	15	5. 6, 7. 8 10. 26. 27
From the Excellency of the Laws,	..	..	..	4. 26
From the Promises,	15. 19. 23. 24	18. 26	..	4 5 6. 7. 10. 11. 12. 20
From the Threatenings,	23	26	..	4. 7 11. 27 28. 29. 30

(Michaelis, as quoted above; Salvador, *Histoire des Institutions de Moïse et du Peuple Hébreu;* Pastoret, *Histoire de la Législation*, tom. iii.; Jahn's *Biblische Archäologie*, th. ii.; Lowman's *Dissertation on the Civil Government of the Hebrews;* Spencer, *De Legibus Hebræorum;* Witsii *Ægyptiaca;* Warburton's *Divine Legation of Moses;* Hales's *Analysis of Chronology*, vol. ii.; Winer's *Biblisches Realwörterbuch*, arts. 'Moses,' 'Gesetz,' &c.; the Commentaries on the Pentateuch of Vater, Rosenmüller, &c.; Graves *on the Pentateuch;* Faber's *Horæ Mosaicæ;* Lane's *Modern Egyptians*, and other works on the Arabians, furnish excellent illustrations of some of the Mosaic Institutions.)

MOSHEIM, JOHANN LORENZ VON, was born of a noble family at Lübeck, October 9, 1694. He was educated at the gymnasium of Lübeck and the university of Kiel. At Kiel he succeeded Albert zum Felde as professor of philosophy in the university. At the invitation of the duke of Brunswick he became professor of theology in the university of Helmstedt, where he remained from 1725 to 1747, when he was appointed professor of theology at Göttingen and chancellor of the university. Here his lectures on theology attracted all classes of students. He died on the 9th September, 1755, at the age of 61. He was thrice married. By his first wife he had two sons and one daughter, and by his third wife one daughter, afterwards duchess of Noailles.

Mosheim was greatly distinguished as a preacher. His style was formed on the model of the great English and French preachers, Tillotson and Watts, Saurin, Massillon, and Fléchier. He has been compared to Fénélon for the graces of his style, and he is considered one of the founders of the modern German literature. His talents were of a very high order, his learning was immense, and his character was exemplary.

The whole number of Mosheim's works is 161. He himself published at Helmstedt, in 1731, a catalogue raisonnée of the works which he had published up to that time. His best known work is the 'Institutionum Historiæ Ecclesiasticæ, Antiquioris et Recentioris, libri iv.' This work, which is written in Latin, was first published in 2 vols. 12mo., in 1726, and the enlarged edition, in composing which he examined the original authorities, was published in 4to. in 1755, just before Mosheim's death. Another edition was published in 1764, with an account of Mosheim's writings by Miller, one of his pupils. It was translated into German by Von Einem, and by J. R. Schlegel. Schlegel's translation is the better, and is enriched with valuable notes. It has also been translated into French, Dutch, and English. The first English version was made in 1764, by Dr. Maclaine, an assistant minister at the Hague, and has been frequently reprinted. It is very unfaithful. Dr. Maclaine's professed object was to improve Mosheim's style, by adding words and rounding off periods. His alterations and additions constantly express his own sentiments instead of Mosheim's, and sometimes flatly contradict his author. In 1832 a faithful translation, with valuable notes, was published by Dr. Murdock, of New Haven, Connecticut, United States. Mosheim's Ecclesiastical History extends from the birth of Christ to the beginning of the eighteenth century. Each century is treated of separately, under the two heads of External and Internal History. The External History comprises *prosperous events*, or the extension of the Church by the efforts of its public rulers and private members, and *calamitous events*, such as persecutions and infidel attacks. The Internal History includes the history—1, of the Christian doctors; 2, of the doctrines and laws of the Church; 3, of its ceremonies and worship; 4, of heresies. This arrangement is open to several objections, of which the chief are, that it is too artificial; that what Mosheim calls external and internal history constantly run into each other (and indeed it is not easy to understand how any part of the history of a community can be said to be *external* to it); and lastly, it imposes on the historian the necessity of deciding what no human mind can decide, namely, what events are prosperous and what calamitous to the Church. But the work of Mosheim is open to a graver objection. He has not treated his subject with the proper spirit of pious interest, though his own orthodoxy is undoubted. Nevertheless, his deep knowledge, his patient research, his general candour and impartiality, and his philosophical spirit, entitle Mosheim to a place among the best church historians. His works gave an impulse to the study of Church history in Germany, which has produced, among other works, those of Pfaff, Baumgarten, Walsh, Semler, Schröckh, Henke, Schmidt, and Neander. Of these, that of Schröckh, a pupil of Mosheim, is the fullest, extending to 45 vols. 8vo. Neander's 'Kirchengeschichte' is still in progress: when completed, it will probably be the best that has yet appeared. Our own literature is very deficient in this branch; but recent events have revived the study of ecclesiastical history in England, especially at Oxford.

Mosheim published several works on Church history, besides the 'Institutions,' of which the most important are, his tract 'De Rebus Christianorum ante Constantinum,' and 'Institutiones Historiæ Christianæ Majores,' 1739, which is a full Church history of the first century. Among his other works are, a Latin translation, with notes, of Cud worth's 'Systema Intellectuale,' Jena, 1738; six volumes of Sermons, 1747; and nine volumes on the 'Morals of Holy Scripture,' 1773.

MOSQUE (from the Arabic *Maschiad* or *Medsched*, and intermediately the Spanish and Portuguese *Mesquita* and *Masqueta*), a Mohammedan place of worship, the distinctive marks of which are generally cupolas and minarets. Internally they exhibit nothing remarkable as to plan or accommodation, forming merely a single large hall or apartment, without any seats or other fittings-up, and with no other decoration than that of pavements and carpets, or arabesques and mosaics on the walls. In regard to these latter, some of the mosques at Cairo are highly embellished. Although more famed than any other, the mosque of Santa Sophia at Constantinople exhibits nothing of Mohammedan or Arabian architecture, but was originally built as a church, and is in the Byzantine style.

MOSQUITO, a term applied to certain stinging flies belonging in all probability to several distinct genera. The mosquitoes are either gnats or gnat-like insects, which are furnished with a proboscis adapted for piercing the flesh, and at the same time forming a kind of siphon through which the blood flows; this instrument moreover injects into the wound which it makes a poison which causes inflammation.

Many insects called mosquitoes probably belong to the same tribe as the common gnat (*Culex*, Linn.); Humboldt however asserts that the insects known by that name in America belong to the genus *Simulium*, and that the *Culices*, which are equally numerous and annoying, are called *Zancudoes*, which means long legs. The former are what the French call *Moustiques*, and the latter *Cousins*.

The genus *Simulium*, according to Macquart (*Suites à Buffon; Hist. Nat. des Insectes*, 'Diptères'), belongs to the family *Tipulariæ* and section *Tipulariæ-florales*, and is thus characterised:—fourth joint of the palpi rather elongated and slender; antennæ cylindrical, 11-jointed; eyes round, ocelli wanting; basal joint of the tarsi as long as the others taken together; wings very broad, basal and marginal cells very narrow.

M. Macquart, in his account of the habits of the species of this genus, says, 'They frequent the leaves of shrubs under trees, and live upon the juices found upon those leaves, especially such as are produced by the plant-lice; they do not however confine themselves to this kind of nourishment, but when opportunity offers, like gnats, they suck the blood of animals and produce an equally painful wound. Their proboscis is much less complicated than that of the gnats, consisting, as in other *Tipulariæ*, merely of a labrum and lingua; these parts however are more developed than usual. These minute flies are constantly in motion, and in running apply the whole sole of the anterior tarsus to the plane upon which they may be moving; they moreover appear to use their fore-legs as feelers.'

MOSQUITO SHORE. [CENTRAL AMERICA.]

MOSS. [CHRISTIANIA.]

MOSSES. [MUSCI.]

MOSUL, or **MOOSUL** (Al-Moutsal, in Arabic), a large town of Turkish Asia, on the right or west bank of the Tigris, in a low and flat country on the road from Bagdad to Diarbekr and the high land of Armenia. It is likewise on the road from Bagdad to Aleppo (Haleb) and Asia Minor. Caravans trade between Mosul and Aleppo, carrying to the latter place gall-nuts from Kurdistan, and Indian goods from Bassorah, which they exchange in Syria for European manufactures. Indian goods are also forwarded to Tocat, in Asia Minor, from whence copper is received in return, and sent down by the Tigris to Bagdad. Notwithstanding the favourable position of Mosul, its trade, which was once considerable, is now reduced very low. The only manufacture now carried on to any extent within the town is that of coarse cotton cloths, dyed blue, and used by the lower order of people. According to Marco Polo, the muslins took their name from Mosul, where they were first manufactured. The Arabic spoken at Mosul differs considerably from that of Cairo, and even from that of Aleppo; it has a mixture of Turkish, Persian, and even Indian words in it. The population, which is said to be rather less than 50,000, is chiefly composed of Mohammedans, consisting of Arabs, Turks, and Kurds. The Christians are about 1800 families, namely, 1000 of Chaldeans, who have nine churches, four of the Latin or Western communion, and five Nestorian; 500 families of the Syrian Greek church, who have three churches; and 300 families of Jacobites or Eutychians, who have two churches. The Catholic or Latin bishop of Diarbekr, or of Chaldea, resides here. There are also about 300 Jewish families, who have a synagogue.

The government of Mosul is in the hands of a pasha of two tails, who has a very limited territory and is independent o the neighbouring pashas of Orfah and Bagdad, and receives his investiture from the sultan. He keeps a force of about 1000 men, chiefly cavalry.

The town is surrounded by a wall; the streets are narrow and unpaved. There are several bazars, numerous coffee-houses and baths, and about thirty mosques. A bridge of boats connects Mosul with the eastern bank of the Tigris, where some mounds are supposed to mark the site of antient Nineveh. [NINEVEH.] (Buckingham's *Travels in Mesopotamia*.)

MOTACILLA. [SYLVIADÆ.]

MOTALA-ELF. [SWEDEN.]

MOTET (*Mottetto*, Ital.), in Music, a vocal composition set to sacred words, and used in the Catholic church. The word was synonymous with anthem, when first introduced, and signified a superior kind of hymn, accompanied only by the organ. [ANTHEM.] Latterly however the Motet has lost much of its primitive solemnity, having been, for considerably more than half a century, written with full and florid orchestral accompaniments, and thus, like the Mass, is deprived of no small portion of its devotional character. Many attempts have been made to discover whence the word is derived, but without any satisfactory result.

MOTH, the English name of the insects belonging to that section of the Lepidoptera called *Nocturna*. [LEPIDOPTERA.]

MOTHE-LE-VAYER, FRANÇOIS DE LA, was born at Paris, 1588, and in 1625 succeeded his father as substitute to the procureur-général; but he soon abandoned his profession to pursue his favourite study of history. In 1639 he was admitted into the Academy. Cardinal Richelieu being pleased with his work on the education of a prince, intended to appoint him preceptor to the dauphin, but the queen, Anne of Austria, refused her consent. Notwithstanding this, in 1649 he was entrusted with the education of the young duke of Orleans, whose astonishing progress under the tuition of Le Vayer induced the queen to acknowledge the talents of the master and confide to him the completion of the king's (Louis XIV.) education.

He died in 1672, in the 85th year of his age.

Of his numerous works, which obtained extraordinary success, the most important are: 1, 'Discours de la Contrariété d'Humeurs qui se trouve entre certaines Nations, et singulièrement la Françoise et l'Espagnole,' Paris, 1636, 8vo. The title-page states it to be a translation from the Italian of Fabricio Campolini. 2, 'Considerations sur l'Eloquence Françoise,' 1638, 12mo. 3, 'De l'Instruction de Mons. le Dauphin,' 1640, 4to. 4, 'De la Vertu des Païens,' Paris, 1642, 4to.; 3rd edition, 1647. Several collections of his works have been made; but the best is that of Dresden, 1756-59, 14 vols. 8vo., the materials of which were furnished by Roland le Vayer, nephew of the author. La Mothe is styled the Historiographer of France by Voltaire (*Siècle de Louis XIV.*), who also mentions him as a notorious Pyrrhonist.

The great diversity of opinion which La Mothe observed in the world seems to have laid the foundation of that scepticism which pervades his writings. His society was eagerly sought by all the learned and enlightened persons of his time, and he was readily admitted into the brilliant circles of Mademoiselle Gournay, who at her death bequeathed him her library; but from the vulgar and prejudiced part of the community he experienced persecution. Passing one day under the galleries of the Louvre, some one, pointing to him, cried out, 'There goes a man with no religion!' 'My friend,' replied La Mothe, 'I have religion enough to forgive you the insult.'

He was nearly fifty years of age before he published his first work. From that time (1636) he published regularly every year. His work 'De la Vertu des Païens' was answered by Arnauld, in a tract entitled 'De la Nécessité de la Foi en Jesus Christ.' La Mothe's book not selling so fast as the bookseller desired, he made grievous complaints. 'I have a method that will facilitate its sale,' said the author, and immediately procured a prohibition against the reading of it, which had the desired effect, for the work was read with admiration, and every copy sold off. (*Biog. Univ.* Voltaire.)

MOTHER-OF-PEARL. [SHELL.]

MOTHER-WATER. When any saline solution has been evaporated so as to deposit crystals on cooling, the remaining solution is termed the mother-water, or sometimes merely the mothers.

MOTION is change of place; there has been motion when a body, at one time, occupies a part of space different from that in which it was at a preceding time. The only additional necessary conception is continuity of change: every point which has moved from one point of space to another must have passed over every part of some line, straight or not straight, drawn from one point to the other.

Some of the antients used the word in a more general sense, answering to change. Thus, according to them, creation, generation, corruption, increase, diminution, and change of place, are the six sorts of motion. We have here no further to do with this than to remind our readers, when they see *local* motion spoken of in old writings, that this is the term by which simple change of place, to which the word motion is now restricted, is distinguished from the other changes which the same word then denoted. We still apply the word, as we do terms of magnitude (see that word) to changes of the moral system, as in speaking of the motions and emotions of the mind.

If there be anything which would need neither definition nor comment, it might be supposed to be simple motion, a thing never absent from one moment of the waking perceptions, nor even of the dream. Its existence was however denied, or is reported to have been denied, by various of the Greek sophists, though it is highly probable that some matter-of-fact historians have handed down as a deliberate opinion what was merely meant for an ingenious attack on one or another established school. According to Sextus Empiricus (i. § 17), Diodorus surnamed Cronus, a Carian, disproved the existence of motion as follows:—If matter moves, it is either in the place in which it is, or the place in which it is not; but it cannot move in the place in which it is, and certainly not in the place in which it is not: consequently it cannot move at all. To which the first-named author replies, that by the same rule men never die, for if a man die, it must either be at a time when he is alive, or at a time when he is not alive. A better answer would have been, that it is true of all material phenomena that they happen either in the place in which the matter is, or in that in which it is not, except only the change from that place in which the matter is and will not be, to that in which it is not but will be. The syllogism of Diodorus may be useful to remind us that motion implies both spaces and times, since the sophism excludes the latter from consideration. Zeno of Elea (not the Stoic) gave the celebrated argument of Achilles and the Tortoise. [PROGRESSION.]

If we consider merely motion, without any reference to the matter moved or the quantity of external force required to move it, we have, as we conceive, a subject of pure mathematics before us, though this has been contested. Newton however used considerations of motion without hesitation in his fluxions; and his successors have endeavoured to avoid them by circumlocutions, which, however consonant they may be to conventional ideas of rigour, have never failed to introduce perplexity and obscurity to the beginner. It may be right to remind the student that the change of place introduced by Euclid (i., prop. 4 and other propositions) has not necessarily all the concomitants of the idea of motion; geometry would not interfere to prevent the superposition from being made without the notion of the triangle, whose place is changed, passing through the intervening parts of space. It was the introduction of the idea of *time* which the parties who objected to the doctrine of fluxions repugned.

But if we consider matter in motion, we must inquire into the external causes of motion, and the capabilities of matter with respect to motion; this we shall do in the next article [MOTION, LAWS OF], confining ourselves in the present one to the first-mentioned branch of the subject.

Next to the idea of motion comes that of swiftness, rate of motion, or velocity (see also the latter word), suggested by observing different motions, or different changes of place in the same time. But here we must observe, that we are rather indebted to motion for our measure of time than to time for our measure of motion. If sentient beings, like ourselves, had lived in perpetual day, without any recurrence of periodical phenomena in nature, or any mechanical means of generating equable motion, we have no right to suppose that they would ever have learned to consider time as a measurable magnitude. They might admit that it might be more or less, as we do of industry, courage, or any other moral qualities [MAGNITUDE], but we cannot be more destitute of measures for those qualities, than they would be of means for measuring time. Since however we have obtained, though by means of equable motion, a distinct idea of successions of duration, equal in magnitude, we use this idea in the definition of motion, just as in geometry we consider the line before the surface, though we have no certainty that we ever should have a distinct notion of a line, if we had not formed lines by the intersection of surfaces. We say, though we have no certainty, but we do not forget that many philosophers are of opinion that such ideas as those of time and of a line are fundamental notions, resulting from our rational organization, and (if we do not mistake them) anterior to observation, or, at least, not derived from it. This question is here immaterial, as we suppose all parties ready to start with a definite notion of time. Considering the motion of a simple point, which describes a line, it is called uniform when the lengths described in successive equal times are equal, *whatever each time may be.* It is important to remember this, since different successive motions may be uniform in some respects and not in all. Thus successive revolutions may be performed in equal times, as to whole revolutions, but equal fractions of one revolution may not be performed in equal times. In uniform motion, an arbitrary unit of time is chosen, and the length described in that time is called the *velocity*, which is simply the Latin for *quickness*. If extreme verbal correctness were required, this length should be called, not the velocity or swiftness, but the measure of the velocity. For the length described in (say) one second is not the velocity or swiftness, but something by which we judge of it. The word velocity is an abstraction from the comparison of motions; of two moving points, that one which described the greater length in a given time moved the quicker: and swiftness is the absolute substantive by which we express the existence of the obvious relation, just as magnitude is that by which we express the existence of the relation of greater and less.

When equal spaces are not described in equal times, we can imagine the rate of motion to change either gradually or discontinuously. Thus it can be imagined that a body which moves for some seconds uniformly at the rate of 10 feet in a second, may at once, without any intermediate state, take a velocity of 20 feet. But such a conception cannot be realised on any material body, though there may be all the appearance of it. [IMPULSE.] When the rate of motion is changing perfectly gradually, there seems to be no direct method of obtaining the rate at any one instant; for no successive equal spaces are described in equal times. This difficulty will be discussed in the article VELOCITY: for the present, it may be considered sufficient to take a length so small that the change of rate undergone in passing through it is insensible, and to consider the point as moving uniformly through that length. Let the very small length s be described in the small fraction t of a second; then $s : t$ is the length which would be described in one second at the same rate, since $t : 1 :: s : (s : t)$, and $s : t$ may be taken for the velocity.

The existence of motion is detected either by a change of the distance of an object, or of its direction, or both; but it is not necessarily the object which moves. The spectator himself may be in motion unconsciously, and it is matter of common experiment that every motion of the spectator of which he is not conscious, and every rapid motion, whether he be conscious of it or not, causes surrounding objects to appear in motion. In walking, the effort necessary to maintain motion perpetually reminds us that it is ourselves who move; in a carriage, at an ordinary pace, we can always destroy the illusion of surrounding motions by a moment's thought. But if the attention drop, and we look at objects with the mind intent on other things, they soon take the motion of the carriage in a contrary direction. In the smooth motion of a boat, no effort of thought will enable the spectator to realise his own motion, and destroy that of the shore or a neighbouring vessel. We state that which we find to happen to ourselves; perhaps the experience of other persons may be different.

It may also happen that the object is in motion as well as the spectator, in which case the latter motion will be transferred to the former, in the manner in which we shall describe. The whole motion of the object, compounded of that which it has of its own, and that which it appears to have from the motion of the spectator, is called the *apparent* or *relative* motion.

The method of ascertaining the relative motion is as follows:—Since we only determine the positions of bodies by their distances and directions; and since we suppose the motions both of the spectator and the object to be given, let a fixed point be taken to represent the position in which the spectator imagines himself to remain, and laying down the real distances and directions of the object at the end of successive times, set off those distances from the fixed point in the proper directions. The relative positions of the object being thus secured, the line passing through these positions will be that in which the object appears to move. For instance, let the spectator move through 123...89 while the object moves through ABC...HI, so that when the first is at 1, the second is at A; when the first is at 2, the second is at B, and so on; the last positions being 9 and I. Take O for a fixed point, at which the spectator fancies himself to be, and having joined 1 and A, 2 and B, &c., draw O*a* parallel and equal to 1A, O*b* parallel and equal to 2B, &c., and O*i* parallel and equal to 9I. Hence the spectator, fixed at O, will see the object successively at the same distances and in the same directions as *a*, *b*, &c., and *i*; whence the line *abc*...*hi* will be that of its apparent motion.

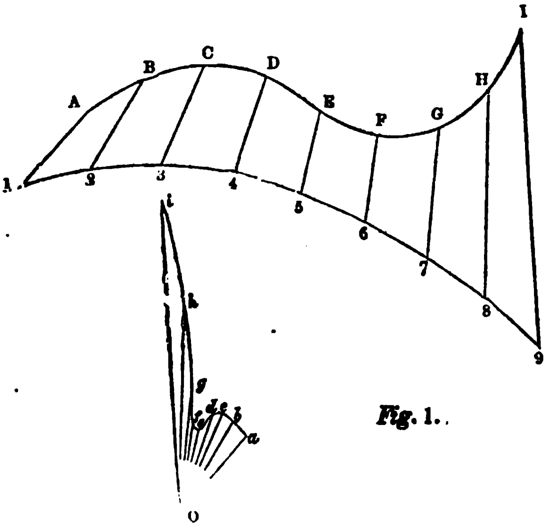
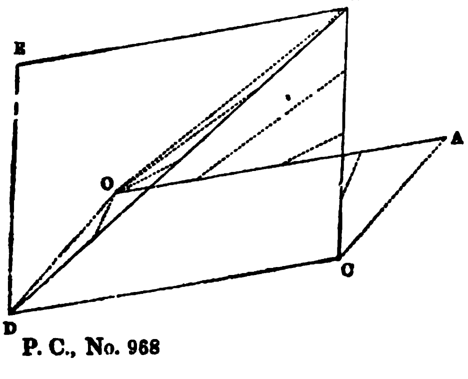


Fig. 1.

When both motions are rectilinear and uniform, the apparent motion may be more simply obtained, as follows:—Let the spectator move uniformly from O to A, while, in the same time, the object moves from B to C. Take the following method of fixing the spectator: as he moves forward from O to A let the paper on which the figure is drawn move backward in the direction contrary to OA, so that by the time the spectator has reached A, the point A shall have receded to where O was. He will therefore never have changed his place, his progression on the paper having been always compensated by the retrogression of the paper itself. Take CD parallel and equal to AO, whence the point C will, by the motion of the paper, at the end of the motion, be where D was at its beginning. Consequently the spectator, who imagines himself at rest, will give to B that motion which is compounded of a motion along BC, while BC itself is carried into the position ED. That is, B will appear to move along the line BD, the spectator imagining himself to remain at O. The dotted lines show the method of proceeding, as first described.

Fig. 2.



While the ship A moves from A to B, let C move through CD, E through EF, G through GH, K through KL, M through MN, and let P remain at rest. Then, a spectator in A supposing himself at rest, C will appear to remain at C, E will appear to move through E*f*, G through G*h*, K through K*l*, M through M*n*, and P through P*p*. The motion of A has been transferred in a contrary direction to each of the other vessels.

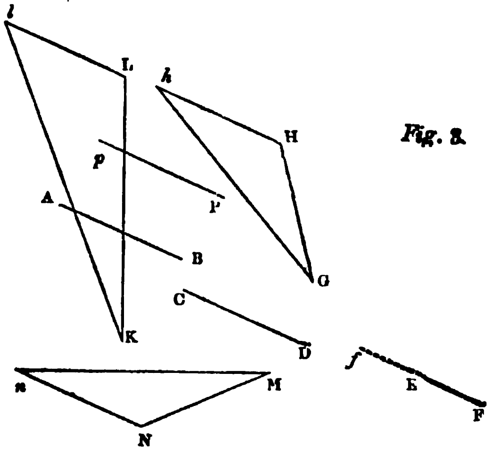


Fig. 3.

When bodies are very distant their changes of distance are not soon perceived, consequently it is only by change of direction that their motion becomes visible. This is the case in all the heavenly bodies; but we shall now show what the apparent motion of a planet, superior and inferior, would be, if changes of distance, as well as direction, could be perceived and estimated.

If the spectator be in motion, an object at rest appears to him to have precisely his own motion, but in a contrary direction: for if the object be O and the spectator move through ABCD, no distances would be changed if the spectator were fixed at O, and the object moved through ABCD, and all directions would only undergo a diametrical change. Consequently the relative motion of the object is represented by allowing it to change places with the spectator, and inverting the direction of north and south, which will have the effect of making the relative motion from west to east, if that of the spectator were from east to west, and *vice versâ*. Let us suppose now that the earth moves round the sun in a circle, which will be near enough for our present purpose; it will be immediately obvious that the direction of motion, so far as concerns the order in which the constellations will be described, is the same in the relative motion of the sun round the earth as in the absolute motion of the earth round the sun. For though the absolute directions of motion are opposite, yet S, to a spectator at E, is seen towards a point of the heavens opposite to that in which E appears from S. [Motion, Direction of.]

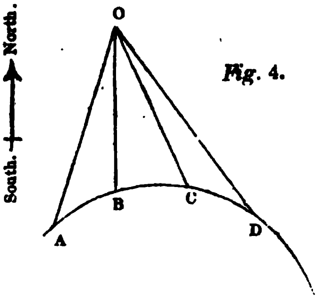
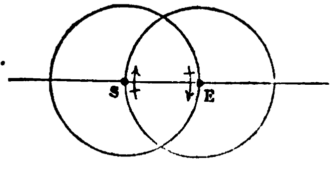


Fig. 4.

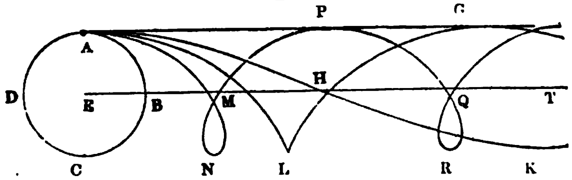
Fig. 5.



In giving to the sun the apparent motion which answers to the real motion of the earth, the same motion must be given to the orbits in which the planets are carried round the sun. The question then is as follows: if a planet move round the sun, say with a uniform circular motion, while the sun moves round the earth, also uniformly and circularly, what path will the planet actually trace out?

To get a notion of the possible species of curves, let us simplify the question by supposing a circle ABCD moving along a straight line ET, while a point moves round the circle from A.

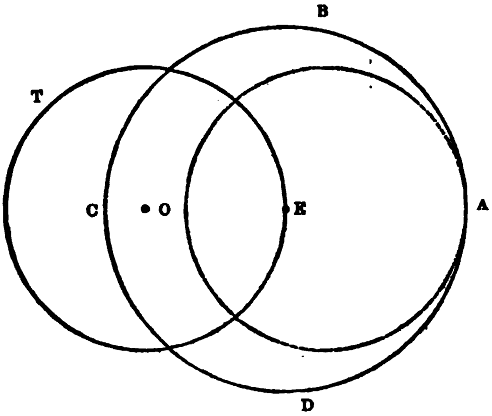
Fig. 6.



In the first place, if A did not move round at all, the line AG would be described; if A moved slowly round, the translation of the circle would cause an undulating curve like AHK to be described: if A moved as fast on the circle as the circle itself is moved forward, the undulation would be changed into a curve with cusps like ALG; while if A move faster on the circle than the circle is carried forward, the circle, so to speak, will not have time to get out of the way, and prevent the formation of loops, as in AMNMPQRQ.... The faster A moves, the larger and the nearer will be the loops, so that at length no one will be clear of the preceding and following, or the loops will interlace.

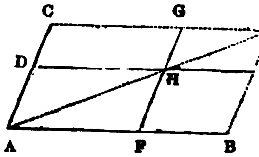
If the circle move round another circle, the same appearances will be presented in an inverse order. Let the centre E of the circle ABCD be carried round the circle ET, whose centre is O. If A did not move at all upon its circle, it would, by the motion of its circle, describe a circle (dotted) equal to ET: if A moved slowly, it would describe a succession of close loops enveloping O; if quicker, the loops would at last disengage themselves from each other; while for still more rapid motion of A the loops would become cusps, and afterwards the curve would simply undulate. The character of these curves will be further discussed under Trochoidal Curves, and their astronomical application under Planetary Motions. It is sufficient here to say that the apparent orbits of all the planets (or rather, the orbits as they would be if changes of distance were perceptible) are trochoidal curves of the above-described species, with loops which do not interfere with one another.

Fig. 7.



The composition of motion has been virtually proved in the preceding paragraphs, combined with the account of the second law of motion. [Motion, Laws of.] If causes of motion act instantaneously, one of which would make a body describe AB uniformly, and the other AC, *in the same time*, we find in the second law of motion that the body will move so that its distance from AB at the end of any time, measured parallel to AC, is what it would have been if the cause of motion in the direction AB had never existed nor acted. Suppose, for example, that three-fifths of the whole time of motion from A to B has elapsed; take AD three-fifths of AC, and the body must be then somewhere in the line DE. Again, take AF three-fifths of AB, and by the same law it follows that the body must be in the line FG, that is, it must be at the point H, which simple geometry shows to be on the diagonal AK, and by three-fifths of that diagonal distant from A. The same may be shown for any other proportion of the whole time; consequently the body, impressed with the two motions, describes the diagonal AK uniformly, and in the same time as that in which the separate motions from A to B, or from A to C, would have been performed. This is precisely the course the body would have taken in space, if, while it moved from A to B on the paper, the paper itself had taken the motion AC; but the establishment of the latter assertion must not be confounded with the proof of the composition of velocities impressed on matter; the latter requires those considerations which lead to the second law of motion.

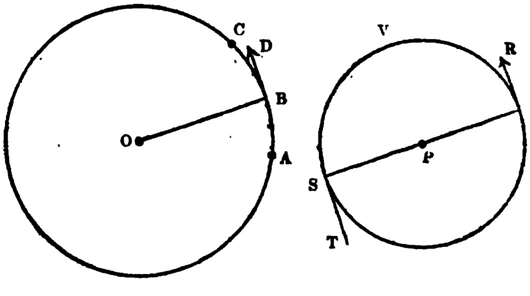
Fig. 8.



There are a great many uses of the word 'motion,' which are convenient, but require the introduction of arbitrary suppositions. Thus the moon never cuts the ecliptic twice running in the same place, and the intersection of her orbit with the ecliptic being called a node, it is said that the *node moves*; thus giving this node a sort of imaginary existence in the interval.

MOTION, DIRECTION OF. We have inserted this article, not for the sake of rectilinear, but of circular motion, the consideration of which is apt to cause some embarrassment to the beginner. In motion along a given right line there can be but two directions, in one or other of which the course must be; and these two directions are opposite to one another. But in circular or other rotatory motion, all imaginable directions are taken in the course of a revolution, and whatever linear direction the moving body takes at any one point, it has the opposite direction at the opposite point. Still however there are two ways of moving on a circle: the motion may either be from C to A through B, or from A to C through B. These are called, somewhat improperly, different directions of motion.

Fig. 9.



If two bodies be moving over two circles, they are said to move in the same direction when, two radii being taken in the same direction, the linear directions of motion are the same, as BD and QR. Thus care must be taken not to compare two circular motions by positions which belong to radii in opposite directions. If, for instance, the directions of motion be ABC and QVS (which are the same), and if at the same time the two bodies be at B and S, their linear directions of motion are opposite, though according to the definition their circular motions are in the same direction. Thus in the case of the moon, and her revolution round her own axis [Moon], the middle point of the visible moon is moving round the moon's axis in a direction opposite to the orbital motion of the moon; but the radius of that middle point is opposite in direction to the line joining the centres of the earth and moon; so that the direction of revolution of the moon's rotation is the same as that of the orbital rotation.

MOTION, LAWS OF. The laws of motion mean those universal methods of receiving and losing motion which close attention to mechanical phenomena, coupled with strict inductive reasoning, has shown to be inherent in the constitution of matter.

If an intelligent observer, not used to inductive reasoning, nor instructed in the results of mechanics, were required to state the views which experience had taught him of the constitution of matter, as an agent or patient in the production or reception of motion, he would perhaps reply as follows: Matter seems to have no power of moving itself, though if we judge from the fall of bodies towards the earth, the phenomena of magnetism, &c., it would appear as if matter might be the cause of motion in other matter. And it seems moreover that motion is an accident of matter which diminishes and dies out of itself, if some sustaining cause be not perpetually in action; for in all cases in which the experiment can be tried, we find that moving bodies are reduced to rest by being left to themselves. The motions of the heavenly bodies, it is true, appear to be permanent; but we have no certain assurance that there is not a constant sustaining *physical* cause of this permanency.

There would be something of truth, and a good deal of falsehood, in the preceding conclusions, and it is not an easy thing to give that exhibition of the real constitution of matter which is placed beyond all doubt by the coincidence of its results with all the more complicated phenomena of nature. There is no question that those principles, to take two cases out of thousands, on which a ball can be projected almost unerringly to its mark from the mouth of a cannon, and the motions of the moon can be predicted within a small fraction of a second, are founded in truth; but it does not therefore follow that an *à priori* demonstration of them, mathematical or experimental, can be given; and in fact the method of presenting the laws of motion to a beginner is encumbered with serious difficulties.

We shall begin by the assumption that those laws of motion which are to be found in all works on mechanics are true; the reason for such assumption being, that if we take them for granted, and use them as the basis of a mathematical system of mechanics, all results of that system, however many the links in the chain of deduction, are found to agree with observed phenomena in species, and as nearly in magnitude as the various resistances and disturbances will allow. In astronomy and optics, phenomena have been predicted with all but geometrical accuracy, by deduction from principles which would certainly be false if the received laws of motion were false. In terrestrial mechanics, the number of instances is unlimited in which these laws lead to that near approximation to prediction which is fully as much as can be expected with our imperfect knowledge of data. Many hundreds of phenomena admit, upon these laws, of an explanation which, compared with that which they could receive from any others, is as easy as the hypothesis of the motion of the earth compared with that of its stability.

So simple are the laws of motion themselves, that many have supposed them to be necessary, in the same sense as when we say it is a necessary consequence of our conception of straightness that two straight lines cannot inclose a space. We shall mention this notion again presently: in the meanwhile we are in this situation, that while it is difficult, as a matter of reasoning, to disentangle the fundamental laws from the variety and complication of the phenomena in which their effects are exhibited, yet these laws themselves, when disengaged, are of that startling simplicity which disinclines the mind to receive them as the results of a train of deduction, and disposes it rather to think that it could have dictated them from its own previous conceptions.

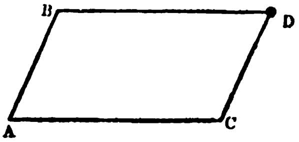
It will make some difference in our method of seeking for these laws, whether we suppose the earth to be at rest or in motion. Now the decisive proofs of the motion of the earth, as it happens, are themselves derived from certain consequences of the laws of motion. [MOTION OF THE EARTH.] We seem then to be reasoning in a vicious circle; nor do we see any mode of escape except by establishing the truth of these laws, whether the earth be at rest or in motion. And the process will be, first to detect laws for which there is a high and almost overpowering degree of probability in their favour; next to appeal to the above-mentioned uniform truth of the results deduced from the assumption of such laws for the conversion of this high state of probability into one of absolute demonstration.

We will first assume the motion of the earth: every point of its surface then is in a state of revolution round the axis, while at the same time the whole is carried forward round the sun; to which we must add, the slight motion arising from the precession of the equinoxes, and the possible translation of the whole system. But this motion is very different in different parts; at the pole, for example, there is no diurnal motion, near it only a small one, and at the equator a considerable one. The points near the pole, all the motions considered, are describing a trochoidal orbit (p. 450), the undulations of which are small, and the rotatory velocity small; those near the equator make larger undulations, with greater velocity of rotation. Our first idea might be, then, that at the different parts of the earth some modification of general laws would be observed, arising from the difference of the motions of the several places. It would not surprise a person wholly unacquainted with mechanics, to whom the preceding facts were stated for the first time, if he were told that some mistakes were made in the pointing of guns in our Indian battles, arising from the artillerymen having been trained by officers who had learnt their art in the latitude of Addiscombe, near Croydon, in Surrey, and had forgotten to allow for the difference in the diurnal motion of the two countries. Now the first law of motion which we can establish (though usually called the *second*) arises from it never having been observed that any notice need be taken of the difference of place on the earth in estimating effects of motion. It is not found necessary to write different treatises on gunnery for different latitudes, nor to alter the disposition of parts in any machine moved from one latitude to another to produce a more advantageous effect. There is, it is true, a small diminution in the weight of bodies, as they are carried toward the equator, and [CENTRIFUGAL FORCE; PENDULUM] the results of this are apparent in experiments in which the acquisition of motion depends upon weight, or rather, upon its proportion to the quantity of matter. But this very problem of the pendulum is one in which the question of the truth of the laws of motion is established by a test which would detect the smallest quantities, and furnishes an answer to those who might say that the possible effects of the difference of diurnal motions, though not distinguishable in such cases as that of a cannon-ball, might be perceptible in delicate instruments.

If to the motion of the earth we superadd another, such as the motion of a carriage, the same sort of result is found. Those who move on a railroad at the rate of 30 miles an hour, or 45 feet in a second, do not find the relation in which they stand to the objects in the carriage in any degree changed by the motion. At the instant of taking the motion, or on any sudden jolt or change of motion, effects may be produced to which we shall frequently refer: but when the speed is once obtained, it is well known that a person might occupy himself in reading a work on mechanics written on *terra firma* (so called), and might verify all the experimental conclusions, without coming to any result which would remind him of the difference of state between the writer and himself, as to motion. Hence we are led to the conclusion that all the relations of matter to matter remain unaltered, if the whole system be made to move, provided that the same motion be communicated to all its parts. And though we do not, absolutely speaking, know what rest is, since no point of the earth, nor of any heavenly body, can be shown to be at rest, yet since we see that the relations remain unaltered when the velocity of a whole system is changed, we are led to conclude that the same laws which prevail when all the parts of a system have the same motion, would also prevail if the whole system were at rest; the ground of our presumption being, that the laws remain unaltered under any alteration of the common motion which it is in our power to make.

Let us now suppose that the carriage, instead of moving in a right line, is carried on a curved road, say a simple circle. It is no longer observed that loose objects in the carriage have a tendency to repose relatively to the carriage itself. If the motion become sufficiently rapid, or the friction of the substances on which they stand be sufficiently small, they will endeavour to move outwards, or from the centre of the circle of motion. This phenomenon can be made a consequence of the laws of motion, when the latter have obtained their simplest form; we do not at present enter into this subject further than to point out that it is only of rectilinear motions we can predicate any law as descriptive of what is inherent in matter. We have, it is true, already spoken of circular motions in taking into account those of the earth; but it must be remembered, firstly, that the circles in question are so large, that a small arc of any one is nearly a straight line; secondly, that we *have* been obliged to advert to this tendency outwards, which is the reason of the diminution of weight (or of much the greater part of it) detected from the oscillations of a pendulum which is carried towards the equator.

This second law of motion (for such it is called, though it must be deduced first when the earth's motion is considered) may be thus stated:—If there be two or more causes of motion, taking place in two different right lines, whether inherent in the body or external to it, their effects do not interfere, nor does either diminish or augment the effect of the other. If, for instance, the body A be subject to two actions, one of which, being entirely in the direction A B, would bring the body to B in a given time, and the other, entirely in the direction A C, would bring it to C in the same given time; then the body will move from A to D, precisely as it would have done if, moving along A B in the manner first specified, the line A B had been translated with its extremity A moving in the second manner specified, the said line A B not changing its direction.



The most simple and general method of stating this law is as follows:—The distance of a point from a straight line or plane, measured in any given direction, and as it will be at the end of a given time, is not affected by the action, during that time, of any causes of motion, provided they act in the direction of, or parallel to, that straight line or plane; or no force, in a given direction, can produce motion to or from a line in that direction. Thus if a ball were thrown up in still air, in such a manner that it would mount 50 feet in one second, no imaginable *horizontal* current or whirlwind, however much it might alter the actual course of the ball, would prevent its rising 50 feet in the second. The statement of the law by Newton, namely, that when a force acts upon a body in motion, the change of motion which it produces is in the direction and proportional to the magnitude of the force which acts, is perhaps rather too vague to give a distinct notion to learners.

From the law just enunciated, we may learn that bodies upon the earth, moving with the earth, have the properties of bodies at rest with respect to all motions that are to be estimated relatively to the earth: at least upon the supposition that the curvature of the motions of the earth is not sufficiently great to produce a sensible effect. We have then to inquire what is the natural state of matter on the earth? Can it preserve any motion of itself, or does every motion gradually slacken and die out, by the mere inability of matter to maintain it without the application of external causes? On this point we have only strong presumptions, which would be by themselves insufficient. Our first step would be to conclude, from what we actually see, that rest is the natural state of matter, and one to which it always approaches, however great a cause of motion be applied, unless that external cause, or some part of it, be maintained. On looking further however we find that terrestrial matter, immediately on its being put in motion, encounters causes of retardation. The resistance of the air, and the friction of the basis on which the substances rest, are easily shown to lessen the motion of bodies which encounter them. The more nearly these are removed, the longer does motion continue. It is certain then that these resistances contribute in a great degree to the destruction of motion; but it is not therefore to be immediately assumed that there is no other cause. If we grant that a perfectly smooth ball, lying upon an indefinitely extended plane without friction, and not in contact with any atmosphere, would move for a long time without any sensible diminution of the rate with which it was made to set out, we grant quite enough to explain all that we see, without the necessity of supposing that the motion would continue for ever. How then can we establish the first law of motion (so called), which is thus stated, that matter will retain its state of rest, or of motion, for any length of time, however great, until acted upon by some external cause? We must here appeal to the results of the application of this law, which have never in any one instance, exhibited any reason to suspect that it is only approximately true. Throughout the long period of astronomical history, no one of the heavenly bodies has shown any diminution of its motion, or any of the consequences which would arise, if the motion had a tendency to wear itself out. We shall not here go into the details of these consequences; the conclusion is, that the state which matter, independently of external bodies, has been created capable of maintaining, is not merely rest, but also uniform motion in a straight line; so that it has no more tendency of itself to part with any of its velocity, nor to move slower or faster than it was first made to move, than it has to set itself from rest into motion. A great many, perhaps most, of the mistakes which have been made by writers against the Newtonian theory of attraction, have arisen from want of proper conception of the *neutral state* of matter. Maintenance of velocity and direction has been to them a proof of the existence of external causes maintained in action; whereas it proves nothing but that there was at some time or other an external cause which acted for a longer or shorter time: the external cause steps in when the velocity changes, or the direction, or both, and not till then.

Properly considered, the immense number of different states which matter retains, namely, either absolute rest, or any degree of velocity whatsoever, is as wonderful and mysterious a law as that of the attraction of matter upon matter, without any apparent intermediate agent. That matter should, without any perceptible maintainer, keep one rate of motion and one direction until acted on from without, is as difficult to admit, as that the mere presence of other matter should change that motion and that direction. What should teach blind atoms to draw straight lines in preference to circles or spirals? Have they the fundamental conceptions, according to some, or the powers of perception and inference, according to others, by which reasoning minds know or discover the simplicity of a straight line?

These two consequences of observation, namely, the law of its existence, by which matter can retain certain states, if no other matter interfere, and that by which it can change the state of other matter, its own at the same time undergoing another change, should never be allowed to be separated. There are two classes of philosophical speculators (for no religious question need be allowed to enter), whose system introduces no difficulty into the details of mechanical philosophy which did not enter into its principles. The first consists of those theists who look upon the maintenance of the creation to be the consequence of the same power as that which first created, and who consider that one moment's cessation of a sustaining power, of the same quality, so to speak, as the creative, would be the annihilation of all things: the second consists of atheists, who will of course find no more difficulty in the maintenance of the universe than in its first construction. But a great confusion of ideas is introduced into all fundamental questions which relate to matter, by the existence of a sect which we suspect greatly to outnumber either of the former two, and whom we may call believers in the *Creator* and not in the *Maintainer*. These, whatever they may think of the God of the moral world, imagine that the God of the material became inactive and quiescent as soon as matter was created, and endowed with certain powers, or made subject to certain laws. These laws, which are really their minor deities, carry on the business of the universe, and they can abstract the idea of God altogether from the continuance of the existence of matter, though not from its first creation. Among them may be found many of the literal interpreters of the Mosaic account [MOTION OF THE EARTH], who hold strictly that the Creator 'rested from his work,' and left matter to its 'laws,' except on certain rare interpositions. Many of this sect have admitted the laws of motion, and, among others, the power of matter to maintain its motion, because there was an appearance of inactive sameness, or want of change, in the permanence of rest, or permanence of direction and velocity. But they have been startled by the entrance of attraction, and have disputed its possibility on account of the absence of *second* causes sufficient for its explanation: however clearly it might be shown that all the results of attraction are present among phenomena, they would not allow their *first* cause to be awakened from the sleep in which it was their pleasure to suppose him plunged, so far as matter was concerned. Perhaps it is one of the most singular mental aberrations which ever was manifested, that at the time of the appearance of the Newtonian doctrine, the first mechanical theory which rested on the *maintainer* of the creation, at least until (which has not yet happened) some good quiescent 'second' cause was discovered—that doctrine was frequently charged with atheism.

If the earth were supposed to be fixed, we might obviously (though not obliged to do so) begin from matter at rest, and establish first that law of motion which usually stands first.

The third law of motion was enunciated by Newton as follows:—'Action and reaction are equal and contrary;' which requires a definition, and this definition will require the statement of the principle, or something amounting to it, in a more definite form. We may readily suppose that when matter communicates to other matter motion which the latter had not before, the former must lose some of its own. On any other supposition, the connexion of matter with other matter would create motion. But this it would seem to do in the case of attraction, so that the *primâ facie* objection to the supposition of matter creating motion seems to be answered by an instance. It must however be observed that in every case of nature, the creation of motion by attraction is accompanied by the creation of an opposite motion. If a magnetic and non-magnetic needle be placed in water, not only will the magnetic needle move towards the other needle, but the other needle towards the magnetic needle It appears then that opposite motions are to be considered as contrary effects; and, if applied to the same body, we know that they would destroy one another. In like manner then, as in considering the first law of motion, we have to learn that maintenance of uniform velocity must be looked at as inherent in matter, and as not arising from external causes; so in the third we are taught to consider opposite velocities as negations each of the other—so that the creation of both is equivalent to the creation of neither, and not, as might be supposed, requiring two new and distinct causes of motion. In like manner, if A were to lend a sum to B, which C was to stand engaged to repay, a credit and a debt would be created which did not before exist, the whole stock of the community remaining unaltered.

The most essential part of the principle however is derived from observation of the fact that, *cæteris paribus*, the more matter is moved, the more slowly is it moved. If the magnetic and non-magnetic needles be of equal mass, they will at the end of any time have equal and contrary velocities; but if the magnet be double of the other, it will in the same time acquire only half the velocity. In fact, confidently as we feel entitled to expect that, in some sense or other, action and reaction will be found equal and contrary, we have not learnt the meaning of the word action as long as we think only of velocity, and not of the quantity of matter in which velocity is created. A cause of motion once existing, and which was entirely expended in giving a velocity of 100 feet per second to a ball of two pounds weight, would have given 200 feet per second to a ball of one pound weight. Hence it is MOMENTUM which is the measure of the action of matter upon matter, and the definite enunciation of the third law is as follows:—Whenever any matter gains momentum in one direction, other matter either loses as much momentum in that direction, or gains as much in the contrary direction. Action then is creation or destruction of momentum; reaction is destruction or creation: while the destruction of momentum in one direction, and its creation in the contrary direction, are equivalent effects.

The absolute strictness of this law, probable as it is rendered by terrestrial observations, is proved in the same way as that of the others, namely, by the observation of the conformity of its legitimate deductions with observed facts. But the law being once admitted, its necessary consequences may be carried to a point startling to those readers who are not accustomed to consider any degree of minuteness which is undiscoverable by the senses. (See the remarks in ATTRACTION, vol. iii., p. 68.) Those who can comprehend that, if the law of attraction be true, a particle of snuff in a terrestrial snuff-box does its part (though but a small one) towards the maintenance of the motions of the solar system by its attraction of the particles in a Saturnian snuff-box (if the inhabitants of that planet be allowed such a luxury), will be able to comprehend that the earth itself feels (how slightly, we need not say) every motion which is made upon it. When Archimedes only wanted a point to rest his lever upon, in order to move the world, he little thought that his end could be gained by walking upon its surface, and that he made perhaps his strongest attempt when he hurried out of the bath to tell king Hiero of his new method of detecting the goldsmith's fraud. In walking forward upon the earth, which friction enables us to do, our feet obviously act upon it; and whatever momentum is communicated to ourselves, the same is lost by the earth, or gained in an opposite direction: and the same may be said of a person who jumps upwards. Thus the whole momentum of the universe, estimated in any one direction, obtained by taking the velocity of every mass in that direction, remains always the same, at least unless there be somewhere in the universe matter which obeys other laws than those of our system.

The three laws of motion, then, may be thus enunciated:—

1. Matter, unacted on by other matter, preserves the state which it had when action last ceased, that is to say, remains at rest, if it were then at rest, or if it were then moving, continues to move with the same velocity, and in the same direction. Rest, or uniformity of direction and velocity, can be maintained without the continuance of external action.

2. All force, or cause of motion, in any direction, produces its effect in that direction, and in no other; that is, the distance of a material point from any line, at the end of a given time, is unaffected by forces, whatever they may be, which act in that line or parallel to it.

3. Action of matter upon matter is evidenced by the creation of momentum, and measured, in any direction, by the momentum created in that direction: and action is always accompanied by equal and contrary reaction; that is, momentum is never created in any one direction, without a loss of the same momentum in that direction, or the creation of an equal momentum in the opposite direction.

Professor Whewell (to whose 'First Principles of Mechanics,' Deighton, Cambridge, 1832, we should particularly refer the reader, observing that the French writers are remarkably vague and indistinct in their treatment of the fundamental points of mechanics) has lately (*Camb. Phil. Trans.*, vol. v., part ii.) entered into the question 'On the Nature of the Truth of the Laws of Motion;' that is, whether they are '*necessary*, and capable of demonstration by means of self-evident axioms, like the truths of geometry, or *empirical*, and only known to be true by trial and observation, like such general rules as we obtain in natural history.' His conclusion is that there is a necessary and empirical part in each, as follows:—

Necessary.	Empirical.
1. Velocity does not change without a cause.	The time for which a body has already been in motion is not a cause of change of velocity.
2. The accelerating quantity of a force is measured by the acceleration produced.	The velocity and direction of the motion which a body already possesses are not either of them causes which change the acceleration produced.
3. Reaction is equal and opposite to action.	The connection of the parts of a body, or of a system of bodies, and the action to which the body or system is already subject, are not either of them causes which change the effects of any additional action.

From the preceding it will appear that the *necessary* part of each law is either a verbal proposition or disputable. To say that velocity does not change without a cause, is a reference to that permanent association of change with reason for change which habit derived from experience, if nothing else, would lead us to make in all cases, whether concerning motion or anything else: the law of matter is found in the empirical part. Again, the accelerating quantity of a force can mean nothing but the acceleration produced; for our only meaning of force is cause of motion or alteration of motion, and it is an identical proposition that the accelerating quantity of a cause of acceleration is measured by the acceleration produced. Thirdly, if in 'reaction is equal and opposite to action' we are to understand by action the production or alteration of MOMENTUM (M × V), we do not see the *necessity* of the proposition: while if it be merely understood that there is a somewhat which matter cannot give to other matter without itself losing the same, we may, as in the case of the presumed necessary part of the first law, deny that it is any peculiar property of *matter* which is stated. It is the mode of measuring this somewhat which makes this law have a specific meaning with reference to matter.

The mistakes into which philosophers fell upon the laws of motion are uninteresting except in the applications which were made of them; and in the article MOTION OF THE EARTH will be found enough of these to give an idea of the difficulties which such fallacies placed in the way of sound knowledge. A full account of the labours of Galileo is accessible to all in the life of that great man, published in the 'Library of Useful Knowledge.' For an account of the notions of Descartes on the same subject, see VORTICES. The first distinct enunciation of these laws appears in the Principia of Newton, since whose time they have been usually quoted in their present form and number.

Though all mechanical problems admit of solution upon the assumption of these laws, in conjunction with those which may be called the distinctive properties of the solid, fluid, and gaseous states, yet the purposes of mechanical inquiry are better served by certain general principles deduced from them, the proper conception of which can only be made by mathematicians, and are therefore referred to a purely mathematical article [VIRTUAL VELOCITIES]; see also PRESSURE, FORCE, INERTIA, CENTRIPETAL AND CENTRIFUGAL FORCES, ACCELERATION, VELOCITY, &c.; MOVING FORCE; particularly the article INERTIA, for the reason of the non-introduction of that word.

Among the many absurdities which have arisen out of a misapprehension of the laws of motion, is the attempt to discover what is called a *perpetual motion*, or a machine which of itself would never stop. The earth and planets are such machines in their rotations on their axes; and we have seen that any particle of matter, unacted on by other matter, and once in motion, is a perpetual motion. If a wheel attached to an axle could be deprived of friction at the pivots, and enclosed in a permanently air-tight and perfectly exhausted receiver, it would also, when once in motion, be a perpetual motion. But as long as any friction or resistance, however small, is perpetually retarding the motion, it is obvious that the velocity, if maintained, must be indebted to some external supply of moving power. To take the case of friction, which arises from the roughness of the supports, and which, independently of *adhesion*, may be considered as a rapid succession of very small jolts, by which the roughnesses of the one surface strike upon those of the other, and communicate a portion of momentum to the frame, and finally to the earth: to suppose that a wheel as above described could go on for ever, with friction, would be to suppose that there could be action without reaction. In fact, a perpetual motion, such as is intended to be made by the speculators on the subject, is nothing less than a machine which will work for ever without new moving power; it being not one bit less absurd to suppose that it would perpetually overcome friction and atmospheric resistance, than that it would continue to supply the impetus necessary to carry on the sawing of a plank or the weaving of lace.

MOTION OF THE EARTH. The theory of gravitation has placed this question on a footing entirely different from that on which it was argued, whether by Aristotelians or Copernicans. Both of the latter parties supposed the existence of a fixed central body somewhere, which the first of them would have to be the earth, and the second the sun. This *centrum mundi*, or centre of the universe, is exploded, and with it all the systems, whether Ptolemaic or Copernican, which preceded the discoveries of Newton. But, as already noticed in COPERNICUS, the existing system preserves the name of that great man; the reason being, that its distinctive peculiarity is retained relatively, if not absolutely, namely, that the planets all move round the sun, or round a point near to the sun. But it is added to the real Copernican system, that sun, planets, and all, may be, and probably are, in motion; the translation, as it is called, of the whole system being very nearly rectilinear, and the curvature, if any, arising from the attraction of the fixed stars. Nothing but a long course of observation can settle this last part of the question.

In approaching the old controversy on the motion of the earth, we confine ourselves rather to the arguments by which it was opposed than to those by which it was supported. For this we have two reasons: firstly, that the latter are well known and extensively circulated, while the former, unless preserved in historical articles, will find the oblivion from which they have no intrinsic merit to rescue them; secondly, that the controversies of the present day may be usefully illustrated by recurring to the long-decided struggle between the Copernicans and their opponents. We have now among us those who would fetter all *new* truths by *their* interpretation of the Scriptures, though they quietly acquiesce in the defeat which their own principle formerly received. The charges still brought against the cultivators of the sciences, 'to the distress and disgust of every well-constituted mind,' as Sir J. Herschel expresses it, should be looked at, not as the honest manifestations of an alarm newly awakened by the circumstances of the present day, but as the effects of an abiding spirit, which has always opposed investigation, and which, if it had prevailed, would have smothered all the knowledge of nature which has been acquired in the last two centuries. If some of those who have constituted themselves successors of the cardinals who forced Galileo to recant, have learnt from the past history of their own cause, and from the temper of the present age, to show the real scope of their system less openly than it appeared in the seventeenth century, the compliment which they thus pay to the advancing intelligence of mankind, though received with thanks and highly appreciated, should not be accepted as an equivalent for the mischiefs which must result from a successful attempt to place the great question of Revelation upon a false basis. The case of those who now endeavour to impede the progress of geology is so similar in its fundamental points to that of the former labourers to the same effect in the field of astronomy, that the circulation of some account of the latter will perhaps enable our readers to help themselves in forming their opinion of the former.

When the work of Copernicus appeared in 1543, it seems to have been considered as a mere attempt to demonstrate (see the old use of this word in DEMONSTRATION) the motions of the heavenly bodies in a more simple way. Guarded as it was by the expressions of the preface, it was neglected as a purely speculative trial of a strange and impossible hypothesis. In 1566 Ramus (*Scol. Math.*) simply reproaches Copernicus with the gigantic character of his hypothesis, and says it would have been better to have taken one nearer to the truth, in a manner which implies that he thought both were agreed as to what the truth really was. Copernicus himself, as we have seen, treated his own ideas as a reproduction of those of the antients, and in truth the existence of such a doctrine as the earth's motion was perfectly well known to all men of learning. Aristotle (in his second book on the Heavens) states that Pythagoras and his followers placed the sun in the centre, on account of the superior excellence which they attributed to the element of fire, of which they supposed the sun to be made. Different authorities give the same opinion (whether with or without the reason) to Philolaus, Anaximander, Nicetas, Seleucus, Cleanthes, Leucippus, Ecphantus, Heraclides Ponticus, and Aristarchus. The introduction of Pythagoras, as a predecessor of Copernicus, is as rational as would be the connection of the modern atomic theory with the doctrines of Epicurus; and much of the same kind is an assertion not unfrequently made, that Cardinal Cusa was a supporter of the earth's motion. This writer (*De Doctâ Ignorantiâ*, lib. ii., c. 11) certainly denies that there can be any centre of the universe; for, says he, if there were a centre, there would be a circumference, that is, a termination, to the universe: and his reasons relative to the earth's motion are of the same degree of force. He is more rational in the next chapter, where he explains that the apparent motion of other bodies may be that of the spectator. Riccioli cites a sermon of Cusa, which proves, says he, that the cardinal had come to a sounder opinion; for he speaks of God's angels or intelligences moving the sun and stars. Nothing can better illustrate, in our opinion, the arguments against Riccioli and his predecessors: when the cardinal is writing for men of science, he advances, after his fashion, the doctrine of the earth's motion; when he is writing excitations (not exercitations, as Riccioli says) to religious feeling, he speaks of God's works in a manner which persons in general understood: in confounding the preacher of religion with the philosopher, Riccioli made the usual error of his day, and only repeated his own mode of treating Moses, Isaiah, and the writer of Job. But it would have been better to have argued by analogy, that if either of the latter had written a professedly philosophical work, he might, whatever appears to the contrary from his religious writings, have admitted the motion of the earth.

Copernicus had no predecessor as a mathematical reasoner upon the question. The first continental followers of the new system were Rheticus, Reinhold, Mœstlinus the instructor of Kepler, and Urstitius, who was probably the instructor of Galileo. In 1556 appeared in England the 'Castle of Knowledge,' by Recorde [Recorde, Robert], in which a cautious and implied avowal of Copernican principles is made, and also the Ephemeris of John Field, expressly computed from Copernicus and Reinhold. John Dee and his pupil Thomas Digges (son of Leonard) were both avowed Copernicans: the first absolute defence of the system is contained in the appendix to the 'Prognostication Everlasting,' &c. of Leonard Digges, republished by Thomas Digges (who added the appendix) in 1594. This appendix is called 'A Perfit Description of the Cœlestial Orbes, according to the most Ancient Doctrine of the Pythagoreans; lately reuiued by Copernicus, and by Geometricall Demonstrations approued.' We shall quote from this work the account (in modern spelling) of 'what reasons moved Aristotle and others that followed him to think the earth to rest immoveable as a centre to the whole world.'

'The most effectual reasons that they produce to prove the earth's stability in the middle or lowest part of the world is that of Gravity and Levity. For, of all other, the element of the earth (say they) is most heavy, and all the ponderous things are carried into it, striving (as it were) to sway even down to the inmost part thereof. For the earth being round, into the which all weighty things on every side fall, making right angles on the superficies, pass to the centre, seeing every right line that falleth perpendicularly upon the horizon in that place where it toucheth the earth, must needs pass by the centre. And those things that are carried toward that medium,' or middle point, 'it is likely that there also they would rest. So much therefore the rather shall the earth rest in the middle, and (receiving all things into itself that fall) by his own weight shall be most immoveable. Again, they seek to prove it by reason of motion and his nature; for of one and the same simple body the motion must also be simple, saith Aristotle. Of simple motions there are two kinds, right and circular: right are either up or down; so that every simple motion is either downward toward the centre, or upward from the centre, or circular about the centre. Now unto the earth and water, in respect of their weight, the motion downward is convenient to seek the centre; to air and fire, in regard of their lightness, upward and from the centre. So it is meet to these elements to attribute the right or straight motion, and to the heavens only it is proper circularly about this mean or centre to be turned round. Thus much Aristotle. If therefore (saith Ptolemy of Alexandria) the earth should turn but only by that daily motion, things quite contrary to these should happen. For his motion should be most swift and violent, that in twenty-four hours should let pass the whole circuit of the earth; and those things which, by sudden turning, are stirred, are altogether unmeet to collect, but rather to disperse things united, unless they should by some firm fastening be kept together. And long ere this the earth, being dissolved in pieces, should have been scattered through the heavens, which were a mockery to think of; and much more beasts and all other weights that are loose could not remain unshaken. But also things falling should not light on the places perpendicular under them, neither should they fall directly thereto, the same being violently in the meanwhile carried away. Clouds also and other things hanging in the air should always seem to us to be carried toward the west.' In his answer to the preceding, Digges propounds the experiment which was afterwards urged (by those who had not tried it) against Copernicus, as follows: 'Of things ascending and descending in respect of the world, we must confess them to have a mixed notion of right and circular, albeit it seem to us right and straight, not otherwise than if, in a ship under sail, a man should softly let a plummet down from the top along by the mast even to the deck: this plummet passing always by the straight mast seemeth also to fall in a right line; but being by discourse of reason weighed, his motion is found mixed of right and circular.' From his preface Digges appears to have considered magnetism as the cause of the earth's self-sustaining power; an opinion carried further by Gilbert (the next English Copernican) in 1600, who, in his book on the magnet, endeavours to deduce the earth's motion from magnetic causes, as well as the precession of the equinoxes.

Hitherto the theological part of the controversy has not made its appearance. We must date this view of the question from the discoveries of Galileo. Neither in antient nor modern times have those who would bind over the sciences to agree with *their* interpretation of the Scriptures ever taken alarm at hypotheses, until those hypotheses began to have facts in their favour. The inconsistency is worth noting; for taking these objectors on their own principles, there may be impiety (if the Bible be a revelation of philosophy) in propounding a theory which contradicts it; but there can be none in stating the results which follow from actual investigation: the thoughts of the mind of man may contradict revealed science (if such there be), but the works of the God of nature can hardly detect falsehood in the God of revelation. It was Copernicus then, and not Galileo, who was the heretic, if heresy there were in the case; but the former and his immediate disciples slept in peace, while the latter was forced to sign a recantation. The story of Galileo is so well known, from the party use which has been made of it amongst us, as well as from the excellent account of Mr. Drinkwater (Bethune) in the 'Library of Useful Knowledge,' that it is unnecessary to go into details. It has been a severe lesson to the Roman Catholic church to beware of bringing its infallibility to the practical test of a declaration in philosophy. We say the Roman *church*, for though admitting that the seven inquisitors who signed the indictment against Galileo are not to be regarded, upon the principles of that church, as a final authority, yet the sufferance of their decision for two centuries must be construed as the act[*] of a church which is jealous above all others of what is taught or done by its ministers. The Minims Le Seur and Jacquier knew better than we can do in what state the doctrine of the earth's motion was left[†] by the process; their declaration at the commencement of the third book of their edition of Newton (1742), runs as follows: 'Newton in this third book assumes the hypothesis of the motion of the earth. The propositions of the author cannot be explained otherwise than by making the same hypothesis. Hence we have been *obliged to put on a character not our own.* (Hinc alienam coacti sumus gerere personam.) But we profess obedience to the decrees promulgated by sovereign pontiffs against the motion of the earth.' At the same time, with reference to the reproaches heaped upon the whole body of Roman Catholics for this persecution of Galileo, we heartily wish that all persecutions, Catholic and Protestant, had been as honest and as mild. There is no reason to doubt the perfect good faith of the whole proceeding: and, remembering that the tribunal was one of which Galileo himself admitted the jurisdiction, and supposing the inquisitors to have believed they were doing their duty, any less amount of severity would have been a palpable respect of persons (for Galileo had powerful friends). For ourselves, we would as soon have been among the inquisitors as in the position of Galileo himself, if it be true that, on rising from his knees, after taking the most solemn oaths that he 'abjured, cursed, and detested' the doctrine of the motion of the earth, he repeated aside to a friend, '*E pur si muove*' ('It does move, for all that'). We may pity, but cannot admire, either party. Not to leave unsaid any palliative on either side, we may state that the exclamation of Galileo has no very good authority, and that the inquisitors themselves were not unanimous. One of them, the cardinal Bentivoglio, states in his memoirs, that he did all he could to prevent the decision. It should also be noticed that the prohibitions issued at the time were mostly against works written in Italian; we cannot help suspecting that the opinion would have remained unassailed if it had been expressed only in Latin. The question just discussed was settled June 22, 1633, but this was not the beginning of the controversy. The following list of writings will save future reference. They are headed by their dates:—1614, Scheiner, 'Disqu. Math. de contr. et novitat. Astron.;' 1615, Foscarini, 'Epistola Italica de mobil. terræ;' 1615, Luniga, 'Lett. sopra l'opin. del Copernico;' 1616, Cruger[*], 'Disput. de quot. telluris revol.;' 1618-1622, Kepler, 'Epit. Astron. Copern.;' 1619, Lansberg (Philip), 'Comm. in motum terræ;' also tracts of Ursinus, Campanella, and Godenius; 1619, Fienus, 'Disp. an Cœlum moveatur et terra quiescat.;' 1631, Morinus, 'Famosi et antiqui problematis de telluris motu et quiete hactenus optata solutio;' 1631, Fromondus, 'Antaristarchus, sive Orbis terræ immobilis;' 1633, Galileo, 'Dial. sopra i due massimi sistemi del mondo, Tolemaico e Copernicano,' the prohibited work; 1633, Lansberg (James, son of Philip), 'Apol. comment. Phil. Lansberg in motum terræ;' 1634, Morinus, 'Resp. ad J. Lansberg Apolog.;' 1634, Rosse, 'Confut. opin. Lansbergii;' 1635, Linemann, 'Disput. math. adstruens mot. diurn. telluri vindicandum esse;' 1638, Wilkins, 'Discourse tending to prove that 'tis probable there may be another habitable world in the moon;' 1638, Bouillaud, 'Philolaus, sive diss. de vero syst. mundi;' 1640, Licetus, 'De terra, unico centro motus, disp.;' 1640, Wilkins (anonymous), 'A Discourse tending to prove that 'tis probable the earth is one of the planets;' 1642, Gassendi, 'Epistolæ duæ de motu impresso a motore translato;' tracts of Deusingius, Morinus, and others; 1643, Morinus, 'Alæ telluris fractæ, contra Gassendum;' 1643, Claramontius, 'Antiphilolaus;' 1644, Polaccus, 'Anticopernicus Catholicus;' 1645, Rheita, 'Oculus Enoch et Eliæ' (defence of the Tychonic system); 1645, Bouillaud, 'Astronomia Philolaica;' 1645, Christian, 'Disput. de trip. mundi system.;' 1645, Grandamicus, 'Nova Demonstr. immob. terræ ex virtute magnetica;' 1646, Rosse, 'The New Planet no Planet,[†] or the Earth no Wandering Star, except in the wandering heads of Galileans' (answer to Wilkins); 1647, Gassendi, 'Institutio Astronomica;' 1649, Gassendi, 'Apol. in Morini lib. cui tit. Alæ telluris fractæ una cum tribus Galilei Epistolis de Conciliatione Sacræ Scripturæ cum systemate telluris mobilis;' 1651, Riccioli, 'Almagestum Novum;' 1653, Dubois, 'Dialogus Theologico-astronomicus;' 1655, Herbinius, 'Examen Controv. famosæ,' &c.; 1656, anonymous, 'Demonstr. math. ineptiarum J. Dubois;' 1665, Fabri, 'Dial. phys. in quibus de motu terræ disputatur;' 1668, Riccioli, 'Argomento fisico-matematico contro il moto diurno della terra;' 1680, Bianchini, 'Dial. contro il syst. Copern.;' 1682, Megerlinus, 'Syst. Mundi Copern. demonstr.'

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[*] The Papal power must, upon the whole, have been moderately used in matters of philosophy, if we may judge from the great stress laid on this one case of Galileo. It is the standing proof that an authority which has lasted a thousand years was all the time employed in checking the progress of thought. There are certainly one or two other instances, but those who make most of the outcry do not know them.

But the most amusing application of the case before us is that frequently made by the unknown writers who publish their own great discoveries. These generally cite the *persecution* of Galileo as a parallel to the *neglect* of themselves.

[†] Mr. Drinkwater states that both Copernicus and Galileo remain in the Index Expurgatorius for 1828 with 'nisi corrigatur' to each. It appears however that the omissions and alterations with which the former author was allowed to be read were settled in 1620.

The controversy ceases to have any interest after the publication of the Principia of Newton. Even to this day, we believe there are some who deny the earth's motion, on the authority of the Scriptures, and every now and then a work appears producing mathematical reasons for that denial; these works, as fast as published, after making each two converts and a half in a country town, are heard of no more until fifty years afterwards, when they are discovered by bibliomaniacs bound up in volumes of tracts with dissertations on squaring the circle, and perpetual motion, and pamphlets predicting national bankruptcy.

We shall now recapitulate some of the arguments against the earth's motion, taking first the scriptural and afterwards the physical.

The scriptural arguments are of two kinds, Copernican and anti-Copernican, for it must be remembered that the asserters of the earth's motion, almost with one accord, admitted the Scriptures as a judge of the controversy. The following are some of the texts and arguments. We take them from Fienus, Fromond, Morin, Rosse, and Riccioli on the one side, and from their statements of their opponents' arguments, or from Wilkins, on the other.

Psalm xix., 4, 5, 6: 'In them hath he set a tabernacle for the sun, which is as a bridegroom coming out of his chamber, and rejoiceth as a strong man to run a race. His going forth is from the end of the heaven, and his circuit unto the ends of it.' Here it is remarked that the metaphor, where it exists, is explicit, in '*as* a bridegroom,' '*as* a strong man,' but that the words which apply to the sun's motion are absolute assertion.

Ecclesiastes i. 4, &c.: 'One generation passeth away, and another generation cometh; but the earth abideth for ever. The sun also ariseth, and the sun goeth down, and hasteth to his place whence he arose. The wind goeth towards the south, and turneth about unto the north.' In the Vulgate, the last sentence refers to the sun. 'Oritur sol et occidit, et ad locum suum revertitur, ibique renascens gyrat per meridiem, et flectitur ad aquilonem.'

Joshua, x. 12: 'Sun, stand thou still upon Gibeon, and thou, moon, in the valley of Ajalon. And the sun stood still, and the moon stayed.... So the sun stood still in the midst of heaven, and hasted not to go down about a whole day.' It was contended that the earth ought to have been made to stand still, 'if Joshua had been a Copernican.'

2 *Kings*, xx. 11: 'And he brought the shadow ten degrees backwards, by which it had gone down in the dial of Ahaz.' *Isaiah*, xxxviii. 8: 'So the sun returned ten degrees, by which degrees it was gone down.'

Psalm xciii. 1: 'The world also is stablished that it cannot be moved.' *Psalm* civ. 5: 'Who laid the foundations of the earth, that it should not be removed for ever.'

Job, ix. 6, &c.: 'Which shaketh the earth out of her place, and the pillars thereof tremble: which commandeth the sun, and it riseth not, and sealeth up the stars.'

Job, xxxviii. 4, &c.: 'Where wast thou when I laid the foundations of the earth?.... Whereupon are the foundations thereof fastened? or who laid the corner-stone thereof?.... Where is the way where light dwelleth? and as for darkness, where is the place thereof?'

The Copernicans cited the preceding, *Job*, ix. 6, and the following, *Psalm* xcvii. 4, 'The earth saw, and trembled;' and *Psalm* xcviii. 7, which, in the English version, is 'Let the sea roar, and the fulness thereof, the world, and they that dwell therein;' but in the Vulgate, 'Moveatur mare et plenitudo ejus, orbis terrarum, et universi qui habitant in eo.' The Ptolemaists replied, with reason, that these texts evidently imply a violent and unusual motion, while all the others speak of stability as the common order of things. We look upon Fromond as, next to Riccioli, the most learned and sensible of the anti-movement party, while Lansberg is certainly not the least of the Copernicans. Yet the latter, to fill up the immense void between Saturn and the fixed stars, states that it is crowded with spirits good and evil, employed in their vocations: the former meets him by the following argument. By the universal consent of theologians, hell is at the centre of the earth: the creed says that Jesus Christ 'descended into hell;' and St. Paul, in *Ephesians*, iv. 9, that he 'descended into the lower parts of the earth.' The empyreal heaven, and the habitation of the blessed, must be as far as possible from hell; but the former was, by consent of theologians, at the circumference of the universe; therefore, says Fromond, the earth must be at the centre. But Morinus outdoes the rest. From the creed, he says, it appears that Jesus Christ 'ascended into heaven;' and from the first chapter of *Acts*, that he was 'taken up.' It is generally thought that the hour of the ascension was noon, at which time, according to the Copernicans, the heads of persons on the earth are towards the centre of the system (the sun). Consequently it was not an ascent, but a descent, for to go towards the centre is to descend. I know, says Morin, that the Copernicans have a subterfuge and a fallacy, for they say that the ascent was an ascent with respect to the earth only; and he goes on to show what shuffling knaves they were, for so direct a perversion of plain words. It is however but fair to the anti-Copernican party to add that Riccioli, by far the most learned of all of them, has not thought Morinus worthy of one word of mention in his list[*] of writers on the subject.

Riccioli cites the following additional texts. *Genesis*, xv. 12: 'And when the sun was going down,' &c. *Gen.*, xix. 23: 'The sun was risen upon the earth.' *Gen.*, xxxii. 31: 'The sun rose upon him.' *Judges*, xix. 14: 'The sun went down upon them.' *Matthew*, v. 45: 'He maketh his sun to rise on the evil and on the good:' with several others to the same purport. Also *Psalm* lxxv. 3: 'The earth and all the inhabitants thereof are dissolved: I bear up the pillars of it.' He adds all the places in which 'heaven above' and 'earth beneath' are mentioned.

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[*] The Preceptor of Hevelius.

[†] Lalande gives a Latin title; we do not know whether it was published in Latin at the same time or not.

[*] Since then this is a list selected by the latest writer of note, as well as the most learned, it may be worth while to give the names.

Copernicans: Copernicus, Rheticus, Moestlinus, Kepler, Rothman (until he followed Tycho), Gilbert Foscarini, Zuniga, Bouillaud, Lansberg, Herigone, Gassendi, Des Cartes.

Anti-Copernicans: Aristotle, Ptolemy, Theon, Regiomontanus, Alfraganus, Cleomedes, Macrobius, D'Ailly, Buchanan, Maurolico, Clavius, Barocius, Neander, Telesius, Martinengus, Lipsius, Scheiner, Tycho, Tassonus, Claramontius, Inchofer, Fromondus, Lagalla, Tanner, Bart. Amicus, Rocco, Mersenne, Polaccus, Kircher, Spinelius, Pineda, Lorinus, Mastrius, Belluta Pontius, Delphinus, Elephantutius. Many of these are theologians only.

The Copernicans, besides the very few passages which they could find alluding to a motion of the earth (and that only an unusual one), brought forward texts in which admitted errors exist; such as the Mosaic definition of the firmament, the circumference of Solomon's brazen sea (which, the diameter being ten cubits, must have been upwards of thirty-one cubits in circumference, and not thirty, as stated), and the like. To this the general answer was, that there is a great difference between stating round numbers, according to usual measurement, and absolutely asserting untruth. Riccioli however lays it down that the obvious literal sense of the Scripture is to be taken, except where it is manifestly false; that Archimedes had shown the proportion of ten to thirty to be false, but that no one had actually shown the earth to move. This was evidently convenient, but unfair; the motion of the earth was the thing in question, and could not be proved false by assuming a literal interpretation, which, it was admitted, might be rejected if the earth's motion were true.

Upon a review of the passages cited, it is clear enough that, if there be any astronomical system at all in them, it is that of an immoveable earth and a moveable sun; while if there be no astronomical system, it follows that vulgar notions are adopted in the modes of expression, which represent appearances without reference to their truth or falsehood. On one horn or other of this dilemma, all our modern Urbans must be content to abide: will they go back to Ptolemy, or forward with the advance of science? Can they show any reason why the astronomical system of the Old Testament should be rejected, and those passages which appear to favour one geological theory rather than another should not only be received, but be attempted to be enforced upon others by clamours of latitudinarianism, infidelity, and all those reproaches by which (and fortunately, by which only) untolerated differences of opinion are punished?

That the attempt to enforce a system of science derived from an interpretation of the Scriptures will signally fail, should be taught by the history of the past. Not even the Church of Rome will ever again dictate on a question of fact, and in Protestant countries (and Catholic too, we suspect) public opinion must and will support absolute proof against doubtful interpretation. The opponents in this matter are, some of them men of learning, like Fromond and Riccioli; others men of conceits, like Morin.[*] The former seize the stronger parts of their own case, but they will find that it requires a better foundation than imposition of interpretations to bear the sort of support which the latter afford. A compact college of cardinals might more safely make the attempt than a miscellaneous party.

The declining days of what was called the Aristotelian philosophy had their span much shortened by the glaring light into which it was thrown when held up against the results of the philosophy of Galileo; and this not more by the exhibition of the Ptolemaists than of their opponents the Copernicans. The latter were taught that rational mechanics must precede simple astronomy; and it is no exaggeration to say that not an inconsiderable portion of that power over nature which we now have, can be traced in its earliest growth to the necessity of finding stronger weapons to oppose the old system than were forged in the philosophical workshops of the age we have been considering.

The physical arguments of the time consisted much in supposing inclinations, propensities, and almost feelings of privilege and place, to exist in different sorts of matter. A comet, says Fromond, is 'not such an obscene ape of the planets that nature should have manufactured a sphere and a heaven for it to revolve in;' and the proper pride of a comet was the sufficient reason for one motion rather than another. The arguments for the sun's motion and the earth's stability may be condensed as follows. Aristotle and Ptolemy assert it; the Scriptures assert it (Fienus puts them second); the heavenly bodies are made for man, and the servant comes to his master, not the master to the servant; the natural motion of earthly bodies (as when falling) is in a right line; a body cannot have two natural motions, therefore the earth cannot move in a circle; if the earth moved, an arrow shot upwards could not fall on the spot from whence it was shot; the air, differing from the earth in substance, cannot be moved at the same rate, consequently, mountains, towers, &c., would produce a wind if the earth moved: a stone let fall from a height would not fall directly under the point which it leaves; an arrow shot towards the east would go much farther than one shot toward the west, the first having the air with it, the second against it; houses, and the earth itself, would be broken to pieces by so rapid a motion, which however the heavens can bear, being made of iron, *according to Homer*, while the earth is soft and friable; the immensity of the distance which must exist between the orbit of Saturn and the fixed stars, if the whole orbital motion of the earth produce no effect upon the latter; the excessive greatness of the fixed stars on the same supposition; &c. &c.

The Copernicans contended generally for the greater simplicity of their system, and the incredibility of the enormous velocity which the sphere of the fixed stars must have if the Ptolemaic hypothesis were true: to which it was answered, that God 'doeth great things past finding out, and wonders without number;' that the earth would corrupt and putrefy without motion, whereas the heavens are incorruptible: answer—that wind, &c. give sufficient motion; that the most moveable part of man is underneath, since he walks with his feet; whence the most unworthy part of the universe (which all parties called the earth) should be moveable: answer, that the Copernicans were absurd (as in fact they were) for taking the earth *out of* the centre of the universe upon an argument the force of which was derived from its being *in* the centre (or lowest part); also, which is theoretically true, that, if the earth move, the head of a man moves faster than his feet; that rest is nobler than motion, and ought therefore to belong to the sun, the nobler body: answer, that for the same reason the moon and all the planets ought to rest; that the lamp of the world ought to be in the centre: answer, that a lamp is frequently hung up from a roof to enlighten the floor; that there is a cause of motion (magnetism) in the earth: answer, that no Copernicans had examined the sun, or they might perhaps have found as good causes of motion there; that the Hebrew word for the earth has a root which signifies motion—which on the other side was contended to apply to the motion of animals upon its surface.

Such were the more common arguments of the Copernicans; others may be seen in a paper entitled 'Old Arguments against the Motion of the Earth,' in the 'Companion to the Almanac for 1836.' We do not charge every one, either of the Ptolemaists or Copernicans, with all the absurdities above noted; but we have not found one of either side free from such *à priori* attempts at a knowledge of the nature of things. Our countryman Bishop Wilkins has less of this sort of argument than any one except Galileo, and he deals with the scriptural objections in a very learned and able manner. He points out the absurdities into which the Fathers had fallen by a degree of literal interpretation which had become obsolete even in the days of Fromond: how, for instance—Basil made the moon greater than any of the stars, because Moses calls the sun and moon the two greater lights; Justin Martyr and several others supposed a vast body of water above the starry firmament; St. Augustin concludes the visible stars to be innumerable; many fathers assert that the heavens are not round, but stretched forth as a curtain; some that the sea not overflowing the land was not a consequence of the usual laws of matter, but a perpetual miracle; some that the sea is higher than the land, because it is called 'altum,' translated by us 'the deep;' some that the earth is placed upon the sea; some say that the stars have understanding and speech, and, according to Origen, moral responsibility. All these things follow, either at once, or by the most universally admitted species of inference, from the literal signification of words in the sacred Scriptures. These interpretations vanished first; those who sailed round the world destroyed the greater number of them; and the abandonment of them was acquiesced in even by those who would have nailed the earth to a Hebrew word. The earth itself was next allowed to move, when Galileo had established a mechanical system which would reconcile such motion with terrestrial phenomena, as completely as that of Copernicus and Kepler with celestial. The time came when even divines might insist on this simplicity of motion in illustration of the wisdom of the architect. But the structure of the earth had not been examined; consequently when the conclusions of geological induction began to appear, the old method was ready, the texts were forthcoming, neither was interpretation wanting, nor those who would raise an outcry against the results of examination and the investigators, because the former would not agree with the interpretation, nor the latter be fettered by its imposition. The same course will be run, with the exception only that the enemies of free inquiry and honest statement are not so numerous nor so powerful as in the seventeenth century, so that the effect will be less, both in extent and duration. So very slight have been the scientific attainments of the opposing party on this occasion, that it becomes those who are interested in the history of the sciences to take some measures for the preservation of their writings, since it is found that the purely theological works against the motion of the earth are extremely scarce, while only those which unite science, such as it was, with theology, are now* in any degree diffused.

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[*] This worthy, to a great capacity for finedrawn deduction, added the power of an astrologer, and some art in extricating himself from the scrape of an unfulfilled prophecy. When Gassendi remained alive after the time which Morin had positively fixed for his demise, the latter persisted that the nonfulfilment of the prophecy was in consequence of the warning which it gave Gassendi, whose health was declining, to try change of air.

If we throw away all the arguments which would now be considered fantastical, we shall find the sense of both sides of the controversy contained within very narrow limits. The strength of the Copernicans lay in the simplicity with which they exhibited the celestial motions; that of their opponents, in the then unanswerable argument of the throwing up of a stone. Both parties believed that the stone of itself would not follow the motion of the earth; at least such was the opinion until the Galilean philosophy was fully received. Fromond shows his penetration when he says that the Copernican philosophy will finally be wrecked on this argument; had he admitted an alternative, and assumed either that the mechanical argument would destroy the motion of the earth, or the motion of the earth would lead to an entire change in the principles of mechanical philosophy, no one would now have disagreed with him.

We shall close this article with a mention of the actual proofs of the motion of the earth.

1. It is difficult to believe, in the present state of mechanical knowledge, that any heavenly body is at rest, and the burden of proof must lie upon those who assert rest, and not upon those who believe in motion, which a person instructed in mechanics must do, until the contrary is proved.

2. If a motion existed, a centrifugal force would arise, which would produce an effect on the oscillation of a pendulum tried in different parts of the earth. [Centrifugal Force; Pendulum.] Such an effect is found to be produced corresponding to that which should be produced by the earth's rotation; nor have those who deny that rotation ever produced any explanation of the phenomenon.

3. An experiment has been tried, which it will be worth while to describe, and which Delambre says had 'a sort of success.' When we say that a stone let fall from the top of a high tower should fall precisely under the point from which it started, we say that which ought not to be perfectly true; the reason is as follows:—The starting-point of the stone, being at a greater distance from the centre than the point directly under on the earth, describes a somewhat larger circle, and moves a little quicker. The stone therefore at the commencement of its fall has a motion from west to east, a little more rapid than the under point of the earth. The resistance of the air, though it exists with respect to the fall of the stone, does not exist with respect to the motion from west to east, since the air, earth, and stone are carried together: consequently the stone should fall a little east of the foot of the tower. This experiment was tried at Bologna by Guglielmini, who published his results in a work called 'De Motu Terræ diurno,' Bologna, 1792; it was repeated at Hamburg: the heights were respectively 241 and 235 feet (French).

In every instance the projected body fell a fraction of an inch to the east, and never to the west of the point directly under the point of projection. Had this departure been an accidental effect, it is incredible that it should always have taken place in one direction. Delambre does not state the number of experiments made; but if it were only six, and if the chances of departure east or west had been equal, it would have been 63 to 1 against the departure being always in one direction. In the last two proofs we are made to perceive the earth's rotation, by phenomena which can be explained on no other hypothesis that is worth consideration.

4. We perceive the earth's *orbital* motion only in the phenomenon of Aberration, from which one of two things must be true; either the earth moves round the sun, or light does not move in a straight line; and what is more, the light from every star, in whatever part of the heavens it may be found, changes its course with the position of the sun. The change, it is true, is minute, but it is as well established as it would be if it were visible to the naked eye; and it must be remembered that twenty seconds is not a small quantity when the eye is applied to an instrument capable of measuring one second. Were there no other phenomenon by which to test it, the orbital motion would be conclusively proved by that in question.

5. The next argument is analogy, which, though not perfectly conclusive itself, lends a great additional force to the rest. The planets all exhibit motion round the sun; this can be proved; and the only question that remains is, whether the sun moves round the earth, carrying the planets round itself, or whether the earth is itself a planet moving round the sun. The planets also, in most cases, revolve round axes visibly, and there is no proof that any one does not.

6. The last argument is authority, properly used. There are many who do not know enough of the subject to decide even between Newton and the worthy Frenchman, whose name it is unnecessary to mention, who thinks he proves the planets to be reflections of the sun upon the polar ice, and the southern hemisphere of stars to be a reflection of the northern upon a very curious crystal plane, but how placed we do not exactly know. With such persons authority must decide, if there be any decision at all in their minds; and it is of some importance to them to know what sort of authority they trust to. The argument from authority may be thus summed up:—1. The motions of the heavenly bodies are irregular, particularly those of the moon, which, when closely examined, exhibit irregularities, the cycles of which never were determined from observation alone. 2. At the time when the controversy about the earth's motion took place, the time of the moon's transit over the meridian, for instance, could not be predicted within several minutes. 3. By means of the labours of Newton and his successors in theory, and Flamsteed and his successors in observation, the prediction now rarely differs from the result by more than half a second of time. 4. It has been the unanimous opinion of those concerned in bringing astronomy to this state, not merely that the earth has a motion both of rotation and orbital progression, but that the proofs are such as to leave no doubt whatsoever on the subject; nor is it in history that any person who was mathematician enough to read the writings of Newton ever entertained any hesitation upon the subject.

MOTIONS OF PLANTS are phenomena connected with specific vital forces, and not capable of explanation upon any known principle. As they are very common, but, excepting in a few cases, usually overlooked, it is necessary to notice their existence. Locomotion, that is, the power of transporting themselves wholly from one place to another, is a property assigned to animals as one of the most obvious characters of the kingdom to which they belong, and is stated not to occur among plants; nevertheless locomotion in its exact sense does occur among some of the lower plants. Amongst Confervæ is a genus named Oscillatoria, consisting of green articulated filaments, deriving their name from the oscillating motion observable in them; these plants not only move their limbs, but shift their station with some rapidity; for example, if a patch of them is placed in water in a plate, and a black bell-glass is inverted over them in such a manner that its edges do not quite touch the plate, the Oscillatorias will remove from where they were first placed, and glide out on the side of the bell-glass which is exposed to light. The late Captain Carmichael observed their motions with great care, and sufficiently proved that they were not owing to external causes of any kind; especially not to agitation of the water in which the Oscillatorias are placed. Let, he says, a small portion of the stratum be placed in a watch-glass nearly filled with water, and covered with a circular film of talc, so that its edge may touch the glass; the water will be rendered as fixed as if it was a piece of ice. The glass may now be placed under the microscope, and the oscillation of the filaments viewed without risk of disturbance from the agitation of the water. By following this course, it will be speedily perceived that the motion in question is entirely independent of that cause. The action of light, as a cause of motion, cannot be directly disproved, because we cannot view our specimens in the dark; but indirectly there is nothing easier. If a watch-glass, charged as above, be laid aside for a night, it will be found that, by the next morning, not only a considerable radiation has taken place, but that multitudes of the filaments have entirely escaped from the stratum, both indicating motion independent of light. Rapidity of growth will show itself in a prolongation of the filaments, but will not account for this oscillation to the right and left; and still less for their travelling, in the course of a few hours, to the distance of ten times their own length from the stratum. This last is a kind of motion almost unexampled in the vegetable kingdom.

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* There are, it is well known, different degrees of scarceness in old works. We have met with Riccioli, Fromond, Morin, Fienus, Rosse, Wilkins, Gilbert, &c., exposed for sale in London, within these five years, and with several more than once; but we never met with any of the purely theological authors quoted by Riccioli.

Another kind of locomotion has been seen in the reproductive particles or spores of certain Confervæ. At a particular period of their life, these spores move about spontaneously inside the tubes in which they are generated, and at length force themselves out into the water wherein the mother-plant is floating. Once plunged in this element, the spores move about with velocity, in a gyratory manner, till they reach a shaded place, when they fix themselves by one end, produce a root, and lose all power of after-motion, so that such plants have locomotion when young, and are destitute of it when old. Many such phenomena are known to occur in plants of the same low kind of organization.

But while locomotion thus unquestionably occurs among some kinds of plants, vegetable movements are more commonly confined to the limbs, in which they are visible in different ways. A kind of motion occurs in roots, although not perceptibly, except by its effects. Many kinds of Orchidaceous plants appear one season in a spot at some distance from that which they occupied in the previous season, and thus appear to travel; in such cases however the shifting of place is effected by means of underground suckers, annually formed by the parent, which projects them to a certain distance from herself, and then perishes. The cormi, or bulbs, as they are called, of many Iridaceous plants exhibit the same kind of property, raising themselves upwards year after year, so that if originally buried some inches under ground, they at last travel upwards into the air; this is effected by each cormus forming a bud at its apex, which bud grows into a new cormus and kills its parent, forming a new cormus at its own apex, and then perishing in its turn. This power of rising upwards is possessed in a most singular manner by palms, but in those plants takes place in a different way; some palm-trees, which originally had their stem resting by its base on the surface of the ground, force it upwards by protruding the bases of their roots, till at last a kind of plinth is formed of many irregular arches, upon which the column or trunk of the palm-tree is upheaved. A case of this kind is mentioned by M. Poiteau, in the 'Annals of the Horticultural Society of Paris,' vol. iv., p. 4, f. 16, where the arches of the roots were high enough to allow a man to pass beneath them. Here it is evident that the elevation of the trunk is caused by some special power of extension in the roots, which exercise that power in the direction of least resistance, namely, of the air, rather than of the solid earth.

The phenomena of flowers' unfolding or closing under sunshine, of which everybody is aware, are strictly referrible to the class of vegetable motions, although as these occurrences may be owing to some irritation exercised upon the tissue by light, they ought perhaps to be considered of a class essentially distinct from the preceding, where motion takes place by an inherent power of the species, independent of external stimulants. With the unfolding and closing of flowers must also be arranged those singular motions in the parts of fructification which occur upon their being touched: if the filaments of the barberry are irritated, they rise up and strike the anthers against the stigma; if the sexual column of stylidium, which is bent over one side of the flower, is touched, it swings over instantly to the other side. Several cases of this power of motion occur in Orchidaceæ: if the caudicula of the pollen masses of Catasetum is disturbed, it springs up so violently as to separate itself from the column on which it grows, and to dart to a considerable distance. A very singular instance of motion in the flowers of another plant of this kind, growing in the Swan River Colony, has been described by Mr. Drummond (*Gardeners' Gazette*, vol. xiv., p. 428). The lower lip, he says, in which the anthers are placed is a boat-shaped box; the upper lip, which he supposes to be the stigma, forms a lid which exactly fits it; the hinge on which the lid moves springs from the upper part of the flower, and is attached to its centre; and when it opens, the upper part turns round within the box, comes out at the bottom, turns up and back; so that when fully expanded it stands fairly over the flower. The moment a small insect touches the point of the lid, it make a sudden revolution, brings in the point of the lid at the bottom of the box, so that it has to pass the anthers in its way, and makes prisoner any small insect which the box will hold. When it catches an insect, it remains shut while the insect moves about; but if the insect be not caught, the box soon opens again. The plant here imperfectly described is perhaps a species of Caleana.

Another kind of motion, more resembling spontaneous action, especially as it is not apparently connected with the application of stimuli, is that which occurs in the sexual apparatus of many plants at the period of impregnation. In Armeria at this time a short column below the stigmata lengthens, so as to close up the foramen of the ovule, and at the same moment the cord on which the ovule is suspended slips aside and elevates the ovule, so as to enable it to present its foramen to the column; the same phenomena are visible in Daphne Laureola and other plants; and something of an analogous nature occurs in Zygnemata, which at the period of fructification bring themselves together and effect a kind of spontaneous vegetable copulation. The most striking phenomena of this nature occur however in Asclepiadaceæ, which have their pollen grains closely packed in bags, from which it would seem that there is no escape: at the period of impregnation, each of these pollen grains projects one tube from its side, and these tubes all direct themselves spontaneously towards a thin space on the side of the bag that holds them. Piercing this bag, they succeed in extricating themselves and reaching the vicinity of the stigma, but are still at some distance from it; they then direct themselves towards that organ, and succeed in reaching it, wherever it may be, either by directing themselves at right angles, or downwards, or even upwards, as the peculiar structure and location of the stigma may require.

In the Sensitive plants, various species of Mimosa, especially M. pudica, the leaves fold up on being touched, and this so slowly, that it is easy to perceive that the folding is effected by the gradual communication from leaflet to leaflet of the shock produced by the touch: if a portion of the end of one of the leaflets of the Mimosa is cut off, the whole of the leaflets of that pinna gradually fold up, one after the other, from the point to the base; then the neighbouring pinnæ will fold up their leaflets from the base to the point, and presently the petiole itself will suddenly bow itself down; whereupon the folding up of the remainder of the pinnæ will take place: sometimes, after a little space, the leaves above and below will also close up, all under the influence of the one original injury. These curious phenomena have been watched with care by Dutrochet, in whose little book, 'Sur la Motilité des Plantes,' a long and particular account of the phenomena will be found. Many other plants possess this kind of sensitive power in their leaves: Smithia sensitiva, Æschynomene sensitiva, Porlieria hygrometrica, Biophytum sensitivum, are well-known cases; and it is recorded that in Senegal there grows a plant which the natives call by a name equivalent to 'How d'ye do?' as if it offered a friendly salutation by its bowing to those who touch it. (See De Candolle's *Physiologie Végétale*, p. 857, where several of the modes are enumerated in which leaves having motion close up.) The 'sleep of the leaf,' that is, their folding up and drooping at night, while they raise themselves and unfold by day, are powers of motion in the limbs of plants, which are doubtless of the same nature as that of the Sensitive plant and its allies. To the same class also must be assigned the fly-catching leaves of Dionæa: this plant, which grows wild in the marshes of Carolina, has a leaf which is bordered with a row of strong teeth, and when spread open, is strikingly similar to one of the toothed iron traps when set as used for catching game, that is, it consists of two roundish sides, each furnished with a row of strong teeth. Near the middle of each side there grow three stiff bristles, placed in the form of a triangle; if one of these bristles is touched by an insect or any other means, the two sides of the leaf spring up instantly, the teeth cross each other, and the insect is held so fast, that it can only be extricated by forcing the sides of the leaf asunder, an operation of some difficulty, so great is the muscular force with which the contraction is effected. These movements are all owing to a specific irritability resident in the moving organ, and must be distinguished from the following, which takes place, to all appearance, spontaneously.

Desmodium gyrans, the Gora-chand of Bengal, was first mentioned in systematical botany by the younger Linnæus, who speaks of it as a wonderful plant, on account of its singular motion. 'No sooner,' he says, 'had the plants he raised from seed acquired their ternate leaves, than they began to be in motion in every direction; this movement did not cease during the whole course of their vegetation, nor were they observant of any time, order, or direction: one leaflet frequently revolved, while the other on the same petiole was quiescent; sometimes a few leaflets only were in motion, then almost all of them would be in movement at once; the whole plant was very seldom agitated, and that only during the first year. It continued to move in the stove during the second year of its growth, and was not at rest even in the winter.' 'The irritability of this Desmodium,' Burnett adds, 'is never so great, even in our best houses, as it is said to be in its native climate, and its motions here are very seldom so lively as those described by Linnæus. Warmth appears essential, for its movements are always the most observable when the heat is greatest; that they are not attributable to the sun's rays, nor to any currents of air, is shown from the fact that the plant loves the shade, and that the motion is most evident when the stove is closed and the atmosphere quite still. These movements have more the semblance of spontaneity than any others that have been observed in the more perfect plants; for the leaflets, if held quiet between the fingers for a short time, and their movements thus prevented, are said immediately on their release to revolve with accelerated force, as if to make up for the time lost during the forcible interruption.' De Candolle describes the motion thus:—the leaves consist of three leaflets, two of which are lateral, very small, linear, and oblong, and an odd one, separated from the two others, much larger and oval-oblong: the two side leaflets are in almost continual motion, which takes place by little starts, like the small hand that marks the seconds in a watch. One of these rises so as to mount about 50° above the level of the petiole, and the other falls on the opposite side to about the same distance; when the latter rises, the other falls, and thus a constant oscillation is maintained. The central leaflet also moves, but much more slowly, sloping first to the right, then to the left, and so on.

What the cause of these singular motions may be has never been explained, and it seems useless to inquire: they appear to belong to the class of first causes, concerning which we can know nothing further than their effects. It is evident that they are quite distinct in their nature from such motions as that of a stem bending towards the light, in consequence of the process of its solidification taking place more on the side exposed to light than on the other side.

If no mention is here made of the motions of internal microscopical particles upon their own axis, when floating in water, such as were remarked by Brown and others in pollen, and as may be found very commonly upon bruising plants in water, it is because such particles appear in all cases to be starch, and their motion, however singular, to be a physical rather than a vital phenomenon.

On Motion of Sap see SAP.

MOTRIL. [GRANADA.]

MOTTE, ANTOINE HOUDAR DE LA, was born at Paris, 17th January, 1672. His father was originally a hatter at Troyes, where he possessed a small estate called La Motte, whence the surname of the family was derived. After completing his studies at the Jesuits' College, he turned his attention to the law, which he shortly after gave up to follow his taste for the drama, and to assist at a private theatre in the representation of Molière's comedies. In 1693, being then only twenty-one years of age, he produced at the Théâtre Italien his first piece, entitled 'Les Originaux,' with little success. This piece has not been inserted among his works, but is printed in the 4th volume of Gherardi's 'Théâtre Italien.' Disappointed at his failure, he resolved to renounce the world, and retired with one of his friends to La Trappe, but the Abbé de Rancé, setting little value on the momentary enthusiasm of two inconsiderate young men, dismissed them at the end of two months, without giving them the habit of the order.

After returning to Paris he produced his opera 'L'Europe Galante,' which was very successful; in 1707 a volume of Odes, which, although much read, added nothing to his reputation; and in 1710 his 'Academical Discourse,' a model of the kind.[*]

The most presumptuous and extravagant act of La Motte was his translating the Iliad, without knowing a single word of Greek, and abridging that poem with the intention of improving it. This translation was preceded by a discourse, in which he endeavoured to prove that admiration for the antients, and particularly Homer, was a modern prejudice. Madame Dacier refuted this discourse by a tract entitled 'Des Causes de la Corruption du Goût,' to which La Motte replied by his 'Réflexions sur la Critique.' At the age of 40 he became blind, and also lost the use of his limbs, in which condition he remained for many years, and died 26th December, 1731.

His works, including his letters to the duchess du Maine, were collected in 1754, and filled 10 vols. 12mo. (*Biog. Univ.*; Voltaire.)

MOTTEUX, PETER ANTHONY, was born at Rohan in Normandy, in 1660, at which place he also received his education. After the revocation of the Edict of Nantes he came over to England, and succeeded in establishing himself in business, and kept a large East India warehouse in Leadenhall-street. Being master of several languages, he obtained a situation in the foreign-letter department of the Post-office. His death, which was attended with suspicious circumstances, took place on the 19th February, 1718, in a disorderly house in the parish of St. Clement Danes, and being the anniversary of his birth, completed his 58th year. His remains were interred in the church of St. Mary Axe, London.

This gentleman so completely acquired the English language as to be able to produce a translation of 'Don Quixote,'[†] and subsequently to write several songs, prologues, and epilogues, one of the latter of which will be found at the end of Sir John Vanbrugh's comedy of 'The Mistake.' He also wrote several plays, namely: 'The Loves of Mars and Venus,' Lond., 1697, 4to.; 'Beauty in Distress,' a tragedy, Lond., 1698, 4to.; 'The Temple of Love,' 1706, 4to.; 'The Amorous Miser,' a comedy in 3 acts, 1705, 4to.; also a poem on Tea, 1722, 8vo., with several French works translated from the English.

MOTTO, an Italian term, shortened by some of our old writers to *mot*. It means a word or sentence added to a device; and is commonly used, when put upon a scroll, as an external ornament of coat-armour. The use of mottoes for this purpose is antient, and as appended to a coat of arms they are frequently hereditary in families. In strictness, the motto should bear allusion to something in the achievement, but in modern times the taking of it rests entirely with the fancy of the bearer, and it may be changed at pleasure. A sentence or quotation prefixed to anything written is also termed a motto.

MOULDINESS is a name applied to all minute fungi which appear in masses upon organic bodies. It appears to be caused by a damp atmosphere and a diminution of light, both which conditions are favourable to the development of those bodies whose spores or reproductive particles are floating everywhere in the atmosphere, ready to spring rapidly into growth whenever they chance to fall upon suitable situations.

All the fungi that constitute mouldiness are so small as to escape observation, except when from their numbers they form microscopical forests, and then they clothe the surface of the body which they attack with light patches of yellow, blue, white, green, red, and various other colours. The species of these plants are extremely numerous, and are distributed by writers on fungi into many genera, chiefly belonging to the Hyphomycetous division of the order, the combining character of which is, that the plants are flocculent, naked (that is, not enclosed in a case, or seated upon a peculiar receptacle), distinct, but interwoven into a general mass, which looks like a thin web, or a collection of cobwebs.

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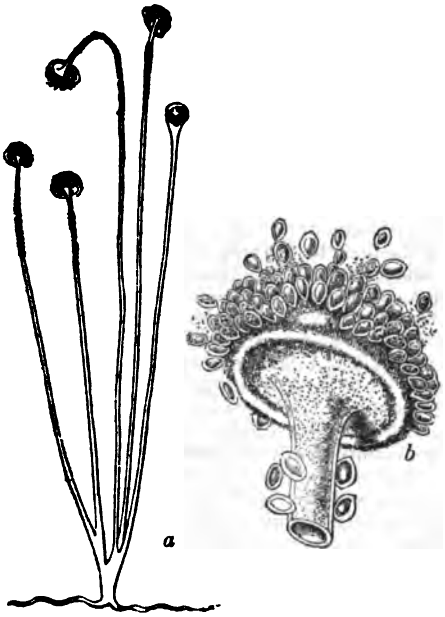
[*] La Motte's tragedy, called 'Ines de Castro,' is mentioned by Voltaire ('Siècle de Louis XIV.') as one of the most interesting of those which had kept their place on the stage.

[†] It appears however, by the title-page of an edition of 'Don Quixote,' London, 1706. 4 vols. 8vo., that Motteux was only the publisher, and that the work was translated by several hands, and printed for Samuel Buckley, at the Dolphin, Little Britain.

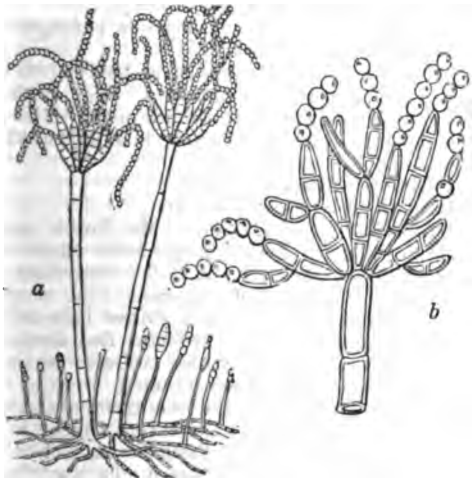
One of the most common is the Ascophora Mucedo, which forms a blue mould upon bread, paste, and similar substances prepared from flour. This plant forms a fine horizontal cobweb-like bed, from which rise up slender branches terminated by an expansion which bears the spores.



Ascophora Mucedo, very highly magnified.

a is a sporiferous branch arising from the horizontal bed; *b* is the termination of a branch covered with spores.

Another form is that of Penicillium, in which we have the same entangled flocculent bed, and a similar elevation of perpendicular branches: but the latter are not terminated by a disk covered with spores; on the contrary, they end in a jointed tuft, every division of which produces at its point a necklace of spherical sporules.

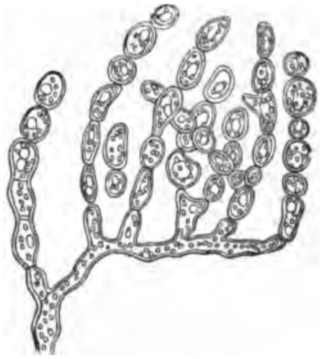


Penicillium verticillatum, highly magnified.

a represents a cluster of perpendicular branches springing up from the horizontal bed; *b* is one of the pencil-like heads which terminate the branches.

Mouldiness is occasionally produced by Coniomycetous fungi—that is, by those very imperfectly organised species which have no flocculent bed, nor any special part on which the spores are generated, but which merely consist of a series of joints within which reproductive bodies are formed. Of these, the Torula Casei, found in the crevices of putrid cheese, may serve as an example.

Many of these plants are capable of living under circumstances that would be fatal to any other form of vegetation; for example, Ascophora Mucedo springs up plentifully in paste poisoned with corrosive sublimate.



A morsel of Torula Casei, very highly magnified, after Corda.

Their general station is upon decaying animal or vegetable matter; but one species, the Botrytis Bassiana, attacks the *living* silkworm and kills it; others destroy house-flies, which may be seen in the autumn glued by these parasites to the window, on which they have alighted in a semitorpid state.

The following are the botanical names of some of the more common species of fungi that cause mouldiness:—

Hydrophora stercorea (yellow, turning black), on the dung of various animals; *Mucor mucedo* (bluish black), on fruit, pastry, &c.; *Eurotium herbariorum* (white, yellow, or orange), on damp plants in Herbaria; *Cladosporium herbarum* (green, turning black), on various decaying bodies, damp paint, &c.; *Aspergillus candidus* (white), very common; *Aspergillus glaucus* (blue), very common.

MOULDINGS (in Architecture), any assemblage of narrow surfaces projecting from the face of a wall or other surface and also advancing one beyond the other. They are bounded by straight lines, either horizontal or vertical, according to their situation, but the surfaces themselves are *plane* or *curved*, and if the latter, concave or convex, or else compounded of both forms; and again are either *plain* or *curved*. Sometimes indeed, instead of projecting, mouldings are *sunk*, as is the case when they form a border within a sunk pannel, for though they project with respect to the surface of the latter, they recede within the general face of the wall. The mouldings within the pannels of doors are of this description. Mouldings are employed as borders to doors, windows, and other apertures, as arches, in which latter case they are termed *archivolt mouldings;* while those forming the imposts from which the arch springs are called *impost mouldings*. The bases of columns likewise consist of mouldings. They are also employed to mark the horizontal divisions of a wall, both internally and externally, and every member to which they are applied is said to be *moulded*. As their edges are straight lines, their contour can be shown in drawings only by their shadowing, and by the outline which they produce at their extremities, as in the case of a cornice. But as this is insufficient, except to afford a general idea, in working drawings and those of detail mouldings are shown on a larger scale, and by means of a section through them, by which their *profile* is accurately defined; and upon a good profile, that is, one where the mouldings are well proportioned to each other, and so combined as mutually to relieve each other, and to produce both an agreeable variety of surfaces and of light and shade, much of the beauty and finish of a building depends.

Mouldings are distinguished by different names, according to their *profiles*, their sizes, or their situations. Thus the *fillet*, *tænia*, *band*, are all plane or flat mouldings, the only difference being that the first-mentioned is narrower than the others, and frequently is not so properly a distinct moulding as a space left between other surfaces, or else a rim to a larger moulding, as to a cymatium terminating a cornice, &c., while *tænia* is the name given to the broad fillet separating the architrave from the frieze in the Grecian Doric entablature, and *band* is applied to any still broader plane surface—thus if instead of dentils, in an Ionic or Corinthian cornice, a projecting plane surface be left where they would occur, it is called an *uncut dentil band*. The *corona* (one of the principal members in every cornice) is also a mere plain band, except that it is occasionally enriched in Roman architecture. Again lesser convex mouldings are termed *beads*, but the longer mouldings of the same kind in the bases of columns are termed *tori* or torusses. The *cyma recta*, or *cymatium*, is a compound moulding, concave above and convex below; while the *cyma reversa*, or, as it is technically termed by workmen, the ogive or ogee moulding, is convex below and concave above. The *cavetto* is a mere hollow or sweep intervening between and serving to connect two mouldings, one of which projects beyond the other. The *scotia*, or hollow between the upper and lower torus of the base of a column, is a moulding of this kind upon a large scale, and has therefore a distinct name assigned to it, which also points out its situation. The *ovolo* is a simple convex moulding, so called because it is generally carved into *ova*, or ornaments in the shape of eggs, within hollows. The ovolo of the Doric capital (which is always uncut) is distinguished by the name of *echinus*. All the other mouldings may be carved or enriched, except the *cavetto* and fillet; the pattern being accommodated to the surface of the moulding. The cyma recta, or *talon*, as it is sometimes called, is cut with a peculiar kind of tongued or arrow-headed ornament.

These mouldings are common to both Grecian and Roman architecture, but besides being more profusely applied in the latter style, they have this marked difference, that in Roman architecture the curved mouldings, whether simple or compound, are described by quarter circles, whereas in Greek they describe other curves obtained from conic sections, and are therefore not only more elegant in their contour, but susceptible of far greater variety. Some of them are also occasionally *undercut*, that is, hollowed out below and behind, whereby, while a greater depth of shadow is obtained, a greater sharpness of lines and lightness of form are produced. Of this kind is what is now distinguished by the name of the *bird's-beak moulding*, because its section produces an outline very much resembling that of the hooked upper and lower mandible in the beaks of some birds. In Gothic mouldings, undercutting is very common, and hollows or recesses more or less deep are frequently numerous in the profiles of mouldings in that style. The mouldings are also for the most part produced by *splayed* or *bevelled* surfaces, that is, slanting or turned obliquely from the outer face or general plane where they occur. In that style the mouldings are so numerous, and the profiles produced by them so complex, as to render it impossible to describe or characterise them further. They are however of the utmost importance, and therefore require to be well studied and perfectly understood, for which purpose such works of detail as Pugin's 'Gothic Specimens' and 'Gothic Examples,' Moller's 'Denkmale,' &c., may be recommended. One circumstance however which ought to be mentioned is that the mouldings all recede within the face of the wall (like those of pannels), except labels, hood-mouldings, and others, that come under the general denomination of *weather mouldings*, because made to project instead of recede, and therefore more exposed to rain and weather.

In regard to Grecian mouldings, it remains to be observed that many of those which are uncarved, and therefore supposed to have been quite plain, were painted with some ornamental pattern, and that not unfrequently in the most brilliant colours. But this singular mode of decoration is treated more at length in the article POLYCHROMY.

MOULINS, a town in France, capital of the department of Allier; situated on the right or east bank of the river Allier, in 46° 34′ N. lat. and 3° 19′ E. long.; 161 miles from Paris in a direct line south-south-east, or 175 miles by the road through Fontainebleau, Montargis, and Nevers.

This town is scarcely noticed before the thirteenth century, when Robert, Count of Clermont, son of Louis IX. (St. Louis), king of France, and ancestor of the Bourbon family, founded here an hospital. It owes its name to the number of water-mills which were formerly here. It became capital of the Bourbonnois, and the residence of the dukes of Bourbon, one of whom, Louis II., built a castle at Moulins, which François I. of France finished, probably upon acquiring possession of the Bourbonnois, after the forfeiture of the Constable Bourbon, in the early part of the sixteenth century. Of this castle there is only a part remaining, namely, a square tower used as a prison, and some buildings occupied by the gendarmerie.

The town is agreeably and advantageously situated in a fertile plain, on one of the roads from Paris to Lyon, and on the bank of a navigable river. The immediate vicinity is very delightful; it is well wooded, and among the trees were formerly many mulberry-trees, planted for rearing silkworms; these trees thrived exceedingly, until the decay of the silk manufacture, consequent on the Revolution, led to their being neglected or destroyed. The town is on a level site, and is tolerably well built.

The houses are chiefly of brick; the fronts are ornamented with figures formed in black bricks, the others being red There is a handsome stone bridge over the Allier, above 700 feet long and more than 42 broad, with foot pavements. It was built in the middle of the last century; immense cost and labour were bestowed in fixing the foundation, the depth of the water and the shifting banks rendering the bed of the river so insecure, that four bridges had been destroyed in the previous century. Beyond the bridge is a fine avenue of trees, extending about two miles in a straight line along the road to Limoges and Clermont. Moulins contains several pleasant promenades, and some handsome public fountains. Of the squares, that of Allier is the largest and most regular. There are a handsome town-hall with a colonnade, and a court-house lately built. In the church of the Visitation is the monument erected by the Princess des Ursins to the memory of her husband, the unfortunate Duke of Montmorenci, beheaded at Toulouse by order of Richelieu. There are fine barracks near the bridge, public baths, two large hospitals, and a small theatre.

The population of Moulins, in 1831, was 14,672 for the commune; in 1836 it was 15,231. The chief manufacture of the place is cutlery, especially excellent scissars. These articles are hawked about by women, who beset with the greatest importunity the traveller arriving in the town. There are several establishments for spinning cotton and woollen yarn, and for throwing silk. There are manufactories of blankets, cotton counterpanes, woollen stuffs, and hats. There are tan-yards and steam-mills for corn. Trade is carried on in corn, wine, iron, timber for ship-building, coal, cattle, and raw silk. There are ten yearly fairs. The townsmen are distinguished by their kindness of manner. There are coal-mines and quarries of limestone in the neighbourhood. Marble of different colours is found, but is not worked. Moulins has several judicial and fiscal government offices; a society of rural economy, physical sciences, and arts; a public library of 18,000 or 20,000 volumes; a high school, with museums of natural history and physics attached to it; a drawing school, and a collection of paintings and engravings.

Marshal Villars, one of the most eminent generals of the age of Louis XIV., was a native of Moulins. Moulins is the seat of a bishopric, of which the department of Allier constitutes the diocese. The bishop is a suffragan of the archbishop of Sens and Auxerre.

The arrondissement of Moulins has an area of 1002 square miles, and comprehends 85 communes. It is divided into nine cantons or districts, each under a justice of the peace. The population, in 1831, was 86,837; in 1836, 90,582.

MOULTAN. [HINDUSTAN.]

MOULTING. [BIRDS, p. 426.]

MOUNT VERNON. [VIRGINIA.]

MOUNTAIN LIMESTONE. Mr. Smith employed this term to designate the calcareous rocks which underlie the coal strata in England. It is the equivalent of the 'carboniferous limestone' of Conybeare and many other English geologists. Some German writers have translated the term into berg-kalk, while in France the corresponding version of Mr. Conybeare's title, 'calcaire carbonifère,' appears to be preferred. [COAL FIELDS.]

MOUNTAINS. Though the term mountain be universally understood, yet it will be found very difficult to define strictly what is meant by it. From the mole-hill in the meadow, to the gigantic Chimboraço, the gradations are infinite, and no positive line can be drawn between the hill and the mountain. Moreover, the name is sometimes given to a single elevation or peak, as Mount Ætna, &c., and sometimes to a whole and extensive cluster of eminences, as Mount Caucasus. Isolated mountains are rare, and when they do exist are generally, though not always, volcanic.

The general disposition of mountains is in groups or chains. The word group explains itself, but what is understood by a chain may not be so clear. When hills or mountains are so arranged as to form a line or band whose length greatly exceeds its breadth, such a disposition, whether the line be straight or curved, is called a chain, and sometimes a ridge; though the latter name is more exclusively applied to the lesser chains. We are not however to understand by a chain of mountains, a single unbroken longitudinal eminence, like that formed by the connected roofs of a row of houses. A chain of mountains, on the contrary, is very irregular and composed of many subordinate parts. In a complete chain there are three parallel or nearly parallel ridges; the centre one is usually the highest. These three ridges, though distinct, are seldom equidistant from each other, and they are frequently united. From the points of junction, and from different parts of the outer ridges, other chains strike off at various angles, and these in turn send off other ramifications, which go on dividing and diminishing in height till the last undulations are lost in the general surface of the plain. These different branches of a chain have received various and very arbitrary names. Some divide the whole system of a chain into the primary, principal, primordial, or great chain, and secondary and tertiary chains; but these names having now reference to the order of formation of rocks rather than to their disposition, though the latter circumstance is greatly dependent on the former, they are at present confined to geological considerations, and we therefore say such a chain or ridge is a branch of some other chain or ridge. Thus the Apennines are a branch of the Alps. Minor ramifications, when short, are called spurs. Wherever the main chain sends off other chains, the former is, at that particular spot, higher than elsewhere, so that between two consecutive elevations there is an apparent depression: hence the summit or ridge-line of the main chain is divided into heights, which are called peaks, domes, &c., according to their shape; and depressions, which receive the general name of passes, because they are the places where the passage over the chain from opposite valleys is most easily effected. These passages or passes are termed *cols* in the Alps, *ports* in the Pyrenees, and *pertuis* in the Jura. They are also called gorges or defiles, but incorrectly, for the gorge is properly the contracted part of a valley, and the defile a very narrow passage at the foot of the mountains or winding amongst them. The ridge-line of great chains is also irregular in breadth as well as height; it is sometimes very narrow and sometimes very broad, and in some places spreads out into what is termed table-land (Langfield in Norway). Table-lands, or plateaus, are however not always of this terrace form; they are not unfrequently sunk, if we may so say, into the broad summit of the ridge, so as to be surrounded by lofty eminences and peaks. Table-land is also sometimes ascended by gentle acclivities, without any appearance of mountains.

The valleys which are situated between the parallel ridges of the main chain are termed longitudinal valleys; their axis, and consequently the principal watercourse, is nearly parallel to the direction of the chain. The valley of the Rhône above the lake of Geneva, the valley of the Magdalena in South America, &c., may be taken as examples. Two things have been remarked in longitudinal valleys: first, that there is sometimes so perfect a conformity between the re-entering angles on one side and the salient angles on the other, that if it were possible to bring the two sides into contact, they would perfectly correspond, so as to leave no trace of their having been separated; and, secondly, it has been observed, that the side of the valley opposite to the centre ridge is the steepest. These observations are true as regards many places, but are by no means to be received as universally correct. The other valleys, whose axes form various angles with the direction of the great chain, are the principal valleys of a country, and are usually designated by the names of the chief rivers which flow through them. The valleys of the tributary streams which empty themselves into the main rivers are called lateral valleys. The terms upper and lower valley are sometimes used to denote the parts of a valley as they lie along the higher or lower part of a river's course. Such then are the parts of a regular chain of mountains, but we are not to suppose that all those great elevations to which we give the name of chain are thus regularly formed. Mountains are sometimes grouped, as we have said, so as to present no appearance of a chain; sometimes the chains run parallel, but wholly independent of each other; in some cases they radiate from a common centre or nucleus. Indeed nothing can well be more irregular than the arrangement of mountains, and they differ as much in height, steepness, and particular appearance. By some (Bergmann) it has been imagined that in chains running north and south the western slope is the most abrupt, and that when the chain runs east and west the southern slope is the steepest. But this is far from being always the case, and General Andreossy has laid down as a principle that the steep side of a chain of mountains is that which looks towards the higher part of the general slope on which the chain is set. This opinion is doubtless better founded than that of Bergmann, nevertheless it is not strictly correct; and there seems reason to believe that no general law obtains on this subject.

The appearance presented by chains of mountains is not only very different in different parts, but the very same mountains when seen at a distance no way resemble their aspect when seen nearer. At a distance the minute irregularities are lost in the general contour, and the particular shadows are blended into a uniform tint. The forms of rocks generally depend on their nature, and a practised eye can sometimes pretty correctly divine the latter from the former. These may either present the aspect of needles or sharp pointed masses, or the summits may be dome-shaped, or stretch along like a vertical wall, either entire or bearing a resemblance to ruined battlements and towers; sometimes the whole mass is piled up into a succession of gigantic steps or terraces. Individual mountains and hills also vary in form; those which are volcanic are generally conical; others are round, oval, lumpy, saddle-backed, &c.

Mountain-chains are the natural water-sheds (the *divortia aquarum*), but it must not be thence inferred, as has too frequently been the case, that all water-sheds are mountain chains. This erroneous idea has covered our maps with mountains where in nature not a hill is to be seen.

Another error is to regard the mountains of the earth as so many connected chains, which, by starting from some particular point, may be traced stretching and branching continuously over the whole surface of the globe. The fallacy of such pretended continuity is evident from the difference in the arrangement as described by different writers. The truth is, that mountains are scattered over the surface of the land in the greatest confusion, here isolated, there in groups or in chains; the chains being in some places single and independent, in others connected; in one place running in parallel directions, in another intersecting, crossing, or branching off at different angles; in some cases completely enclosing a certain extent of country so as to form an entire and perfect basin, in others only partially enclosing a space. In one country the mountains are set in the centre, or near one of its coasts, and in the direction of the greatest length of the country; in another, they are set across the country. In fact, the chains are observed to be in all possible directions, both as regards the points of the compass and the trending of the coast-lines. Thus, with the exception of the Andes and the Rocky Mountains, the Appalachians, the Ghauts of India, the Scandinavian Alps, and the Apennines, there is very little conformity between the direction of mountain-chains and the configuration of countries.

Mountains have a very important part to perform in the general economy of the earth; they arrest the fleeting clouds, whose precipitated waters they store up in their interior and exhaustless reservoirs, whence springs are continually issuing, which unite and form those streams that fertilise the plains, or, collected into mighty rivers, favour the transport of commodities and facilitate the intercourse between the ocean and the interior of the continents. The influence of mountains on local climate is all-powerful, and depends upon the direction in which they lie as regards the sun's course, their height, their position on the surface of the globe, their proximity to or remoteness from the sea, the winds they arrest or give passage to, &c. Mountains have moreover a climate of their own, or rather a great variety of climates. Thus in ascending from the sea towards the summit of the Andes, every kind of climate is passed through as completely as if the traveller were to proceed from the equator towards the pole. At an elevation of about 16,000 feet on the Andes under the equator, we reach the limit of perpetual congelation; and mountains in that region which exceed that height have their summits covered with eternal snow. The line of perpetual congelation is however far from being parallel with the general surface of the earth. It approaches that surface as it advances towards the poles, but the laws which determine this line are still very imperfectly known. [CLIMATE.]

The limits of perpetual congelation, as ascertained from the stability of snow on the mountains, are subject to vary with the particular aspect of the mountains and other local circumstances. Thus, generally speaking, the snow-line is highest on the south side of mountains in the northern hemisphere, and *vice versâ;* but this is not always the case; and according to M. Jaquemont, the line of perpetual snow is much higher on the northern than on the southern side of the Himalaya mountains. Mr. Pentland states that the limit of perpetual snow is at an elevation of 15,800 feet on the mountains of Vilcanota in South America, which are as far south as 14° 33′.

The fact of the cold increasing as we ascend mountains is due in part to the greater rarity of the atmosphere in the higher regions, and to their greater distance from the radiated heat of the plains; nevertheless the particular aspect of various parts of mountains as regards the sun, and the conformation of the higher valleys, greatly modify the cold of particular places; and a much greater heat is sometimes experienced in a high valley than is felt in one much lower down. To this circumstance is due in part the seeming anomalies that are met with in the habitation of plants, many being found at heights where they would be little expected.

Though mountains are such striking objects, and, when contemplated only with respect to their absolute elevation above the sea, appear to be enormous protuberances on the earth's surface, they are very inconsiderable when compared with the whole mass of the globe. The habitable parts of the earth, at least those where population is most dense, and in which human industry is most concentrated, all lie within a few hundred feet above the sea, which may be regarded as a part of the true surface of the sphere. But even the height of the loftiest mountains, which is about five miles, is only about one eight-hundredth part of the radius of the earth. In books of travels we often find the distance mentioned at which a particular mountain is visible. As assertions of this kind are sometimes loosely made, the following rule will serve for roughly estimating the distance at which a mountain of known height can be seen from the surface of the sphere: multiply the square root of the height of the mountain in feet by 1·2247; the product will be the distance in miles at which the mountain is visible.

With regard to the heights of mountains it may be observed that they vary considerably. Some authors however regard every eminence below one thousand feet as a hill. Since the application of the barometer to the admeasurement of heights, there are few mountains of any importance, in Europe at least, whose elevation above the sea is not now known and registered. A list of the principal mountain heights on the globe would fill a volume. It may be sufficient here to give the heights of the principal peaks of some of the more important chains.

Europe.—Mont Blanc, Alps, 15,668 feet; Mont Perdu, Pyrenees, 11,283; Monte Corno, Apennines, 9523; Lomnitz, Carpathians, 7962; Sneehetta, Dovrefield, Norway, 8122; Mulhacen, Sierra Nevada, Spain, 11,678; Mont Mezin, Cevennes, France, 6567; Puy de Sanci, Auvergne, France, 6200; Ætna, Sicily, 10,870; Olympus, Greece, 9754; Vesuvius, 3932.

Asia.—Dhawalagiri, 28,077; Jewahir, 25,747. These two are peaks of the Himalaya. Mowna Roa, Sandwich Islands, 15,988; Ophir, Sumatra, 13,840; Egmont, New Zealand, 11,430; Italitskoï, Altaian chain, 10,735; Ararat, Armenia, 17,260; Arjish, Anatolia, 10,000?; Olympus, Anatolia, 6500; Lebanon, Palestine, 9600; Awatska, a volcano in Kamtchatka, 12,000 feet.

Africa.—Geesh, in Abyssinia, 15,000?; Peak of Teyde, Teneriffe, a volcano, 12,180; highest peak of Atlas chain, 12,000, and perhaps more.

America.—Nevado di Sorato, 25,250; Illimani (the richest gold mountain of Peru), 24,450; Chimboraço, Andes, 21,600; Antisana, 19,136; Cotopaxi, 18,867; Pichinca, 15,931; Popocatepetl, Mexico, 17,720: the last four are volcanoes. Rocky Mountains, 11,000; Mount Washington, Appalachians, 6650.

For the details of particular chains and remarkable mountains and volcanoes see their several names.

MOUNT SORREL. [Leicestershire.]

MOURZUCK. [Fezzan.]

MOUSE. [Muridæ.]

MOVEMENT, in Music, a detached and independent portion of a composition. Symphonies, concertos, quartets, sonatas, vocal pieces of various kinds, &c., are divided into portions commonly differing from each other in time as well as in key, and every such portion is called a movement. Thus, the Pastoral Symphony of Beethoven consists of five movements, viz., 1, a Country Scene; 2, The Rivulet; 3, The Village Dance; 4, The Storm; 5, as a *finale*, The Shepherd's Song.

MOVING FORCE may be defined as force considered with reference to the momentum it produces, in like manner as accelerating force means force considered as the cause of acceleration. Imagine a bullet, with a feather tightly fastened to it, thrown from the hand into a vacuous space. The action of the earth will cause a parabola to be described [Projectiles]; and as the feather must move with the bullet, all the alterations of velocity (accelerations or retardations) which take place in the one also take place in the other. All forces then, so far as they are estimated by the accelerations they produce, are the same in both cases. But if we take into account the masses of the two substances, we see that very different degrees of pressure must be applied throughout the same time to produce the velocity at starting, and the action of the earth applies very different degrees of pressure to the two.

Moving force is applied to the cause of Momentum, in the same sense as accelerating force to the cause of acceleration. Apply continued pressure to a weight of ten pounds, such as will in one second produce a velocity of 80 feet per second; apply another pressure to a weight of seven pounds, such as will also in one second produce a velocity of 50 feet per second: the momenta produced in one second are then as 10×80 to 7×50, or as 800 to 350; and the moving forces are said to be in this proportion. The following equation is made the measure:—

$$\text{Moving force} = \text{mass} \times \text{accelerating force};$$

but this is on the supposition that a unit of acceleration produced in a unit of mass shall require the amount of pressure which is taken as the unit of moving force. [Mass; Momentum.]

The connection of momentum and acceleration are developed in Velocity and Virtual Velocities. It is necessary to remind the young student in mechanics that accelerating force is a mathematical abstraction, the conditions of all problems which actually occur introducing as data not accelerating forces, but moving forces. Owing however to the problems which usually come earliest in mechanical treatises containing only accelerating forces among their data, or given laws of acceleration without reference to the masses in which acceleration is produced, or the pressures which produce them, the learner is not sufficiently reminded of this.

MOWBRAY, SIR ROGER DE, of Barnbougle, son of Geoffrey de Moubray, lord justiciar of Lothian in the end of the thirteenth century. Sir Roger was lord justiciar of Scotland from 1319 to 1321; when, having engaged in a conspiracy against King Robert Bruce, he was seized and put in prison. He died here before trial; but, notwithstanding, process was led against him, and sentence pronounced on his dead body. (Fordun, xiii. 1.)

MOXA, a word of uncertain origin, signifying any substance whose gradual combustion on or near the skin is used for the relief or cure of disease. This method was early practised in the East, particularly by the Chinese and Japanese, from whom it was copied by the Portuguese; but having fallen into disuse, it was revived by the French surgeons during the Egyptian campaign. The substance employed by the Chinese is formed of the downy covering of the leaves of the Artemisia Moxa (De Candolle): but the down of many other plants, or the pith, may be used. The stalk containing the pith of the common sun-flower (Helianthus annuus) is a very convenient means, when the prepared moxas cannot be procured. Those used in Britain are all imported from France, and generally consist either of a pyramidal or cylindrical roll of linen, which is mostly steeped in a solution of nitrate or chlorate of potass. The size of this is generally about eight lines high, and from four to five broad. It is ignited at the one end, and the combustion gradually extends to the other. This differs from the actual cautery by means of a red-hot iron, in as much as the latter produces immediately its maximum of effect, which progressively diminishes, while in the case of the moxa the heat gradually increases, and the greatest effect is produced towards the end of the operation. It is also different from a blister, both in its mode of action and in the stage of a disease in which it may be most advantageously applied. The general principles which should regulate the use of blisters having been already explained [BLISTER], as well as those connected with the actual cautery [ESCHAROTICS], the following observations refer to its distinctive characteristics. We may remark that the pain is not so great as might be expected, indeed less than often attends blisters, and that it is often borne by females and children, or at least boys, with the greatest fortitude.

Besides the secondary effects of the local application, which, being of a counter-irritative kind, are common to blisters and moxa, in the case of the latter there is the additional influence of a certain amount of caloric. 'Caloric, applied under certain circumstances and with appropriate restrictions, stimulates in a powerful manner the capillary vessels, causing them to contract their diameters, and to circulate their blood with greater velocity; and, either by this action on the capillaries, or by a direct one on the lymphatics of the part, it has also the power of exciting the function of the absorbents in a remarkable manner. The direct effects of moxa are seldom, if ever, confined to the skin; and if the moxa be applied, through the medium of a needle, the caloric may be made to propagate its influence to any depth. The beneficial influence of moxa, in relieving or curing disease, apparently depends on its tonic action over absorption and capillary circulation. Hence it should be employed in those cases only in which there exists a state of debility of the capillaries and a consequent retardation of their circulation, and a diminution of absorption; and invariably avoided wherever there is increased action or active inflammation.'

To hold the moxa over the part affected, an instrument has been invented, but a portion of silver-wire formed into a loop, surrounding the cylinder near the base, is sufficient. The moxa may be applied in various ways. 'It may be used so as not to cause any injury; in a greater degree, so as to produce vesication; and in a still greater degree, an eschar, which may be either deep or superficial; or it may be employed with the acupuncture needle.' In the first form, it is burnt near, but not in contact with, the part affected, and is often of great service in healing indolent ulcers; it generally requires to be applied once a day. It is even used in some chronic inflammations of the eye with very good effect. In the second form it is also to be held near the skin, and continued till a blister results. In tic douloureux of very superficial nerves this is sometimes beneficial. The third mode is the most common, and for this the part to which the moxa is intended to be applied is marked out, and the moxa being surrounded with a piece of card-paper, which has been moistened with a solution of common salt, to protect the adjacent skin, the moxa is ignited at the one end, and the combustion increased, if necessary, by means of a blow-pipe. For the cure of obstinate sciatica and deep-seated diseases of the joints a frequent repetition of the moxa may be required, but it seldom fails to give relief. 'When the moxa and acupuncture needle are used together, a moxa of a proper size is to be perforated by a needle of such a length as will be sufficient to reach the seat of the disease, and at the same time extend so far from the surface of the skin as to keep the moxa about one inch from it. The needle is then introduced, and the moxa is now put in a state of combustion, and the heat disengaged from it is communicated to the needle, and thence conveyed to the seat of the disease.' [ACUPUNCTURE.] When the pain from the third mode of applying the moxa is very great, a linseed-meal poultice will generally mitigate it.

Prejudice against this remedy, on account of its apparent severity, has prevented its being extensively used, but almost all practitioners who have made trial of it can attest its efficacy. It will rarely be had recourse to, except in cases of a neuralgic or paralytic kind of such obstinacy or painfulness as to justify the measure; but in such diseases it should not be overlooked. (Wallace, *On the Action of Moxa.*)

MOZAMBIQUE, the Town of, is the principal settlement of the Portuguese on the eastern coast of Africa. It is situated in 15° 2′ S. lat. and 40° 43′ E. long. The harbour is formed by a deep inlet of the sea, five miles and a half broad and six long, which receives the waters of three considerable rivers. At the entrance are three small islands, which, together with reefs and shoals, render the anchorage perfectly safe in the worst weather. Of these islands, that of Mozambique, on which the city stands, is formed of coral, is very low and narrow, and scarcely one mile and a half long. It is situated nearly in the centre of the entrance of the inlet. The other two islands, S. George to the northward and S. Iago to the southward, lie opposite to one another, nearly three miles outside that of Mozambique; they are of coral, covered with vegetation, but without inhabitants.

The north-eastern extremity of the island is occupied by the fort of S. Sebastiaõ, which was erected soon after the Portuguese took the place. Though much neglected, it is still a strong fortification and capable of making a formidable resistance. There are also two other small forts, one of which is built at the southern extremity of the island. The streets of the city are narrow, but the houses are generally lofty and well constructed. Nearly in the middle of the city is a large square, at the eastern extremity of which is a long and commodious stone wharf, built on arches, stretching out from the shore almost to low-water mark, and affording at all times an excellent landing for boats. On the three other sides of the square are the palace of the governor, the custom-house, and the main-guard. The palace is an extensive stone building, apparently of great age, with a flat leaden roof and a large square court in the centre. The city takes up one half of the island, and to the south of it is the Black Town, inhabited by coloured people, whose small bamboo-huts, placed in the most irregular order, form a striking contrast to the lofty stone buildings of the Portuguese and their regular streets. The country surrounding the bay is for the most part uncultivated, except along the northern shores opposite Mozambique, where extensive tracts of ground are under cultivation and supply food for the maintenance of the population. Rice and other provisions are also imported by the Arabs.

The population, amounting to about 6000, consists of a small number of Portuguese, and a larger number of Canareens, an appellation given to the Creole Portuguese of Goa and the other Portuguese settlements in the East Indies. There is also a considerable number of Banyans from Hindustan, but the free coloured people and the slaves constitute the bulk of the population. The commerce of Mozambique has greatly decreased, and in recent times it was chiefly supported by the exportation of slaves to Brazil. In addition to slaves, only a small quantity of ivory, gold-dust, and a few articles of smaller value were sent abroad.

Mozambique was first visited by Vasco de Gama in 1498, who at first was received in a friendly manner, but became an object of hatred as soon as it was known that he was a Christian. It was only by force that he could obtain the requisite necessaries and a pilot. The town was taken in 1506 by Tristan da Cunha and Albuquerque, and as most of the commercial places of that coast experienced the same fate about that time, Mozambique became the centre of the Portuguese possessions in those seas, and the seat of a viceroy, to whom all other governors in Africa were subordinate. As long as the Portuguese remained in possession of their extensive conquests in India, Mozambique and the other settlements on the coast were in a flourishing state, but they began to decline in the seventeenth century, and have continued to decline ever since. The governor of Mozambique has still the supreme authority over all the Portuguese settlements from Cape Delgado on the north to Dalagoa Bay on the south. He remains only three years in office, and is then promoted to some other government.

(Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar;* and Prior's *Voyage along the Eastern Coast of Africa.*)

MOZAMBIQUE, THE COAST OF, is a term used to designate that portion of the eastern coast of Africa which is situated between Cape Delgado (10° 41′ S. lat. and 40° 34′ E. long.) on the north, and the northern mouth of the river Zambesi (17° 30′ S. lat. and 33° E. long.) on the south, constituting the western side of the wide strait by which the island of Madagascar is separated from the mainland of Africa, and which is called the Channel of Mozambique.

Though this country lies along a sea frequently navigated by vessels sailing to the East Indies, and though the Portuguese have had settlements on it for more than three centuries, the country is very little known as regards its principal features, with the exception of the coast-line, which was surveyed by British officers in 1823 and 1824. The Portuguese have several forts along this coast, but their authority hardly anywhere extends more than ten miles inland, and in many places it is not even acknowledged on the shores. The interior is inhabited by a peaceful but powerful and brave nation, the Makawas, who maintain a commercial intercourse with the Portuguese, but do not permit them to visit their country.

The narrow beach is generally lined by a shore from twelve to fifteen feet high, covered with bushes, and composed of sand. This strip of elevated ground seems to be of moderate width, and behind it extends a plain dotted with clumps of trees on some elevated mounds. This plain is a morass of great extent and considerable depth, and is impassible, being covered with grass nearly six feet above the water. Between it and the sand-hills is a narrow strip of dry land covered with jungle, the haunt of elephants, hippopotami, deer, lions, and tigers. Along the course of the numerous rivers the country is higher and drier; it is also generally covered with forests, whilst along the sea-shore trees are scarce, and grow principally on the water's edge. It is not known how far the morass extends inland, but about thirty miles from the coast the banks of the rivers are high and the country cultivated, though still intersected with extensive swamps. The mountains and hills which constitute the eastern border of the table-land of southern Africa occur on the banks of the Zambesi river, about 180 miles from the sea, but that is the only place in which their situation is known. Vessels sailing along the coast perceive no mountains on the continent.

The sea along the shores of this country is considered very dangerous to navigators, and many vessels are lost. For a space of ten to twenty miles, it is lined by shoals, on which rise several small islands; some of them consist of dry sand, and are bare, whilst others are well wooded. Most of them are coral islands. The channel which divides these islands from the continent has generally deep water. The sea east of the shoals is nearly everywhere unfathomable. The most remarkable of these islands are Fuego or Fogo, Mafamede, and St. Antony, all of which are situated south of Mozambique: they are uninhabited. Towards Cape Delgado are the Querimba islands, which are of various sizes, but all low and formed of coral, with long flat reefs extending seaward, and rising abruptly from an immense depth. Between these islands there is good anchoring ground, vessels being sheltered by the mainland to the westward, and in every other direction by islands and reefs, so as to afford security to vessels in the heaviest gales. The best harbour is formed by the islands Ibo and Matamo. Ibo and Querimba are the only inhabited ilands.

Here, as in all tropical countries, the year is divided between the rainy and dry seasons. The rains commence in November and continue to the end of March. They are abundant, and the country along the rivers is then overflowed to a distance of several miles. The heat in summer being very great and the country not well drained, the numerous swamps render nearly the whole coast unhealthy, especially for Europeans, who are not inured to the climate.

The country is rich in productions. The grains which are cultivated are rice, millet, maize, and a small quantity of wheat; the most common vegetables are cabbage, lettuce, spinach, peas and beans of different kinds, tomatas, pumpkins, and cucumbers. The fruits are cocoa-nuts, mangoes, oranges, limes, acajoa-apples, custard-apples, pineapples, guavas, bananas, and plantains. Different kinds of pimento are also cultivated. Fish and turtle abound on all the coral-banks and islands. Cattle, sheep, and especially goats, are numerous. The exports are ivory, the tusks of the hippopotamus, gold-dust, columbo-root, gums, and some amber. Formerly a great number of slaves were exported.

The settlements which the Portuguese still maintain on the eastern coast of Africa do not extend to the north of Cape Delgado. The most northern is Ibo (12° 20′ S. lat. and 40° 30′ E. long.), the harbour of which is formed by the Querimba island. It is strongly fortified, but does not appear to be a place of trade. Farther south is Pomba, which has one of the finest harbours on the coast, the entrance being a channel between two rocky points, one mile and three-quarters across; but the basin into which it opens is nine miles long by six broad, and has sufficient water for the largest ships. This place has some trade. Near 15° S. lat. are three excellent and spacious harbours, Port Conducia, Port Mozambique, and Port Mokamba, but only the second is used for commercial purposes.

The most southern Portuguese settlement on this coast is Quilimane, built on the northern bank of the northern branch of the river Zambesi, which branch is likewise called Quilimane. It is about eight miles from the sea. The river at its entrance is a mile broad, and immediately increases in width considerably. The place contains only thirty-two houses, built of brick, which are inhabited by the Europeans and their descendants, and a great number of huts for the slaves. The population is about 2800. The trade in slaves was considerable till very recently. Besides rice, it exports ivory and some gold and silver.

(Owen's *Narrative of Voyages to Africa, Arabia, and Madagascar;* and Prior's *Voyage along the Eastern Coast of Africa.*)

MOZAMBIQUE, THE CHANNEL OF, divides the island of Madagascar from the continent of Africa, washing the western shores of the island and the coast of Mozambique. Opposite the town is the narrowest part of the channel, but even here its width is 250 miles. The length of the channel, between 12° and 25° 45′ S. lat., may be about a thousand miles. Towards its northern extremity are the Comoro Islands. [Comoro Islands.] Along the coast of Mozambique are extensive shoals with several low coral islands, and along the Madagascar shore several rocky islands, but only a few small islands occur in the middle of the channel. The shores of Madagascar are tolerably high, but those of the coast of Mozambique are all low. The depth of water is very considerable, it being impossible in many places to get soundings close to the shore on the side of Madagascar, or close to the shoals on the opposite side.

This channel is much navigated by vessels bound to the East Indies, as it affords at certain seasons a more speedy passage than any other course; this however depends on the monsoons, or periodical winds, for the current always sets in the same direction, which is southward, and with considerable force. From April to November the south-east monsoon prevails, the winds blowing from south-west, west, south-east, and east-south-east along the whole extent o. the channel. In the beginning of November the north-east monsoon is experienced at the northern extremity of the channel near the Comoro Islands, and in the course of that month it proceeds farther south, and about the end of it reaches St. Augustin's Bay. But it does not extend farther, the sea south of a line drawn from St. Augustin's Bay in Madagascar to the Bazaruta Islands near the coast of Sofala being all the year round under the dominion of the south-east monsoon, or rather trade-wind. According to the prevalence of these monsoons, vessels going to and coming from India frequently pass through this channel. It is also occasionally visited by whalers, as the black whale, which yields the spermaceti, is very abundant in these seas. Water-spouts are of frequent occurrence, as well as in some parts of the Indian Sea towards its eastern border.

(Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar;* Prior's *Voyage along the Eastern Coast of Africa.*)

MOZART, JOHANN-CHRYSOSTOMUS-WOLFGANG-GOTTLIEB, was born at Salzburg, January 17, 1756. His father, Leopold, the son of a bookbinder, was sub-director of the chapel of the prince-archbishop of Salzburg, and employed the hours not devoted to the duties of his office in teaching the rules of musical composition, and also in giving lessons on the violin. His *Violinschule,* a work in quarto, published at Augsburg, in 1769, was much esteemed in its day, and may still be profitably read by scientific students. He married Anne-Maria Pertl, and what has been pointedly noticed by M. Schlictegroll (whose *Necrology* has proved highly useful to us in the present instance), will not perhaps be thought altogether unworthy of remark by those who investigate moral and physical causes and effects, namely, that this couple, the parents of one so admirably organised for creating beautiful harmonies, were distinguished by personal beauty of the rarest kind. They had several children, all of whom died when but a few months old, except the subject of this notice and a sister four years his senior. The latter received instructions on the harpsichord from her father when her brother had scarcely completed his third year, and at that early period the child evinced in the most decided manner the pleasure afforded him by combined sounds, as well as his aptitude for music generally. His amusement was to seek out *thirds* on this instrument, and his success was followed by the strongest demonstrations of infantile joy.

When the young Mozart was four years old, his father, hardly in earnest, taught him a few easy minuets and simple lessons, each of which he learnt in about half an hour. In less than two years more appeared the first dawn of his talent for composition; he invented short pieces of music, which his father noted down; but it is to be regretted that not one of these curiosities was preserved. That great sensibility which almost invariably is a concomitant of genius, and which never forsook him, was apparent from the moment he could express himself. 'Do you love me?' was a question he frequently put to those about him; and when he was ironically answered in the negative, his tears began to flow. In all his pursuits his ardour was extraordinary. 'While learning the elements of arithmetic, the tables, the chairs, even the walls, bore in chalk the marks of his calculations. And it may not be irrelevant to state,' says the author of his Memoir in *The Gallery of Portraits*, 'what we believe has never yet appeared in print—that his talent for the science of numbers was only inferior to that for music: had he not been distinguished by genius of a higher order, it is probable that his calculating powers would have been sufficiently remarkable to bring him into general notice.'

Not long after he had completed his sixth year, the child excited the astonishment of his father by the production of a harpsichord concerto, methodically and correctly written, and wholly unobjectionable, except that it contained too many difficult passages. The appearance of such a phenomenon (for as such it could only have been viewed) determined the father to let the youthful prodigy be seen at some of the German courts. He first took him to Munich, where the elector received him and his family with every kind of encouragement. In 1762 the party proceeded to Vienna, and performed before the emperor Francis I., who was not less pleased by the vivacity of the boy than amazed by his powers. In the following year the Mozart family made an extensive European tour: in Paris they resided many months, where the youthful wonder performed on the organ in the Chapelle du Roi, before the whole court. There the party gave public concerts, and in that city, in the same year, Mozart published his two first works, when he had not finished his eighth year!

In 1764 the Mozarts arrived in London, and remained till the summer of 1765. 'Here,' says the above-mentioned memoir, 'the boy exhibited his talents before the royal family, and underwent more severe trials than any to which he had been before exposed, through which he passed in a most triumphant manner. So much interest did he excite in this country, that the Hon. Daines Barrington drew up an account of his extraordinary performances, which was read before the Royal Society, and declared by the council of that body to be sufficiently important to be printed in the *Philosophical Transactions*, in the 60th volume of which it appears.' And in the 69th volume of the same work, Dr. Burney remarks:—'Of Mozart's infant attempts at music I was unable to discover the traces from the conversation of his father, who, though an intelligent man, whose education and knowledge of the world did not seem confined to music, confessed himself unable to describe the progressive improvements of his son during the first stages of infancy. However, at eight years of age I was frequently convinced of his great knowledge in composition by his writings; and that his invention, taste, modulation, and execution in extemporary playing, were such as few professors are possessed of at forty years of age.' During this residence in our metropolis, he composed and published six sonatas, which he was permitted to dedicate to the queen of Great Britain. The family then returned to the Continent. At the Hague, Mozart published six more sonatas. The party now paid a second long visit to Paris, and returned to Salzburg in 1768. In the same year Mozart, by desire of the emperor Joseph II., composed an entire opera, *La Finta Semplice*, which was much commended by Hasse, who was then in high repute, and by Metastasio, but it never was publicly performed, is now unknown either as a whole or in part, and probably its chief merit was of a relative kind.

In 1769 Mozart, at the age of fourteen, was appointed director of the archbishop of Salzburg's concerts. Soon after he went with his father to Italy, and at Rome gave a remarkable proof of the power he possessed of fixing his attention, and of memory, by noting down the famous *Miserere* of Allegri, after his return from the pontifical chapel, where he had heard it performed. At Bologna he was introduced to the celebrated Padre Martini, who, after testing the youth's abilities, became one of his warmest admirers. While in that city, he was unanimously elected a member of the Accademia Filarmonica; and at Rome the pope conferred on him the order of the Golden Spur. At Milan, in 1770, he wrote and brought out his second opera, *Mitridate*, which was performed twenty nights consecutively. In 1773 appeared his *Lucio Silla*, which had twenty-six successive representations. In the same year he produced other works, among which were, an opera buffa, *La finta Giardiniera*, two Masses for the chapel of the elector of Bavaria, &c. In 1775, at the desire of the archduke Maximilian, he composed the cantata *Il Re Pastore;* and from that period till the year 1779 he continued to labour with his pen, though but few of its products then obtained, or ever will obtain, a celebrity at all equal to that which his subsequent productions have so justly acquired.

In November, 1779, Mozart finally settled in Vienna, the inhabitants and manners of which city were very agreeable to him; and now, having reached his twenty-fourth year, he exhibited the rare example of one who had been astonishing as a child, had disappointed not even the most sanguine hopes, and become proportionately great as a man. 'In his twenty-fifth year he was captivated by the charms of Madlle. Constance Weber, a very amiable person, and an accomplished, celebrated actress, to whom he soon made a proposal of marriage. This was courteously declined by her family, on the ground that his reputation was not then sufficiently established. Upon this he composed his *Idomeneo*, in order to prove what means were at his command, and, animated by the strongest passion that ever entered his heart, produced an opera which he always considered as his highest effort: certainly it was the first that showed his matured and positive strength. Portions of it are in his most original and grandest manner, but parts show that he had not quite emancipated himself from the thraldom of custom. Some of the airs, though far superior to those of his contemporaries, are too much in the opera style then prevailing, a style now become nearly obsolete; and when, fourteen years ago, it was wished to bring out *Idomeneo* at the King's Theatre, it became evident that, if performed as originally written, its success would be very doubtful. To Madlle Weber, on whom the composer's affections were unalterably fixed, was assigned the principal character in the opera, and the high reputation which the author acquired by his work having immediately silenced the objections of Constance's family, her hand was shortly after the reward of his efforts.' (*Gallery of Portraits.*) The union proved a most happy one: in his wife he found an affectionate, active, zealous friend, a useful counsellor, and, when his health began to decline, a patient, unwearied, devoted attendant.

In 1782 Mozart produced *Die Entführung aus dem Serail* (*L'Enlèvement du Sérail*). It was at a rehearsal of this opera that Joseph II. said to the composer, 'My dear Mozart, this is too fine for our ears; it has too many notes.' 'I beg your majesty's pardon,' replied Mozart, with his characteristic independence, 'there are precisely as many notes as are necessary, and no more.' Joseph said nothing, though evidently embarrassed by the reply; but when the opera was performed and heard in a perfect state, he loaded it with praises. *Le Nozze di Figaro*, the *libretto* of which is well abridged from Beaumarchais' admirable comedy, was produced in 1786, by command of the emperor, 'by whose authority alone an Italian conspiracy against it was suppressed.' In the same year was brought out his *Schauspiel Direktor* (director of the comedy), a short opera, possessing little merit.

In 1787 appeared, at Prague, the *chef-d'œuvre* of Mozart, his *Don Giovanni*, the *libretto* made up, with considerable ability, by Lorenzo Da Ponte, from the many dramas founded on the same popular subject. This was received with enthusiasm by the Bohemians, but was then above the comprehension of the Viennese. Indeed the composer, aware of its superiority, and conscious that it would prove 'caviare to the general,' said—'I have written this opera to please myself and my friends.' And when it was performed, more than thirty years afterwards, at the Académie Royale at Paris, it was so little understood on the stage and in the orchestra, that Garat, the celebrated singer, exclaimed, 'Don Juan a paru incognito à l'opéra.' It never found its way to our Anglo-Italian stage till the year 1817, 'when it was performed in a manner that surpassed all former representations, and has never since been equalled. The production of *Don Giovanni* at the King's Theatre, which put ten thousand pounds into the lessee's pocket, and forms an era in our musical history, was so strenuously opposed by an Italian cabal, that but for the courage and perseverance of the director of that season, it would have been put aside, even after all the expense of getting up and trouble of rehearsing had been incurred.' The comic opera *Così fan tutte* was composed in 1790; *Die Zauberflöte* (*the Magic Flute*) in 1791, for M. Schickaneder, the proprietor of a theatre in the suburbs of Vienna, who himself wrote the almost incomprehensible *libretto;* and *La Clemenza di Tito* (abridged from Metastasio's beautiful drama) in the same year, for the coronation of Leopold II.

Had Mozart's life been extended but a few years longer, he would have repeated his visit to this country. When the spirited and liberal Salomon engaged Haydn to write symphonies for his concerts, and to repair to London in order to superintend their first performance, it was settled that Mozart should succeed his illustrious friend the following year, an agreement which death alone prevented from being carried into effect.

Of Mozart's symphonies, quintets, quartets, sonatas, &c., —of his masses, motets, detached vocal pieces, and many other works—we cannot afford space for even a bare list. His additional accompaniments to *The Messiah*, which exhibit such knowledge of effect, so refined a taste, and withal such respect for a composer whom he considered the greatest that had ever lived, prove that it is possible to decorate the lily and add fragrance to the violet. They were written for the Baron von Swiéten in 1788; and we may venture to predict that this masterpiece of Handel will never again be heard unattended by these invaluable contributions of a congenial spirit.

The last, and, taken as a whole, the most sublime work of Mozart, his *Requiem*, was written on his death-bed; and having been left in rather an unfinished state in regard to minor details, his pupil, Süssmayer, filled up some of the accompaniments. This led, a few years ago, to a dispute concerning its authorship, an indiscreet friend of the latter having claimed as Süssmayer's composition the best parts of the Mass. The assertions by which the claim was supported, and the arguments in its favour, proved unavailing against the convincing evidence afforded by the work itself, and the controversy can never be successfully renewed. A story too that an anonymous mysterious stranger commissioned Mozart to compose the *Requiem*, raised many idle conjectures, some of them of the most grossly superstitious kind. The matter however has since been satisfactorily explained.

In bestowing on Mozart so abundant a share of genius and such exquisite sensibility, Nature seems to have thought that she had been sufficiently bountiful. Physical strength she denied him: small in stature, slight in construction, and feeble in constitution, he was not calculated to reach even the middle period of life. His health gradually declined, though his imagination continued in full vigour to the last, and an attack of fever, prevalent at the time in Vienna, hastened his dissolution, which took place on the 5th December, 1792. He left a widow and two sons · one of the latter adopted his father's profession, and is, we believe, still living, but inherits more of his parent's goodness of heart than of his talent. The other is in the employment of the Austrian government, at Milan. Mad. Mozart, at the expiration of many years, entered again into the matrimonial state with Baron von Nissen.

'It has been said of Mozart that his knowledge was bounded by his art, and that, detached from this, he was little better than a nonentity. That his thoughts were almost wholly bent on music was not a matter of choice, but of necessity. Had not his ill-remunerated labours occupied nearly all his time, his means would have been still more limited than they were, for a salary of less than a hundred pounds from the imperial court was all the permanent income he had to depend on. But his acquirements were far greater than is generally supposed, in proof of which we have the best authority for saying—(we quote again, and have an undeniable right, from the before-mentioned memoir)—that once, at a court masquerade given at Vienna, Mozart appeared as a physician, and wrote prescriptions in Latin, French, Italian, and German, in which not only an acquaintance with the several languages was shown, but great discernment of character and considerable wit. Assuming this (communicated to us by the late Mr. Attwood, his pupil and companion on the occasion) to be true, he could not have been a very ignorant man, nor always a dull one, out of his profession. But still stronger evidence in favour of his understanding may be derived from his works. That he who, in his operas, adapted his music with such felicity to the different persons of the drama—who represented the passions so accurately—who coloured so faithfully—whose music is so expressive, that without the aid of words it is almost sufficient to render the scene intelligible—that such a man should not have been endowed with a high order of intellect is hard to be believed; but that his understanding should have been below mediocrity is incredible.'

MUCIUS. [JUSTINIAN'S LEGISLATION.]

MUCUS. The recent researches of Dr. Henle of Berlin (*Ueber Schleim- und Eiter-Bildung*, in Hufeland's *Journ. der practisch. Heilk*, 1838), have determined the true composition of this substance, which had previously presented many qualities that appeared anomalous. He has proved that it is composed of the scales or cells of the epithelium, which covers all the open cavities of the body [MEMBRANES, MUCOUS], separated and suspended in a considerable quantity of watery fluid.

The epithelium, or cuticular covering of all mucous membranes, consists of one or more layers of minute cells; and it is deposited not only on the free surfaces of the large open cavities, but is continued into all the canals and ducts of glands that open on the mucous membranes. In different situations the form of the epithelium cells varies considerably; in some parts they are rounded, or polygonal and flat, adhering to each other in a continued membrane by their adjacent edges; in others they have a cylindrical or conical form, and are only attached to the mucous membrane by one of their extremities; in others they have also a cylindrical or conical form, and their free margins are beset with vibrating ciliæ.

By the contact of the foreign matters to which all the mucous membranes are exposed in the performance of their functions, or by other processes, the epithelium cells are constantly being removed, and their place is as constantly supplied by the formation of new cells from the surface beneath. Thus on all the mucous surfaces a more or less rapid process of desquamation and reproduction of cuticle is ever going on; the superficial layers scaling off, and deep layers being produced in a manner exactly similar to that in which, as the outer surface of the cuticle of the skin (the epidermis) is removed, fresh layers are deposited on the inner surface to replace them and maintain the thickness of the membrane.

The superficial layer of epithelium cells thus removed, not in dry scales, like the epidermis, but mixed with a quantity of watery fluid secreted by the surface of the mucous membrane, constitutes healthy mucus—a viscid, ropy, transparent, and apparently homogeneous substance, which is distinguished more especially by the presence of minute epithelium cells either floating separately or united into small membranous flocculi. Its chief chemical properties are that it mixes with any quantity of water without being dissolved, but swelling up and forming flocculi, does not dissolve in alcohol, and is not coagulated by heat.

The mucus is subject to various alterations by disease. In some cases, the epithelium, remaining healthy, is separated in a distinct membrane, as the cuticle is from the skin in blisters, by violence, &c. The quantity formed is also subject to great variation, and in many cases the structure of the cells composing it is altered. By these changes in the quantity, as well as in the composition and form, either of the watery secretion, or of the epithelium-cells, which together constitute mucus, all the morbid secretions of this class are produced. Thus all catarrhs, dysenteries, &c., consist essentially of a disease of the mucous membrane, which, instead of secreting the quantity and kind of epithelium sufficient for its protection from the substances that come in contact with it from without, secretes an unnatural quantity of watery albuminous fluid with epithelium cells of variously altered forms.

MUDAR. [CALOTROPIS.]

MUDSTONE, a local name for part of the 'Upper Silurian rocks' of Mr. Murchison.

MUEZZIN, in Mohammedan countries, is the general appellation of those officers or clerks of the mosques whose duty it is to cry out from the minaret gallery the ezann, or invitation to prayers, at the five canonical hours, namely, at dawn, at noon, at four o'clock in the afternoon, at sunset, and at night-close. The muezzin cry is a substitute for bells, which are not used in Mohammedan countries. The words of the ezzan are:—'God is great; I attest that there is no other God but God: I attest that Mohammed is the prophet of God: come to prayers; come to the temple of salvation: God is great; there is no God but God.' Each of these sentences is repeated several times in succession, with pauses between, and in a kind of slow chanting, and occasionally shrill tone, forming a solemn though wild melody, peculiarly impressive, especially when suddenly breaking upon the silence of the night. On hearing the muezzin's call, the devout Mussulmans turn their faces towards Mecca, and recite their namaz, or prayers.

MUFFLE, a vaulted flat-bottomed earthen vessel in which substances may be strongly heated, and at the same time protected from the contact of the fuel; in this smaller vessels are placed containing the substances to be acted upon.

MUFTI, the general denomination of the head doctors of the law in Turkey, of whom there is one in every large town. The mufti of Constantinople is the highest in rank, and has a jurisdiction over the muftis of the provinces, and also over the medressés, or colleges, and generally over the whole body of the oulemas, or lawyers. He is styled sheikh ul islam, or 'chief of the elect,' and is consulted in important matters of law. He is appointed by the sultan, who can also depose him. His decisions, called 'fetwahs,' are written in a laconic style, and he assigns no reasons for his judgment. His secretary, called fetwah eminé, has an office with about twenty clerks for the despatch of business. The dignity of sheikh ul islam is one of the principal in the empire, and is equal in rank to that of grand-vizier. His dress is of white ermine. Mouradja d'Ohsson, in his 'Tableau de l'Empire Ottoman,' gives several specimens of the 'fetwahs.'

MUGGLETONIANS, a sect of Christians which arose in England in the year 1651. The leaders of this sect were Lodowicke Muggleton, a journeyman tailor, and John Reeve, who asserted that they had been appointed by an audible voice from God, as the last and greatest prophets of Jesus Christ, that they were the two witnesses mentioned in the 11th chapter of the Revelations, and that they had power to bless or damn to all eternity whomsoever they pleased. They published a great number of works, and obtained many followers. The chief writers against them were the Quakers, and among these, George Fox and William Penn. On the 17th of January, 1676, Muggleton was tried at the Old Bailey, and convicted of blasphemy. He died on the 14th of March, 1697, at the age of 88.

It is impossible here to give a full account of the strange doctrines of this sect. The chief articles of their creed appear to have been, that God has the real body of a man, that the Trinity is only a variety of names of God, that God himself came down to earth, and was born as a man and suffered death, and that during this time Elias was his representative in heaven. They held very singular and not very intelligible doctrines concerning angels and devils. According to them the soul of man is inseparably united with the body, with which it dies and will rise again.

A complete collection of the works of Reeve and Muggleton, together with other Muggletonian tracts, was published by some of their modern followers, in 3 vols. 4to., 1832. Among the works written against them are the following: 'The New Witnesses proved Old Hereticks,' by William Penn, 4to., 1672; 'A True Representation of the Absurd and Mischievous Principles of the Sect commonly known by the name of Muggletonians,' 4to., Lond., 1694.

MUGI'LIDÆ (or fishes of the Mullet tribe), a family of fishes of the order Acanthopterygii. This family may be distinguished by the following characters:—body nearly cylindrical, covered with large scales; dorsal fins (two in number) separated, the first with only four spinous rays; the ventral fins have their origin a little behind the line of the pectorals; branchiostegous rays, six. The head is somewhat depressed, and, like the body, is covered with large scales or polygonal plates; the muzzle is very short; the mouth is transverse, and when closed forms an angle, the lower jaw having an eminence in the middle, which fits into a corresponding hollow in the upper; teeth very minute; pharyngeal bones much developed.

The grey mullet (*Mugil capito*, Cuvier), a fish not uncommon on many parts of the British coast, will serve to illustrate this group. It is rather more than one foot in length: the length of the head, compared with that of the body and tail, is as one to four; the greatest depth of the body, which is beneath the first dorsal, is about one-fourth the whole length, excepting the tail; the head is broad and depressed, snout rounded; the skin of the anterior and posterior margins of the orbit does not advance over the eye; first dorsal fin commences about the middle of the body, its height is equal to twice its length; between the first and second dorsal there is a considerable interval; its proportions, as regards height and length, the same as the first: the upper surface of the body is dusky-grey, tinged with blue; the sides and belly are silvery-white, marked with longitudinal dusky lines; fin membranes dirty-white; a dark spot on the base of the pectoral fin

The thick-lipped grey mullet (*Mugil chelo*, Cuvier), according to Mr. Couch's MSS., communicated to Mr. Yarrell, seems to be abundant on the coast of Cornwall, but no other British naturalists appear to have noticed it. It is distinguished from the common grey mullet chiefly by its large and fleshy lips, the margins of which are ciliated; the teeth resemble hairs; the maxillary bone curved, and showing itself behind the commissure.

A third species of mullet is added to the list by Mr. Yarrell, who proposed for it the specific name of *curtus*, from its comparatively short form. 'The length of the head, as compared with that of the body and tail, is as one to three, the proportion in the common grey mullet being as one to four; the body is also deeper in proportion than in *M. Capito*, being equal to the length of the head: the head is wider, the form of it more triangular, and also more pointed anteriorly; the eyes larger in proportion; the fin rays longer, particularly those of the tail; the ventral fins placed nearer the pectoral, and a difference exists in the number of some of the fin rays: the colours of the two species are nearly alike; and in other respects, except those named, they do not differ materially.' (Yarrell's *British Fishes.*) Mr. Yarrell caught this new species at the mouth of Poole harbour.

MÜHLHAUSEN, in France. [Mulhausen.]

MÜHLHAUSEN, the capital of a circle of the same name, in the government of Erfurt, in Prussian Saxony, is in 51° 13′ N. lat. and 10° 28′ 45″ E. long. It is situated in a very pleasant country on the banks of the Unshut, which is here joined by the Schwemmotte, which flows through the town. It is surrounded with walls and ditches, has four gates, and consists of the upper and the lower town and four suburbs. There are four Lutheran churches, of which that dedicated to the Virgin Mary and the cathedral of St. Blasius are worthy of notice. Among the charitable institutions are an infirmary, three hospitals, and an orphan asylum. The town possesses a gymnasium, numerous parochial and other schools, a society for the promotion of industry, and other useful societies. The population is nearly 12,000. The manufactures of woollen cloth, serges, calicoes, leather, snuff, and tobacco, are very considerable. The breweries, distilleries, and tanneries are flourishing. Large quantities of starch, glue, and oil are made here. There are likewise dyeing-houses and fulling-mills, and the manufacturers of the neighbouring district of Eichsfeld send their woollens to Mühlhausen to be fulled, dyed, and prepared for the market. The inhabitants carry on a very great trade in their own manufactures and in corn. Mühlhausen was one of the oldest free cities in Germany; it boasted of having enjoyed its liberty from time immemorial, and preserved its democratical form of government till 1802, when the town and territory were assigned to Prussia, and finally confirmed to that power in 1814.

MULBERRY. The black or common mulberry is the fruit of *Morus nigra*, the only species of Morus worthy of being cultivated as a fruit-tree. It is a native of Persia, and its indigenous range appears to be extensive. Its introduction to this country dates about the middle of the sixteenth century. Under great vicissitudes it proves very tenacious of life; and under ordinary circumstances it attains, even in this climate, a considerable age, for some trees planted in 1548 are still alive. The fruit is used at the dessert, fresh gathered, and at the same time it ought to be so ripe as to be just ready to drop from the tree; indeed the fruit may be said to be in the highest perfection with regard to ripeness when it actually drops, and hence a grass plot surrounding the trunk is desirable; but the trees are found to thrive better when the soil is kept stirred: however, as grass will be generally preferred, all strong-growing sorts of grasses should be avoided; and it should also be kept very closely mowed till at least immediately before the fruit ripens. By this means the sun's rays will be permitted to penetrate the soil to a greater depth than when obstructed by a covering of long grass. Mulberries are also preserved in the form of a syrup; and their juice, mixed with that of apples, forms a beverage of a deep port-wine colour, called mulberry cider.

The soil for mulberry-trees should be of a light, rich, and moderately dry nature. If the subsoil be not naturally pervious, it should be rendered as much so as is possible. A good bottoming of brick rubbish will prove beneficial with regard both to the growth of the tree and the flavour of the fruit.

Propagation of the mulberry may be effected either by seeds, cuttings, or layering. The last is the preferable mode, where it can be conveniently adopted; and the shoots or branches used for this purpose, as also those intended for cuttings, should be selected from those trees, or parts of a tree, that have been observed to be most fruitful; for although the plant is generally monœcious, yet some trees occasionally assume a diœcious character. Hence likewise seedling plants are not so desirable as those propagated from trees previously ascertained to be prolific; and moreover seedling plants are a greater number of years in attaining a bearing state.

As the acquisition of a good mulberry-tree is very desirable, the following directions for obtaining a bearing tree readily and quickly will be useful. If a tolerably large branch of a vigorous tree is 'ringed,' and the annulation is enclosed in a box filled with rich soil, sufficiently large to hold as much as will preserve a somewhat uniform temperature, or at least an approximation to that which the roots of a tree naturally experience in the ground, roots will be readily emitted into the earth, and in due time the branch may be cut off and planted. A covering of moss is useful, partly for maintaining an equable temperature, and partly for preserving moisture.

The mulberry-tree requires very little pruning beyond that of regulating the head. The season for this operation should be always mid-winter; for if in a growing state, this plant bears amputation very ill, especially as regards large limbs. Mulberries have been trained against south walls, over which a single plant has been known to extend upwards of ninety feet horizontally; additional size and flavour are said to have been gained, but certainly not so much over a standard on a proper bottom as to compensate for the great extent of wall-room occupied.

Medicinal Uses.—The fruit (popularly, but incorrectly, termed a berry) of *Morus nigra* is used in medicine. It is formed by a partial union of the enlarged and fleshy calices, each enclosing a dry membranous pericarp. It is at first green, then red, and lastly of a deep violet-black, having much juice of a like colour. It contains much mucilage, with an astringent resin, and is sweetish and subacid, owing to the presence of some malic or tartaric acid. As the cooling properties depend on the acid, the fruit should be gathered before it is quite ripe. It may either be formed into a syrup, or a vinegar may be made with it similar to raspberry vinegar, which constitutes an excellent gargle in inflammatory sore-throat, and a drink in slight febrile affections. It is also susceptible of many other uses, economic or domestic. The fruit of the blackberry (Rubus fruticosus) is sometimes substituted for that of the mulberry, but it is not acid.

MULCASTER, RICHARD, was a native of Carlisle, and of an old family in Cumberland. He received his earliest education on the foundation at Eton, under the celebrated Udal, whence, in 1548, he was elected scholar of King's College, Cambridge. From Cambridge he removed to Oxford, and in 1555 was chosen student of Christ Church. In the next year he was licensed to proceed in Arts, and about the same time became known for his proficiency in Eastern literature. He began to teach in 1559; and on September 24, 1561, for his extraordinary attainments in philology, was appointed the first master of Merchant Taylors' school in London, then just founded. Here he continued till 1586, when he resigned; and some time after was appointed upper master of St. Paul's School. Here he remained twelve years; and then retired to the rectory of Stanford Rivers, in Essex, to which he had been instituted at the presentation of the queen, and where he died, April 15th, 1611. Several of his smaller compositions commendatory verses, &c. are prefixed to works of his contemporaries; and Gascoigne has printed some Latin verses of his composition, which were spoken before the queen at Kenilworth, in 1575. His separate works were: 1, his 'Positions, wherein those primitive circumstances be examined which are necessarie for the training up of Children, either for skill in theire book or health in their bodie,' 4to., Lond., 1581 and 1587; to which a second part was promised. 2, 'The first part of the Elementarie, which entreateth chefely of the right writing of the English tung,' 4to., Lond., 1582, a book which Warton (*Hist. Engl. Poetr.*) says contains many judicious criticisms and observations on the English language. 3, 'Catechismus Paulinus, in usum Scholæ Paulinæ conscriptus, ad formam parvi illius Anglici Catechismi qui pueris in communi Precum Anglicarum libro ediscendus proponitur,' 8vo., 1601. This is in long and short verse, and, though now forgotten, was once esteemed. Fuller relates that Mulcaster was a severe master, but much beloved by his pupils in after-life, and by none more than by Bishop Andrews. (*Gent. Mag.*, vol. lxx., pp 420, 604; Wilson's *Hist. of Merchant Taylors' School*, vol. i., p. 78, &c.; Chalmers's *Biogr. Dict.*, vol. xxii., p. 501.)

MULE. This word is, in its particular sense, used to denote the offspring of the male ass and the mare [HORSE, vol. xii., p. 314]*; but, in its general signification, it is applied to the offspring of any two animals of distinct species, and is then synonymous with the term 'Hybrid.' [HYBRID, vol. xii., p. 374.]

'The true distinction between different species of animals,' writes John Hunter,† 'must ultimately, as appears to me, be gathered from their incapacity of propagating with each other an offspring capable again of continuing itself by subsequent propagations: thus the horse and ass beget a mule capable of copulation, but incapable of begetting or producing offspring. If it be true that the male has been known to breed, which must be allowed to be an extraordinary fact, it will by no means be sufficient to determine the horse and ass to be of the same species; indeed from the copulation of mules being very frequent, and the circumstance of their breeding very rare, I should rather attribute it to a degree of monstrosity in the organs of the mule which conceived, as not being a mixture of two different species, but merely those of either the male or female ass. This is not so far-fetched an idea, when we consider that some true species produce monsters which are a mixture of both sexes, and that many animals of distinct sex are incapable of breeding at all. If then we find nature in its most perfect state deviating from general principles, why may it not happen likewise in the production of mules, so that sometimes a mule shall breed from the circumstance of its being a monster respecting mules?' We think that the views here laid down are clear and satisfactory so far as they go, and that the question with which the paragraph concludes is in no danger of a contradictory answer.

But the student should be on his guard as to an unhesitating admission of everything that is laid down even by an authority so deservedly eminent as that of the great physiologist whose opinion we have just quoted. Professor Owen, for instance, in one of his valuable notes on another part of this very paper, truly observes that John Hunter's assertion that the fertility of a hybrid with an individual of a pure breed proves the fact of identity of two supposed distinct species equally with the production of offspring from the connection of hybrid with hybrid, cannot be admitted. ‘To prove the identity of two supposed distinct species,’ continues the Professor, ‘granting the fertility of the hybrids from the two to be the proof required, it should be shown that such hybrids are fertile *inter se*, and capable of propagating indefinitely an intermediate variety. Now this is precisely the fact which is wanting in the evidence adduced in the text. All that Hunter proves is that two species very nearly allied to each other will produce a hybrid offspring, and that the hybrid is again productive with an individual of the pure breed; but this only illustrates a general law by which the reversion of the hybrid to the pure breed is provided for; while, on the other hand, the intermixture of the distinct species is guarded against by the aversion of the individuals composing them to a sexual union.’ And it is no contradiction to this general rule to show that in some instances this aversion is overcome, as in the case of the lion and tigress—to cite an example, among the *Carnivora* [Lion, vol. xiv., p. 35], and in that of the pheasant and common fowl; and the hen canary-bird with the goldfinch, linnet, &c., among birds. [Canary-Bird, vol. vi., p. 228.] Such cases are the exceptions, and prove the generality of the rule or law.

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* Mr. Darwin, in his highly interesting 'Journal and Remarks,' being the third volume of the 'Narrative of the Surveying Voyages of H.M. ships Adventure and Beagle,' gives the following graphic account of the social habits of the Mule, when describing the passage of the Cordillera. 'Our manner of travelling was delightfully independent. In the inhabited parts we bought a little firewood, hired pasture for the animals, and bivouacked in the same field with them. Carrying an iron pot, we cooked and ate our supper under the cloudless sky, and knew no trouble. My companions were Mariano Gonzales, who had formerly accompanied me, and an "arriero," with his ten mules and a "madrina."'

'The madrina (or godmother) is a most important personage. She is an old steady mare, with a little bell round her neck; and wheresoever she goes, the mules, like good children, follow her. If several large troops are turned into one field to graze, in the morning the muleteer has only to lead the madrinas a little apart and tinkle their bells; and although there may be two or three hundred mules together, each immediately knows its own bell, and separates itself from the rest. The affection of these animals for their madrinas saves infinite trouble. It is nearly impossible to lose an old mule; for if detained for several hours by force she will, by the power of smell, like a dog, track out her companions, or rather the madrina; for, according to the muleteer, she is the chief object of affection. The feeling however is not of an individual nature; for I believe I am right in saying that any animal with a bell will serve as a madrina. In a troop each animal carries, on a level road, a cargo weighing 416 pounds (more than twenty-nine stone); but in a mountainous country, a hundred pounds less. Yet with what delicate slim limbs, without any proportional bulk of muscle, these animals support so great a burden! The mule always appears to me a most surprising animal. That a hybrid should possess more reason, memory, obstinacy, social affection, and powers of muscular endurance, than either of its parents, seems to indicate that art has here out-mastered nature.'

† 'Observations tending to show that the Wolf, Jackal, and Dog are all of the same species.' See Professor Owen's edition of John Hunter's 'Observations on Certain Parts of the Animal,' London, 8vo., 1837.

Doubtless there must be a concurrence of predisposing accidents to bring different species, in their anxious desire to obey the all-powerful impulse of reproduction, together; and the presence of such predisposing causes may be generally traced in most of these erratic alliances. In the great majority of them the species thus mingled are very nearly allied. Thus there are several instances on record of the Hooded Crow (*Corvus Cornix*) pairing and producing offspring with the Carrion Crow (*Corvus Corone*); the male of Montagu's Harrier (*Circus hyemalis*) and a Ringtail (*Circus cyaneus*) having been shot at the nest feeding their young (Yarrell, *ex relatione* Sweeting). Mr. Berry notices the pairing of a Blackbird and a Thrush in Lancashire: these birds reared their broods, which were strongly marked hybrids, for two successive years. (*Magazine of Nat. Hist.*, vol. vii.)

Mr. Yarrell, who, in his beautifully illustrated and interesting ‘History of British Birds,’ now in course of publication, mentions the last-named cases in detail, adds that several instances are known in which the female of the Black Grouse, usually called the Grey Hen, has bred in a wild state with the Common Pheasant; such a hybrid is represented in the title-page of Mr. T. C. Eyton's ‘History of the Rarer British Birds.’ [Black Grouse, vol. iv., p. 483.] The last-named ornithologist has also recorded the fruitful connection between the Common Goose and the Chinese Gander; and the Hon. Twiselton Fiennes communicated to the Zoological Society of London an instance of the Common Wild Duck breeding with the male Pintail (and see further Ducks, vol. ix., pp. 181, 182).

The author of the ‘History of British Birds’ above quoted has had so much experience on this intricate subject, so far as it relates to birds, that the following observations by him are worthy of all attention:—

‘Several experiments on the productive powers of various hybrid birds are now in progress; but without intending to anticipate the interesting particulars which may be elicited, I may briefly refer to what has fallen under my own observation. Some degree of restriction, either accidental or imposed, and arising from various causes, appears to be necessary to induce the union of birds that are of different species; but the influence of the divine command to “increase and multiply” is so irresistible, that some birds unite with strange partners, rather than have no partner at all; when putting two birds of different species together, with the intention of breeding from them, union is less likely to take place if they are kept within sight or hearing of other birds of their own species. The two sexes of the broods produced by such unions take little or no notice of each other when adult, even during the usual breeding season, and are believed to be unproductive among themselves if so restricted; but if allowed an opportunity of uniting with the true species of either parent, they are then prolific, and the young birds produced soon lose all intermediate character.’ (*Hist. Brit. Birds*, part xiii.)

Our limits will not permit us further to pursue the zoological part of this subject, one of the most interesting that can be presented to the practical breeder or to the physiologist, who will anxiously expect the results of the experiments above alluded to by Mr. Yarrell.

MULHAUSEN, or MULHOUSE, properly written *Mühlhausen*, a town in France, in the department of Haut Rhin, situated on the banks of the Ill, a feeder of the Rhine, in 47° 45′ N. lat. and 7° 21′ E. long., 237 miles in a direct line east-south-east of Paris, or 278 miles by the road through Troyes, Langres, Vesoul, Belfort, and Altkirch.

This town derived its origin and its name from a house and a mill established on the Ill by the friars hermits of the order of St. Augustin. In the eighth century it is noticed as a village, and from 1268 it ranked as a free imperial city. It was long time harassed by the landgraves of Alsace, whose attacks induced the townsmen to ally themselves, in 1466, with the Swiss Cantons of Berne and Soleure, in 1506 with Basel, and in 1515 with the whole Helvetic Confederacy, of which it may be considered to have become a member. These alliances procured to the townsmen peace and security; and Mulhausen, with its small territory, though surrounded on every side by France, preserved its separate existence till A.D. 1798, when it was incorporated with the French republic. It has ever since remained incorporated with France.

Mulhausen is divided into the old and new towns. The old town is built on an island formed by the Ill, which here flows in several channels, and is crossed by a number of bridges. The town forms an irregular oval, with streets, crooked indeed, but tolerably broad and well paved, and with well-built houses. There are a Catholic and a Protestant church, a town-hall, and a high school. The new town, to the south-east of the old town, is on the right bank of the Ill; the streets are straight, provided with foot-paths, and adorned with handsome houses

The population of the commune of Mulhausen at the commencement of the century was 6628; in 1831 it had increased to 13,300, of whom 13,187 were in the town. Besides the resident population, 7000 workmen daily resort to the town from the neighbouring communes to follow their several employments. It is the centre of the trade of the department, and of the manufacture of printed cottons and silks, so much esteemed for their brilliant and fast colours, a manufacture which employs, in this and the neighbouring districts, nearly 80,000 persons. There are manufactures of cotton and woollen yarn, of excellent muslins, and other cottons, of fine and ordinary woollen cloths, of cotton hose, straw hats, morocco leather, and soap. There are dye-houses, tan-yards, metal-foundries, and establishments for making steam-engines and other machinery. A commercial gazette is published. There are four yearly fairs.

The Canal de Monsieur, which unites the navigation of the Rhône and of the Rhine, passes by the town; there is a large basin for boats in the new town.

MULI'NIA, Mr. Gray's name for a genus of conchifers, allied to *Mactra*, having the ligament, properly so called, internal, and the lateral teeth simple.

MULL, an island on the western coast of Scotland, in the synod and county of Argyll, comprised between 56° 16′ and 56° 40′ N. lat., and 5° 45′ and 6° 23′ W. long. Its length from north to south is 30 miles, and the greatest width, from Treshnish point on the west coast to Craiganure Kirk on the east, is 23 miles. To the north the island is bounded by Loch Sunart and the headland of Ardnamurchan, to the south by Loch Linnhe, and to the west by the Minsh channel. On the north-east it is separated from the mainland by a narrow strait called the Sound of Mull. The coast is indented by numerous lochs and bays. Of the former the principal is Loch-na-Keal on the western side, which enters so far inland that its extremity is separated from the Sound of Mull by an isthmus only two miles in width, thus dividing the island into two unequal parts, whereof the northern forms the parish of Kilninian, and the southern the parishes of Kilfinichen and Torossay. At the entrance of this loch are a number of small islands, including Ulva, the Treshnish islands, and Staffa, noted for its basaltic cave and columns. The island terminates to the south-west in a headland called Rossy, or the Ross of Mull, a short distance off which is Iona. [Iona.] The substance of the island is principally trap rock. The highest mountain, called Beinmore or Benmore, signifying in Gaelic 'the great mountain,' is situated near the southern shore of Loch-na-Keal, and is 3168 feet in height. The ascent is not difficult, and the summit commands a fine view of the neighbouring islands.

The interior of Mull is designated by Dr. M'Culloch (*Western Isles*, 8vo., Lond., 1824) as 'trackless and repulsive, rude without beauty, stormy, rainy, and dreary.' It appears however (Sinclair's *Statistical Acc. of Scotland*, 8vo., Edin., 1792, iii., p. 265) that in 1792 a road had been constructed from Achanacreig on the east coast, to Across on the Sound of Mull, a distance of twenty miles, and in that space there were five stone bridges. In the parish of Kilninian it was otherwise; many torrents intersected the roads, which, for want of bridges, were frequently impassable.

The greater part of the island is the property of the duke of Argyll. The soil, where the surface is not covered with crags, heath, or swampy morasses, consists of loam and clay. Hemp, flax, oats, barley, and potatoes are cultivated, but the cultivation is inferior to that of the adjacent islands, and the grain produced in the most plentiful seasons is barely adequate to the support of the inhabitants. (Hiron, *General View of the Hebrides*, Edin., 4to., 1794.) The principal object of the farmer is the breeding of sheep and black cattle. Of the latter the average annual export is 2000 head, including the oxen from the isles of Coll and Tir-y, which are driven through Mull on their way to the lowlands. The horses are small but hardy. Their breed is said to have been improved by mixture with those from the 'Florida,' a vessel of the Spanish Armada wrecked off the coast. The fair for horses is held on the 21st of August. Grouse, woodcocks, and ptarmigans are frequently met with, and red deer are sometimes taken on the mountains. The kelp produced along the shores is considerable.

The principal town or village is Tobermorry, on the north-eastern point of the island. It has a harbour, pier, inn, and custom-house, at which all the legal forms connected with the herring-fishery have to be gone through. Boat-building is carried on to a small extent.

The three parishes into which Mull is divided contained, in 1831, an aggregate population of 10,538 persons, distributed among 2031 families, of whom 1297 were employed in agriculture.

In the parish of Torossay, in 1792, there was a parochial school, and two others supported by the Society for the Propagation of Christian Knowledge.

(Langland's *Large Map of Argyllshire; Population Returns*, &c.)

MÜLLER. [REGIOMONTANUS.]

MÜLLER, OTHO FRIDERIC, a Danish naturalist, born at Copenhagen, March 11, 1730. His parents were poor; but being fond of literary pursuits, and of studious and regular habits, he obtained in 1753 an appointment as tutor to a young nobleman, the count de Schulin. In this situation he had ample opportunities for cultivating his taste for reading and for the observation of nature. It is said that the countess de Schulin, his pupil's mother, who was a woman of great ability, persuaded Müller to devote his talents to natural history, for we find that previously to this time his principal study had been theology. Botany seems to have engaged his attention (though he owes his celebrity to his zoological researches), and he employed his leisure time in collecting plants, and in making drawings of them. He subsequently travelled for a considerable time in different countries with his pupil, and so greatly extended his knowledge of natural history, that on his return to Copenhagen, in 1767, he was a first-rate botanist and zoologist. Marrying soon after a woman with considerable property, he resigned all his professional engagements, and devoted the remainder of his life to the pursuit of science.

In 1763 he published a work on fungi, in Danish, which was followed by a history, in two volumes (which came out separately), of the species of insects and plants inhabiting that part of the country in which he resided. It was written in Latin, and entitled 'Fauna Insectorum Friedrichsdaliana,' 8vo., Leipzig, 1764; and 'Flora Friedrichsdaliana,' 8vo., Strasburg, 1767. These works showed much method, and great accuracy in the investigation of specific characters, which qualities procured him considerable reputation; and he had the honour of being appointed to continue the publication of the 'Flora' of Denmark, a superb work, undertaken by the command of king Frederic V., who was a great patron of science. It had been commenced in 1761, by George Christian Oeder, who brought out three volumes; Müller added two others, the last of which appeared in 1782. Müller however now took more interest in the study of minute animals than of plants, and he published in 1771, in German, a work on 'Certain Worms inhabiting Fresh and Salt Water,' 1 vol. 4to., Copenhagen. He here particularly described those annulose animals which Linnæus had called *Aphrodites* and *Nereides*, whose reproductive powers, as observed by Bonnet, possess so much interest. Müller divided them into four genera, and described a great many new species, besides adding much interesting information concerning their structure and habits. He displayed still greater powers of observation in the next work which he published, in Latin, named 'Vermium Terrestrium et Fluviatilium, seu Animalium Infusorium, Helminthecorum, et Testaceorum non Marinorum, succincta Historia,' 2 vols. 4to., Copenhagen and Leipzig, 1773-74. The first part is devoted to the infusory animalcules, of which he discovered a great many new species. He was the first naturalist who attempted to arrange these minute animals into genera and species, assigning to each distinctive characters. The second part of this work contains some interesting observations on intestinal worms; and the third, which fills the second volume, is devoted to the testaceous mollusca, which the author attempted to classify according to the organisation of the animals inhabiting the shells; but, as Cuvier has remarked, their structure was too little known at that time, and Müller was not enough of a comparative anatomist to be very successful in this attempt. His treatises on the 'Hydrachnæ in Aquis Daniæ Palustribus detectæ et descriptæ,' 4to., Leipzig, 1781, and on the 'Entomostraca, &c.' (little shelled crustaceans inhabiting fresh waters, which were comprised by Linnæus in the genus *Monoculus*), 4to., Leipzig, 1785, are monuments of patient investigation; they are both written in Latin, and are accompanied with a great number of plates. Müller here described a vast number of animals whose existence was previously scarcely suspected, though they are contained by millions in all fresh waters.

The subject in which he took the greatest interest was the microscopic investigation of infusory animalcules: he worked at this incessantly, and at his death (which took place on the 26th of December, 1784) he left a history and detailed description of this class of minute animals, illustrated with 50 plates. This work was published in 1786, by his friend Otho Fabricius, in 4to. (Hauniæ); it is written in Latin. 'These three works, on the Infusoria, Monoculi, and Hydrachnæ, have procured Müller,' says Cuvier, 'a place in the first rank of those naturalists who have enriched science with original observations.' He classified each of these families of animals, and his arrangement remained unaltered for many years, partly owing to the great care and exactness with which he formed his system, and partly in consequence of the many difficulties with which the investigation of these microscopic animals is surrounded. The Infusoria were a new kingdom of animals which he revealed to the naturalist, and previously to the modern researches of Ehrenberg his labours stood alone in this branch of science. [INFUSORIA.]

In 1779 Müller commenced the magnificent 'Zoologica Danica,' a work which was intended to correspond, in the animal kingdom, to the 'Flora Danica' in the vegetable. He only lived to publish two parts, which were in folio, each containing 40 coloured plates. The text, which was in Latin, appeared first in 8vo., but was reprinted in 1788, of the same size as the plates. Two other parts of the 'Zoologica Danica' have since been published, the first by M. Abildgaart, and the other by M. Rathké: the last appeared in 1806. This work, which was intended to embrace all the species of the animal kingdom found in the north of Europe, still remains very incomplete, only 160 plates having appeared. It is however very valuable, from its containing descriptions and figures of a great number of new species of molluscous animals and zoophytes.

Besides the great works which we have mentioned, Müller wrote a general catalogue of the animals of Denmark, entitled 'Zoologicæ Danicæ Prodromus,' 8vo., Copenhagen, 1777, and several memoirs on different subjects. The Danish government marked their sense of the merits of this laborious naturalist by making him a counsellor of state, and giving him several other honorary appointments.

MÜLLER, JOHN, born at Schaffhausen, in Switzerland, in 1752, was the son of a clergyman and schoolmaster in his native town. He studied at Göttingen, under Heyne, Schlœzer, Walch, and other eminent professors, and showed an early taste for historical research. On his return to Schaffhausen he was appointed professor of Greek in the gymnasium of that town. He afterwards went to Geneva, as tutor to the children of Counsellor Tronchin of that city, where he became acquainted with the naturalist Bonnet, Bonstetten, and other learned men. With Bonstetten he formed an intimacy which lasted till his death. In 1778 he delivered a course of lectures on universal history, which were afterwards published in twenty-four books. It is a rapid but well-written abridgment, and useful to young people.

Müller shows no partiality for great states and empires, and he bestows particular notice upon small communities which have struggled hard and succeeded in maintaining their independence. He gives some interesting particulars not generally known of the history of the republics and little states of modern Europe, such, for instance, as Ragusa. He exposes, without partiality, the defects and errors of all governments, antient and modern, republics as well as monarchies. The work ends with a review of the political situation of Europe in 1783. Müller's 'Universal History' was translated into French, 'Histoire Universelle, par Jean de Müller,' 4 vols. 8vo., Paris, 1813-17.

In 1781 Müller was appointed professor of history at Cassel, where he published a treatise 'On the Influence of the Antients upon the Moderns,' and another on the establishment of the temporal dominion of the popes in the eighth century. About the same time he published the first volume of his great work, which has placed him in the first rank of historians, his history of the Swiss confederation, 'Geschichte der Schweizerischer Eidgenossenschaft,' which he afterwards brought down to the end of the fifteenth century. The author traces the rise of the towns and small communities of Helvetia through the gloom of the dark ages, and gives minute particulars of their customs, manners, and laws, referring at every step to authentic documents. It is a work of vast and deep research, and, though necessarily minute, is yet attractive in its style. The interest and value of the work, as a book of historical reference, are not confined to the narrow ground of Swiss politics; it serves also to illustrate the early history of the Teutonic nations in general.

In 1786 Müller was appointed librarian and counsellor of state to the elector of Mainz. In 1792, when the French took that city, he repaired to Vienna, where the emperor Leopold II. gave him an official appointment as a member of the privy chancelry. He there wrote several political pamphlets tending to show the necessity of a close union and harmony among the various German states in that great crisis. In 1800 Müller was appointed first keeper of the imperial library. In 1804 he left Vienna for Berlin, where he published some essays on the history of Frederic the Great, and also a treatise on the decline of liberty among the antients. After the battle of Jena in 1806, Napoleon saw Müller at Berlin, and showed him a marked regard, which seems to have captivated the historian. In 1807 Napoleon appointed him secretary of state to the new kingdom of Westphalia, under his brother Jerome, an office which he exchanged in the following year for that of director of public instruction. He entered with zeal upon his new and arduous duties, which however he could not long pursue, as he died at Cassel, in May, 1809. His complete works were published at Tübingen in 27 vols., 1810-19. Müller's letters to his friend Bonstetten were published separately by J. H. Füssli; 'Briefe an seinen ältesten Freund in der Schweiz, in den Jahren 1771 bis 1807,' 8vo., Zürich, 1812. They are very interesting as records of the times. Müller's history of Switzerland was translated into French and continued to the epoch of the French Revolution by P. H. Mallet; but a much superior translation is now being published by Professor Monnard of Lausanne and L. Vulliemin, who have also undertaken to continue Müller's work down to the present time. 'Histoire de la Confédération Suisse par Jean de Müller, Robert Gloutz Blozheim, et J. J. Hottinger; traduite de l'Allemand et continuée jusqu' à nos jours, par Charles Monnard et Louis Vulliemin,' 8vo., Paris and Geneva, 1837-9. Five or six volumes of the work have already appeared, and the notes by the editors are copious and valuable; when finished, it will form a complete history of Switzerland. Heeren wrote a biographical notice of Müller, Leipsig, 1809.

MÜLLER, WILHELM, a modern German writer and lyric poet of great talent, was born at Dessau, Oct. 7th, 1794. More ardent and industrious than methodical in his studies, he nevertheless avoided a mere desultory course of reading. He applied himself more particularly to antient German literature and poetry, the fruits of his researches into which were first given to the public in his 'Blumenlese aus den Minnesänger,' 1816. His next production of any note was a translation of Marlowe's 'Faustus' [MARLOWE], in 1818, which was succeeded by his 'Rom, Römer, and Römerinnen,' 2 vols., 1820, a graphic and clever sketch of the papal capital and its inhabitants, the result of a tour which he made in Italy with Baron von Sack, and which he designed to extend into Greece. His literary reputation was afterwards greatly increased by his 'Gedichte aus den hinterlassenen Papieren eines reisenden Waldhornisten,' and his 'Lieder der Griechen.' The latter breathe a very high spirit of enthusiasm; nor are the beauty and melody of the language inferior to the energy of the sentiments. Many tales and other productions of that class by him appeared in the 'Urania' and other literary annuals; and he also contributed several articles to Ersch and Gruber's 'Encyclopædia.' He died, October 1, 1827.

MULLE'RIA. [OSTRACEA.]

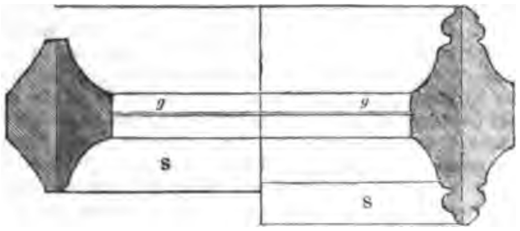
MULLET. [HERALDRY.]

MULLINGER. [MEATH, WEST.]

MULLION (by some supposed to be a corruption of *munnion*, from the Latin *munio*, to defend or strengthen, or else to be derived from the French *moulure*, a moulding), a term in Gothic architecture applied to the upright bars, or rather stone shafts, dividing the general aperture of a window into secondary openings, which are again frequently subdivided vertically by a similar shaft crossing the mullions horizontally, and therefore called a *transom;* whereby the whole space beneath the head of a window (supposing it to be an arched one) is formed into a series of pannels in which the glass is fixed, and which are sometimes technically distinguished as *lights* or *days*. Except in very small windows not exceeding in width one such *light* or compartment, mullions invariably occur in Gothic windows, being in fact absolutely necessary when no other mode of glazing was practised than that of small panes set in lead, because without some kind of strengthening or support, either by stone or metal rods, a spacious surface of the kind would be damaged by a strong wind, whereas each division becomes a separate window of no greater width than a single small one: consequently the number of the mullions depends upon the width of the window. Two-mullioned and three-mullioned windows are the most usual in ecclesiastical architecture, except for the large east or west windows in churches, or windows of nearly equal dimensions in other buildings. In these they are frequently very numerous; that, for instance, in the façade of York Cathedral is divided into eight lights or compartments by seven mullions, while that above the entrance to Westminster Hall has eight mullions. Again the former of these is *untransomed*, but the other is *transomed*, being divided in its height to the spring of the arch into two tiers of arch-headed compartments; it also affords an instance of what is by no means uncommon, namely, of principal and subordinate mullions, being divided by two larger mullions into three leading compartments, each of which contains three smaller ones. The lesser or simple mullions, sometimes described as those of the *first order*, consist of the mouldings which run into and form the cusps, where the heads of the compartments are foiled; while the larger ones have additional mouldings. In explanation of this we may refer to the window from Kirton Church, at page 324, GOTHIC ARCHITECTURE, where the centre mullion is larger and composed of more mouldings than the other two, which have only those that form the cusps. As far as they go, the other specimens of windows given in that article will further exemplify the subject of mullions, and serve to render it evident that unless windows were so divided it would be impossible that their heads should be filled up with tracery.

After what has been said, it is hardly necessary to insist upon the importance of mullions, without which a window ceases to be a Gothic one, though it may be a Gothic arch filled with glass. Neither is it sufficient that there be mullions, if they have not the character suitable to the style. Modern architects are apt to be too negligent in this respect, and to make their mullions too poor and meagre, a defect for which no merit in other parts can atone, since the whole will have an air of dryness and insipidity, and there will be little, if any, of that relief and vigour which antient examples possess: the spirit of the style is lost. There is indeed no express rule for determining their proportions, yet no one who knows anything of the style, or has feeling for it, can be at a loss. The breadth of the mullions should never be less than one-fourth of the width of the *intermullions* or lights between them; and in many examples they are more than one-third. It is also important that they should have projection or depth as well as breadth, that is, the glazed surface of the window should recede considerably from the line of the outer face of the mullion. Unless this be attended to, there will be more or less a deficiency of that spirit, boldness, and richness depending upon such particulars of execution, let the outline of a design for a window be ever so good. When, as is now frequently the case in modern churches, the windows are glazed with ground glass, a greater rather than a less degree of boldness in the mullions is requisite, in order to produce that relief which the semi-opake surface of the glass tends to diminish. It is the neglect of such apparently trifling matters that causes the prodigious difference between modern imitations and the originals, which almost every one feels, though few can explain.

Subjoined are the horizontal sections or plans of two mullions; one of the simpler and usual form, the other of a richer character, and with more mouldings; but both of them, as is invariably the case, agree in coming nearly to a point externally, presenting there merely a narrow face or fillet. Each mullion exhibits also some variation of the same general form, in its darker and lighter tinted sides. The cut further instances the spacing of the mullions, which are here not quite three times their own width apart. It will be seen that the *depth* of mullions, or their thickness through their external and internal face, is greater than their *width*. In the second of the two here shown, the depth is double the width.



The letters *g g* indicate the line of the glazing of the window; and S S, the sill.

MULTINOMIAL. [POLYNOMIAL.]

MULTIPLE, SUBMULTIPLE, MULTIPLICATION.

Any number of *equal* magnitudes added together give a multiple of any one among them. Thus 4 + 4 + 4, or 12, is a multiple of 4. And submultiple is the inverse term to multiple: thus 12 being a multiple of 4, 4 is a *submultiple* of 12. The term submultiple is equivalent to ALIQUOT PART.

The derivation of the word is from multi-plex, mani-fold, and multiplication is the process of forming a multiple. Thus to multiply 184 yards by 279 is to repeat 184 yards 279 times, and to add all the results together. And this is the first and fundamental meaning of multiplication. Its usual symbol is × : thus 4 × 3 is 12.

If we look at the primary rules of arithmetic, we shall see that multiplication is the only one which cannot be entirely performed upon concrete quantities. To or from 100 yards 50 yards can be added or subtracted, and 100 yards can be divided by 50 yards; but 100 yards cannot be multiplied by 50 yards. The very definition of multiplication requires that every question should contain a number of *times* which another number, abstract or concrete, is to be repeated; and this number of times or repetitions cannot be a number of anything else. Thus to talk of multiplying 10 feet by 7 feet is a contradiction in terms; if it mean that 10 feet is to be multiplied by 7, or that 7 repetitions of 10 feet are to be made, 10 feet is multiplied *seven* times, not *seven-feet* times. But if it be meant that 10 feet is to be repeated as often as 7 feet contains *one* foot, the question has three data, and belongs to a class which will be considered in PROPORTION: it is in fact a question of multiplication in which the number of repetitions is not given, but is to be extracted from the result of a question in division. On this subject see also RECTANGLE.

It being now distinctly understood that a number of times or repetitions is an essential element of every question of multiplication, the extension is obvious by which a fraction of a time, or a fraction of a repetition, is allowed to enter. Thus 12 + 12 + 12 + 6 is 12 repeated three times and half a time, or 12 multiplied by $3\frac{1}{2}$ is 42. Similarly $2\frac{1}{4} + 2\frac{1}{2} + 2\frac{3}{4} + 1\frac{1}{4}$, or $8\frac{3}{4}$, is $2\frac{1}{2}$ taken $3\frac{1}{2}$ times. Up to this point there is no violation of etymology; the *multiplicand* (*multiplicandum*, number to be multiplied) is taken manifold times. But [NUMBER] by the same sort of extension of language by which 1, and even 0, are called numbers, the mere exhibition of a multiplicand is called multiplying it by one: thus 7 is 7 taken once, or 7 multiplied by 1, though, etymologically, multiplication does not take place. Again, when the half of a number is taken, or when it is taken half a time, it is said to be multiplied by $\frac{1}{2}$; and so on for any other fraction. The advantage of such extension in practice more than counterbalances its obvious defect, namely, that the beginner must, without great care, be confused by the application of a word in a sense diametrically opposed to its literal meaning.

The abbreviated process of multiplication rests upon the following principles. (1.) If the parts of a number be multiplied, and the results added together, the whole is multiplied: thus 18, composed of 13 and 5, is taken 7 times by taking 13 and 5 each 7 times, and adding the results. (2.) Multiplication by the parts of any number, and addition of the results, is equivalent to multiplication by the whole: thus 13 taken 7 times and 8 times gives two products, the sum of which is 13 taken 7 + 8 or 15 times. (3.) Successive multiplication by two numbers is equivalent to one multiplication by the product of these two numbers: thus 7 taken 3 times, and the result taken 4 times, is 7 taken as many times as there are units in 4 times 3, or 12 times. (4.) If one number be multiplied by another, the result is the same if the multiplicand and multiplier be changed: thus 7 times 8 is the same thing as 8 times 7. (5.) In the decimal system, the annexing of one cipher multiplies by 10, of two ciphers by 100, &c.

The application of these principles requires that, in the decimal system of notation, the products of all simple digits up to 9 times 9 should be remembered: this is usually done by learning what is called the multiplication table, and this table, which is only absolutely necessary up to 9 times 9, is usually committed to memory up to 12 times 12. This being supposed to be done, we shall now show the process of multiplying 1234 by 5073. By (2.) we must take 1234, 5000 times, 70 times, and 3 times, and add the results. To take 1234, 3 times, we subdivide it into 1000, 200, 30, and 4, each of which taken 3 times, and the results added together, gives

```
3000
 600
  90
  12
────
3702
```

from which process the rule for multiplying by a single figure may easily be derived. The next step is to take 1234, 70 times, that is, first 7 times, and the result 10 times. The full process is

```
 7000
 1400
  210
   28
─────
86380
```

Similarly 1234 taken 5000 times, gives 6,170,000. Now put the three results together, and add them; which gives the first column following.

```
   3702        1234
  86380        5073
6170000        ────
───────        3702
6260082       8638
             6170
            ───────
            6260082
```

The second column shows the usual manner of performing the operation, which we suppose the reader to know. We have given the preceding detail that he may do what many have never done, viz. compare the common process with the deduction of the result from first principles.

There are several abbreviations of multiplication which are very valuable, but which are not commonly taught.

1. Five times is half of ten times: to multiply by 5 annex a cipher and divide by 2: thus 76783 × 5 is most easily done as follows:

2) 767830

383915

2. Nine times is one less than ten times, so that 76783 × 9 can be found as follows:

767830
76783

691047

This may be best done by subtracting every figure of the multiplicand from the preceding, carrying and borrowing where necessary, in the usual way, on the supposition that the first figure is to be subtracted from ten. Thus the process of multiplying 27293 by 9 is as follows:

27293
245637

3 from 10, 7, carry 1; 1 and 9 is 10, 10 from 13, 3, carry 1; 1 and 2 is 3, 3 from 9, 6; 7 from 12, 5, carry 1; 1 and 2 is 3, 3 from 7, 4; 0 from 2, 2.

3. Eleven times is one more than ten times; so that the addition corresponding to the preceding subtraction must be made. Thus to multiply 62781 by 11, proceed as follows:

62781
690591

Let 1 remain; 1 and 8 is 9; 8 and 7 is 15, carry 1; 1 and 7 is 8 and 2 are 10, carry 1; 1 and 2 is 3 and 6 are 9; 6 and 0 is 6.

4. To multiply by any number from 12 to 19 inclusive, multiply by the last figure, and to the carrying figure add the figure of the multiplicand which is just done with. Thus

2734
17

46478

7 times 4 is 28, carry 2, adding 4, or carry 6; 7 × 3 is 21, and 6 is 27, carry (2 + 3 or) 5; 7 × 7 is 49 and 5 is 54, carry (5 + 7 or) 12; 7 × 2 is 14 and 12 is 26, carry (2 + 2 or) 4.

5. To multiply by 25, annex two ciphers and divide by 4: to multiply by 125 annex three ciphers and divide by 8.

6. In multiplying by a number of two figures, ending with 7 or 8, as 68, it may be advisable to take the multiplicand 70 times, and subtract it twice, in preference to taking it 60 times, and adding it 8 times.

The following rules are taken from the 'Risala Hisab.' (Taylor's *Liliwati*, Introduction, p. 17.) The first at least can easily be done without paper.

1. To multiply two numbers together, each of which is between 11 and 19: to the whole of one number add the units of the other; ten times this, together with the product of the units' places, is the product required. Thus, 17 times 14 is 21 times 10 and 28, or 238.

2. To multiply two numbers together, each of which has only two places: to the whole of one factor, multiplied by the tens of the other, add the tens of that factor multiplied by the units of the other; ten times the result, together with the product of the units, is the product required. Thus 76 × 38 is done as follows: 76 × 3 is 228, which, increased by 7 × 8, or 56, is 284, and 2840 increased by 48 is 2888, the answer required.

The multiplication of sums of money is facilitated by a process known by the name of PRACTICE.

The multiplication of fractions offers no difficulty when the extension of the word multiplication, already described, is understood and admitted. For instance, when we have to multiply $\frac{3}{5}$ by $\frac{4}{11}$, or to take $\frac{3}{5}$ 4-elevenths of a time, we see that $\frac{3}{5}$ being $\frac{33}{55}$ [FRACTIONS], one-eleventh of this is $\frac{3}{55}$, and 4-elevenths is $\frac{12}{55}$: whence the rule commonly given, namely, multiply the numerators together for a numerator, and the denominators for a denominator. In the multiplication of one decimal fraction by another, as 1·23 by ·018, the multiplication of the numerators gives 123 × 18, or 2214, an that of the denominators 100 × 1000, or 100,000. But a decimal fraction which has 100,000 for its denominator, has as many places as there are in both of the others together, whose denominators are 100 and 1000. From this consideration the common rule immediately follows.

For a mechanical contrivance for expediting multiplication, see NAPIER'S RODS.

MULTIPLE POINTS. When two or more branches of a curve pass through the same point, it is called a multiple point; and this, whether the branches touch or cut one another. When two or more branches intersect, it is obvious that as many distinct tangents may be drawn at the multiple point as there are branches which there intersect, that is, for one value of the abscissa the differential coefficient of the ordinate may have more values than one. In most cases the points at which this happens may be ascertained by inspection of the equation of the curve. Thus in

$$y = (x - b) \surd (x - a) + c \quad b < a$$

$$\frac{dy}{dx} = \surd (x - a) + \frac{x - b}{2 \surd (x - a)}$$

we see that y, in general, has two values, and so has $\frac{dy}{dx}$: to each value of the former belongs one of the latter. But in the single case of $x = b$, both values of y become equal, or y has only one value; while $\frac{dy}{dx}$ has the two values $+ \surd (b - a)$ and $- \surd (b - a)$. There is then a multiple point when $x = b$ and $y = c$; and as two branches cut one another, it is called a *double* point. Similarly, had there been three, four, &c. branches, it would have been called a triple, quadruple, &c. point.

It is not worth while to enter here on the general method of determining double, &c. points. (See *Lib. Usef. Kn.*, 'Differential Calculus,' p. 182.)

MULTIPLICATION. [MULTIPLE, &c.]

MULTIVALVES, the name formerly used to designate those shells which were made up of more than two pieces. Thus the *Cirrhipeds* (*Lepas*) were all multivalve shells of Linnæus, and so were *Chiton* and *Pholas*.

MULWIA. [MAROCCO.]

MU'MMIUS, L. [CORINTH.]

MUMMY is a name derived from an Arabic word *mum*, signifying wax, and which is now applied not only to those dead bodies of men and animals, in the preparation of which wax or some similar material was used, but to all those which are by any means preserved in a dry state from the process of putrefaction.

The art of embalming, by which the greater part of the mummies now existing were prepared, was practised, with more skill than has ever since been acquired, by the inhabitants of ancient Egypt, of whom whole generations still remain preserved from decay in the vast hypogæa or catacombs in the neighbourhood of Thebes and the other great cities of that country.

The most authentic description of the Egyptian method of embalming is that given by Herodotus (ii. 86). In Egypt, he tells us, 'there are men who professedly exercise this art. When a corpse is brought to them, they show the bearers of it wooden models of bodies, painted in imitation of reality. They say that the most expensive of them is His, whose name I will not in such a case mention. They exhibit also a second model, inferior to the first, and cheaper than it; and a third, the cheapest of all. After this explanation, they ask the bearers of the dead body, after which model they wish it to be prepared, and they, having agreed upon the price, depart. The embalmers proceed for the most expensive plan in the following manner. First, with a curved iron they extract the brain through the nostrils, partly by pulling it out, and partly by pouring drugs in. Then with a sharp Æthiopian stone they cut the body in the flank, and through this aperture they take out all the viscera, which they wash with palm wine, and clean with powdered aromatics. They then fill the belly with the purest powdered myrrh and cassia, and other perfumes (frankincense excepted), and sew up the wound. In the next place they cover the body with natrum (a mixture of carbonate, sulphate, and muriate of soda), and bury it in the same material for seventy days, a longer period not being allowed. When the seventy days are passed, they wash the body and envelop it all in bandages of fine linen covered with gum. The relatives, on receiving the body again, have a wooden case made in the form of a man, in which they place it, and having shut it in, they put it in a sepulchral building, setting it upright against the wall.

'Those who would avoid the heavy expense of this method of embalming, have the bodies thus prepared:—they fill all the intestines with cedar oil, without either cutting into the abdomen or removing the viscera; then preventing the egress of the injected fluid, they salt the body for the fixed number of days, and at the end of that time they let out the cedar oil, the power of which is such that it brings out macerated in it both the intestines and all the viscera; it consumes the flesh, and the skin and the bones only of the corpse remain. This being done, they return the body. The third mode of preparation is that with which the bodies of the poor are treated. They wash out the abdomen with a cleansing liquid, put it for seventy days in natrum, and then return it to the relatives.'

To this account Diodorus Siculus (*Biblioth. Histor.*, lib. i., cap. 91) and some others, while generally confirming it, add a few unimportant particulars; and though it has been subjected to severe criticism from various commentators, yet the researches of those whose authority is next in importance, the members of the Institute who accompanied Napoleon in his Egyptian campaign, have proved that as far as it goes this description by Herodotus is substantially correct. The results of these researches, in which MM. Jomard, Rouyer, and Larrey were chiefly engaged, are contained in the great work, 'Description de l'Égypte.' Those of M. Rouyer especially illustrate the process of embalming. He found that in the hypogæa which he visited there were two different classes of mummies; those in which an incision had been made above the groin, and those in which there was no such opening. In both the brain had in general been extracted by breaking through the roof of the nose, or more rarely through the orbit; but in some there was no unusual aperture in the skull, and the brain had been left in it, a fact which is confirmed by the examination of some of the mummies that have been brought to England. (Pettigrew, *History of Egyptian Mummies.*)

Among the mummies which have an incision in the flank (and which are probably the bodies of the rich, in whom that measure was necessary for the complete cleansing of the interior), M. Rouyer distinguishes those which were dried with the assistance of balsamic and astringent substances, and those which, in addition to these means, were salted.

Of both these kinds some are filled with a mixture of aromatic resins, and others with asphaltum or pure bitumen. The mummies which are filled with aromatics only are olive-coloured. Their skin is dry, flexible, and like tanned leather, and contracted. Their features are distinct, and appear to be like those that existed in life. The resins which all their cavities contain are dry, light, brittle, and aromatic. The teeth, hair, and eye-brows are generally perfect. Some of them are gilded all over the body, or on the most prominent parts.

The mummies which are filled with bitumen are reddish; their skins are hard and polished as if they had been varnished; they are dry, heavy, inodorous, and difficult to unrol; their features are but slightly altered; the hard black resinous substance with which they are filled possesses little odour, and they are scarcely alterable by exposure to the air.

Those which have been salted, as well as thus prepared, differ little in their general appearance from those just described; but they are usually less perfect, the features being altered, and their hair having commonly fallen off. When they are uncovered and exposed to the air, a slight saline efflorescence forms upon them, which consists of different salts of soda. The intestines and other viscera, which in all these kinds of mummies were removed through the aperture in the flank, after being washed with palm wine and sprinkled with aromatics, were usually placed in an earthen vessel, and then, with prayer for the pardon of the sins in eating and drinking into which they had led their possessor, were thrown into the river; but sometimes, after being thus cleansed, they were returned into the abdomen, or were preserved in a separate vase by the side of the body. The edges of the incision in the flank are always found placed in simple contact, not sewn together as Herodotus mentions.

Among the Egyptian mummies which have not had the viscera removed by opening the abdomen, M. Rouyer also distinguishes two kinds; in one of which the bodies had been salted, and then filled with an impure kind of bitumen (pissasphalt), while in the other they had only been salted and dried. M. Rouyer thinks that instead of the viscera being destroyed, as Herodotus mentions, by oil of cedar, which has no caustic properties, some caustic solution of soda was first injected, and that afterwards, when it had destroyed the viscera, the cavities were washed out with the oil of cedar. The mummies which, after having had their viscera thus removed, were filled with bitumen, are the most numerous of all; they are black, hard, and heavy, and they preserve none of their features. Not only are all the cavities filled with the pissasphalt, but the surface of the body is covered with it, and it has so completely penetrated into all the tissues, that the whole forms but a single mass. It is probable therefore that this material was injected very hot, and that the bodies were plunged into a vessel containing it in a state of fusion. It is an impure, greasy, and strongly smelling substance, less black and brittle than the asphalt with which the other mummies are filled; it was long regarded as a valuable medicine for wounds and bruises, and in the sixteenth and part of the seventeenth centuries a considerable trade was carried on in it by a number of Jews, who sold it as 'balm of mummies.'

Those mummies which have been only salted and dried are even less perfect than the preceding. Their features are entirely destroyed; all their hair is fallen off; and both the body and the bandages by which it is enveloped fall in pieces when brought to the air, or may very easily be broken up. In many of these adipocire is formed; but in general they are hard, dry, and whitish, like dirty parchment.

The bandaging, to which all the Egyptian mummies were subjected, was one of the most remarkable parts of the process. Their envelopes are composed of numerous linen bands, each several feet long, applied one over the other fifteen or twenty times, and surrounding first each limb, and then the whole body. They are applied and interlaced so accurately, that one might suppose they were intended to restore to the dry shrivelled body its original form and size. The only difference in the bandages of the different kinds of mummies is in their greater or less fineness of texture; they are applied on all in nearly the same manner. All the bandages and wrappings which have been examined with the microscope are of linen.

The body is first covered by a narrow dress, laced at the back and tied at the throat, or it is all enveloped in one large bandage. The head is covered by a square piece of very fine linen, of which the centre forms a kind of mask over the features. Five or six such pieces are sometimes put one over the other, and the last is usually painted or gilded in representation of the embalmed person. Every part of the body is then separately enveloped with several bandages impregnated with resin. The legs extended side by side, and the arms crossed over the chest, are fixed by other bandages which surround the whole body; and these last, which are commonly covered with hieroglyphics, are fixed by long, crossing, and very ingeniously applied bands which complete the envelope. Most of the bodies are placed in this state in the catacombs; those of the rich only are enclosed in cases. The cases are usually double, the interior being composed of boards made of several portions of linen glued together, and the exterior cut from a piece of cedar or sycamore wood.

The Egyptians practised embalming almost as extensively on some animals which they deemed sacred as on men. The list of the mummies of animals which Mr. Pettigrew gives includes the monkey, bat, dog, cat, lion, wolf, jackal, fox, hyæna, bear, ichneumon, shrew-mouse, deer, goat, sheep, oxen and calves, hippopotamus, vulture, eagle, falcon, hawk, owl, ibis, goose, swallow, crocodile, toad, lizard, snake, adder, cerastes, carp, pike, and some other fish, and a few species of insects. Some vegetables also have been occasionally found embalmed. Most of these animals had sepulchres appropriated to their species, but sometimes they are mixed, and very rarely they are found in the catacombs of human mummies. The most frequent mode of preparation was by clearing out the viscera by the caustic fluid, and salting them, and then bandaging them like the human bodies. The ibis and the hawk however usually received more care, and were prepared with resin and asphalt. After being embalmed, each bird was usually placed in a separate earthen vessel.

The Egyptian mode of embalming was imitated occasionally by the Jews, Greeks, Romans, and other nations, and has sometimes been adopted in modern times, but never to the same extent or perfection as they attained. The only other method which is known to have been adopted as a national custom was that practised by the Guanches, the antient inhabitants of the Canary Isles. [CANARY ISLES.] Their mummies are particularly described by M. Bory de St. Vincent, in his 'Essai sur les Isles Fortunées.' Numerous and vast catacombs are filled with them in each of the thirteen islands, but the best known is one in Teneriffe, which contained upwards of a thousand bodies. The mummies are sewn up in goat or sheep skins, and five or six are commonly joined together, the skin over the head of one being stitched to that over the feet of another; but those of the great are contained in cases hollowed out of a piece of savine-wood. The bodies are not bandaged, and are dry, light, tan-coloured, and slightly aromatic. Several of them are completely preserved, with distinct though contracted features.

The method of embalming adopted by the Guanches consisted in removing the viscera, in either of the same ways as the Egyptians practised, then filling the cavities with aromatic powders, frequently washing and anointing the surface, and lastly drying the body very carefully for fifteen or sixteen days in the sun, or by a stove. So complete is the dessication of these mummies, that a whole body which Blumenbach possessed weighed only 7½ pounds, though the dried skeleton of a body of the same size as usually prepared weighs at least 9 pounds.

In some situations the conditions of the soil and atmosphere, by the rapidity with which they permit the drying of the animal tissues to be effected, are alone sufficient for the preservation of the body in the form of a mummy. This is the case in some parts of Peru, especially at Arica, where considerable numbers of bodies have been found quite dry, in pits dug in a saline dry soil. There is an excellent specimen of a mummy of this kind in the museum of the College of Surgeons, which was brought from Caxamarca by General Paroissien. Like most of them, it is in a sitting posture, with the knees almost touching the chin, and the hands by the sides of the face. It is quite dry and hard; the features are distorted, but nearly perfect, and the hair has fallen off. The Peruvian mummies do not appear to have been subjected to any particular preparation, the dry and absorbent earth in which they are placed being sufficient to prevent them from putrefying. M. Humboldt found the bodies of many Spaniards and Peruvians lying on former fields of battle, dried and preserved in the open air. In the deserts of Africa the preservation of the body is secured by burying it in the hot sand; and even in Europe soils are sometimes met with in which the bodies undergo a slow process of drying, and then remain almost unalterable even on exposure to the air and moisture. There is a vault at Toulouse in which a vast number of bodies that had been buried were found, after many years, dry, and without a trace of the effects of putrefaction; and in the vaults of St. Michael's church, Dublin, the bodies are similarly preserved. In both cases putrefaction is prevented by the constant absorption of the moisture from the atmosphere, and through its medium from the body, by the calcareous soil in which the vaults are dug.

It is not necessary here to consider the various means which are now employed for the preservation of the animal tissues, both for stores of food and for museums of anatomy and natural history, as they are very rarely applied to the whole body, and are deficient in that which forms the most essential part of the preparation of a mummy, the process of drying. If European climates were more favourable, it is probable that, with the present knowledge of materials for hardening the tissues, such as pyroligneous acid, corrosive sublimate, arsenic, the salts of iron, &c., mummies might be prepared equal even to the Egyptian in permanence, and superior to them in the preservation of their forms. (Pettigrew, *Hist. of Egypt*, 'Mummies;' *Library of Entertaining Knowledge—Egyptian Antiquities.*)

MUMPS, an inflammation of the parotid, and often, at the same time, of the other salivary glands, of contagious or epidemic origin. The inflammation, and the fever by which it is accompanied, generally increase for about four days, and then begin to subside; and after four days more, the disease is commonly at an end. The affection has a tendency to metastasis, that is, to pass suddenly from the organ first affected to some other. The treatment required is very simple; quietude, abstinence, seclusion from cold, the application of poultices or other warm substances, or, in severe cases, of leeches to the swelling, are all the means that are usually necessary.

MÜNCHHAUSEN, ADOLPHUS, BARON, born in Hanover in 1688, studied at Jena, Halle, and Utrecht, and afterwards filled several important official stations in the electorate. He was an active agent in founding the university of Göttingen, of which he was appointed curator, which situation he held till his death. He devoted himself with great assiduity and zeal to the advancement of that institution, which rose under his care to a high rank among the universities of Germany. He established the chairs of geography, literary history, and political science, and improved the system of teaching philosophy and theology, by doing away with the old scholastic methods. Heyne says that Münchhausen introduced into the university freedom of thinking, feeling, and writing. He promoted the establishment of the Royal Society of Sciences of Göttingen. He increased the library of the university from 10,000 to 60,000 volumes, which number afterwards, whilst Heyne was librarian, was brought up to 200,000. All these things Münchhausen did with very moderate means, and chiefly by his activity, judgment, and perseverance. More ample particulars of what Münchhausen effected for the benefit of the university of Göttingen are given in the 'Quarterly Journal of Education,' No. XX.; in Heyne's 'Oratio in Honorem ac Memoriam Münchhausianam,' inserted in the 2nd volume of his 'Opuscula Academica,' and in his other oration on the same subject delivered before the Royal Society of Sciences of Göttingen, inserted in the second volume of 'Novi Commentarii Societatis Gottingensis;' and also in Heeren's 'Life of Heyne.'

Münchhausen was for many years privy-counsellor to the elector of Hanover, George II. of Great Britain, and in the latter years of his life was appointed first minister, by his successor, for the electorate of Hanover, which situation he filled to the general satisfaction, though only for a short time. He died at Hanover, in 1770.

MUNDA. [CÆSAR, C. J., p. 124.]

MUNDLEYSIR. [HINDUSTAN, vol. xii., p. 211.]

MUNEEPOOR, a country in Asia, east of the British possessions on the Ganges, extends between 23° 45′ and 25° 30′ N. lat. and 93° and 94° 30′ E. long. Its northern boundary-line is ill defined, but is generally assumed to be formed by the high range of mountains which, extending in a north-east and south-west direction, constitute the southern border of the valley of the Brahmapootra. From the British possessions on the west it is divided by the course of the river Barak between the mouths of its two tributaries, the Chikoo, which runs into the Barak from the south, and the Ieeree, which joins it from the north, and by the course of these two last-mentioned rivers. Along its southern boundary extends a mountain-region inhabited by several independent tribes belonging to the Nagas or Kookees. On the east it is divided from the valley of Kubo and other districts annexed to the Birman empire, by a chain of mountains called the Muring range. According to the estimate of Captain Pemberton, the known portion of Muneepoor occupies an area of 10,000 square miles, of which a valley, or rather plain, containing 650 square miles, constitutes the central portion. This plain is encircled on all sides by a zone of hilly and mountainous country, inhabited by various tribes, subject to Muneepoor.

The valley, which constitutes by far the most valuable portion of the kingdom, is 2500 feet above the sea. Its extreme length is about 36 miles, and its average breadth about 18. In its whole extent it is covered with a deep alluvium of great fertility, and consists of two gently inclined plains, meeting in the middle on the banks of the Imphan Toorel river. Numerous small detached groups of hills appear in various parts of the valley, above which they rise from 500 to 600 feet; and to the east of the antient town of Muneepoor is a range, whose central peak, called Nongmueeching, is 2700 feet above the valley, and 5200 feet above the sea. The valley itself is perfectly free from forests, but every village is surrounded by a grove of fruit-trees. Nearly the whole of the central portion consists of a series of *jheels* and marshes, which retain water all the year round, and furnish extensive pasture-ground for cattle and horses. The villages are built either upon the edges of the slopes connecting the bases of the mountains with the valley, or on the banks of the Imphan Toorel, which are generally higher than the country behind them.

The range of mountains which forms the western barrier of the valley is more elevated and extensive than any other between Silhet in Bengal and the western boundary of the Birman empire; it runs in a direction nearly south-south-west, between 94° and 93° 30′ E. long., for 80 miles, to the extreme southern limits of the Muneepoor valley, where it gradually declines, and at length terminates in a series of broken and rugged heights. It slopes gradually into the valley by a succession of lower hills. But on the western side this range, which has not yet received a general name, throws off numerous precipitous ridges, whose upper portions are too steep to admit cultivation, which is consequently limited to the lowest part of their declivities. On this side it is an almost unbroken mass of magnificent primeval forest and luxuriant vegetation, whilst the eastern face of the range, which fronts the valley, has been almost entirely cleared, and is annually cultivated with rice and cotton by the Nagas. The elevation of the principal range varies from 5790 to 8200 feet above the sea.

The Muring range, which bounds the valley on the east, is less extensive and elevated. Its extreme length is about 50 miles, and its eastern declivity is the more precipitous. It is united with the valley by a gentle slope. Its elevation varies between 4900 and 6730 feet above the sea. This range lies within the limits of Muneepoor, but the valleys beyond it belong mostly to the Birman empire; the most important and extensive is that of Kubo.

On the north and south the valley is not enclosed by a continuous range, but by the projecting ends of numerous ridges, which issue from two extensive mountain-tracts which lie in that direction; the northern has been explored very imperfectly and the southern not at all by Europeans. The northern is immediately connected with the mountains which constitute the southern boundary of the valley of Asam, and the southern seems to constitute the most north-eastern extremity of the Yeomadong range or Aracan mountains, which, separating Aracan from Birma, terminate with Cape Negrais (16° N. lat.). The ridges projecting from both mountain-regions stretch into the valley, and are separated by narrow defiles, through which a small stream generally flows.

The principal river of the vale of Muneepoor is the Imphan Toorel, which rises with two principal branches in the mountain-region lying north of the vale; the eastern is called the Eeril, and the western the Khongba river. The latter, which is the principal branch, unites with the Eeril two miles south of Langthabal, near 24° 40′ N. lat. Ten miles lower down, it is joined by the Thobal river, which likewise descends in a southern direction from the northern mountain-region. The Imphan Toorel traverses the centre of the vale in a southern direction, and enters the southern mountain-region at the village of Shoogoonoo, near 24° 15′ N. lat. Its course in this region is not known, but it is said to form a tremendous fall, which is very probable, as the difference of level between the vale of Muneepoor and the low lands of Kulé amounts to more than 1500 feet. This difference of level must be overcome either by a rapid succession of numerous falls or by one or two of stupendous magnitude. After leaving the mountain-region at 22° 35′ N. lat., it enters the plain of Kulé, belonging to Birma, where it is called Nankathé Khyoung, and after receiving the united waters of the Myettha and Man rivers, which flow from the south, it suddenly turns north by a bold bend and flows in that direction for about 35 miles, when it bends east, and traversing the Ungoching hills, enters the Ningtha or Kuenduen river, the great tributary of the Irawaddi. The whole course of the Imphan Toorel is upward of 300 miles, but, except during the rainy season, it is only navigable for small skiffs formed of a single tree, which are the only description of boats used in Muneepoor. During the floods it flows with a velocity of five or six miles an hour, and has a depth of 20 to 30 feet, owing to its contracted channel; but if the season is more than usually wet, the waters rush over the banks, and convert all the central portions of the vale into a vast swamp.

At about 24° 30′ N. lat. the Imphan Toorel is joined by the Koretuh river, or the outlet of the lake Logta, which is about four miles long and two wide, and occupies the south-western corner of the vale. It is formed by numerous small streams descending from the western mountain-range. Near its southern extremity are three ranges of small islands; the central range, called Tangak-hoolet, is 470 feet above the level of the lake. These islands are principally inhabited by fishermen, and are particularly well adapted to the culture of fruit-trees. The lake furnishes twenty-six varieties of fish, eighteen common to the rivers of Bengal, and eight not found in any of them.

The mountainous district of Muneepoor, which lies to the west of the vale, and separates it from Cashar, is traversed by the Barak or Soormah river, an affluent of the Brahmapootra, or Megna, into which it falls near the village of Sunerampoor in Bengal. The sources of this river are about 25° 30′ N. lat. and 94° 20′ E. long., in the mountain-region which lies between Muneepoor and Asam It runs through Muneepoor in a south-south-western direction, and forms at the most south-western corner of the country a bend, by which its course is changed into a northern one. It flows north for about 50 miles, and here forms the boundary-line between Muneepoor and Cashar up to the mouth of the Jeeree river. Its course through Muneepoor is upwards of 180 miles; but it is too rapid for navigation. It is only at the mouth of the Jeeree river that it becomes navigable for boats of any burthen.

The climate of the vale of Muneepoor is modified by its elevation above the sea and the mountains which surround it. In December and January the thermometer at noon varies between 56° and 58°, and hoar-frost occurs frequently during the night. In November and February the thermometer is at noon between 60° and 68°, and in June it generally attains from 80° to 85°. The difference between the temperature of Muneepoor and Calcutta in winter (December, January, and February) is from 11 to 18 degrees; but in summer (June, July, and August) it varies only between 6 and 8 degrees. The quantity of rain is much less at Muneepoor than at Calcutta, though the number of rainy days is greater. At Calcutta there are only 72 rainy days in the year, while in Muneepoor they amount to 115; but at Calcutta 55·39, and at Muneepoor only 48·33 inches of rain fall. On the slopes of the mountains surrounding the vale the showers are more frequent than in the level country; but the cold months, from November to February, are almost entirely exempt from rain. In March the showers become very frequent, and in the month of April the rains are sometimes more abundant than in other parts of the year. In May the rivers begin to rise, and continue to do so until the middle of October, when they again fall with remarkable rapidity. During the cold months, until ten or eleven o'clock in the morning, the valley is enveloped in a dense fog, which, on dissipating, leaves a beautifully clear and cloudless atmosphere; but an hour after sunset the vapours become again condensed, and are precipitated as dew, which, during the night, is converted into hoar-frost. The climate of Muneepoor is peculiarly favourable to the constitutions both of Europeans and the natives of Hindustan.

The agricultural produce of Muneepoor consists principally of rice, which forms the staple article of food, and the crops are everywhere very abundant, as the numerous streams which issue from the mountains surrounding the vale ensure an adequate irrigation even to the fields which are above the level of the general inundation. Tobacco, sugar-cane, indigo, mustard, and different kinds of sesamum and opium, are also cultivated, and cotton in the valleys of the mountainous districts. In the gardens which surround each house vegetables are extensively cultivated; and since the termination of the Burmese war, English officers have introduced the vegetables of Europe, such as peas, potatoes, different varieties of greens and cabbages, carrots, radishes, beet-root and turnips; the two first have proved so acceptable to the people, that they now are almost universally cultivated. Fruits do not generally attain great perfection, except pineapples, which are not inferior to any on the face of the globe, and the oranges grown on the islands of lake Logta. The other fruits are apples, apricots, raspberries, strawberries, limes, pomegranates, guavas, mangoes, and jack-fruit; but they are not distinguished by flavour, owing to want of care and skill in their cultivation. Silk is collected in considerable quantities in some villages on the northern borders of the vale.

In no part of India do the forests afford a greater variety of excellent trees than those which cover the mountains surrounding the vale of Muneepoor. Cedar of gigantic size, fir, and pine, occupy the highest portions of the ranges; oak of every size occurs on the several hills and mountains, and is employed as fuel and building materials. Many other forest-trees, commonly found in countries in the latitude of Muneepoor, are abundant. The teak-tree however, and the keo, from which the celebrated Burmese varnish is obtained, are only met with on the south-eastern ranges bordering on the vale of Kubo. But all this wealth is of little use in a commercial point of view, as the nature of the country precludes the possibility of transporting the timber to foreign markets with any prospect of advantage.

The animals employed in agriculture are buffaloes and cattle, more especially the former. The cattle are much superior to those of Bengal. The horses are of a diminutive size, rarely attaining a height exceeding thirteen hands; but they are hardy, vigorous, and highly valued. Goats and sheep are only reared on the slopes of the mountains; the latter were lately introduced by British officers. Elephants are frequently seen in the glens and defiles on the north of the vale; deer are abundant, and grow to a very considerable size. The wild hog is not less common, but the tigers have retired to the fastnesses of the hills, as cultivation has extended in the vale. A wild dog is found among the hills, where it hunts in packs. Fowls, ducks, geese, and pigeons are sufficiently numerous.

Gold is not found in Muneepoor, though it occurs in the Kyen-duen, and in the rivers which fall into it; but iron is common in several parts, especially in the beds of small rivers south of Thobal and in the hills near Langthabal. This metal is worked and manufactured into axes, hoes and plough-shares, spears, arrow-heads, and blades for daggers. No other metal seems to occur; but several rich salt-springs are found on the eastern side of the vale, not far from the foot of the hills. The quantity of salt manufactured from them is not only sufficient for the consumption of the vale, but is also used as an article of traffic with the surrounding tribes, who barter for it their tobacco, ginger, cloth, and cotton.

The Muneepoorees, or inhabitants of the vale, appear to be the descendants of a Mongol colony, which in antient times penetrated into this country: they rather resemble the Chinese and Burmese than the inhabitants of Bengal, being taller, stronger, and possessing a more vigorous mind than the latter. They have made considerable progress in the arts of civilisation. They make several kinds of cotton-cloth and muslins, and their silk fabrics are remarkable for strength and the brilliancy of their colours, especially a kind of large scarfs, which sometimes are very richly embroidered, and then exported to Ava. Capt. Pemberton estimates the whole population at only 20,000 souls, and states that only one-quarter of the cultivable surface is at present employed for agricultural purposes. He ascribes it to the continual inroads of the Burmese before the last war The language of the Muneepoorees is very different from that of Bengal, but the Bengalee is generally understood. Brahmanism seems to be the prevailing religion.

The mountains which enclose the vale are occupied by different tribes of mountaineers. All the tribes north, west, and east of the vale partake strongly of the characteristic features of the Tartar countenance, and are remarkable for superior height, fairer complexion, and more elevated forehead, when compared with the tribes which occupy the southern borders of Muneepoor. The last-mentioned tribes rarely average more than five feet one or two inches in height, and their colour is nearly as dark as that of the Bengalees of the plain; in features they rather resemble the Malays than the Tartars. The mountainous country between Cashar and the vale of Muneepoor is occupied by the Kupooees, known in Bengal by the name of Nagas: the numerous tribe of the Murams inhabit the high mountain-range between Muneepoor and Asam; and among the other tribes, the Loohooppas, on the north-east of the vale, are the most numerous. All these tribes are cultivators of the soil, and reside in villages. Among the Murams the terrace system of cultivation very generally prevails: but the other tribes only clear the forest and burn the wood, after which they cultivate the ground until it is exhausted. Tobacco, cotton, ginger, and pepper are universally cultivated; and cloth is manufactured of their own cotton, which is highly prized by the inhabitants of the adjoining low countries.

The town of Muneepoor, which is nearly in the centre of the vale, was destroyed in the wars with the Burmese, and has not been rebuilt. The raja of Muneepoor, who, since the peace of Yandaboo (1826), is placed under the protection of the British government in India, resides in the village of Langthabal, near the union of the rivers Khongba and Eeril. There is no place in this country which carries on any commerce, but it will probably become the entrepôt of an extensive trade, as the most easy route by land between Hindustan and China lies across this vale, and the Chinese merchants from Yunnan formerly advanced as far as Muneepoor in their commercial travels. The greatest difficulty which opposes such an extension of trade is the mountainous country between the lowlands of Cashar and the vale. Though three roads traverse this tract, they pass from four to seven mountain-ranges within a space of between 80 and 90 miles, and can only be used during the dry season. The country between Muneepoor and China seems to offer fewer obstacles to the transport of merchandise.

(Pemberton's *Report of the Eastern Frontier of British India;* Ritter's *Erdkunde von Asien*, vol. v.)

MUNICH (in German, *München*), the capital of the kingdom of Bavaria, is situated on the left or west bank of the Isar, in a plain which is bounded on the east by low hills. It is in 48° 8′ 19″ N. lat. and 11° 35′ 15″ E. long. Munich, though it still bears traces of its antiquity, is one of the handsomest towns in Germany. It has several broad straight streets, with lofty houses, in a good style, and some very handsome squares. In the Odeon-square is an obelisk 95 feet high, made of the metal of cannon taken from the enemy, and erected in 1833, in honour of 30,000 Bavarians who fell in the Russian campaign in 1812. The Max-Joseph-square is to be adorned with a colossal bronze statue of King Maximilian, which is now completed, and will probably be set up before this article is printed. Though not a place of strength, Munich is still surrounded with a rampart, and has seven gates leading to the suburbs, viz. St. Anne's (formerly Lehel), Au, Isarvorstadt, Maximilianvorstadt, Ludwigsvorstadt, and Schönfeld; the last three are of modern date, and contain a great number of fine buildings. The largest suburb is the Au, lying beyond the two arms of the Isar, and connected with the old city by two bridges, one of stone, 347 feet in length, and the other of wood, 700 feet long.

The population of Munich and the suburbs was, in 1815, 60,215. In 1824 it amounted to 66,125 without the garrison; but including the garrison, with the 4667 women and children belonging to it, and the village of Haidhausen, with 3475 inhabitants, the total was 74,067. Cannabich (1836) says that, according to the latest census, the total population, including the garrison, was 95,536. The latest account we have seen (1838) gives 95,718, of whom 72,117 were Roman Catholics, 5826 Lutherans, 607 Calvinists, 932 Jews, and 48 of various other sects.

The number of illegitimate children known to be such in Munich is very great, and seems to be increasing, as appears from the following statement:—

Years.	Legit.	Illegit.
1809	1572	653
1814	1958	786
1815	2295	814

Some accounts of the last two or three years state the number of illegitimate births as equal to and even exceeding that of the legitimate; but such statements require to be supported by very good evidence.

Munich has numerous scientific and literary institutions, most of which have been improved or founded by the late king Maximilian Joseph I. and the present king Ludwig; to the latter it is chiefly indebted for the magnificent buildings and inestimable treasures of antient and modern art. The Royal Academy of Sciences was founded in 1759 by the elector Maximilian Joseph III.; in 1807 it received from king Maximilian I. a new constitution and ample endowment, and was reorganised in 1827. A general conservator has under his care the public library of 400,000 volumes and 8500 MSS., the Museum of Natural History, the Brazilian Museum, composed of the collections formed by Dr. Spix and Dr. Martius (whose numerous and splendid works on Brazil and its natural history far surpass anything hitherto published in Germany), the Physical, Mathematical, and Polytechnic collections, the Botanic Garden, the Cabinet of Medals, the Antiquarium or Cabinet of Antiquities, the Chemical Laboratory, the Observa tory at Bogenhausen, &c. There are two gymnasia for the higher branches of education, the Royal Academy of Arts, the Military Academy, the Veterinary and Medical-Clinical Schools, the seminary for forming teachers, the Central Polytechnic School, and many others. The university was founded in June, 1472, at Ingolstadt, was transferred in 1800 to Landshut, and in 1827 to Munich. In 1835 it celebrated its 373rd anniversary, on which occasion the new regulations for the studies and discipline were promulgated. There are 58 ordinary and 10 extraordinary professors, and between 1300 and 1400 students. The university is well furnished with all the necessary requisites, and has a library of 105,000 volumes. Besides many private schools, there are 13 elementary schools for boys and 12 for girls of the lower classes, which are attended by above 6000 children; and Sunday-schools, chiefly for servants and work-people. The charitable institutions are numerous, and on a very liberal scale. Such are the general hospital, for 500 patients; St. Joseph's Hospital, for 260 patients; an asylum for the blind, and for the deaf and dumb; the military lazaretto, the poorhouse, the lunatic hospital, the lying-in hospital, and many others. The house of correction is considered as a model of its kind. It contains a manufactory of woollen cloths. In one year the cloth manufactured was worth 100,194 florins, and the gain of the 442 prisoners 36,467 florins (10 florins=1*l.* sterling). The successful exertions of Count Rumford for the suppression of mendicity at Munich are well known. His establishment for preparing and distributing economical soup still subsists.

The manufactures of Munich are of many different kinds, chiefly for the consumption of the city and neighbourhood: the articles made are linen, woollen cloth, calicoes, damask, silk, ribands, household furniture, piano-fortes, playing-cards, articles of gold and silver, coaches, excellent mathematical, surgical, optical, and astronomical instruments. Fraunhofer's (now Utzschneider's) manufactory of astronomical and optical instruments is celebrated throughout Europe. In 1824 it produced the great telescope for the university of Dorpat, which is 160 Paris inches in length and 10 in diameter. There are likewise manufactures of leather, snuff, and paper (the latter, established in 1347, is probably the oldest in Germany), extensive breweries, and distilleries. But all these are on the whole of little importance, and the inhabitants owe their support chiefly to the numerous public establishments, the government offices, the expenditure of the court, and of the numerous landowners who reside in the capital. Lithography was invented at Munich by M. Sennefelder.

The environs of the city are very pleasant, and contain numerous places of public resort and amusement, which are very much frequented. The English garden, as it is called, laid out by the elector Charles Theodore, is a favourite place of resort in summer. The river Isar flows through it, and has a neat bridge over it. In the vicinity are the royal country-seats of Nymphenburg and Schleissheim, both of which contain fine picture-galleries. The inhabitants of Munich are very fond of amusement: in the summer they enjoy the open air in the country; and in the winter, besides the carnival, frequent concerts and balls. There are likewise three theatres. Though Munich is so far south, the climate is by no means mild, in consequence of its elevation of 1585 feet above the level of the Adriatic and the vicinity of the mountains of the Tyrol. The changes of temperature are sudden, and injurious to health.

Within the last twenty years Munich has raised itself to a European celebrity as a seat of the fine arts, for which distinction she is mainly indebted not to the patronage alone, but to the personal enthusiasm of the present sovereign Ludwig I. of Bavaria, in behalf of art. The number of public buildings erected within that comparatively very brief space of time, some of them such as would be deemed ornaments to any of the largest capitals in Europe, is astonishing, when the limited resources of such a small kingdom as Bavaria are taken into the account. Neither is it merely as buildings—as works of architecture alone, that these additions to the capital are worthy monuments of art; for painting and sculpture, fresco, and in some instances polychromy also, have been unsparingly employed to embellish them. The interiors of our British Museum and National Gallery are of quaker-like plainness in comparison with the halls of the Glyptothek and Pinacothek; nor have we anything whatever that can even convey an idea of the frescos of the Hof-Arkaden and the Allerheiligen Kapelle, or of the Ionic polychrome temple in what is called the English Garden. It would in fact require not only a volume, but one copiously illustrated with engravings, to describe at all satisfactorily those edifices alone which have been erected and adorned within the brief space above mentioned, or which are still actually in progress. We shall therefore merely give some account of the principal, after first noticing one or two of the more remarkable of the older buildings.

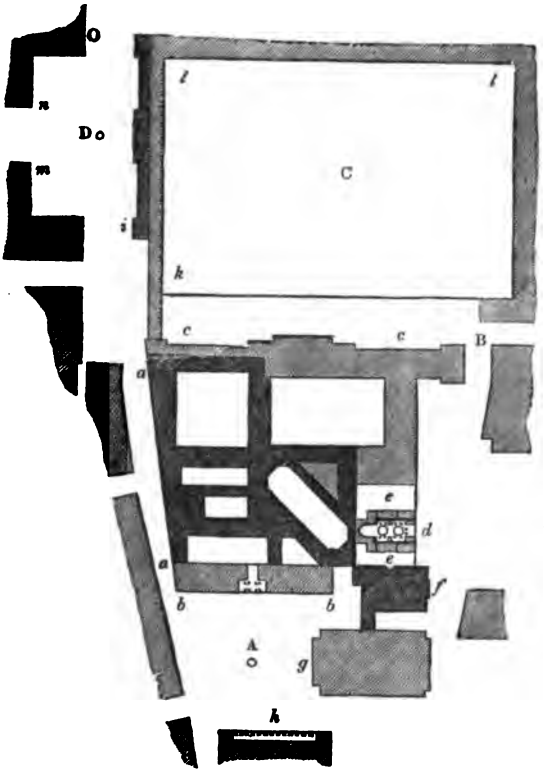
The cathedral, or Frauen-kirche, which was begun by Duke Sigmund in 1468, and completed twenty years afterwards, is in a poor and mean style of Gothic, besides being very homely in its materials. 'Both the nave and towers,' says Dr. Dibdin, 'which are of red brick, are frightful in the extreme; without ornament, without general design, without either meaning or expression of any kind. The towers cannot be less than 350 feet in height, but the tops are mere pepper-boxes.' The edifice is therefore remarkable chiefly for its size, although its dimensions are by no means extraordinary, the length being 321 feet English, the greatest breadth 122, and the height to the summit of the vaulting of the nave 110. Neither does the interior contain much that is particularly interesting, excepting the large and sumptuous mausoleum in the middle of the choir, which was erected in 1603-12, by Maximilian I., to the memory of his great-grandfather the emperor Louis IV. This splendid work of art, which Dibdin declares to have 'hardly any superior of its kind throughout Europe, is of black marble and bronze, and was executed from the designs of Peter Candid, who also painted the principal altar-piece.

The next in point of antiquity is St. Salvator's, now the Greek church, erected in 1494; after which, according to the succession of dates, comes St. Michael's, or the Hof-kirche, of which the first stone was laid April 18th, 1583, by Duke William V. It is 280 feet in length, and is in the form of a cross. The architect was Wolfgang Müller, and of what he has here done Dibdin speaks in the highest terms of praise. 'I can recollect nothing,' says he, 'to be put in competition with it as a comparatively modern edifice. The interior is, as to Roman architecture, what that of St. Ouen is as to Gothic, although the latter is of considerably greater extent. It is indeed the very charm of interior architecture.'

The church of St. Caietan, a work of the seventeenth century, when it was founded by the electress Adelaide, and completed in 1675, was designed by an Italian architect, Agostino Barella of Bologna. It is 220 feet in length, by 120 in its greatest width, being in the form of a cross, and it has a centre cupola raised on Corinthian columns. The façade however is of much later date than the rest, not being built until 1767, when it was executed after the designs of Couvillers, a Frenchman. Dibdin says of this church, that it is quite of the Italian school of art, and seems to be a St. Peter's at Rome in miniature—the façade beautiful and striking. Again, 'It is doubtless one of the most beautiful churches in Bavaria.' But correct as such opinion might be at the time when he visited Munich, in 1818, it is no longer so. The present Allerheiligen Kapelle, Ludwigskirche, St. Bonifacius, did not then exist; nor, with the exception of the Glyptotheca, which was merely in progress, not one of the many splendid new fabrics which now adorn the Bavarian capital had even been commenced, as may be seen, by referring to our Table of Buildings. Neither did the building itself at that time contain Thorwaldsen's magnificent work, the tomb of Eugène Beauharnois, duke of Leuchtenberg, erected to him by his widow, in which, besides a colossal figure of the ex-viceroy of Italy, there are two beautiful genii, and a female representing the muse of History, while a portal of Grecian design forms a rich architectural background to the whole composition. The Trinity church, formerly that of the Carmelite nuns, was begun in 1704, and is a rotunda with a cupola on eighteen Corinthian columns. The façade is of the Ionic order.

The *Alte Residenz*, or Old Palace, is a vast pile, said to have been erected from the designs of Vasari, by Maximilian I., at the close of the sixteenth century. The west front is about 550 feet in length, and has two noble Doric portals, ornamented with bronze statues. Within are three courts, adorned with rich fountains and bronze figures while as to the interior itself, the stores of art of every description there treasured up almost exceed credibility

What is called the *Schöne* or *Reiche Kapelle* well deserves its latter epithet, being composed of and filled with the most costly materials; lapis lazuli, jasper, amethysts, gold, ivory, display themselves everywhere, even in the mosaic floor: in short, such is its marvellous gorgeousness that this single apartment is said to have cost Maximilian I. several millions of florins. To attempt to give any idea of the other contents of this palace and its numerous cabinets—of the works in painting, carving, bijouterie, &c. of which it is the repository, is here utterly impossible. Yet, vast as this pile before was, it has been prodigiously extended by two others, namely, the *Neue Residenz* (new palace), or *Königsbau*, and the *Festbau*, which may be considered as incorporated with it, and forming together with it one enormous mass of building, as is apparent from the accompanying *situation's plan*, comprising the whole of that extensive and varied group of architecture extending from the façade of the post-office to the old picture-gallery on the north side of the Hof-Garten and that end of Ludwigs Strasse.



A	Max-Joseph's Platz.
B	Hof-Garten Strasse.
C	Hof-Garten.
D	Odeon-Platz.
a a	Alte Residenz, or Old Palace.
b b	Königsbau.
c c	Festbau.
d	Allerheiligen Kapelle, or Chapel Royal.
e e	Gardens.
f	Old Hof-theatre.
g	New Theatre.
h	Postgebaude, Post-office.
i i	Bazaar.
k k	Hof-arkaden.
l l	Picture Gallery.
m	Odeon.
n	Leuchtenberg Palace.
O	Ludwigs Strasse.

The Königsbau (*b b*), begun in 1826, from the designs of the celebrated Leo von Klenze, adjoins the Old Palace at its south-west angle, and forms the north side of the Max-Joseph's Platz, the east and south sides of which are occupied by the theatre and post-office respectively; while the centre is adorned with the splendid bronze monument of the late king Maximilian Joseph, a sitting colossal figure on a double pedestal, whose sides are covered with reliefs, and the lower one has the figure of a lion partly projecting from it at each angle. Of the *Place* the façade of the Königsbau, 406 feet in length, forms one entire and the longest side, it being somewhat narrower at the other end, or the side occupied by the Postgebaüde. Not only the style of the Königsbau, but the design itself, bears a strong resemblance to that of the Palazzo Pitti at Florence; more in fact than is at all desirable, because if noble and imposing, it is also too severe and monotonous, and by no means corresponds with or suggests the more refined style of decoration employed in the interior. The ground-floor and that above it have each twenty-three arches in one continued line, of which the centre ones below are larger than the others, and form open entrances to the loggia or carriage vestibule, as in the Strand front of Somerset House. The third story rises above the rest of the elevation, it being only eleven windows in length, and has therefore a balustraded terrace on each side of it, forming the flat roof above the remainder of the façade; in which respect the building also resembles the original one at Florence. Closely however as the architect has followed his model for the most part, he has not scrupled to innovate upon it in some respects, since, besides giving a Doric entablature to the ground-floor, he has introduced an order in pilasters in each of the upper ones; the first with Greek Corinthian capitals, the other with Roman.

After all, it is the interior of the Königsbau which has obtained for the building its celebrity, on account of the magnificent and classical taste displayed in its decorations, the extensive employment of fresco-painting and sculpture, and the high talent manifested in them by Schnorr, Zimmermann, Kaulbach, Schwanthaler, and other artists, who have here had ample scope allowed them. Those who wish for any particulars respecting them, may be referred to the 'Visits and Sketches' of Mrs. Jameson, who has spoken of some of the apartments rather at length and with no little warmth of admiration. Unfortunately however there is one pervading defect unobserved, or at least unmentioned by her, and which, as far as the architect is concerned, detracts very materially from his praise, and from the merit of all the rest; which is, that there are no beauties of any kind in the plan, consequently nothing has in that respect been sacrificed to architectural effect, notwithstanding which, the arrangement is most inconvenient and faulty. In fact, it is decoration alone, rather than architecture, which here displays itself; whatever praise therefore may be due to Von Klenze for the share he may have had in conceiving or suggesting, or even in designing much of the embellishment, he certainly has shown neither ability nor study in regard to anything else. The staircase on the east or king's side leads through two ante-rooms (whose walls are of scagliola in imitation of coloured marbles, with painted friezes, representing respectively the history of Orpheus and subjects from Hesiod's 'Theogony') into a saloon or reception-room 32 feet square, the walls and ceiling of which are adorned with a series of subjects from Homer, painted in fresco by Schnorr. The next in course is the throne room (58 ft. 6 in. by 33 ft. 4 in.), the walls of which are entirely covered with gildings, with the exception of the pilasters and mouldings, and decorated with arabesques in polished and dead gold, while the friezes by Schwanthaler exhibit different subjects from Pindar. The gilding alone of this single room is said to have cost 72,000 florins. Here the rooms on this side may be said to terminate, further progress being interrupted by their majesties' private rooms; therefore those beyond them must be approached from the staircase at the north-west angle of the building, which leads to nearly the same number of rooms terminating in the queen's throne-room and drawing-room, the former decorated with encaustic paintings by Kaulbach, of subjects from Klopstock. Another strange oversight in the plan is, that the dining-room (painted by Zimmermann with a series of subjects from Anacreon) is placed immediately behind the king's throne-room, in such a manner that the latter must be made use of as a passage-room to it. It cannot therefore be denied that the plan is positively bad; and even many more defects in it might be pointed out The whole indeed seems to be fitted for nothing more than a series of rooms not intended to be occupied, but to remain always open to free inspection, as a continuous gallery exhibiting a succession of *stanze*, each appropriated to one set of wall-paintings and other decorations; and as far as concerns embellishment, each is in itself a study. It is impossible to particularise further than we already have done, except merely to mention, that on the upper floor, forming the loftier part of the façade, there are apartments for entertainments, among which is a ball-room, 62 feet by 37, and 27 high, with semicircular ends, and adjoining it a *Blumensaal*, or hall of flowers, 68 feet by 36, opening to the terrace over the east end of the building; and the four Nibelungen-saale (on the ground floor, at the west end of the front), so called from Schnorr's magnificen frescos, the subjects of which are taken from the celebrated old German epic, the Nibelungen Leid.

The second and later addition to the Residenz, which is also by Klenze, is what is called the *Festbau* (*c c*): it has a façade towards the Hofgarten (of which it extends along the south side about 800 feet in length) in the Roman style, with an Ionic colonnade in the centre, upon which are a series of allegorical figures by Schwanthaler. The throne-room is intended to contain eighteen colossal statues of bronze gilt. The Hofgarten (*c*) itself is a planted square of about 1100 feet from east to west, and 700 from north to south. The west side may be considered the Palais Royal of Munich, it being lined throughout its whole extent by arcades, beneath which are cafés, &c., in that portion which belongs to the Bazaar; while that distinguished by the name of the *Hof-arkaden* (*k*) is decorated with a series of sixteen frescos by Sturmer, Förster, Zimmermann, Schilgen, Eberle, and other artists, illustrating as many events in the annals of Bavaria. This national historical gallery, as it well deserves to be called, was completed and opened to public view, October 3, 1829. In continuation of the *Hof-arkaden* are the arcades of the bazaar, where, in compartments between the doors and windows, are twenty-eight smaller frescos representing Italian views, all of which are by Rottmann, who has here shown great ability as a landscape-painter. The principal front of the bazaar itself (*i i*), another of Klenze's productions, faces the Odeon-Platz, of which it forms the east side. It is in a simple but tasteful style of Italian architecture, with enriched pannels between the larger arches of the ground-floor, and grouped windows above, consisting of lesser arches, whose archivolts rest upon Corinthian pilasters.

Along the north side of the Hofgarten extends the old picture gallery (*l l*), arranged in a suite of rooms over another lengthened arcade. The rooms themselves are not well adapted for their purpose, being lighted by windows on each side; but they are about to be appropriated to extensive collections of carvings in ivory, &c.; and all the choicest pictures will be deposited in the Pinakothek, as will those from Schleissheim and the other royal collections, the total number of which is not less than nine thousand. The abundance of works of art in Munich is quite prodigious, and that not in painting alone, but in sculpture, as is testified by the Glyptotheca alone.

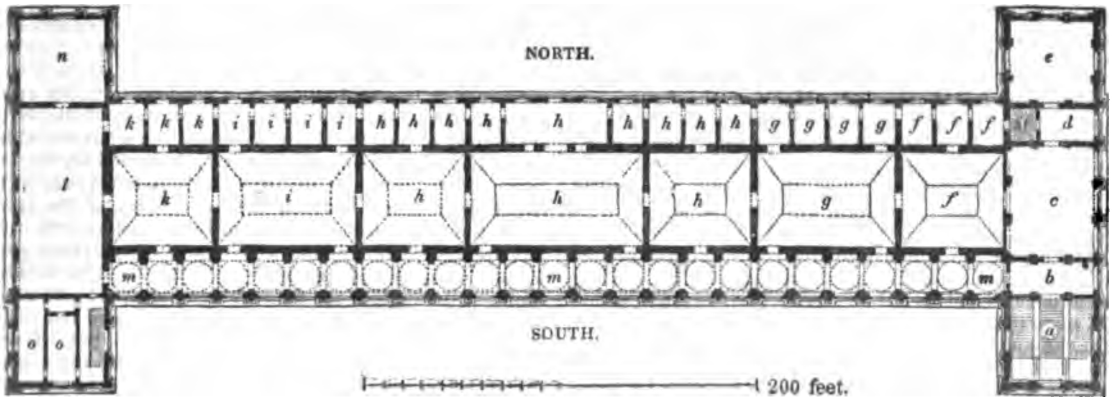
Though by the same architect (Klenze), this last-mentioned museum of sculpture is very different in style from that of the additions to the Residenz, as it may be said to be pure Greek, yet not so much a copy as a free application of Grecian architecture. The building is at a considerable distance from any others, standing with its south or principal front towards a large open space called the Königsplatz. It is not more than about 220 feet square in plan, with a court in the centre; yet, although in point of magnitude it is by no means remarkable, it is far more imposing in appearance and of ampler proportions than many edifices of much greater extent. Although highly encomiastic in her account of the Glyptothek, Mrs. Jameson says little of the façade, and that little is incorrect; for she describes it as having a portico of twelve Ionic columns, raised on a flight of steps; whereas the latter cannot properly be so termed, for they consist of three very deep gradini, continued as a base along the whole front, like those in some of the antient Greek temples; while what is said as to the number of the columns, though correct in itself, is apt to lead into a singular error as to their disposition, only eight of the columns being in front and the others behind, in such manner as to form a second range of four columns and four antæ, or seven intercolumns, five of which are open, and the one between the two antæ at each end closed up or blank. Consequently it may be termed a compound of portico and loggia, and might be described technically, both clearly and briefly, as consisting of an Ionic *octastyle* projecting before a *tetrastyle in antis*. [Civil Architecture.] Hence there is a richness and intricacy of columniation, and a variety of light and shade, to which none of our porticos make any pretension; nor can we refer to anything at all similar, except it be the small but highly picturesque architectural bit at the north-west angle of the Bank of England. In its dimensions this portico differs very little from that of the Post-Office or that of University College, London; but it is of much loftier proportions than the latter, and more classical in style and in intercolumniation than the former; besides which, while it rises, like that of University College, above the rest of the edifice, and in a greater degree, it is relatively much ampler than that or any other which we possess, for we have not one example in which the portico itself is not small in comparison with the mass to which it is attached. Another circumstance wherein this portico differs far more markedly from anything of our own, is the richness of its cornice and acroteria, and more than all, the splendid display of sculpture in the pediment, which is not filled with sculpture in relief, but recessed or hollowed so as to admit detached figures or statues, as was the case in the temple of Ægina, and may be seen in the models of its pediments at the British Museum. The composition itself, intended to exhibit the various operations of the plastic arts, modelling, sculpture, carving, &c., was designed by Wagner, but the figures were executed severally by Schwanthaler, Leeb, Haller, and others, and were first put up in 1836. The six bronze colossal statues for the three large tabernacle niches on each side of the portico, and which constitute the remaining architectural decoration of this front, still remain to be added; and when that shall have been done, this façade will be a fine and consistent example of modern Greek architecture, not only noble in all its embellishments, but free from any of those insignificant features which too often mar an entire design. The interior is divided into a series of rooms, of which the two rotundas at the angles of the place are lighted from above, through lanterns and domes; the others by large semicircular or lunette windows, above their cornices, and towards the inner court. The first rooms, beginning with those on the left hand, or west side of the vestibule, are appropriated to Egyptian antiquities and other works of early art; to these succeed the Ægineten Saal, or Hall of Ægina marbles, the Apollo Saal, the Bacchiden Saal, and the Niobiden Saal, which last is at the west angle of the north front, and is lighted by one of the two windows on that side of the building. The space between that and the corresponding angle is occupied by what are called the *Fest Saale*, two large apartments whose walls are entirely covered with frescos by the celebrated Cornelius and his pupils. At the north-east, answering to the Niobiden Saal, is the Heroen Saal, from which there is a descent into the Roman hall or gallery, the most spacious of all, and which, in consequence of its floor being lower than the general level, is loftier than the rest. This as far exceeds the other sculpture-rooms in the splendour of its architecture as it does in extent, and it is divided into three compartments, each of which has a slightly concave dome; the walls are in imitation of *flor di persico* marble, and the whole is a splendid combination of embellishment. An ascent of steps at the farther end leads up into the *Saal der farbigen Bildwerke*, or hall of coloured marbles, the rotunda at the south-east angle of the front, adjoining which is the hall of modern sculpture, containing those two admirable specimens, Canova's Paris and Thorwaldsen's Adonis. This room is the last of the suite, and brings the visitor again to the entrance vestibule. Although sufficient architectural unity is kept up throughout, there is also a very pleasing degree of variety, not only as regards colour and decoration, but the forms, dimensions of the rooms, their domes, vaultings, and ceilings, and their enriched pavements.

Mrs. Jameson's work supplies much interesting remark upon the antient sculptures here collected. For a catalogue raisonné of the whole collection, we would recommend Schorn's 'Beschreibung der Glyptothek;' and for accurate information as to the building itself, we refer our readers to the plates of it in Klenze's own 'Entwürfe,' where, besides plan, and various sections, &c., will be found the principal ornamental details, and several interior views in outline.

The *Pinakothek*, or Pinacotheca, another, and in some respects the best, of Klenze's works, is a much more extensive edifice than the Glyptothek, and altogether different both in its plan and its style of architecture, although it resembles it in being perfectly insulated, and standing in an open situation at no very great distance north-east from the other building, and in the immediate vicinity of the spacious infantry barracks. The first stone was laid April 7th (Raphael's birthday), 1826, by the royal founder himself, and the building was completed in about ten years. The annexed plan, which is that of the upper floor, will serve greatly to abridge description, and to convey a clear idea both of the form of the edifice and the arrangement of the galleries.

Although each side of the building presents an architectural façade of uniform character, that facing the south may be considered the principal one. The lower portion consists of a very lofty ground-floor, with a series of arched windows within square-headed framings, surmounted by cornices, and resting upon a socle, or rather podium, formed by two courses of large rustics. In the centre of that side

[Plan of the Upper Story.]



a, Staircase.
b, Entrance Hall.
c, Vestibule.
d, Inspector's Room.
e, Reception Room.
f, Hall and Cabinets of the Modern School.
g, Old German School.
h, Flemish School.
i, French and Spanish Schools.
k, *l*, Italian School.
m, *m*, *m*, Corridor.
n, Hall for Copyists.
o, *o*, Offices.

that is beneath the loggie (marked *m m* in the plan) are eleven such windows on each side of the entrance portico, or rather porch, as it rises no higher than the ground-floor, which consists of four Ionic columns, whose entablature supports a balcony in front of the three centre arcades or windows of the loggie above. Along the upper floor the same order is continued throughout in half-columns against the piers of the arches between them, which, although glazed, cannot so well be considered so many separate windows as one connected arcade. This order is crowned by a bold cantilever cornice and antefixæ, terminating the elevation; for the attic does not rise immediately over the order, but is set back as far as the hinder wall of the loggia. The projecting ends of the plan assist greatly, not only in giving an air of solidity as well as variety to the general mass, but also greater importance to the lateral façades. On the lower floor, at the west end of the building, are a library, and rooms for collections of prints and drawings. The rest consist of rooms required for the keeper and other officers of the establishment. The upper floor is sufficiently explained by its plan. The larger rooms in the centre are lighted from above; and although the height to the top of their lanterns is rather more than fifty feet, this seemingly unnecessary loftiness, while it contributes greatly to architectural importance, and affords ample space for decoration above the cornice of the rooms (of which full advantage has been taken), also causes the light to fall upon the upper part of the walls themselves, the height to the cornice whence the ceilings spring not being more than twenty-five feet, so that the tops of the highest pictures can never be much more than twenty feet from the floor, and must have the light full upon them. Not only the ceiling but all the decorations of the rooms may be pronounced magnificent, and both the floors and the dados, or lower parts of the walls, are of Bavarian marble, one practical advantage of which last is that no pictures can be hung lower than within three feet of the ground.

In addition to these magnificent rooms, and about 1500 of the choicest pictures in the world, there is what almost anywhere else would be considered a museum and gallery of itself, namely, the *Loggie*, forming a line of 400 feet in extent, decorated throughout with arabesques on its walls, and with historical frescos in the lunettes facing the arches, and subjects in each of the small cupolas covering the twenty-five compartments of this corridor. These frescos, which have all some reference to the history of art, were designed by Cornelius and executed by Zimmermann and others.

The same year in which this Pinacotheca was begun was also distinguished by the commencement of another monument of architecture, which of itself would have almost sufficed for the fame either of Klenze, or his royal patron, namely, the Allerheiligen Kapelle, or Chapel Royal (*d*), on the east side of the Residenz. In its style however it does not at all resemble any other portion of it, but shows itself as a distinct composition. Neither does it all resemble any other works of the same architect, being in the Byzantine or Lombardic fashion [Lombardic Architecture], and the façade bearing some resemblance in parts to that of San Zeno at Verona. It may be described as about 70 feet wide and as many high, exclusive of the lower portion on each side, covered with a half-gable, and whereby the entire width is increased to about 100 feet. The centre, which is the breadth of the chapel itself, terminates in a flattish gable, beneath whose sloping mouldings is a series of small pendent or corbelled arches. These mouldings and arches are returned horizontally at the extremities, above broad pilasters or buttresses, which are surmounted by small tabernacles serving as pinnacles to the angles, as is also the case with the half-gables. Slenderer pilaster shafts, whose carved caps do not reach quite up to the corbelling of the gable, divide the front of the chapel itself into three compartments, the middle and widest of which contains a rich portal, with receding columns and arches, with a bas-relief in the lunette or semicircular tympanum over the square-headed door, and a statue on each side of the canopy or pediment which crowns this entrance. Above it is a large circular or wheel-window; and in each of the other compartments are two round-headed windows, one above the other; there is also a single window of the same design, beneath each of the half-gables. With respect to the plan of the interior, although it may be said to be simple in arrangement, it is such that it is exceedingly difficult to describe it verbally with precision: the body of the chapel is 105 feet in length within, exclusive of the apsis, or large semicircular tribune, for the altar, at its western extremity (elevated about three feet above the rest of the pavement), which gives about twenty feet more. This space cannot be described as nave and choir, or either separately, but as consisting of two square compartments of thirty feet, each covered by pendentives and a dome, and separated or united by an intermediate narrower space. On each side these compartments have below three circular-headed arches on columns, opening into what may as properly be designated loggie, as side-aisles; and above as many windows of the same form, not however immediately over the arches just mentioned, as the clerestory windows over the arches in the nave of a church, but at the back of the upper recesses, or tribunes, corresponding with those below. Consequently the width in the upper part of the building is, in appearance at least, greatly extended, and increased from thirty to nearly sixty feet across. Further than this, description as to plan must not be attempted; and if that has been attended with difficulty, we ought to despair of conveying anything like a distinct notion of the profuse and gorgeous yet solemn decorations of the whole interior: the pavements, walls, arches, pendentives, domes—all is embellishment; and all that is not marble or mosaic is painting and gold. The columns are of red Salsburg marble, with white bases and gilded capitals; the socle, or bottom of the walls, is also of red marble throughout; and the rest, to the height of the upper loggie, encrusted with different coloured marbles or scagliola, of which the prevailing masses are of a greenish hue; the next, veined red or blue; and the smaller surfaces dark-grey or black. The parapet of the recesses over the side-loggie and some intermediate parts are ornamented with a variety of coloured mosaic-like patterns, on a ground of stucco lustro. All the rest is entirely covered with fresco painting, upon a gold ground, after the manner of the mosaics in St. Mark's, Venice, and the cathedral of Monreale near Palermo. The subjects were designed, and chiefly executed, by Professor Hess: those of the first compartment and its cupola are all symbolical of the event [illegible]

Old Testament; those of the other, of the New; while those introduced in the large intervening arch refer to the connection between the two. Thus what, judging by the the plan alone, appears a rather fanciful division into two equal spaces, without any central cupola, is beautifully 'motived' and full of meaning. Many of the figures are colossal; those, for instance, of the Redeemer and the Deity himself, in the large tribune of the principal altar, which may be considered as the focus where the power of art is concentrated. Notwithstanding the almost unequalled gorgeousness of this magnificent sanctuary, so far is it from being at all gaudy, that it is rather characterised by an unusual degree of solemnity, to which effect the gold ground of the frescos contributes in no small degree. The building was consecrated and opened for service, Nov. 1st, 1837, within little more than ten years from its foundation.

On the south side of this magnificent chapel is what was formerly the Hof Theatre (*f* in plan), but it is not now made use of as such, the larger and adjoining building (*g*) being now the principal theatre. The present structure, which has a fine Corinthian portico of eight columns, towards the Max-Josephs Platz, was originally erected by Karl Fischer (died 1820), and rebuilt according to the first design, after being burnt down in 1823. On the south side of the same platz is the new façade of what was formerly the Döring Palace, but is now converted into the post-gebaüde, or post-office (*h*). Like the opposite Königsbau, this is also in what may be termed the Florentine style, though of a different character. The length is 290 feet, the whole of which, exclusive of thirty-two feet at each end, is occupied by an open loggia of thirteen arches, resting upon Doric columns, with as many windows above them, besides two in each of the end compartments, that is, one on the ground-floor and one above it. All these windows are arched, but enclosed within square architrave mouldings, and crowned by cornices. There are also windows of the same description within the loggia, but only three on each side of the entrance, corresponding with the alternate arches. The whole is crowned by a cornicione, with an enriched band or narrow frieze beneath it, the pattern of which is white upon a red ground; for it should be observed that this building exhibits, to a certain extent, the application of polychromy, the general surface being coloured of a greenish hue, and that of the interior of the loggia of reddish-brown; while the rustic quoins, columns, archivolts of the arches, window-dressings, &c., are left white. On the west side of the Odeon-Platz (D), where, in front of the bazaar, is an obelisk of cast metal, ninety-six feet high, are the Odeon (*m*) and Leuchtenberg Palace (*n*), whose opposite fronts towards the street that runs between them present two handsome and uniform façades in the Italian style, of two stories above the ground-floor, of eleven windows in each, and with a small Doric portico, or entrance porch, of four columns. The large concert or ball room, on the principal floor of the Odeon, is 124 feet by 71, and 50 high.

Northwards from the Odeon-Platz runs the Ludwigs-Strasse (*o*), by far the handsomest and most regular street in Munich, having on its east side the Kriegs-ministerium, the new public library, and new Ludwigs Kirche; on its western side, the Maximilians-Palast, Blind Institute, &c., and terminating in the spacious quadrangle of the new Georgianum, or university buildings. We shall speak of these as they occur in the course from the Odeon-Platz to the other extremity of the street, therefore first of the palace of Duke Maximilian, a large insulated structure in the Italian style, of about 200 by 300 feet. The façade towards the Ludwigs Strasse (206 feet) somewhat resembles that of the Königsbau, although it is far less severe in character and more varied in its features The ground-floor has three large arched doors in the centre, between four insulated Doric columns supporting a balcony in front of the three centre windows above. On each side of this portal are five windows, which, like those of the Postgebäude and lower floor of the Pinacothek, are round-headed within square dressings. Those of both the upper floors are square-headed, the first with pediments, the second without; the decorations of the principal rooms, including their parquetted floors and rich ceilings, are magnificent; the walls of the large reception-room, or first saloon, are adorned with six large compartments in fresco by Langer, representing mythological subjects. The ball-room, sixty by forty feet, and thirty-five high, is profusely embellished.

The next building, almost immediately opposite the preceding, is the Kriegs-ministerium, or war-office, and is the work of the same architect (Klenze). The façade, 248 feet in length, is also in the Florentine style, and consists of a centre having seven large arcades, filled in with door and windows on the ground-floor, and two stories above it, with two wings or lateral divisions, five windows in width, and a story lower; at the external angles and those of the centre are courses of bold massive rustics, and the windows, which are arched throughout, are similarly decorated on the two upper floors, although the wall itself is left plain. The spandrels, or spaces between the arch-stones, of the seven arcades of the ground-floor are entirely filled up with military trophies and armour, which mass of sculpture gives unusual richness and character to the whole. The building stands at the angle of the Schonfelds Strasse, towards which street its south side presents a far more extensive and varied façade (363 feet), uniform as to general style, but different as to composition, it being divided into a centre and two advanced wings, connected on each side by four arcades with windows in them, similar to those of the other front. The end pavilions or wings are also in every respect the same as towards the Ludwigs Strasse, except that they are only three windows in breadth. The centre or body is eleven windows in breadth, and rises somewhat higher than the wings, having a series of mezzanine windows just beneath its cornicione.

The remaining public buildings are all by Gärtner, and the first, immediately after passing the Kriegs-ministerium, is the new public Library and archive, whose lofty façade (495 feet in length) is a compound of the Florentine and Lombardic styles. The lower floor forms a massive rusticated basement, 44 feet high, with three portals in its centre. Each of the upper floors has twenty-five arched windows, and the whole is crowned with a cornice of very peculiar design.

The Ludwigs Kirche, which is also in the Lombardic or round-arch style, but treated with considerable originality, is no less remarkable for the beauty of its execution than the richness of its design. The front, somewhat more than 100 feet to the summit of the gable, has two towers of double that height, which give the façade five compartments, the centre one, or that corresponding with the nave within, being an open vestibule, with arches resting upon delicately sculptured columns. Immediately over this porch are five niches with colossal statues of Christ and the four Evangelists, and crowned with arches decorated with arabesques after the mode of Giotto. Above these is a large rose window, and then the gable ornamented with foliage and open work, with a cross on its summit, and colossal statues of St. Peter and St. Paul at its angles, which, as well as those in the niches, were modelled by Schwanthaler. Within, the nave or body of the church is 246 feet by 43, and upwards of 80 feet high. Here too, though not so profusely as in the Allerheiligen Kapelle, fresco-painting has been employed;—chiefly in the tribune at the end of the choir, and in those at the extremities of the transept. The principal subject is the Last Judgment by Cornelius, allowed to be one of the highest efforts of art in the present century.

Nearly opposite this church are the Blind Institute, and what is called the Damenstifts-gebäude, two more of those extensive masses of building which give so much grandeur to this street. The former of these is upwards of 220 and the other 400 feet in length; both are by Gärtner, and both somewhat similar in style to the Public Library. The same may be said of the Georgianum, or new university buildings, at the northern extremity of this noble street, where they form a large quadrangle, into which the street itself runs.

The church of St. Maria Hilf, in the Au suburb, the first stone of which was laid 28th November, 1831, is another noble architectural work, yet quite different in character from any of the preceding, being in the pointed or old German style. This building, which is quite insulated, has three portals in its west front, and above the middle one a large rose window. The tower is upwards of 250 feet in height, and the upper part of it consists of ornamental open work. Within, it is divided into a nave and side aisles, the former of which is nearly 80 feet high. Independently of its architecture, this church deserves notice on account of its nineteen splendid painted windows, by Ainmüller and others, which show the high degree of perfection to which that branch of art has been brought of late years in Bavaria. These paintings were executed chiefly from the designs of

Ruben and Schraudolf, and under the inspection of Gärtner, although not the latter, but Ohlmüller (who died April 22nd, 1839) was the architect of the building.

The new Basilica of St. Bonifacius, by Ziebland, now in progress, promises, when completed—which it is expected to be in 1842—to surpass every other religious edifice in the city, hardly excepting the Allerheiligen Kapelle itself. Like that building, it is in the Byzantine or Lombard taste, both as to architecture and decoration, but is upon a much more extensive scale, being 250 feet long and 120 feet wide: it is divided within into a nave and two aisles on each side of it, by sixty-four marble columns of a greenish tint, disposed in four rows. Of the middle aisle, or nave, the width is 51 feet and the height 70; of the four others, the width 15 feet and the height 40 feet. The pavement is of marble mosaic, and the roof of open timber work, the beams of which are not only carved, but richly decorated with painting and gilding, and the ceiling between them azure, with gold stars. The walls of the outer side aisles are stuccoed with scagliola in imitation of different coloured marbles, but those of the other parts of the building will be painted in fresco by Hess, with subjects from the history of St. Bonifacius. In the rear of this magnificent church (the front of which, towards the Karls-strasse, has a portico of eight Corinthian columns with three bronze doors) will be another building attached to it, intended as a theological seminary, directly facing the Glyptotheca, to which it will form a corresponding piece of architecture, on the south side of the Königs Platz.

Several other buildings and public monuments might be mentioned, but however deserving of notice in themselves, they are only of secondary rank. What has been accomplished at Munich within little more than twenty years, reckoning from the foundation of the Glyptotheca, constitutes an epoch in the history of modern art, not only as regards architecture and sculpture, but both fresco and glass painting. Instead therefore of being at all an hyperbole, the title of the German Athens does no more than simply characterise a city that is, as it were, one vast museum of architecture and fresco-painting. In fact, on comparing a map of London with that of Munich, the latter, though so very much smaller a city, strikes the eye by the number of its public buildings and the great space which they occupy. The plan of Munich, published in the series of maps by the Society for the Diffusion of Useful Knowledge, will be useful to those who take any interest in the present article. This plan does not however show the situation of all the buildings here mentioned, nor the situation of any of those beyond the Kriegs-ministerium in the Ludwigs Strasse, nor the Basilica of St. Bonifacius. But two very conspicuous features in it suggest the propriety of mentioning the spacious new Friedhof, or public cemetery, and the beautiful park near the north-east angle of the Hofgarten and Picture Gallery, called the English Garden. The latter is laid out with plantations, intersected by streams of water, and embellished with statues and various ornamental buildings, the most remarkable of which is the circular monopteros of twelve Ionic columns, erected in 1833, as a monumental temple in honour of the elector Karl Theodore, the founder of the garden; nor is it so remarkable on account of its design, as for exhibiting the first modern application of Greek architectural polychromy, the capitals of the columns and the mouldings of the entablature being enriched with various colours painted in encaustic. The other spot, the Père la Chaise of Munich, has, at its southern extremity, an extensive range of building consisting of a chapel and range of arcades, disposed in the form of a crescent about 550 feet in diameter.

The following architectural synopsis, on the plan of that accompanying the article LONDON, will serve as a general recapitulation, and facilitate reference with respect to the architects and the dates of the buildings, as far as it has been possible to ascertain the latter correctly.

N.B. The measurements are reduced to English feet.

Table of the Principal Buildings, &c.

	Date.	Architect.	Remarks.
Frauenkirche	1468-94	Jorg Gankoffen	Gothic, two west towers 336 feet high.—336 by 115 feet.
St. Michael's	1583-95	Wolfgang Müller	
St. Caietan	1670	Agost. Barella	Façade, erected 1767, by Couvilliers; Doric and Ionic.
Trinity Church	1704-14	. . .	Rotunda, dome on 18 Corinthian columns.
General Hospital	1813	Fischer	
Glyptotheca	1816-30	Klenze	Grecian, Octastyle, Ionic portico
Reitbahn, Riding-house	1822	. . .	Italian, 300 by 80 feet.
Isar Bridge	1823-28	Probst & Klenze	Five arches, length 286 feet.
Theatre	1824-5	Fischer	Hexastyle, Corinthian portico.
Kriegs-Ministerium, or War-Office	1824	Klenze	Florentine style.
Odeon	1826	Klenze	Italian style.
Pinacotheca	1826	Do.	Italian, north and south façades 494 feet.
Synagogue . . finished	1826	Metivier	
Allerheiligen Kapelle	1826-37	Klenze	Romanesque or Byzantine style, 145 by 103 feet and 84 high.
Bazaar	. .	Do.	Italian, round-arch style.
Hof-arkaden	. .	Do.	
Protestant Church	1827-33	Pertch	Oval plan, 143 by 57 feet.
Königsbau	1827	Klenze	Florentine style, façade 406 feet.
Festbau	. .	Do.	Façade nearly 800 feet long, in the Palladian style.
Prince Maximilian's Palace	1828	Do.	Florentine style.
Leuchtenberg Palace	. .	Do.	Italian style.
Obelisk	1828-33	Do.	Bronze, 95 feet high.
Ludwigs Kirche	1829	Gärtner	Byzantine style, towers 209 feet high.
Pfarr-kirche, St. Maria Hilf	1831	Ohlmüller	Gothic, nave and side aisles.
New Public Library and Archive	1832	Gärtner	Façade 494 feet, Florentine style.
The Reichenbacher Bridge	1832	. .	Timber bridge, 675 feet long.
Blind Institute	1832	Gärtner	Florentine style, façade 214 feet.
Isar Thor or Gate	1833	Do.	Gothic or Old German style, three towers.
Polychrome Temple	1833	Klenze	Circular monopteros, Grecian Ionic.
St. Bonifacius	1833	Ziebland	Byzantine, nave and two aisles on each side.
Post-Office	1834	Klenze	Florentine style, façade 290 feet long, 66 feet high.
Georgianum	1835	Gärtner	
Equestrian Statue of Maximilian I.	. .	Thorwaldsen	
Damenstifts-gebäude	. .	Gärtner	Florentine style, façade 430 feet.
Monument of Maximilian-Joseph I.	1835	Klenze & Rauch	Colossal sitting figure; entire height of the monument, which is of bronze, 36 feet.

MUNICI'PIUM, a term which properly denotes, according to its etymology (*munus* and *capio*), the capacity of enjoying rights with the liability to duties. It is however used in the antient Roman writers to express a class or body, the members of which are called Municipes.

Municipium, as a collective name for a number of individuals, had different significations at different periods of Roman history. In its oldest sense, it signified those inhabitants of Italian towns which had a league or treaty with the Roman state, by which the citizens of such towns, though not Roman citizens, enjoyed, when at Rome, all the privileges of Roman citizens, except the suffrage and the eligibility to the honours of the state (magistratus), and were also subject to the burthens of Roman citizens: the Fundani, Formiani, Cumani, Acerrani, Lanuvini, and Tusculani are mentioned as examples. A Roman jurist (Servius, the son) says that municipes originally signified those who became citizens, their own state remaining perfectly distinct from and unconnected with the Roman state, and who were not allowed to attain to the dignities of the Roman state. (Fest. Epit., *Municipium.*) This first definition, which is as precise as a short one can be, still leaves room for many questions. Niebuhr is of opinion that the author of the first definition is mistaken in saying that such municipes were not Roman citizens; but his reasons for disputing the accuracy of the definition do not seem conclusive.

A second class of municipes is defined to be those whose State had become a part of or was blended with the Roman state, as was the case with the inhabitants of Caere, Aricia, and Anagnia. (Festus, *Municipium.*) But this would appear to be a misapplication or improper application of the term, inasmuch as this class of municipes comprehended those who ceased to have a State of their own, but were incorporated with the Roman state on such terms as the latter chose to grant.

A third class is defined (but the definition is somewhat obscure) to comprehend those towns which received the Roman citizenship, and at the same time became municipia: Tibur, Præneste, and other towns are mentioned as examples. Niebuhr observes that the places mentioned in this third class were either 'all Latin colonies or Italian towns, such as by the Julian Law, or by those which followed and gave it a wider application, became municipia in the later general sense.' It seems to be clear from this definition that municipium must here be understood not in the sense which it has in the first definition, but in the later sense of a town called a municipium. For the first part of the definition gives to the municipes of this class the full Roman citizenship; and the second part adds (what might very well have been understood without the addition) that the towns included in this definition must have had a local administration. These towns in effect became integral parts of the Roman state, having before been separate, and as a necessary consequence their local administration, which must still have subsisted, became subject to the general Roman law, instead of being independent of it. Such towns were the municipia of the Imperial period. The definition of municipes by Paulus is, 'those who are natives of the same municipium.' Ulpian, who also (*Dig.* 50, tit. i., s. 1) gives the same definition of municipes, refers to the *original* signification of the term: 'muneris participes recepti in civitatem ut munera nobiscum facerent.' He adds: 'but now, by an abuse of the term, municipes is the name given to the citizens of any particular town, as for example, a Campanus or Puteolanus. He who is born of a Campanian father and mother is therefore a Campanian: if his mother be of Puteoli, he is still a Campanian municeps, unless by some special privilege (privilegium) he is a municeps of his mother's city, a favour which is granted to some cities.'

It appears then that the municipium, as an antient Roman institution, may be defined generally as the communication of the rights of Roman citizens (and as a consequence, their liabilities) to Italian towns by treaty or agreement. It thus resembles the isopolity (ἰσοπολιτεία) of the Greeks. It is easy to conceive that the rights thus conferred might be either the complete rights of Roman citizenship or only part of such rights. After the freedom of the city was extended to all Italy, and subsequently to the provinces, there was no essential difference between a colonia and a municipium, though the origin of their connection with the Roman state was very different. [COLONY.] Thus, under the emperors, all the inhabitants of the same town, whether it was a colonia or a municipium, might with propriety be called municipes, notwithstanding the criticism of Gellius (xvi. 13).

Under the emperors we find various towns in the provinces, as in Spain and Britain, which were erected into municipia. The members of these towns were Roman citizens, and administered the affairs of their own community, subject to the general laws by which all Roman citizens were bound. A municipium had a corporate character, under which all the municipes, that is, all the members of the city, were comprehended. It would appear as if the decuriones were sometimes considered as the corporate body representing the municipium. The municipium could sue and be sued, and could acquire and hold property. The decuriones were the senate or council of a municipium; and the two chief magistrates were called duumviri. The municipia had also other local magistrates; and many of them had a mint, as we see from their extant coins. Thus the later municipia of the empire were in all respects like modern corporate towns, of which they were undoubtedly the origin and the type.

It follows from what has been said, that an Italian town was originally called municipium, or the inhabitants municipes, solely with reference to the participation of the townsmen in the privileges of Roman citizens, and that under the republic such municipia were in all respects independent of Roman law in their internal organization. The municipia included in the third definition and the later municipia erected under the emperors were improperly so called, inasmuch as the inhabitants of these towns became or were Roman citizens, and in all respects subject to Roman law.

The original signification of municipium in the old Roman constitution is discussed by Niebuhr (*Roman Hist.*, vol. ii.) in an instructive chapter which contains all the necessary references. It is not easy however to assent to all this writer's opinions.

MUNIMENTS. This word is a derivation from *munio*, which signifies 'I defend,' and originally designated those writings in which are recorded the transactions of former times, out of which existing relations, in respect of political rights, social rights, or property, arise. Hence, by showing their origin, they *defend* the possession of them by those who have rightfully inherited them.

But *muniments* has, in the course of ages, acquired a somewhat different sense; and from betokening the documents themselves, it is sometimes used to denote the *depositories* of these documents.

Still, by those who aim at speaking with precision, it denotes the written documents themselves. It is also rarely used in reference to any small collection of such documents, or when the interest to be *defended* is small. In such cases the correlative expressions are *title-deeds*, or *evidences*, which means however precisely the same thing, only on a smaller scale. But when we speak of the documents by which the rights of a person are defended in whom a large estate has centred, or who inherits an antient title, or vast manorial or ecclesiastical privileges, then the word of greater dignity, *muniments*, is often used; and still more when the evidences are spoken of which show the right of the crown of any kingdom to its possessions, or the right of crown or people as sustained by written documents.

Private collections of evidences rarely contain anything that is of earlier date than the reign of Edward I. The public muniments of the English nation are believed to excel those of any other nation, both in number, preservation, and the remoteness of the period at which series or classes begin. Yet there is little previous to the reign of Richard I. There is no series commencing before that reign, except that of the Pipe Rolls, the Great Roll of the Exchequer, in which were entered, year by year, the receipts of the crown, and many of its payments. This series begins in the second year of King Henry II., and from that remote period to the year 1835, when this mode of keeping the account ceased, there is scarcely a roll wanting in the whole series. For the times previous to the beginning of that reign, one roll, which belongs to the reign of Henry I., only exists of this series; and the only other record of great importance before the reign of Henry II. is that called 'Domesday Book,' a survey of nearly the whole of the kingdom, made by William the Conqueror, a book which is still sometimes appealed to in determining rights of the crown, or of a subject against the crown, or of one subject against another.

For the particular classes of public muniments, their depositories, preservation, and other information concerning them, see RECORDS, PUBLIC.

MUNSTER, one of the four provinces into which Ireland is divided. It comprehends the southern part of the island, and is bounded on the west, south, and south-east by the Atlantic Ocean; on the north and north-east it is conterminous with the provinces of Connaught and Leinster. It is comprehended between 51° 25′ and 53° 12′ N. lat., and 6° 56′ and 10° 32′ W. long. Its general form is irregular; the greatest length is from the banks of the Shannon below Banagher to Mizen Head, 144 miles; the greatest breadth, at right angles to the length, is from Black Head, in Galway Bay, to the mouth of Waterford Harbour, 119 miles. The area is estimated at 5,210,472 statute acres, or 8141 square miles: the population at different periods has been as follows, giving, in 1831 273 or 274 to a square mile.

Population.

Date.	How ascertained.	Inhabited Houses.	Total Number of Families.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicrafts.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort .	184,546	..	..	..	..	..	..	1,068,000
1821	Under Act 55 Geo. III., c. 120	306,995	357,366	..	..	..	960,119	975,493	1,935,612
1831	Under Act 1 Will. IV., c. 19	330,444	376,051	244,770	62,285	68,996	1,093,411	1,133,741	2,227,152

The general character of the surface is mountainous. The north-western extremity beyond the Shannon is overspread by an irregular group of hills or mountains, of which Slievh Boughty, or Sliebh Baughta, and the Inchiquin Mountains, form part. Two ranges of mountains extend nearly across the province from east to west, enclosing the long narrow basin of the Blackwater. The northern range includes the Commeragh, Knockmeledown (2700 feet high), and Galtee Mountains (3000 feet high); Ballihowra Mountains; Slievh Mish, or Sliebhmish, near Tralee; and at the extreme west, Mount Brandon (3150 feet high), and the heights about Dingle: the southern range includes the Nagle and Bograh Mountains; Magillacuddy's (or Macgillicuddy's) Reeks (3405 feet high) and the other mountains of Killarney; and, in the extreme west, the mountains of Iveragh and Dunkerron. The Shehy and Glanerought Mountains, and other high grounds, are more to the southward. The western side of the province is the most elevated; and the principal streams (except the Shannon) flow between the mountain ranges from west to east.

The mountainous character of the province, and the general direction of the mountain-chains from east to west (or, more accurately, from east-north-east to west-south-west), determine the outline of the coast. From the mouth of Waterford Harbour, the boundary of Munster and Leinster, to Baltimore, the coast runs west-south-west, marked only by small bays, with intervening headlands, and by the æstuaries of several rivers, most of which turn rather abruptly to the south a little above their outfal. These æstuaries form the excellent harbours of Waterford, Dungarvan, Youghal, Cork, and Kinsale. At the south-western extremity of this line of coast is Cape Clear Island, which takes its name from a well-known promontory, the last point of British ground usually seen by vessels in their departure for America, and the first on their return.

The south-western and western coasts from Cape Clear are marked by a succession of bluff promontories, formed by the extremities of the mountain ranges, with the deep intervening bays of Dunmanus, Bantry, Kenmare, and Dingle. From Dunmore Head, which forms the northern extremity of Dingle Bay, the coast stretches away to the north-east, retaining its irregular and broken outline. It is marked by the bay of Tralee and the æstuary of the Shannon.

The chief rivers are the Suir, the Blackwater, the Lee, and the Bandon, all of which, except the Suir, in the upper part of its course, and the others just above their outfal, have a general direction from west to east. There are not many lakes, nor any of great extent; the principal are those of Killarney, which are much resorted to, from the picturesque beauties of the surrounding scenery. The bogs are neither so numerous nor so extensive as in most other parts of Ireland. The province is divided into the six counties of CLARE, CORK, KERRY, LIMERICK, TIPPERARY, and WATERFORD, to the separate articles on which we refer for further information. For ecclesiastical purposes Munster is nearly coincident with the archiepiscopal province of Cashel, which is, after the decease of the present metropolitan, to be united to the province of Dublin. It contains the dioceses of Cashel, Emly, Kilfenora, Killaloe, Waterford, Lismore, Cork, Ross, Cloyne, Limerick, Ardfert, and Aghadoe, several of which are already united, or are to be so at the decease of the present holders, by virtue of the late act for regulating the dioceses of the Irish Established Church.

This district, at an early period, consisted of two districts; one of these, which was sometimes designated South Munster, and included the district of Desmond, and probably of Ormond, comprehended all that part of the province which is south-east of the Shannon (Finglas's *Breviat of Ireland*) and is now divided into the five counties of Waterford, Tipperary, Cork, Kerry, and Limerick. The other part was north-west of the Shannon (Finglas's *Breviat*), and comprehended the present county of Clare. This part was antiently known as Thomond, North Munster, or O'Bryen's Country.

The kingdom of Munster existed at an early period of Irish history; and in the eleventh century Brian, surnamed Boiroime or Boro, acquired so high a reputation for valour and wisdom as to be enabled to usurp the sovereignty of Ireland antecedently held by the king of Meath. [MEATH.] Brian fell at Clontarf, fighting against the Danes and such of the Irish as supported them. The sovereignty of Ireland (which was indeed little more than nominal) did not remain in his family, which at the time of the English invasion seems to have retained only Thomond, the sept or family of MacArthy or MacCarty having acquired the chief dominion in Desmond or South Munster. The supremacy of Roderic O'Connor, king of Connaught and paramount of the Irish princes, was recognised by these chieftains. At an early period of the contest between the Anglo-Normans and the native Irish the prince of Thomond joined the party of the invaders (A.D. 1171); and when Henry II. in person landed at Waterford, the prince of Desmond made his submission (A.D. 1172), and was admitted to retain his principality on condition of homage and tribute. Waterford had been previously taken by storm, and Cork and Limerick were occupied; and the inferior chieftains vied with the superior in the readiness of their submission. Henry's wars having obliged him to weaken his army in Ireland, the natives rose in rebellion, and among them the princes of Thomond and Desmond. When the English rallied, Thomond was the first attacked; Limerick (which appears to have belonged to this principality) was taken (A.D. 1174 or 1175), and O'Brien, after a stout resistance, was obliged to submit (A.D. 1176). The prince of Desmond was also obliged to come to terms with Cogan and FitzStephen, two Norman adventurers, who acquired large possessions round Cork. Dissension among the natives themselves, or between them and the new comers, continued however for a long time to distract the province. South Munster was divided into counties, as at present, in the reign of Henry VIII., when Finglas drew up his 'Breviat;' but Thomond continued till after that time under its native princes. The chief families of the Anglo-Norman race who settled in Munster were the FitzThomases earls of Desmond, the Butlers earls of Ormond, the Geraldines, Barrys, Roches, and Cogans.

In the time of Elizabeth an attempt was made to establish an English colony in the province, on the lands of the earl of Desmond and his adherents, attainted for treason, but the attempt met with but little success. In this period of frequent rebellion an officer governed Munster under the lord-deputy of Ireland, with the title of president. The province was about this time the scene of invasion by a Spanish force, which was obliged to surrender (A.D. 1601-1602.)

Clare, or Thomond, appears to have been formerly considered as belonging to Connaught rather than Munster. It was made shire-ground with Connaught in the eleventh year of Elizabeth's reign. It remained part of Connaught till 1601, when it was added to Munster, but it continued to be included in the Connaught circuit till as late as 1792.

MÜNSTER, one of the three governments into which the Prussian province of Westphalia is divided, is composed of the principality of Münster, the counties of Tecklenburg and Prussian Lingen, and the following mediatised territories, viz. the principalities of Rheina-Wolbeck (*i.e.* the portion not belonging to Hanover), Salm-Aahaus, and Salm-Bocholt, the counties of Horstmar, Recklinghausen, and Steinfurt, and the lordships of Anholt, Dülmen, Gehmen, and Gronau. It is bounded on the north-west by the Netherlands, on the north-east by Hanover, on the east by Minden, on the south by Arensberg and Düsseldorf, and on the south-west by Cleves. Its area is 2800 square miles, and the population, in 1838, was 435,275. It is divided into ten circles. The bishopric of Münster was formerly the largest in the circle of Westphalia, having an area of 3800 square miles, and 350,000 inhabitants. Originally, under the hereditary protectorate of the counts of Tecklenburg, it was elevated, in the twelfth century, to the rank of a principality of the empire. In 1708 a seat and vote in the council of the princes of the empire was granted to the bishop, who was director of the circle; but this grant was never carried into effect. After 1719 the archbishop of Cologne was always bishop of Münster. In 1803 the bishopric was secularised, and divided between Prussia, the princes of Salm-Salm and Salm-Kyburg, the rhinegrave of Salm, and the dukes of Oldenburg, Croy, Looz-Corswaren, and Aremberg. Prussia formed out of its share, which was about 1300 square miles, with 120,000 inhabitants, the principality of Münster, which by the peace of Tilsit, in 1807, was ceded to France, and united with the grand-duchy of Berg, from which a part of it was taken in 1810, and, with portions previously allotted to the above-mentioned princes, was incorporated with the French empire. The congress of Vienna restored to Prussia its principality of Münster, except a small district, together with sovereignty over the parts of the bishopric belonging to the houses of Salm, Croy, and Looz-Corswaren. Oldenburg likewise recovered its share, and Hanover obtained the sovereignty of the mediatised possessions in Münster of the duke of Aremberg.

MÜNSTER, the capital of the whole province of Westphalia, as well as of the government and circle of the same name, is situated on the river Aa, about eight miles above its junction with the Ems, and on the canal leading to Maxhafen. It lies in 52° N. lat. and 7° 30′ E. long., in a flat and moderately fertile country, 190 Paris feet above the level of the sea. It was formerly well fortified, but in 1765 the moat was drained, and the ramparts converted into public walks which surround the city, and are planted with four rows of lime-trees. At the same time the citadel was demolished, and the fine palace of the prince-bishop erected on the site. The town is, on the whole, well built; the houses are lofty, but irregular; those in the market-place have piazzas or colonnades; the streets are broad, and several of the public buildings worthy of notice. Of the eight churches, the principal are—the cathedral, with a chapel containing the monument of bishop Galen (standing in the Close, in Cathedral Square, which is surrounded by fine buildings), adorned with admirable sculptures and possessing a large library; and the church of St. Lambert, built in the finest Gothic style, to the lofty steeple of which the three iron baskets or cages are still suspended which contained the remains of the notorious John Bocholt, or Bockel, commonly called John of Leyden, and his two chief accomplices, who, after obstinately defending the city against the bishop, were made prisoners, and tortured to death with red-hot pincers. [ANABAPTISTS.] Among the other buildings are, the palace of the bishop, the senate-house with its fine Gothic front, the palaces of the barons von Romberg and Droste, and the mansions of several of the nobility. The university was abolished in 1818, and its funds assigned to the Max-Frederic's academy, founded by the king in 1824, to the Roman Catholic seminary, and the gymnasium of Münster and Paderborn. The academy has a theological and a philosophical faculty, and is attended by 350 students. The gymnasium has a library of 25,000 volumes, and is frequented by nearly 400 students. The loss which the citizens sustained by the secularisation of the bishopric has been made up by the city becoming the seat of all the great offices of the province of Westphalia, and still more by the trade in linens, woollens, yarn, Rhenish wine, hams, &c., which has increased in an extraordinary degree within the last twenty-five years. Münster has a surgical school, a veterinary school, a botanic garden, an asylum for the deaf and dumb, and a great number of charitable institutions. The population, in January, 1838, was 19,753.

Münster was founded at the end of the sixth century, and called Meiland, and at the end of the seventh century Miningerode. In 972 it was conquered by Charlemagne, who founded the bishopric, built a fine church and a monastery (*monasterium*), whence it derived its name Münster.

In the many wars which have desolated Germany, Münster was frequently taken; but it is above all celebrated on account of the peace concluded there in 1648, which put an end to the Thirty Years' war. The hall in the senate-house where the treaty was signed is still preserved in the same state, and is adorned with the portraits of all the ambassadors who were engaged in those memorable negotiations.

MÜNSTER, SEBASTIAN, born at Inglesheim, in the palatinate of the Rhine, in 1489, became a Franciscan monk, but afterwards adopted Luther's reformation, and repaired to Basle, where he was made professor of Hebrew, in which language he was very learned. He was also well acquainted with mathematics. He died of the plague, at Basle, in 1552. His works are—1, 'Biblia Hebraica Charactere Singulari apud Judæos Germanos in usu recepto, cum Latina Planeque Nova Translatione, adjectis insuper e Rabbinorum Commentariis Annotationibus, &c.,' fol., Basle, 1534-35; reprinted in 2 vols. fol., in 1546, with considerable additions and corrections. 2, 'Grammatica Chaldaica,' 4to. 3, 'Dictionarium Chaldaicum non tam ad Chaldaicos interpretes, quam ad Rabbinorum intelligenda Commentaria necessarium,' 4to. 4, 'Dictionarium Trilingue,' Latin, Greek, and Hebrew, fol. 5, 'Captivitates Judæorum incerti autoris,' Hebrew and Latin, 8vo. 6, 'Catalogus omnium præceptorum legis Mosaicæ, quæ ab Hebræis sexcenta et octodecies numerantur, cum succincta Rabbinorum expositione et additione traditionum,' &c., Hebrew and Latin, 8vo. 7, 'Organum Uranicum; theorica omnium planetarum motus, canones,' fol. 8, 'Cosmographia Universalis,' fol., 1544, which was translated into German, French, Italian, English, Bohemian, and other languages. It is one of the first universal geographies published in modern times, and is remarkably well executed considering the age in which it was written. The author is most diffuse in treating of Germany and Switzerland. He gives a description of the principal towns, their history, the laws, manners, and arts of the people; the remarkable animals of the country, the productions of the soil, the mines, &c.; and the whole is illustrated by woodcuts, with a portrait of the author. Münster mentions several learned men of his time who furnished him with an account of their respective countries, of Sardinia, the Illyricum, &c. He also gives specimens of several languages. 9, 'Rudimenta mathematica in duos libros digesta.' 10, 'Horologiographia,' being a treatise of gnomonicks.

Münster translated into Latin several works of the learned Hebrew grammarian Elias Levita on the Massorah, and on Hebrew grammar. He also wrote notes to Pomponius Mela and Solinus. His Commentaries upon several books of the Old Testament are inserted among the 'Critici Sacri.'

MUNTJAC, or MUNTJAK. [DEER, vol. viii., p. 363.] In 1838 Mr. Ogilby pointed out the characters of a new species of Muntjac Deer, a male, which had died at the gardens of the Zoological Society in the Regent's Park. This species is about the same size as the common Indian Muntjac, but has a longer head and tail. There was more blue and less red in the general tint of colour, and there was no white over the hoofs, so apparent in its congeners. Mr. Ogilby named the species *Cervus Reevesi*, after J. R. Reeves, Esq., who brought it from China. A female which accompanied the male was living when Mr. Ogilby described the species, and had lately produced a fawn which was spotted, as is generally the case with the young of the

Cervidæ. (*Zool. Proc.*, 1838.) Col. Sykes states that the *Cervus Muntjak* is the *Baiker* of the Mahrattas, and that it is a native of the Western Ghauts of Dukhun (Deccan), but is never seen on the plains. (*Zool. Proc.*, 1831.)

MUONIO-ELF. [Bothnia.]

MURA'D (AMURA'T) I., son of Orkhan, sultan of the Ottomans, succeeded his father, A.D. 1360, when he was forty-one years of age. He fixed his residence at Adrianople, where he raised a handsome mosque, which still exists. He conquered part of Macedonia and Thessaly, concluded a treaty of peace and alliance with John Palæologus, emperor of Constantinople, and married the daughter of the despotos or prince of Servia. Murad paid great attention to the discipline of his army, and especially of his infantry: he founded the corps of Janizaries, which afterwards contributed greatly to the extension of Turkish conquest. [Janizaries.] Contuz, the son of Murad, and Andronicus, the son of John Palæologus, fought together against the Bulgarians and other Sclavonian tribes, whom they defeated at Sirmium on the Danube. An intimacy grew up between the two young princes, of which Andronicus availed himself to persuade his friend to revolt against his father; and whilst both Murad and John Palæologus were in Asia, the two younger princes jointly assumed the sovereign authority in Europe. Murad however soon came back, bringing with him the Greek emperor; the troops, which were chiefly Turkish, returned to their allegiance; and the two young men, having shut themselves up in the town of Demotica, were taken prisoners. Murad sent Andronicus to his father at Constantinople, insisting upon his immediate punishment. John Palæologus ordered the eyes of Andronicus to be put out, but the operation was performed only upon one. Murad caused both his son's eyes to be put out, after which we hear no more of the young prince. Some time after, Manuel, the second son of John Palæologus, whom his father had associated with him in the empire, having given cause of suspicion to Murad, was besieged by the sultan in Thessalonica, whilst his own father did not dare to assist him. Manuel surrendered the town and cast himself on the mercy of the sultan, who forgave him. John Palæologus, ashamed of his humiliating condition, proceeded to Western Europe, leaving Manuel to govern in his absence. In the meantime Murad extended his power into Asia Minor, and annexed Phrygia to his dominions; whilst his general Karatine conquered a great part of Albania, sending an immense number of women and children across the Straits of Gallipoli as slaves into Asia. Lazarus, prince of Servia, alarmed at the progress of the Ottomans, formed a league with the Hungarians, Dalmatians, and other neighbouring nations, and led his troops in person against Murad, who met him in the plains of Cassovia. A fearful battle took place, A.D. 1389, in which the Turks had the advantage, and totally defeated the Christians. Lazarus himself was taken prisoner. Murad, while inspecting the field of battle after the fight was over, received a deadly blow from a wounded Albanian who was lying on the ground near him. The Turkish soldiers, in revenge, massacred all the prisoners, including the prince of Servia. Murad himself died in a few hours, after a reign of thirty years, and was succeeded by his son Bayazid. He was a strict observer of the religion of the Korân, severe but just, and simple in his dress and habits. His body was interred with those of his ancestors, at Brusa in Bithynia.

MURAD II., son of Mahomet I., succeeded his father A.D. 1421, being then twenty-two years of age. An impostor had made his appearance in his father's lifetime, pretending to be Mustapha, Bayazid's eldest son, who had fallen in the battle of Angora, in 1401, against Tamerlane. The Greek emperor, pretending to believe him, protected him against the wrath of Mahomet; and, after the death of the latter, actually entered into a treaty with him, and acknowledged him as sultan. Murad was then at Brusa. The pretended Mustapha established his court at Adrianople, and was acknowledged by several pashas and other officers. The first army which Murad sent against him was defeated; but Murad soon after took the field in person, and being assisted by the Genoese, who furnished him with vessels to carry his army across the Straits of Gallipoli, he defeated the troops of Mustapha, took Adrianople, and, having seized the pretender, had him hanged, A.D. 1422. Murad then turned against Manuel, ravaged Macedonia and Thracia, and threatened Constantinople; but Manuel succeeded in stirring up another insurrection in Asia, in favour of another Mustapha, Murad's younger brother. Murad was obliged to leave Europe to quell the insurrection, and soon after the Greek emperor died, A.D. 1424, leaving to his successor, John Palæologus II., the broken remains of his empire. Murad dispersed the insurgents at Nicæa, and had his two brothers strangled, in order to take away all pretext for further insurrections. On his return to Europe, he obliged John Palæologus to pay him tribute. Meantime the Venetians had taken possession of Thessalonica with the consent of the inhabitants. Murad laid siege to it, and took it, after a long resistance, in 1429, when the town was sacked, and all the surviving inhabitants were carried into slavery. Murad afterwards marched against Servia, although one of his wives was Mary, sister of George, the despotos or prince of that country. He took Semendria, and obliged George to take refuge at the court of Ladislaus, king of Hungary and Poland, to whom he gave up the stronghold of Belgrade. The gallant Hunnyades, at the head of the Hungarians, having defeated the Turks, Murad entered into a truce of ten years with Ladislaus, who swore to observe it faithfully; but being encouraged by the Venetians, by the woywode of Valachia, and by the pope himself, Eugenius IV., who sent him Cardinal Julian Cesarini to quiet his scruples, by telling him that an oath taken to an unbeliever was not binding, Ladislaus broke the truce, and advanced with a large army of Hungarians, Poles, Valachians, and others, to Varna, where he was met by Murad. A desperate battle followed: Hunnyades defeated the left wing of the Turks; but not being supported by the rest, the whole Christian army was cut to pieces, A.D. 1444. Ladislaus himself fell, together with the legate Cesarini.

Murad soon after abdicated the throne in favour of his son Mahomet, then fifteen years old, and retired to Magnesia. But seeing the disorders which broke out in the empire, owing to the youth of his son, he resumed his authority, quelled the incipient anarchy, and turned his arms against Scanderbeg, who however repulsed him at the siege of Croia. He then marched against Hunnyades, whom he defeated with great loss. Murad died of illness at Adrianople, in 1451, after a reign of thirty years. Murad possessed several great qualities, but was sensual and cruel. He was succeeded by Mahomet II.

MURAD III., son of Selim II., succeeded his father in 1575, being then thirty-one years old. In 1578 he began a war against Persia, which lasted till 1590, when peace was made, Persia being obliged to resign to the Turks the towns of Tabriz, Genge, Shirvan, and Khars, with their territories. In 1592 he sent an army into Hungary, which repulsed the Austrians near Gran, and took the fortress of Raab. But afterwards the Turkish armies met with reverses, and the prince of Transylvania having joined the emperor, and the woywode of Valachia having revolted against the sultan, the Turks lost Orsowa and Silistria, with a vast number of men. In the midst of these disasters, Murad died of the stone, at Constantinople, in January, 1595, and was succeeded by his eldest son Mahomet. Murad was fond of war, and yet never went to the field in person. (Mignot; Knowllys.)

MURAD IV., nephew of sultan Mustapha I., who was deposed, in 1622, by the Janizaries, succeeded his uncle when fourteen years old. The first years of his reign were marked by reverses on the side of Hungary as well as on the frontiers of Persia, the Ottomans being then at war both with the emperor and the shah; but in 1627, sultan Murad being now of age, and having concluded peace with the emperor Ferdinand II., turned all his attention towards Persia, and laid siege to Bagdad, where the Persians had a garrison. Meantime the Janizaries having broken out into insurrection, Murad showed great spirit, and succeeded in restoring obedience. In 1635 he repaired in person to the army against Persia, but was obliged to retire. In 1637, having made great preparations, he again took the field in person, and in the following year captured Bagdad after an obstinate defence, when he ordered the whole population, without distinction of age or sex, to be massacred. In 1639 he returned to Constantinople, and made peace with Persia, Bagdad remaining in the possession of the Turks. In 1640 Murad died of a debauch in drinking, to which he was much addicted. His severity repressed the disorderly spirit of the soldiers, and the rebellions of the pashas during his reign, which was upon the whole a successful one;

but his cruelty and debauchery have marked his character as one of the worst princes of the Ottomans. (Rycault, *Turkish History*.)

MURÆ'NIDÆ, or ANGUI'LLIDÆ, a family of fishes belonging to the section of the Malacopterygii called *Apodes*. These fishes have an elongated and often cylindrical body, covered by a thick and soft skin in which the scales are deeply imbedded and scarcely apparent. They have no cœca, but nearly all are furnished with a natatory bladder. In the first group, which constitutes the great genus Muræna of Linnæus, the opercula are small and enveloped in the skin; the gill-opening is small, and is situated far back, an arrangement which, by more completely protecting the branchiæ, permits these fishes to live a long time out of water: they have no ventral fins.

The species of the genus *Anguilla* are distinguished by the possession of pectoral fins; the dorsal, anal, and caudal fins are united. The dorsal commences at a considerable distance behind the pectorals; the upper jaw is shorter than the lower; the gills opening by a small aperture on each side, situated beneath the pectoral fin. Three (if not four) species of *Anguilla*, or eel, are found in this country—the sharp-nosed eel, the broad-nosed eel, and the snig.

The sharp-nosed eel (*Anguilla acutirostris*, Yarrell) may be distinguished, as its name implies, by its comparatively narrow and sharp muzzle. 'The head is compressed, the top convex, depressed as it slopes forwards; the eyes small, placed immediately over the angle of the mouth; irides reddish-yellow: the jaws very narrow, slightly rounded at the end; the lower jaw the longest; nostrils with two openings on each side, one tubular, the other a single orifice; both jaws furnished with a narrow band of small teeth; gape small; various mucous pores about the mouth and other parts of the head; gill-opening a small aperture immediately before and rather below the origin of the pectoral fin; the scales on the body rather small; dorsal fin extending over more than two-thirds of the whole length of the fish; anal fin occupying more than half of the whole length; both united at the end, forming a tail; the number of rays in the first fins not easily ascertained, from the thickness of the skin; the lateral line exhibits a long series of mucous orifices; vertebræ 113. The vent includes four distinct openings, the most anterior of which leads upwards to the intestine, the posterior to the urinary bladder, in a direction backwards, and one elongated lateral opening on each side communicating with the cavity of the abdomen, as in other bony fishes.' Colour of the upper surface of head and body very dark olive-green; under surface silvery: the colouring however varies somewhat according to the nature of the water in which the animal lives, as in other fishes; in those found in clear streams the colours are bright, whilst those found in muddy waters are dusky.

This species is common in streams, lakes, &c., throughout the country. The eel is said to be averse to cold, and in the autumn migrates down the rivers to reach the warm brackish water, where it passes the winter and deposits its spawn. In the spring the young fry may be seen making their way up the streams, sometimes in immense numbers. Such a desire do the young eels (about three inches in length) appear to have to go up the stream, that their course is not easily stopped. The writer of this has seen a flood-gate, six or seven feet in height, in parts covered with them, and has observed many succeed in passing over this perpendicular barrier, by availing themselves of the trickling water which escaped through the crevices of the wood-work.

Those eels which live in ponds, and cannot therefore migrate, bury themselves in the mud during the winter months. In these cases however they will sometimes leave the water, and, availing themselves of the wet grass during the night, travel considerable distances, in order to reach a stream; they are known also to leave certain ponds, the water of which does not suit them, and to make their way over land to other and more favourable situations.

The question as to whether the eel be an oviparous or viviparous fish has been much discussed; many have imagined that it brought forth its young alive, but there appears to be better grounds for the belief that it is oviparous.

'The London market,' Mr. Yarrell informs us, 'is principally supplied from Holland by Dutch fishermen. There are two companies in Holland, having five vessels each: their vessels are built with a capacious well, in which large quantities of eels are preserved alive till wanted. One or more of these vessels may be constantly seen lying off Billingsgate; the others go to Holland for fresh supplies, each bringing a cargo of 15,000 to 20,000 pounds weight of live eels, for which the Dutch merchant pays a duty of 13*l.* per cargo, for his permission to sell.'

The broad-nosed eel (*Anguilla latirostris*, Yarrell) is not uncommon, and is often found in the same waters as the sharp-nosed species, from which it is readily distinguished by the comparatively greater breadth of its head, and the situation of the eye, which is placed in advance of the angle of the mouth. The body is moreover thicker in proportion to its length, the teeth are more numerous, larger, and stronger; the dorsal fin commences farther back; the dorsal and anal fins are much deeper and thicker. The number of vertebræ is 116.

The snig (*Anguilla medirostris*, Yarrell) is in some respects intermediate between the common or sharp-nosed species and the broad-nosed eel. The general colour above is olive-green, and beneath yellowish-white. 'In the comparative breadth of the nose, the snig is intermediate in reference to the sharp and broad nosed eels, but rather more resembles that with the sharp nose,' says Mr. Yarrell; 'it has a slight but elongated depression extending from the anterior edge of the upper jaw to the upper and back part of the head; the tubular openings of the nostrils are longer, and the mucous pores about the lips larger and more conspicuous; both jaws rounded at their extremities, the lower one the longest; teeth longer and stronger than in the common sharp-nosed species; gape large; the angle and the posterior edge of the eye on the same vertical line; the pectoral fins, the commencement of the dorsal fin, and the vent, are each placed nearer the head than in either of our fresh-water eels.'

Besides the distinguishing characters above pointed out there are others, the most important of which perhaps is the difference observable in the form of the vertebræ—see Yarrell's *History of British Fishes*, where the skulls and adjoining vertebræ of these three species are figured.

The conger eel (*Anguilla conger*, Shaw; *Conger vulgaris*, Le Congre, Cuvier) is readily distinguished from the fresh-water species by the upper jaw being the longest, and the dorsal fin commencing much nearer the head—characters which have induced Cuvier to separate it from them as a subgenus.

This marine species is common on many parts of our coast, and is indeed found in most of the European seas. It attains a very large size, being often five or six feet in length and occasionally as much as ten feet or upwards; the thickness bearing about the same proportion to the length as in the common eel. The upper parts of the body are brownish and the under parts dirty-white; dorsal and anal fins whitish margined with deep bluish-black; the lateral line is spotted with white.

In the Mediterranean another species of conger (the *Anguilla myrus*) is found. It resembles the common species, but is of a smaller size, and is known by there being spots on the snout, a band across the occiput, and two rows of dots on the nape, all of which are of a whitish colour.

Nearly allied to *Anguilla*, is the genus *Ophisurus* of Lacépède, the species of which differ from the true eels by their dorsal and anal fins terminating before they reach the end of the tail, which has no fin. The posterior orifice of the nostrils opens on the edge of the upper lip.

One species inhabits the Mediterranean, the *Ophisurus serpens*; it is about five or six feet in length and about three inches in thickness, of a brown colour above and silvery beneath; the snout is slender and pointed.

In some species of this genus the pectoral fins are very small, and in this respect approach the genus *Muræna*, in which there are no pectorals; their branchial openings are small; the opercula and branchiostegous rays are concealed by the skin.

Many of the species of this genus are beautifully mottled or spotted; several are found in the Mediterranean, and one species, the *Muræna Helena*, L., has been found on the British coast.

Several other genera belonging to the present family,—among which the genus Gymnotus (which contains the electric eel) may be mentioned,—are noticed under their proper heads.

MURAT, JOACHIM, one of the most celebrated of the French imperial marshals, and by Napoleon created king of Naples, was born at a village in Perigord, in 1767. His father was a country innkeeper, who had been a steward to the great family of the Talleyrands, and through their interest young Joachim was placed at the college of Cahors, and destined for the church; but his disposition and conduct little fitted him for the sacred profession, and an amour led him to discard the ecclesiastical habit and enlist into a regiment of chasseurs, from which he was soon after dismissed for insubordination. Returning to his native village, he took charge of his father's horses until the breaking out of the Revolution, when he obtained his enrolment into the constitutional guard of Louis XVI., from which he passed as sub-lieutenant into a regiment of chasseurs. During the reign of terror he professed himself an enthusiastic champion of liberty and equality, and rose rapidly to the rank of colonel; but his Jacobin predilections did not prevent him from making himself useful to Bonaparte in the affair of the Sections in 1795; and he was rewarded by being placed on the personal staff of the future emperor in his glorious Italian campaign of 1796.

From that hour the fortunes of Murat closely followed those of his patron. The fiery valour which the 'handsome swordsman' (beau sabreur), as he was called, showed in a hundred fights, the splendid though somewhat fantastic costume in which he delighted to figure, and the love of daring achievement which threw an air of antient romance over all his actions, invested him, in the eyes of his admiring fellow-soldiers, with the renown of some paladin of old; and his enterprising talents in the field obtained for him the graver distinction, in the cool judgment of Napoleon himself, of 'the best cavalry officer in Europe.' He commanded that arm in the campaigns of Egypt, Italy, Austria, and Prussia; and in all, at Aboukir, Marengo, Austerlitz, Jena, Eylau, and Friedland, his services were brilliantly conspicuous.

After the Egyptian campaign, he obtained the hand of Caroline, youngest sister of Napoleon; and in 1806 was raised to the dignity of a sovereign prince, and recognised by the continental powers as grand-duke of Berg and Cleves.

In 1808 he commanded the French army in Napoleon's unprincipled invasion of Spain; from which country he was recalled and sent to Naples to ascend the throne of that kingdom, vacated by the elevation of Joseph Bonaparte to the Spanish crown. In 1812 he accompanied Napoleon on the expedition to Russia, in the command of the cavalry of the grand army—the most numerous and splendid body of horse perhaps which the world has ever seen arrayed in the ages of civilised warfare. During the advance to Moscow, Murat displayed his accustomed prodigies of personal valour; but the reverses of the retreat disgusted him; reproaches which passed between Napoleon and himself aggravated the recollection of some former slights and wrongs of which he deemed that his brother-in-law had been guilty to him; and although he again served the emperor in the campaign of 1813, he finally, after the disastrous battle of Leipzig, deserted his waning fortunes, and allied himself with his enemies. By this defection he for a time saved his own throne; but the delay of the Congress of Vienna to recognise his regal title alarmed his suspicions, and hurried him, on the re-appearance of Napoleon in France, in 1815, into hostilities against the allied powers. In an attempt to induce the Italians to arm for their national independence, he signally failed; he was compelled to flee from his kingdom; and desperately landing again in arms on the coast of Calabria with a few followers, he was captured, and shot by the base sentence of a Neapolitan court-martial. As a sovereign Murat had shown himself mild, liberal, and merciful; as a politician he was weak, vacillating, and faithless; in the field the 'best cavalry officer in Europe' was assuredly no general; as a man he had many warm and noble feelings; but of fixed principle, either in private or public life, he was utterly destitute.

MURATO'RI, LUDOVI'CO ANTONIO, born in 1672, at Vignola, the birth-place of the architect Barocci, in the Modenese territory, studied at Modena, and showed an early aptitude for historical and philological studies. He entered holy orders, and at the age of three-and-twenty he was appointed one of the librarians of the Ambrosian library at Milan. In that collection he discovered several inedited MSS., from which he made extracts, which he published with notes and comments, under the titles of 'Anecdota Latina,' and 'Anecdota Græca.' Some years after he was recalled to Modena by the duke Rinaldo, who gave him the situation of librarian of the rich library of the house of Este, a place which he retained for the rest of his life.

After this appointment Muratori devoted himself entirely to the study of the Italian records of the middle ages; and after many years of assiduous labour he produced his great work, 'Rerum Italicarum Scriptores, ab anno æræ Christianæ quingentesimo ad millesimum quingentesimum,' 28 vols. fol. The first volume of this immense collection was published in 1723, and the last appeared in 1751. Several princes and noblemen defrayed the expenses of the publication; sixteen of them contributed 4000 dollars each. In this collection Muratori has inserted all the chronicles of Italy during the middle ages which he could discover, most of which were inedited, and has accompanied them with valuable commentaries. Some of the texts had been already published by Grævius, in his 'Thesaurus Antiquitatum et Historiarum Italiæ,' but they were mostly confined to the last century or two of the period of a thousand years embraced by Muratori. In seeking after the historical records of the middle ages, Muratori collected also a vast number of documents concerning the social, civil, intellectual, and political condition of Italy during that long period, which he transcribed and commented upon, and he published the whole in seventy-five dissertations: 'Antiquitates Italicæ medii ævi, sive Dissertationes de moribus Italici populi, ab inclinatione Romani Imperii usque ad annum 1500,' 6 vols. fol., 1738-42. 'I have treated first,' says the author in his preface, 'of the kings, dukes, marquises, counts, and other magistrates of the Italian kingdom; after which I have investigated the various forms of the political government, and also the manners of the private citizens; the freedom and franchises of some classes and the servitude of others; the laws, the judicial forms, the military system; the arts, sciences, and education; the progress of trade and industry; and other matters of social and civil history.'

Muratori has been truly called the 'Father of the history of the middle ages.' Subsequent historians, such as Sismondi and others, are greatly indebted to Muratori, without whose previous labours they could not have undertaken or completed their works. Muratori wrote an abridgement of his Dissertations in Italian, which was published after his death: 'Dissertazioni sopra le Antichità Italiane,' 3 vols. 4to., 1766. He also wrote in Italian, 'Annali d'Italia dal principio dell' era volgare sino all' anno 1750,' 12 vols. 4to., 1762. It is the first general history of Italy that was published, and is a useful book of reference. It has been continued by Coppi down to our own times: 'Annali d'Italia in continuazione di quelli del Muratori, dal 1750 al 1819, 4 vols. 8vo., Rome, 1829. Another work of Muratori is his 'Novus Thesaurus veterum Inscriptionum,' 4 vols. fol., 1739, in which he has inserted many inscriptions unknown to Gruter, Spon, Fabretti, and other archæologists who had preceded him.

His work entitled 'Antichità Estensi,' in 2 vols. fol., Modena, 1710-40, is the Fasti of the house of Este in its various branches. He also wrote several historico-political treatises in support of the rights of his sovereign the duke of Modena over the towns of Ferrara and Comacchio, which had been seized by the court of Rome: 'Questioni Comacchiesi,' Modena, 1711; 'Piena esposizione dei Diritti della Casa d'Este sopra la Citta di Comacchio, 1712; 'Ragioni della serenissima Casa d'Este sopra Ferrara,' 1714.

Among Muratori's other works we must mention—1, 'Governo politico, medico, ed ecclesiastico della Peste,' 1720, written on the occasion of the plague of Marseille, and showing the methods required to counteract it. 2, 'Difetti della Giurisprudenza,' 1742, in which he shows the defects of judicial forms in most countries. 3, 'Morale Filosofia,' 1735. 4, 'Istituzioni di pubblica felicità, 1749. 5, 'Della regolata divozione dei Fedeli.' In this last treatise, Muratori, who, though sincerely pious, was too enlightened to be superstitious, combated several popular devotional practices which were merely external, and recommended in preference internal habits of self-examination and prayer. His enemies accused him of heresy. Muratori wrote to the pope Benedict XIV., to explain his meaning and ask for his judgment on the matter of contention. That enlightened pontiff wrote him a kind letter in answer, telling him that 'those passages in his works which were not found acceptable to Rome did not touch either the dogma or the discipline of the church; but that had they been written by any other person the Roman congregation of the Index would have forbidden them; which however had not been done in the case of Muratori's works, because it was well known that he, the pope, shared in the universal esteem in which his merit was held,' &c.

The character of Muratori is clearly seen in his works. Modest though learned, indefatigable, intent upon the improvement of mankind, charitable and tolerant, sincerely religious and strictly moral, he was one of the most distinguished and yet most unobtrusive among the learned of Italy.

He was rector of the parish of Pomposa at Modena, but his literary occupations did not make him neglect his flock: he assisted his parishioners with his advice and his money; he founded several charitable institutions, and rebuilt the parish church. He died at Modena, in 1750. His minor works were collected and published at Arezzo, in 1787, in 19 vols. 4to. His tomb is in the church of S. Agostino at Modena, near that of his illustrious countryman Sigonio.

MURAVIEV, MIKHAEL NIKITITCH, a Russian author of some distinction, was born at Smolensk, October 15-27, 1757. His literary acquirements and talents obtained for him the notice of Catherine the Great, by whom he was appointed, in 1785, preceptor to the young grand-dukes Alexander (afterwards Alexander I.) and Constantine; and it was for the instruction of his imperial pupils that he wrote the greater portion of his prose works, consisting of historical and moral pieces, among which are his 'Epochs of the Russian Empire,' and 'Geographical Sketches of North and South Russia.' His 'Dialogues of the Dead' are also intended to characterise the more remarkable personages of Russian history, and are therefore altogether in a different spirit from those of Lucian, Fontenelle, and their imitators, who employed that form of composition chiefly as the vehicle of satire. One of his most admired productions is his 'Oskold,' which describes the march of the northern nations against Constantinople, and which, though in itself a mere fragment, proves its author to have possessed talents capable of giving his countrymen a prose epic. To these productions, all of which are distinguished by great correctness and energy of style, and no less by the moral feeling which pervades them, may be added his 'Letters of Emilius,' and a series of reflections or sketches, entitled 'The Solitary of the Suburb.' His poetical compositions are of less importance; for though admired in their day, they now possess little interest. Muraviev died June 29 (11th July), 1807, and his historical pieces were collected and edited by Karamzin in 1810. The first complete edition of his works appeared in three large volumes 8vo., 1829, to which is prefixed a biographical and critical sketch, written by his nephew and pupil, Constantine Batiushkov, the distinguished poet.

MURCHISONITE, a variety of moon-stone or felspar. Occurs in crystals and in crystalline masses; primary form an oblique rhombic prism. Fracture uneven. Hardness 5·5, 6·0. Transparent. Opaque. Colour white, with a slight red tint. Specific gravity 2·509. Occurs in the new red-sandstone near Exeter.

Analysis by Phillips—

Silica	68·6
Potash	14·8
Alumina	16·6
	100·

MU'RCIA, a province or kingdom of Spain, situated between 37° 10′ and 39° 10′ N. lat. and 50′ and 3° 5′ W. long. It is bounded on the north by the province of Cuenca in New Castille, on the north-west by the province of La Mancha, on the west by the kingdoms of Jaen and Granada in Andalucia, on the east by that of Valencia, and on the south by the Mediterranean. It is about 120 miles long from north to south, and 110 in extreme breadth from east to west. Its area is 5931 square miles. Its population is computed at more than 490,000.

The province is divided into nine *partidos*, or districts, viz. those of Murcia, Cartagena, Lorca, Chinchilla, Villena, Cieza, Hellin, Albacete, and Segura de la Sierra, each of which has a capital town of the same name. The province contains 212 cities, towns, and villages, one bishopric, six military commanderies, 91 religious houses, 12 hospitals, four hospices, eight colleges, and two seaports, Cartagena and Las Aguilas, the former being one of the grand depôts of the marine. In military matters the province is subject to the captain-general of Valencia; in civil and criminal, to the chancery of Granada. The annual returns to the royal exchequer amount on the average to 3,581 250 *reales*, or about 38,000*l.* sterling.

The province is intersected by numerous ranges of mountains, which are separated by extensive valleys and plains. The principal chains are the sierras of Pinoso and Losillas in the west, those of Orihuela and Monteagudo in the east, those of Chinchilla and Almansa in the north, and that of Carrascoi in the south-east. Those of Tercia, Espuña, Muella, and Castellar intersect the province from south-west to north-east. The sierra of Espuña is the loftiest in Murcia.

The soil is generally parched for want of water, the only rivers being the Segura and its tributaries the Mundo, Taivilla, Moratalla, Caravaca, Quipar, and Sangonera; the valleys in which these rivers flow are in general very fertile, particularly that called the Huerta or Garden of Murcia, but the unwatered low lands are arid and sterile as the desert, and these, with the mountains, which are mostly bare and uncultivated, cover two-thirds of the surface of the province. Both mountains and plains however yield in parts excellent pasturage.

The coast between Cartagena and the kingdom of Granada presents a series of steep and lofty cliffs; eastward from that port it is low and sandy; the whole coast is studded with watch-towers at intervals.

The climate of Murcia is varied; temperate and delightful on the sea-coast and among the mountains, but intensely hot in the plains. Storms are not unfrequent in the spring; the summers are exceedingly hot, the mercury often rising above 100° Fahr. in the shade; the autumns are delightful, and the winters are so mild that ice and snow are almost unknown, and the foliage is always green. Clouds and fogs are rare, and the sky is throughout the year so blue and bright as to have gained for Murcia the title of 'the most serene kingdom.' But on the other hand rain is very scarce; in some parts a whole year will elapse without the fall of a shower.

Of the geology of this province little is known: the mountains are principally of limestone; the Sierra de Segura in the west is one mass of grey and white limestone; in the vale of Segura greenstone is found; trachyte and other volcanic rocks at Almazarron on the coast, where is also an aluminous rock, which is quarried. The chain between Murcia and Cartagena is of sandstone, with marl, lignite, and gypsum; the latter is also found in great quantities on the chalky range to the east of the city of Murcia. Porphyry, primary slates and schist, fine marbles, rock-crystal, freestone, bole, and nitre are found in various parts of the province. Near Hellin is a mine of sulphur, at Villena a saltpit, and saltpetre abounds in the neighbourhood of Cartagena. There are several lead-mines in the province, and report says that there are veins of silver and copper, but they are not worked; there are also some hot-springs and cold mineral waters.

The vegetable productions are wheat, of which the ordinary harvest amounts to 701,923 *fanegas*, or about 1,081,086 bushels, but in rainy seasons to nearly double that quantity; barley, rye, rice, maize, vegetables, and fruit of superior quality, particularly oranges, lemons, melons, and pomegranates. The most common trees are the mulberry and the olive; evergreen and other oaks, poplars, and carobs are in some parts numerous. The pines on the Sierra de Segura form the largest forest in the south of Spain. The nerium oleander, cistus, tamarisk, passerina hirsuta, prickly pear, chamærops humilis, and American aloe grow wild and luxuriantly. Hemp, flax, and sugar-canes are of superior quality, but little cultivated. Great quantities of barilla are produced on the sea-coast; silk and oil are also extensively produced, with some saffron and wine. The *esparto* rush grows most luxuriantly in the neighbourhood of Cartagena, as in the time of the Romans, who, on this account, gave that city the name of Carthago Spartaria.

Cattle are not numerous in Murcia; they are principally sheep and goats, horned cattle being rare; the pigs are very fine. Game is found in vast quantities; fish is abundant on the coast. Wolves, foxes, and wild boars inhabit the mountains.

Of manufactures there are very few, and of none enough to supply the consumption of the province. The principal are silk, which is wrought into ribands, taffetas, and velvets, all of inferior quality; knives and other cutlery are made at Albacete, a small quantity of soap at Villena and Murcia, and a little earthenware, with some saltpetre and gunpowder

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at the latter city; the manufactures of coarse linen, brandies, hemp, and flax are very insignificant.

Commerce in Murcia is at a very low ebb, owing to the indolence of the inhabitants in agriculture and manufactures. If the wretched state of the roads did not prevent much intercourse with the rest of Spain, the port of Cartagena, which is esteemed the best in the country, would probably be made the outlet for the exports of the inland provinces. The other seaport, that of Las Aguilas, a small town built by Charles III., is now falling into decay. Near the confines of Valencia is a singular land-locked bay, ten miles long by three broad, called La Encañizada de Murcia, but it is adapted only to very small vessels. Corn and wine are exported when the harvest or vintage is good, otherwise they are imported from Valencia; the wine is sent to Madrid, and its average value (according to Laborde) was, at the close of the last century, 32,000*l.* sterling. Silk to the amount of 230,000*l.* is exported to Estremadura and New Castille; of barilla, above 100,000*l.* to foreign countries; of cutlery 5000*l.*, and of saffron 4700*l.* to Valencia, New Castille, and La Mancha; and of articles made of the esparto-rush, 4000*l.* to Madrid and other parts of New Castille.

Murcia imports fruit and vegetables from Valencia; beef and mutton, oil, spices, ironware, linen and woollen goods, and many silk stuffs, for there is not industry enough in the province to manufacture the raw produce.

The principal towns in this province are, Murcia, the capital; Cartagena [CARTAGENA;] Lorca [LORCA]; Chinchilla, with 13,000 inhabitants; Albacete, with 11,500; Villena, with 9500; Hellin, with 8000; Cieza, with 6500; Almanza, the Almantica of the Romans, with 6000; Segura de la Sierra, with 4000; Jumilla, with 8000, celebrated for the battle fought in its neighbourhood in 1707, which secured the crown of Spain to Philip V., the first of the Bourbon dynasty; Tutana, with 12,000; Alhama, with 4000, renowned for its baths and hot-springs; and Molina, with 3000 inhabitants.

The Murciano is tall and well-made, with good features but a sallow livid complexion, and very African in appearance. His leading characteristic is sloth, for he is pre-eminently the sluggard of Spain, and spends the greater part of his time in sleep or smoking. He is gloomy and morose in disposition, yet very choleric, litigious, and revengeful; suspicious and frugal, and therefore not fond of society or amusements; bigoted to old customs, and profoundly ignorant. The women are said to be mild and amiable, and less attentive to dress than most of their countrywomen. They wear the national costume—the *basquiña* and *mantilla*. The peasantry wear close-fitting caps, white jackets, loose and short linen drawers girt round the middle with red woollen sashes, sandals of esparto rush; and long narrow plaids of striped wool. The language of Murcia is Castillian, corrupted by Arabic and Valencian.

Murcia was the part of Spain first colonised by the Carthaginians, who, about B.C. 202, founded New Carthage, now Cartagena. It passed, with the rest of the peninsula, under the dominion of the Romans and Goths; from the latter it was conquered, A.D. 552, by Justinian, emperor of the East, and it remained in the hands of the Greeks till 624, when it was recovered by the Gothic king Suintilha. In 712 it was conquered by Abdalazis, son of Muza, the Arab invader of Spain. It continued subject to the khalifs of Cordoba till A.D. 1144, when, after the disruption of that khalifate, it fell under the dominion of the kings of Granada; but in 1221 was re-annexed to Cordoba. In 1239 it was raised into a distinct kingdom by Hudiel, who the following year submitted to Ferdinand the Saint, king of Castille, consenting to pay tribute on condition of being allowed to retain the crown for life. In 1264 he endeavoured to regain his independence, but was conquered and dethroned in 1266 by Alonso X. of Castille and James I. of Aragon. Murcia has ever since remained in the hands of the Christians, and now forms one of the kingdoms of Spain.

(Miñano, *Diccionario Geografico-Estadistico de España y Portugal*; Laborde, *Itinéraire Descriptif de l'Espagne*; Townsend's *Journey through Spain*; Cook's *Sketches in Spain*; Mariana, *Historia General de España*; Conde, *Los Arabes en España*.)

MURCIA, a city of Spain, the capital of the province of that name, lies in 38° 2′ N. lat. and 1° 14′ W. long. It is distant 228 miles from Madrid, 36 from Cartagena, and 48 from Lorca, and is situated in a valley on the left bank of the river Segura. This valley is called the Huerta or Garden of Murcia; 'in beauty,' says Townsend, 'it exceeds everything I had seen in Spain.' Its soil is a rich loam well watered by means of Moorish reservoirs and water-courses; and in fertility it yields to no part of the Peninsula. Mulberries, olives and corn, hemp and flax, are its chief produce, but with these are mingled groves of fig and orange trees and clusters of date-palms. Though in length only 24 miles, and in breadth 5 or 6, it is said to contain more than a third part of the population of the whole province.

The city of Murcia is first mentioned in history under the name of D'Orcola, just before the invasion of the Arabs, by whom it was besieged and taken, A.D. 714. It continued subject to the khalifate of Cordoba till 1144, when it was annexed to the kingdom of Granada; but in 1221 it became again subject to Cordoba, and in 1239 it was made the capital of a distinct kingdom by Hudiel, who the next year submitted to be tributary to Ferdinand the Saint, king of Castille. In 1264 he revolted, and was conquered by Alonso X. of Castille, in 1266; since which time Murcia has remained in the hands of the Christians.

Murcia at the present day contains about 35,000 inhabitants. It is the see of a bishop, suffragan of Toledo, whose diocese comprehends almost the whole of the province. The principal buildings are the cathedral, 10 other parish-churches, 21 convents, 12 for monks and 9 for nuns (suppressed in 1835), 5 colleges, a casa de misericordia, or hospital, the bishop's palace, the town-hall, the granary, the custom-house, and a house for the public weighing of silk. It has also 33 schools, 2 public libraries, 16 *posadas* or inns, and several manufactories. The cathedral is of freestone and marble, very spacious, richly decorated externally, but heavy and gloomy within. The lofty square tower attached to it is ascended by a spiral slope without steps.

Murcia was formerly fortified, but is now open on every side. Four of its antient gates however remain. The streets are narrow, crooked, and irregular, but clean; the handsomest is that of La Traperia. The houses are mean; some of the most antient have fronts decorated with grotesque sculpture of bad workmanship; many have gardens attached, filled with orange or palm trees. There are many squares; the principal are those of Santa Olalla, Del Esparto, San Domingo, Santa Maria, and Los Toros, where the bullfights are held. A handsome bridge of two arches connects the city with the suburb of San Benito on the right bank of the Segura. Along the left bank is a promenade with handsome houses. Three other well-shaded promenades are in the vicinity of the city, but they are little frequented by the citizens.

The commerce and manufactures of the city are very inconsiderable, yet it is the centre of the industry of the province. It has 5 potteries, 10 factories of cloth, 1 of soap, 1 of white-lead, 6 tanneries, 2 oil-mills, 6 establishments for the spinning of silk, and 1 of wool; the manufacture of silk once employed 16,000 hands, but now only 400. There is also a royal factory of gunpowder, producing 800,000 lbs. per annum, and one of saltpetre, producing yearly 30,000 lbs., though formerly not less than 250,000 lbs. The manufacture of the esparto rush into baskets, cordage, sandals, &c., gives employment to many hands. Provisions are exceedingly cheap at Murcia. Beef and mutton sell at about 3*d.* per lb., veal rather above and pork rather below that sum. Good wine, about 2½*d.* the bottle. The price of daily labour is from 10*d.* to 1*s.* The average returns to the exchequer amount to more than 15,000*l.* sterling per annum.

The citizens in character do not differ from the other inhabitants of the province; they are equally slothful, gloomy, and reserved, and little addicted to pleasure; on this account Murcia is one of the dullest cities in Spain.

Murcia has given birth to few great men. Schamseddin, a learned man among the Spanish Arabs, was born here many centuries since; and except a few poets, painters, sculptors, and authors of no great celebrity, the only other distinguished citizen of whom Murcia can boast is the Count Florida Blanca, prime minister of Spain, who died in 1792.

(Laborde, *Itin. Descrip. de l'Espagne*; Townsend's *Journey through Spain*; Mariana, *Hist. de España*; Conde, *Hist. de los Arabes en España*; Miñano, *Diccionario Geografico Estadistico de España*; Inglis's *Spain in* 1830; Cook's *Sketches in Spain*.)

MURDER. In the earlier periods of English jurisprudence, murder, *murdrum*, was a term used to describe the secret destruction of life, witnessed and known by none besides the slayer and any accomplices that he might have; so that the hue and cry, which the law required to be made after malefactors, could not be raised.

Murdrum was also the name of an amercement or pecuniary penalty imposed, until the reign of Edward III., upon the county or district in which such a secret killing had taken place. One of the modes of escaping from this penalty was, a presentment of Englishry; in other words, a finding by the coroner's inquest, upon the statement of the relations of the deceased, that he was an Englishman; the sole object of the amercement having been the protection of Danes, and afterwards of the Normans, from assassination by the English. (Glanville; Reeves.)

By the grant of 'murdra,' which is commonly found in antient charters of franchises, the right to receive these amercements within the particular districts, passed from the crown to the grantee. Amercements for non-presentment of Englishry were abolished in 1340, by 14 Edw. III., st. 1, c. 4.

As the law formerly stood, every destruction of human life, not effected in this secret manner, with whatever circumstances of malignity and cruelty it might be accomplished, was treated as simple homicide. The law appears to have been gradually altered by the judges, in order to reach atrocious criminals whose offences would not formerly have been punishable as murder. As the law now stands, murder is the destruction of human life, accompanied with an intention on the part of the perpetrator of the offence to kill or do great bodily harm, or wilfully to place human life in peril; or resulting from an attempt to commit some other felony; or occurring in the course of resistance offered to ministers or officers of justice, or others rightfully engaged in carrying the law into execution. All other cases of culpable homicide, in which death is produced involuntarily, but is occasioned by want of due caution; or where, though death is produced voluntarily, the crime is extenuated by circumstances; or where a minister or officer of justice is killed, but sufficient authority did not exist, or was not communicated to the party before the fatal blow was given; or where any other circumstances essential to the crime of murder are wanting—amount only to simple felonious homicide, or, as it is commonly called, without regard to the age or sex of the party killed, manslaughter.

The law recognises the right of taking away life in the necessary defence of person or property, and it admits, in some cases, previous provocation as an extenuation of the offence. On the other hand, it makes special provision for the protection of officers and ministers of justice, where the killing of such officer or minister, though culpable, does not under the circumstances amount to murder.

In the modern law of England the crime of murder is characterised by having been committed with malice aforethought, or, as it is sometimes called, malice *prepense;* which term, though in its ordinary signification it imports premeditation, has been extended to cases not only where the offender acts from a motive of ill-will towards another, with an express intention to destroy or injure him, but also where, without the existence of express malice, it is considered necessary, on grounds of policy, to punish homicide with the highest degree of severity.

The term 'malice aforethought' is therefore frequently applied to a state of things in which no malice is felt in the ordinary sense of the term, but is only malice in a legal sense, by construction of law.

If A shoots at B with intent to kill him, but by mere accident kills C, this is a killing from implied malice. If A, by throwing a heavy stone from the roof of a house into the street in which he knows that people are continually passing, kills B, a mere stranger, this also is a killing from implied malice.

Implied malice is however very loosely defined in the law of England, if it can be said to be defined at all. It is stated, that the existence of implied malice is a pure question of law, or a conclusion of law to be drawn from all the circumstances of the case; and it is in some cases made to depend upon a very abstruse technical doctrine. The existence or non-existence of a criminal intention, even where that intention has no reference to any personal injury, but happens to be accompanied with a killing which is altogether accidental, is made to constitute the distinction between the higher and lower species of culpable homicide; and in other cases the existence of such criminal intention brings even an accidental killing within the scope of manslaughter.

Mr. Justice Foster says, 'When the law maketh use of the term "malice aforethought," as descriptive of the crime of murder, it is not to be understood in that narrow restrained sense to which the modern use of the term "malice" is apt to lead one, a principle of malevolence to particulars; for the law, by the term "malice" in this instance, meaneth, that the fact hath been attended with such circumstances as are the ordinary symptoms of a wicked, depraved, and malignant spirit. The malus animus, which is to be collected from all circumstances, and of which the court, and not the jury, is to judge, is what bringeth the offender within the denomination of wilful malicious murder. And I believe most, if not all the cases which in our books are ranged under the head of implied malice, will, if carefully adverted to, be found to turn upon this single point—that the fact hath been attended with such circumstances as carry in them plain indications of a heart regardless of social duty and fatally bent upon mischief.' (*Discourse on Homicide*, 256, 257.)

This vague and figurative description of that which is propounded as a legal definition appears to furnish us with no certain test of the crime of murder. It amounts to no more than this: that, to constitute the crime of murder, the act must have been attended with such circumstances as in the opinion of the court, and not of the jury, are 'the ordinary symptoms of a wicked, depraved, and malignant spirit,' of 'a heart regardless of social duty, and fatally bent upon mischief.' It is a description of that which is rather matter of fact than of law. The question in each particular case is, whether the party acted in wanton and wicked disregard of the probable consequences of an act tending to the destruction of human life; which is an inference to be deduced from the evidence, and in arriving at which no assistance can be derived from the application of mere technical rules. The presence of that evil disposition of the mind of the offender which makes the offence murder, is known only by evidence of an act or omission by which human life is wilfully or wantonly exposed to peril.

Every homicide is presumed to be malicious until the contrary be shown. But upon the investigation, circumstances may transpire which extenuate the offence, and reduce it from the crime of murder to that of manslaughter; or the act may appear to amount either to justifiable or excusable homicide. In cases of justifiable homicide, and, according to modern practice, in cases of excusable homicide, the party causing the death is discharged from responsibility.

To constitute legal homicide, the death must result from injury to the *person* (as contradistinguished from causes operating upon the *mind*) occasioned by some act done by, or some unlawful omission chargeable upon, the party to whom such homicide is imputed. The terms 'wilful omission' apply to every case of noncompliance with a legal obligation which the party may be under, to supply food, clothing, or to furnish any other assistance, or to do any other act, for the support of life or for the prevention of injury to it. It is not homicide unless death take place within a year and a day after the injury; or, in other words, it is not considered homicide when the party injured survives a whole year, exclusive both of the day of the injury and of the day of the death; nor where the death is to be attributed to unskilful treatment, or other cause not resulting from or aggravated by the injury sustained.

The law of homicide applies to the killing of aliens, except alien enemies slain in the heat and in the exercise of war; to felons, except when executed according to law; and to persons outlawed, whether on civil or on criminal process. But a child *in venter sa mere* (in its mother's womb) is not a subject of homicide, unless, subsequently to the injury, it be born alive, and die, within a year and a day from its birth, from the injury received whilst yet unborn. [INFANTICIDE.]

Criminal homicide is one of three kinds, murder, manslaughter, and self-murder. [SUICIDE.]

I. Murder is committed by:—

1. Voluntary homicide, without circumstances of justification, excuse, or extenuation.
2. Involuntary homicide, resulting from the commission of a felony, or from an attempt to commit felony.

3. Homicide, whether voluntary or involuntary, committed in unlawfully resisting officers or ministers of the law, or other persons lawfully acting for the advancement or in the execution of the law.

II. Manslaughter consists in:—

1. Voluntary but extenuated homicide, committed in a state of provocation, arising from a sufficient cause.
2. Involuntary homicide, not excused as being occasioned by mere misadventure.

This second class may be subdivided into:—

1. Involuntary homicide, resulting from some act done, or from the wilful omission to do some act, with intent to occasion bodily harm.
2. Involuntary homicide, resulting from some wrongful act done to the person.
3. Involuntary homicide, in committing, or in attempting to commit, an offence attended with risk of injury to the person.
4. Involuntary homicide, resulting from some act done without due caution, or from the unlawful omission to do some act.

Homicide not criminal is:—

1. Justifiable, as done for the advancement or in the execution of the law; or
2. Excusable, as done for the defence of person or property; or because it has, without the fault of the party, become necessary for his preservation.

The offence is extenuated where the act, being done under the influence of excitement from sudden provocation, or of fear, or of alarm, which may, for the time, suspend or weaken the power of judgment and self-control, is attributable to transport of passion or defect of judgment so occasioned, without any deliberate intention to kill or do great bodily harm; regard still being had to the nature and extent of violence used by the party inflicting the injury which causes death, as compared with the cause of provocation. The offence is not extenuated where, the cause of provocation being but slight, a return is made so excessive and disproportionate, that the killing cannot be attributed to mere heat of blood arising from the provocation given.

Homicide is neither justified nor extenuated by reason of any consent given by the party killed, as in cases of duels.

Homicide is justifiable, where the act is done in a lawful manner, by an officer or other person lawfully authorised, in execution of the sentence of a court of competent jurisdiction.

Homicide is justifiable, where an officer of justice, or other person duly authorised to arrest, detain, or imprison for any felony or for any dangerous wound given, and using lawful means for the purpose, cannot, otherwise than by killing, overtake the party in case of flight, or prevent his escape from justice; provided the officer knew, or had reason to believe, that the party attempting to escape was aware that he was pursued for such felony or wound given.

Also, where any officer of justice, or other person lawfully executing in a lawful manner any civil or criminal process, or other authority for the advancement of the law, or interposing in a lawful manner for the prevention or suppression of any breach of the peace or other offence, is unlawfully and forcibly resisted, and using no more force than is necessary to overcome such resistance, happens to kill the party resisting; or being, by reason of the violence opposed to him, under reasonable fear of death if he proceed to execute his duty, and because he cannot otherwise both execute his duty and preserve his life, kills him who so resists—in either of these cases the homicide is justifiable.

Homicide is also justifiable, when necessary for preventing the perpetration of any felony attempted to be committed by violence or surprise against person, habitation, or property; and where one, in defence of movable property in his lawful possession, using no more force than is necessary for the defence of such property against wrong, happens to kill the assailant; or being, from the violence of the assailant, under a reasonable and *bonâ fide* apprehension that he cannot otherwise both defend his property and preserve his life, kills the assailant: also where one in lawful possession of house or land, after requesting another, who has no right to be there, to depart, is resisted, and using no more force than is necessary to remove such wrong-doer and retain his possession, happens to kill such wrong-doer; or being, from the violence with which such wrong-doer endeavours to deprive him of possession, under reasonable and *bonâ fide* apprehension that he cannot otherwise both maintain possession and preserve his life, kills such wrong-doer.

Homicide is excusable, when a man is involuntarily placed in such a situation that he is under the necessity of killing another in order to save his own life; as where, in a shipwreck, A pushes B from a plank which can save one only.

Homicide is not criminal, when it occurs in the practice of any lawful sport or exercise with weapons not of a deadly nature, and without intent to do bodily harm, and where no unfair advantage is intended or taken. But it amounts to manslaughter where weapons are used, the use of which is attended with probable danger; or where, in case of friendly contest, without the use of such weapons, death results from any unfair advantage taken, either as regards the nature of the instrument, the mode of using it, the want of due warning given previously to violence used, or from any want of due caution. Tournaments, though a sport in which deadly weapons were used, yet, being considered a useful training to arms, were lawful if held with the consent of the king. In case of death therefore, in the course of one of these exhibitions, the criminality of the act appears to have depended upon the royal licence for the holding of the tournament. [TOURNAMENT.]

The statute of 9 Geo. IV., c. 31, s. 3, enacts, that every person convicted of murder, or of being accessory before the fact to murder, shall suffer death; and that every accessory after the fact to murder, shall be liable, at the discretion of the court, to be transported for life, or to be imprisoned, with or without hard labour, for any term not exceeding four years. By an act passed in 1752 (25 Geo. II., cap. 37), the bodies of persons executed for murder were directed to be delivered to surgeons to be dissected, or to be hanged in chains. The 2 & 3 W. IV., c. 75, required that such persons should be hung in chains, or buried within the precincts of the prison. The 4 & 5 W. IV., c. 36, s. 1, has taken away one part of the alternative, and the mode of burial is the only circumstance which distinguishes sentences upon a conviction for murder from those pronounced in other capital cases. Formerly the murder of a bishop, abbot, or prior, by a person owing him canonical obedience, of a master or mistress by a servant, or of a husband by his wife, was denominated petty treason, and punished with greater severity than other murders. The party was drawn to the place of execution; and if the offender was a woman, burning was, as in the case of high treason, substituted for hanging; but by the 9 Geo. IV., c. 31, s. 2, petty treason is to be treated as murder only.

The offence of manslaughter is punishable with transportation for life, or for not less than seven years, or with imprisonment, with or without hard labour, not exceeding four years, with fine, by 9 Geo. IV., c. 31, s. 9. (Foster; East; *Fourth Report of Criminal-Law Commissioners.*)

MURE, SIR WILLIAM, of Rowallan, in the county of Ayr, was born about the year 1594. He was the eldest son and heir of a knight of the same name, and the family to which he belonged was one of the most antient and distinguished in that part of the country: it terminated in Jane Mure, great-grandmother of the present countess of Loudoun and marchioness of Hastings. Of the poet's early life few memorials have been preserved. It would appear however that his character and genius were soon developed: there is a specimen of his verses in English, dated in 1611, when he could be little more than seventeen years old: before his twentieth year he attempted a version of the classic story of Dido and Æneas; and in 1617, when he was scarce four-and-twenty, he addressed the king at Hamilton, on his progress through the country, in a poetical piece which is embodied in the collection entitled 'The Muse's Welcome.' Previous to this time, when he came of age, yet before he had succeeded to his paternal estate, he married for his first wife Anna, daughter of Dundas of Newbiston, by whom he had five sons and six daughters. His second wife was dame Jane Hamilton, lady Duntreath, and of this marriage there were two sons and two daughters.

During the civil war, Sir William took the popular side and in the first army raised against the king, he commanded a company of the Ayrshire regiment. He was a member of the convention in 1643, when the solemn league and covenant was ratified with England; and the next year he accompanied the troops, which, in terms of that treaty, were despatched in aid of the parliament. He was also present, and wounded, in the decisive battle of Long Marston Moor; and in the succeeding month he was engaged at the storming of Newcastle, where, in consequence of the superior officer being disabled, he had for some time the command of the regiment. Little further is known of him, except that on the revision of Roos's Psalms by the General Assembly in 1650, a version by Mure of Rowallan is spoken of as employed by the committee appointed for the improvement of the psalmody. He died in 1657.

By far the greater portion of Sir William's writings remain in manuscript. Various specimens of his compositions however may be found in a small volume entitled 'Antient Ballads and Songs, chiefly from Tradition, Manuscripts, and scarce works, with Biographical and Illustrative notices, including Original Poetry, by Thomas Lyle,' London, 1827; to which Chambers owns himself indebted for the materials of his notice concerning Sir William, in his 'Biographical Dictionary of Eminent Scotsmen.' To this latter we also refer.

MURET, MARC ANTOINE FRANÇOIS (MURE'TUS in the Latinised form of his name), was born near Limoges in 1526. He learnt, with great facility, Greek and Latin, and at the age of eighteen gave lectures on Cicero and Terence in the college of Auch. He afterwards went to Paris, where he taught philosophy and civil law in the college of Ste. Barbe with great success. Being accused, according to Scaliger and some others, of an unnatural vice, he quitted Paris for Toulouse, which he was also obliged to leave. He proceeded to Italy in the greatest distress, and on his journey fell ill at an obscure inn on the road. The medical men of the place, having examined his condition, proposed among themselves in Latin (which they thought he did not understand) to try upon him some new experiment: 'Faciamus experimentum in corpore vili.' Muret was so alarmed at hearing this, that he mustered strength enough to pursue his journey.

All this account however is contradicted, or rather discarded with disdain by his biographers, F. Benci and Lazeri, whose notices of Muret's life are annexed to Ruhnken's edition of Muret's works, 4 vols. 8vo., Leyden, 1789. It is certain however that Muret repaired to Venice in 1554, where he became intimate with Paolo Manuzio, who published several of his commentaries on the classics. In 1559 he accepted the invitation of Cardinal Ippolito d'Este, and went to live with him at Ferrara, and afterwards accompanied the cardinal to Rome, from whence he repaired to France with the papal legate in 1562. In the following year he returned to Rome, where he was highly esteemed by Pope Pius V. and his successor Gregory XIII.

He entered into holy orders, obtained several benefices, and was appointed professor of philosophy, and afterwards of civil law at Rome. He died at Rome in 1585. His principal works are,—1, 'Commentarius de Origine Juris;' 2, 'Commentarius de Legibus, Senatusque Consultis, et longa Consuetudine;' 3, 'Commentarius in Titulos ad Materiam Jurisdictionis pertinentes;' 4, 'Notæ in Justiniani Institutiones;' 5, 'Orationes.' Several of these are funeral eulogies in the usual laudatory style of such compositions. In that on the occasion of the death of Charles IX., king of France, delivered at Rome in 1574, he praises that king for having extirpated heresy in his kingdom. In fact Muret was a learned scholar, and a rhetorician, but by no means a philosopher. His 'Poemata' have grace and fluency, but little of invention or poetical genius, excepting perhaps some of his epigrams. But his commentaries and scholia upon Aristotle's 'Ethics and Rhetoric,' on Plato's 'Republic,' on Cicero's 'Catilinarias and Philippicas,' on Seneca's 'Epistles,' on Sallust and Tacitus, on Terentius, Catullus, and Horace, are truly valuable, as well as his nineteen books 'Variarum Lectionum' of different classical authors.

MUREX. [SIPHONOSTOMATA.]

MURIATIC ACID. [CHLORINE.]

MU'RIDÆ, the name of an extensive family of Rodents, comprising, when taken in its largest sense, a great number of genera and species, which, though none of them attain to any considerable size, become worthy of serious notice from their prodigious multiplication and the destructive influence which they exert over vegetation and the fruits of the labour of the agriculturist.

The Linnean genus *Mus* is thus characterised in the last edition of the 'Systema Naturæ:'—'Dentes primores inferiores subulati;' and, as might be expected from such a definition, it is made the receptacle not only for such rodents as are vernacularly known as *Rats* and *Mice*, but for the Guinea Pig, the Agutis, the Paca; in short for all the *Glires* then known, not arranged under the genera *Hystrix*, *Lepus*, *Castor*, and *Sciurus*. The remaining genus (*Noctilio*), placed by Linnæus among his *Glires*, belongs to the Bats. [CHEIROPTERA, vol. vii., p. 25.] Pallas concurred with Linnæus in uniting under one great genus (*Mus*) all the rodents provided with clavicles which had no striking external distinction, such as the tail of the squirrel or the beaver.

Gmelin separated from this crowd of rodents the Marmots (*Arctomys*), the Dormice (*Myoxus*), and the Jerboas (*Dipus*).

Cuvier, in the last edition of the 'Règne Animal,' carries this subdivision much further, adopting the following subgenera, under the great genus *Mus*, or the *Rats*:—The Marmots (*Arctomys*, Gm.), the Dormice (*Myoxus*, Gm.), *Echymys*, Geoff. (*Loncheres*, Ill.), *Hydromys*, Geoff., *Capromys*, Desm., the Rats and Mice, properly so called (*Mus*, Cuv.), *Gerbillus*, Desm. (*Meriones*, Ill.), *Meriones*, F. Cuv., the Hamsters (*Cricetus*, Cuv.), the *Campagnols*, or Field Rats and Mice (*Arvicola*, Lacép.), which he subdivides into—1st, The Ondatras (*Fiber*, Cuv.), and, 2nd, the ordinary *Campagnols* (*Arvicola*, Cuv.; *Hypudæus*, Ill.),—the Lemmings, Cuv. (*Georychus*, Ill.), *Otomys* (F. Cuv.), and the Jerboas (*Dipus*, Gm.). To these succeed the Jumping Hares (*Helamys*, F. Cuv.; *Pedetes*, Ill.), the Mole-Rats (*Spalax*, Guld.), the *Oryctères*, F. Cuv. (*Bathyergus*, Ill.), *Geomys*, Raf. (*Pseudostoma*, Say, *Ascomys*, Licht., *Saccomys?* F. Cuv.), and *Diplostoma*, Raf.

Mr. Gray, in his 'Outline' (*Ann. Phil.*, 1825), after observing that the *Glires* are exceedingly difficult to arrange, and that the arrangement given is only 'an attempt according to their habits,' makes *Muridæ* the first family of the order, with the following character:—'Cutting teeth two in each jaw, lower awl-shaped, grinders simple or compound, upper shelving backward, lower forwards; limbs proportionate, tail scaly, fur with scattered longer hairs, or flat spines, clavicles distinct.'

He then subdivides the family as follows:—

† Grinders rooted, simple.

1. *Murina.*—*Mus.*, Lin.; *Otomys*, F. Cuv.; *Capromys*, Desm.
2. *Hydromina.*—*Hydromys*, Geoff.

†† Grinders rootless, compound.

3. *Ondatrina.*—*Ondatra.*
4. *Castorina.*—*Castor*, Lin.; *Osteopora*, Harlan.
5. *Echymina.*—*Echymys*, Geoff.; *Heteromys*, Desm.; *Saccomys*, F. Cuv.

Dr. Fischer, in his 'Conspectus Ordinum et Generum' (1829), divides the Glires into two sections: the first consisting of those with complete clavicles; and the second of those which have none. The following genera are thus arranged under the first section:—*Castor*, *Lemmus*, *Spalax*, *Saccophorus*, *Loncheres*, *Myoxus*, *Hydromys*, *Capromys*, *Mus*, *Cricetus*, *Saccomys*, *Pedetes*, *Dipus*, *Aulacodus*, *Arctomys*, *Sciurus*, *Pteromys*, and *Cheiromys*.

Mr. Swainson, in his 'Classification of Quadrupeds' (1835), also separates the *Glires* into two divisions: the first, or *Glires Proper*, with clavicles; and the second with rudimentary clavicles, or none. In the first division, after the genera *Castor*, *Fiber*, and *Myopotamus*, and an observation in a note to the first section, that these divisions are purely artificial, and merely formed to facilitate the search among so many unarranged groups, we find the following sections:—

1. *Rats* and *Mice*, under which are arranged the following genera:—*Arvicola*, Lacép. (*Hypudæus*, Ill.). Example, *Mus Amphibius*, Linn., *Water-Rat*, Penn.; *Georychus*, Ill. (Lemmings). Example, *Mus Norvegicus*, Linn., the *Lemming*;* *Echimys*, Geoff. (Spined Rats). Ex., *Echimys cristatus*, Desm., *Gilt-Tailed Dormouse*, Penn.; *Myoxus*, Gm. (Dormouse). Ex., *Mus avellanarius*, Linn., the *Com-*

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* *Georychus* is generally considered to signify the *Mole-Rats*. The true Lemmings, such as *Mus Norvegicus*, are closely allied to *Arvicola*.

mon Dormouse; Hydromys, Geoff. (Water-Rat). Ex., *H. leucogaster*, Australia; *Mus*, Auct. Ex., *Mus Rattus*, Linn., Common Rat; *Capromys*, Desm. Ex., *Capromys prehensilis*, South America; *Cricetus* (Hamster). Ex., *Cricetus vulgaris*, the Hamster.

2. Fore-legs very short, hind legs long. *Jumping Mice;* under which come the following genera and subgenera:—*Dipus* (Jerboa). Ex., *Mus Jaculus*, Linn. (D. Sagitta, Dum.); subgenus *Gerbillus*, Desm. Ex., *Mus Tamariscinus*, *Tamarisk Jerboa*, Sh.; *Meriones*, F. Cuv. Ex., *Meriones Labradorius;* subgenus *Pedetes*, Ill. Ex., *Mus Caffer*, Pall., *Cape Jerboa*, Penn. Then follows *Lagostomus*, Brookes, with its subgenera *Chinchilla* and *Lagotis*. [CHINCHILLIDÆ.]

3. Tail very short. *Mole* and *Sand Rats*, including *Geomys*, Schmaltz (Sand Rat). Ex., *Geomys Douglasii*, America; *Diplostoma*, Schmaltz, America; *Aplodontia*, Richardson. Ex., *Aplodontia leporina*, America; *Aspalax*, Güld.* Ex., *Mus Typhlus*, Pall., Asia; *Bathyergus*, Ill. Ex., *Mus maritimus*, Gm., Africa.

4. Tail long, bushy. *Squirrels*, under which are arranged *Arctomys*, Gm. Ex., *Mus Marmotta*, Linn., the *Marmot; Spermophilus*, F. Cuv. Ex., *Mus citellus*, Pall., chiefly America. *Sciurus*, Auct. Ex., *Sciurus vulgaris*, Linn., the *Common Squirrel;* together with the subgenus *Pteromys*, Geoff., and the genus *Cheiromys*.

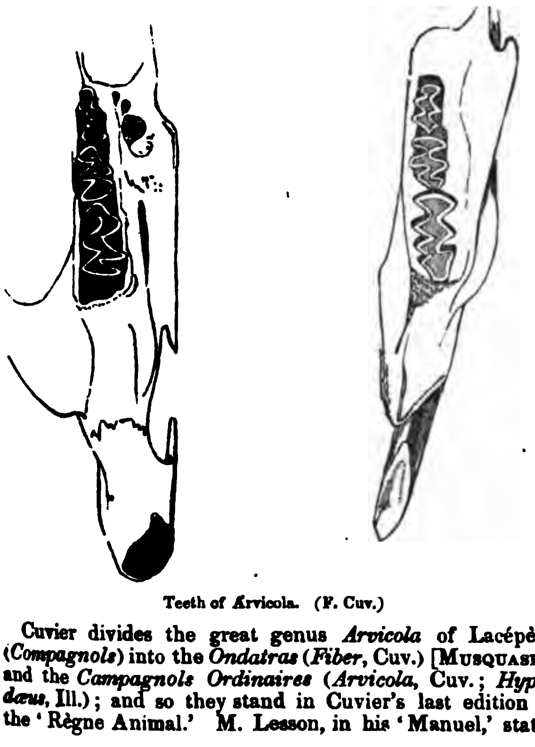
The numerous forms which press upon the attention in considering this large section of *Mammalia* are enough to convince any one who has bestowed any thought on the subject that authors have not spoken of the difficulties surrounding it without reason; we shall therefore introduce the student to the most remarkable among them, and, adopting Mr. Swainson's names for the three first sections as arbitrary divisions under which we may bring the structure and habits, where they are known, of these animals before the reader, proceed to examine the natural history of this great and destructive group.

RATS and MICE (popularly so called).

Genera. Arvicola.

Generic Character.—Ears moderate. Muzzle obtuse. Anterior toes armed with moderate claws. Tail round and hairy, not so long as the body. Number of teats from eight to twelve. Molars composite with flat crowns, presenting angular enamelled laminæ.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{3}{3} = 16$.



Teeth of Arvicola. (F. Cuv.)

Cuvier divides the great genus *Arvicola* of Lacépède (*Compagnols*) into the *Ondatras* (*Fiber*, Cuv.) [MUSQUASH], and the *Campagnols Ordinaires* (*Arvicola*, Cuv.; *Hypudæus*, Ill.); and so they stand in Cuvier's last edition of the 'Règne Animal.' M. Lesson, in his 'Manuel,' states that Cuvier has formed two subdivisions of the *Arvicolæ*, namely, first, the *Campagnols nageurs*, of which M. Lesson gives *Arvicola amphibius*, Desm., *Mus amphibius*, Linn., as an example; and second, the *Campagnols Terrestres* which may be exemplified by *Arvicola agrestis*.

Adopting this latter subdivision of *Arvicola* in its restricted sense for convenience, there being hardly sufficient difference in the structure, whatever there may be in habits, to justify the breaking the true *Arvicolæ* down into two groups, we shall, before we proceed to the description of the two examples selected, detain the reader very shortly with the views of two modern English naturalists of note with respect to the *Arvicolæ*.

Mr. Gray raises this group to the rank of a family under the name of *Arvicolidæ*, and under it places his genus *Ctenodactylus*, a word, by the way, which comes very near to Dejean's name for a genus of Coleopterous insects, *Ctenodactyla*. [CTENODACTYLUS, CTENODACTYLA.] N.B. Mr. Yarrell is of opinion that *Ctenodactylus Massonii* of Gray, is, as suggested by Mr. Ogilby, identical with the *Mus Gundi* of Rothman, on whose description is founded the *Arctomys Gundi* of Gmelin and others, and the *Gundi Marmot* of Pennant's 'Zoology.'

Mr. Bell, in his *British Quadrupeds*, observes that the location of the *Arvicolæ* with the genus *Mus* involves an inconsistency which was early detected, and the correction of which has been universally recognised and followed. The characters of the teeth, he remarks, as well as the general form of the body, and the habits of all the species, remove them not only generically from the *Mures*, but even point out their association with a different family of the *Rodentia*, and their affinity to the beaver, he adds, appears to have forcibly struck Linnæus himself, who, in his *Fauna Suecica*, applied the name *Castor* to the European *Water Vole*, or *Water Rat*. Mr. Bell then continues thus: 'The generic term *Arvicola*, if not absolutely unobjectionable, must be retained, as having the sanction of priority over the name *Microtus* of Schrank, *Hypudæus* of Brant, or *Lemmus* of F. Cuvier. With regard to the name of the family, I have ventured to change that of Mr. Gray, *Arvicolidæ*, to *Castoridæ*, because the genus *Castor* must be considered as the type of the family, of which the present can only be an aberrant form.' [BEAVER.]

§ 1. *Water or Swimming Arvicoles or Voles.*

The author last quoted gives the following synonyms for—

Arvicola amphibius, Desm.—*Castor caudâ lineari tereti* (Linn. 'Faun. Suec.'). *Mus amphibius* ('Syst. Nat.' Mull., 'Zool. Dan. Prod.'). *Mus aquaticus* (Briss.). *Lemmus aquaticus* (F. Cuv.). *Arvicola amphibia* (Jenyns). *Arvicola aquatica* (Flem.). *Rat d'eau* (Buff.). *Water Rat* (Penn.).

Description.—Head thick, short, and blunt; eyes small, not very prominent; ears short, scarcely conspicuous beyond the fur; the cutting-teeth of a deep yellow colour in front, very strong, chisel-shaped, considerably resembling those of the beaver; the surface of the grinding-teeth formed of alternate triangles arranged on each side of the longitudinal axis; fore-feet with four complete toes, the last phalanx only of the thumb being conspicuous beyond the skin; hinder feet with five toes not webbed, though connected to a short distance from the base; tail more than half the length of the body, covered with hairs, of which those on the inferior surface are rather long, and probably assist the animal in swimming by forming a sort of rudder of the tail. Fur thick and shining; of a rich reddish-brown mixed with grey above, yellowish-grey beneath. Dimensions,

—Length of the head and body	8	in.	4	lines.
„ of the head	1		10	„
„ of the ears	0		5	„
„ of the tail	4		8	„ (Bell.)

This appears to be the *Sorgo morgange* of the Italians; *Wasser-mause-Rat* of the Germans; *Water-rot* of the Dutch; *Watn-ratta* of the Swedes; *Vand-rotte* of the Danes; *Llygoden y dwfr* of the antient British; and *Water Vole* and *Water Rat* of the modern British.

Ray names it *Mus major aquaticus, seu Rattus aquaticus*, and he, as well as Linnæus, states that the Water Rat is web-footed. This puzzled White of Selborne, who, in one of his letters to Pennant, writes, 'Ray says, and Linnæus after him, that the water rat is web-footed behind. Now I have discovered a rat on the banks of our little stream that is not web-footed, and yet is an excellent swimmer and diver: it answers exactly to the *Mus amphibius* of Linnæus (see *Syst. Nat.*) which, he says, "natat in *fossis et urinatur*." I should be glad to procure one "plantis palmatis."' This letter is dated early in August, 1767, and Pennant in his *Synopsis* (1771), says of the *Water Rat* that it 'swims and dives admirably, though it is not web-footed, as Mr. Ray supposed and Linnæus copied after him.'

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* Aspalax is Olivier's name; Spalax is Güldeustadt's.

Food, Habits, &c.—The Water Rat inhabits the banks of rivers, streams, ponds, and even ditches, in the banks of which it burrows and breeds. Its retreat is however sometimes at a great distance from the water. White (*Selborne*), says, 'As a neighbour was lately plowing in a dry chalky field, far removed from any water, he turned out a water rat, that was curiously laid up in an *hybernaculum* artificially formed of grass and leaves. At one end of the burrow lay above a gallon of potatoes regularly stowed, on which it was to have supported itself for the winter. But the difficulty with me is how this *amphibius mus* came to fix its winter station at such a distance from the water. Was it determined in its choice of that place by the mere accident of finding the potatoes which were planted there? or is it the constant practice of the aquatic rat to forsake the neighbourhood of the water in the colder months?' We suspect that the potatoes had their charms for the storekeeper. The Water Rat is indeed entirely, as we believe, a vegetable feeder, roots and subaqueous plants being its staple. It has been said to feed on worms, frogs, small fish, and the fry of fish generally, among other animal food; and has thence laboured under a very bad character as the enemy of the fish-pond and the trout-stream. The best writers are agreed that there is no foundation for this charge,* and there can be little doubt, as Mr. Bell observes, that it has arisen from this phytiphagous animal being confounded by inaccurate observers with the common *Brown Rat* (*Mus decumanus*) which often haunts ditches and mill-tails, feeding freely on all sorts of animal substances, and taking the water boldly. The last-named rats have been seen towards nightfall crossing the canal in the Regent's Park in order to forage in the gardens of the Zoological Society.

The *Water Rat* is a very cleanly animal, and, generally, has but one brood, consisting of five or six: these are ordinarily born in May or June, when the vegetation is well forward; but the young are sometimes produced as early as April, in which latter case there is a second litter towards the end of summer or beginning of autumn. The flesh is said to be eaten by the French peasants on *maigre* days.

Geographical Distribution.—Most parts of Europe.

Mr. Bell, who gives a very good figure of the *Common Water Vole*, or *Water Rat*, remarks that a black variety of this species has long been known, and that it has been described by Pallas and other continental zoologists. Mr. Bell is of opinion that this is probably identical with the quadruped described by Mr. Macgillivray in the sixth volume of the 'Transactions of the Wernerian Society of Edinburgh,' under the name of *Arvicola ater*, as very common in the counties of Banff and Aberdeen. The *Water Vole*, it is stated, does not occur where this *Arvicola ater* abounds. The habits of the latter agree with those of the *Water Vole*. Mr. Macgillivray however thinks that there are sufficient differences in the organisation and colour of these two animals to warrant specific distinction. *Arvicola ater* is stated to be deep black above, and black with a tinge of grey beneath; in size somewhat smaller than the *Common Water Vole*, but the difference of the proportions is scarcely appreciable. Mr. Bell observes that this author believes the number of caudal vertebræ to be different; and he adds that, if this were constantly the case, it would go far to establish their specific distinction; but an examination of a stuffed specimen belonging to Mr. Bell's friend, Mr. Yarrell does not, on a comparison with several of the common sort, appear to Mr. Bell to justify this supposition. 'Mr. Jenyns,' continues Mr. Bell, 'states that the black variety is not uncommon in the fens of Cambridgeshire, and differs in no respect from the other but in colour; a testimony which must weigh very heavily against the opinion of its being specifically distinct, when we consider the great accuracy of that gentleman's observations.'

Terrestrial Arvicoles.

Arvicola Agrestis.—The following synonyms of this species are given by Mr. Bell:—*Mus agrestis brachyurus* (Ray). *Mus agrestis* (Linn.). *Mus arvalis* (Pall., Gmel.). *Lemmus arvalis* (F. Cuv.). *Arvicola vulgaris* (Desm.). *Arvicola agrestis* (Flem., Jenyns, Yarrell). *Arvicola arvalis* (Selys-Longchamps). *Campagnol* (Buff.). *Short-tailed Field Mouse* (Penn.). *Meadow Mouse* (Shaw).

Description.—Head large; muzzle very obtuse; ears just appearing above the fur; body thick and full; tail not more than one-third the length of the body, sparingly covered with hair; thumb of the fore-feet rudimentary, without a claw. Upper parts reddish brown, mixed with grey; of the under parts ash-colour; feet and tail dusky. Dimensions:—

	Inch.	Lines.
Length of head and body .	4	1
Length of head . . .	1	2
Length of tail	1	3½

(*Bell.*)

This appears to be *Le petit Rat de Champs* and *Le Campagnol* of the French; *Campagnolo* of the Italians; *Skier Muus* of the Danes; *Llygoden gwtta'r maes* of the antient British; *Field Vole, Short-tailed Field Mouse*, and *Meadow Mouse* of the modern British.

Habits, Food, &c.—Small and insignificant as the animal is in appearance, there is scarcely a species among the rodents more destructive to the fields, gardens, and woods, which have been rendered fruitful by the industrious hand of man, than the *Short-tailed Field Mouse*. In the corn-field, in the rick-yard, in the granary, in the extensive plantation, its depredations are often severe, and sometimes overwhelming. The following instance will show what damage these mice are capable of doing when they become multitudinous. Lord Glenbervie, in a letter to Sir Joseph Banks, dated 30th June, 1814, observes that the whole both of Dean and New Forests appeared to be numerously stocked with mice; at least, wherever the large furze-brakes in the open parts had been burnt, their holes and runs covered the surface. Haywood Hill, a new plantation of about 500 acres, in the forest of Dean, was particularly infested. This enclosure, after being properly fenced, was planted with acorns in 1810, and in the following spring about one-third came up; the rest of the seed having been probably destroyed by mice principally. The young shoots of the natural hollies of the tract, which had been cut down to favour the plantation, were not attacked by the mice in the winter of 1811, though their runs were numerous. In the autumn of 1812 a large quantity of five-years-old oaks and chestnuts, with ash, larch, and fir, were planted in the enclosure. In the winter the destruction began, and numbers of the hollies, then two, three, or more feet high, were barked round from the ground to four or five inches upwards, and died. In the spring of 1813 a number of the oaks and chestnuts were found dead, and when they were pulled up it appeared that the roots* had been gnawed through two or three inches below the surface of the ground; many were also barked round and killed, like the holly-shoots; whilst others, which had been begun upon, were sickly. The evil now extended to the other enclosures; and becoming very serious both in Dean Forest and the New Forest, cats were turned out, the bushes, fern, rough grass, &c. were cleared away to expose the mice to beasts and birds of prey, poisons in great variety were laid, and seven or eight different sorts of traps were set for them, some of which, made of tin, succeeded very well. These were however superseded by the plan of a professed rat-catcher, who, having been employed to catch the mice, had observed, on going to work in the morning, that some of them had fallen into wells or pits, accidentally formed, and could not get out again; many of them dying from hunger, or fatigue in endeavouring to climb up the sides. Such pits were therefore, on his recommendation, immediately tried: they were at first made three feet deep, three long, and two wide; but these were found to be unnecessarily large, and, after various experiments, it appeared that they answered best when from eighteen to twenty inches deep at the bottom, about two feet in length, and one foot and a half in width, and, at top, only eighteen inches long and nine wide, or indeed as small as the earth could be got out of a hole of that depth; for the wider they are below and the narrower above, the better they answer their purpose. They were made about twenty yards asunder, or about twelve on an acre; or, where the mice were less numerous, thirty yards apart. Nearly 30,000 mice had been caught, principally by this last method, in Dean Forest, up to the 22nd of December; and Mr. Davies (the deputy-surveyor) was convinced that a far greater number had been taken out of the holes, either alive or dead, by stoats, weazels, kites, owls, &c., and even by crows, magpies, jays, &c. The success of these holes in Dean Forest was so great, that the use of a bait in them was soon discontinued; but from an inaccuracy in the digging of them, or some other cause, they were far less efficacious in the New Forest, where the mice continued still, though less numerous, to infest our plantations. It was hoped that the severe weather would have either totally destroyed or greatly diminished the numbers of these animals, for they did not venture out during the hard frosts. In a letter from Mr. Davies, dated the 8th of March, 1814, he gives only 1246 as the number taken from the 7th of January to the 5th of March, and he says the whole of these had been caught in a few days of open weather which intervened about that time. The total number taken in Dean Forest to the 8th of March, 1814, did not much exceed 30,000; and in the New Forest only about 11,500 had been taken up to the same period. In both forests two sorts of Mice had been observed, one the Short-tailed, the other the Long-tailed Field-Mouse; but the former was by far the most numerous, particularly in Dean Forest, where it was in the proportion of upwards of fifty to one Long-tailed.

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* It is more sinned against than sinning in this respect; for the quadruped is often devoured by the Pike, and, we suspect, sometimes by the very large trouts. For the former fish it is by no means a bad bait, if dexterously used.

* Mr. Hogg suggested the generic name *Rhizomys* for the animal, from this root-eating propensity.

Buffon speaks of similar depredations to plantations by the species under consideration; but though he seems to have tried the same sort of trap which was used in the English forests above-mentioned, he does not appear to have resorted to the plan of making holes, which is stated to have been successfully employed by the farmers in the neighbourhood of Liege; but though they make the holes round, and not more than four inches in diameter, and a foot deep, the success seems to be complete.

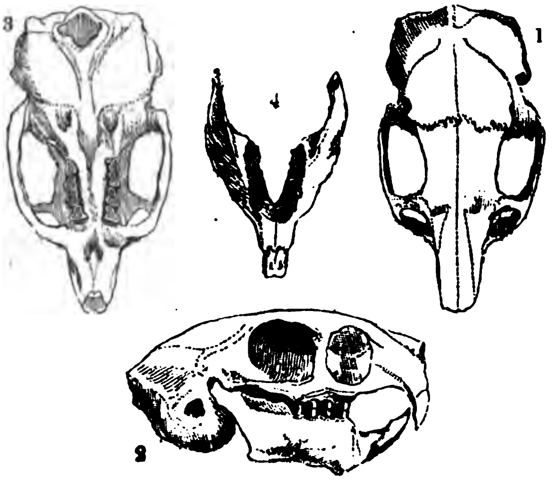
This destructive Arvicole is a burrower, though it not unfrequently takes up with the subterranean retreat of another animal, that of the mole, for instance. The wheat-rick and the barn are not unfrequently infested by them, but their favourite situations are low and damp. Dry seasons are fatal to them. The nest is formed in some bank or meadow, generally of dried grass, and from five to seven young ones are produced at a birth. To this species, or to the Long-tailed Field-Mouse, the latter most probably (see *post*, p. 505), White appears to allude in the letter containing anecdotes of the maternal affections of animals, when he speaks of a remarkable mixture of instinct and sagacity which occurred to him one day, when his people were pulling off the lining of a hotbed, in order to add some fresh dung:—'From out of the side of this bed leaped an animal with great agility that made a most grotesque figure; nor was it without great difficulty that it could be taken, when it proved to be a large white-bellied Field-Mouse, with three or four young clinging to her teats by their mouths and feet. It was amazing that the desultory and rapid motions of this dam should not oblige her litter to quit their hold, especially when it appeared that they were so young as to be both naked and blind.'

Geographical Distribution.—Europe.

Mr. Bell is of opinion that the *Arvicola riparia* of Yarrell (*Zool. Proc.*, 1832) is no other than the *Arvicola pratensis* of Baillon and the *Arvicola rufescens* of Selys-Longchamps.

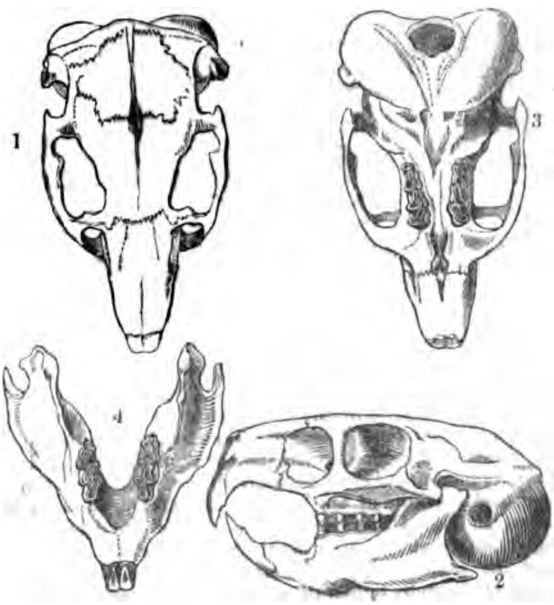
Octodon.

Mr. Bennett observes that 'In the structure of its molar teeth, *Octodon* may be regarded as occupying an intermediate station between *Poephagomys* and *Ctenomys*. In *Octodon* the molars of the upper jaw differ remarkably in form from those of the lower. The upper molars have on their inner side a slight fold of enamel, indicating a groove tending in some measure to separate on this aspect the mass of the tooth into two cylinders: on their outer side a similar fold penetrates more deeply, and behind it the crown of the tooth does not project outwardly to so great an extent as it does in front. If each molar tooth of the upper jaw be regarded as composed of two partially united cylinders, slightly compressed from before backwards, and somewhat oblique in their direction, the anterior of these cylinders might be described as entire, and the posterior as being truncated by the removal of its outer half. Of such teeth there are, in the upper jaw of *Octodon*, on each side, four; the hindermost being the smallest, and that in which the peculiar form is least strongly marked. In *Ctenomys*, all the molar teeth, both of the upper and the lower jaw, correspond with the structure that exists in the upper jaw of *Octodon*, excepting that their crowns are more slender and more obliquely placed, whence the external emargination becomes less sharply defined; and also excepting that the hinder molar in each jaw is so small as to be almost evanescent: as is generally the case, however, the relative position of the teeth is counterchanged, and the deficiency in the outline of the crown of the tooth, which in the upper jaw is external, is, in the lower jaw, internal. In the lower jaw of *Octodon* the crowns of the molars assume a figure very different from those of the upper, dependent chiefly on the prolongation of the hinder portion of the tooth to the same lateral extent as its anterior part: each of them consists of two cylinders, not disjoined in the middle where the bony portion of the crown is continuous, but partially separated by a fold of enamel on either side producing a corresponding notch; placed obliquely with respect to the jaw they resemble, in some measure, a figure of 8 with its elements flattened obliquely, pressed towards each other, and not connected by the transverse middle bars. With the lower molars of *Octodon* those of *Poephagomys*, as figured by M. F. Cuvier, correspond in structure in both jaws. *Octodon* thus exhibits, in its dissimilar molars, the types of two genera: the molars of its upper jaw represent those of both



Skull of Octodon.

1, seen from above; 2, profile; 3, seen from below; 4, lower jaw seen from above.



Skull of Ctenomys.

1, seen from above; 2, profile; 3, seen from below; 4, lower jaw seen from above.

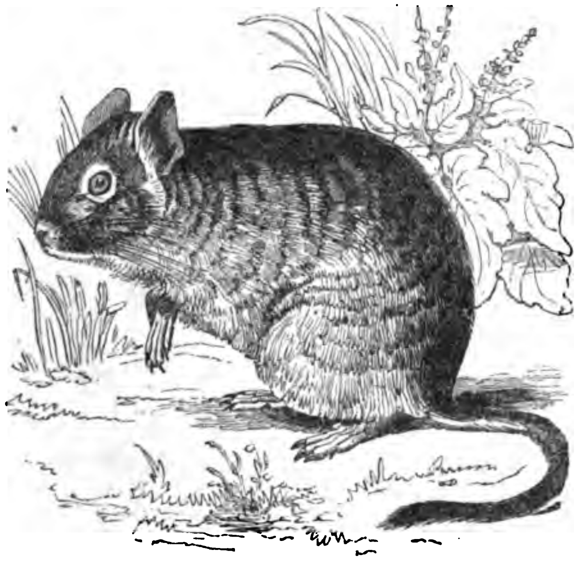
jaws of *Ctenomys;* those of its lower jaw correspond with the molars of both jaws of *Poephagomys.*'

Octodon Cumingii, Benn. (*Dendrobius degus*, Meyen.)

In size and shape generally resembling the *Water Rat*, with which Mr. Bennett thinks that it is nearly connected systematically. All the feet with five toes, but the innermost both before and behind very short, and separated by a wide interval from the rest. Upper surface and sides brownish grey, intermixed with frequent indistinct and undefined spots and patches of dusky black. Colour slightly darker towards the rump, and upper surface of the entire tail, together with its under surface for one-third of its length from the tip, approaching closely to black. Under surface of the body dusky grey, mingled with a shade of brown, lighter and nearly white beneath the base of the tail, and deeper on the breast and the neck, where it becomes almost of the same general hue as the upper surface.

Habits.—Mr. Cuming thus describes the habits of *Octodon Cumingii* in its natural state. 'These animals burrow in the ground, but always under brushwood fences or in low thickets. They are so abundant in the neighbourhood of Valparaiso, that in the high-road between that place and St. Jago more than a hundred may frequently be seen at one time in search of food. Sometimes, but not often, they are observed on the lower branches of the shrubs, and on those which form the fences. They fly at the least alarm, and in running carry their tufted tails like a bent bow. A species of *Horned Owl* feeds principally on these pretty little creatures.' Mr. Bennett adds that two living specimens brought by Mr. Cuming from Chili, were placed by him, in 1831, in the Society's Menagerie: one of them escaped, but the other was alive when Mr. Bennett wrote (December, 1835), and was as active and lively as it was on its first arrival. They were rather shy, and had but little playfulness. They leaped readily and without any appearance of exertion from the floor of their cage to a narrow perch placed at the height of nearly a foot, and there remained seated at their ease. Their food was vegetable.

Locality.—Chili, near Valparaiso, where Captain King informed Mr. Bennett that he had seen thousands of them. (*Zool. Proc.* and *Zool. Trans.*)



Octodon Cumingii. (Bennett.)

Ctenomys.

Dentition, &c., see cut above.

Ctenomys Magellanicus. In general form seems nearly to resemble *Octodon Cumingii.* Toes five, the innermost, both before and behind, much shorter than the others. Tail sparingly haired, but comparatively shorter than in *O. Cumingii*, and destitute of any marked tuft of longer hairs at its extremity. Upper surface and sides brownish grey tinged with yellow, and hardly varied by blackish; in short the same as that of *Octodon*, but of a lighter tint. Colour of the belly lighter than the upper surface; chin and throat pale fawn; short hairs of feet and tail almost white. Length of head and body, 7·5 inches: of the tail 2·75.

Habits, &c.—Captain King's memoranda on the subject of this animal are: 'From the size of the jaw, as compared with the abundant remains of this little animal which are scattered over the surface of the ground, I think that the present specimen is rather a young one. On examining the teeth I find that it cannot be referred to any of the genera of M. F. Cuvier's arrangement in his *Dents des Mammifères:* that to which it approaches most nearly is *Helamys;* but it is sufficiently distinct to constitute a new genus. The red colour of the incisive teeth is very remarkable in all the specimens which I have seen. The little animal is very timid; feeds upon grass, and is eaten by the Patagonian Indians. It dwells in holes which it burrows in the ground: and, from the number of the holes, it would appear to be very abundant.' Mr. Darwin (*Journal and Remarks*) gives a circumstantial account of this curious animal, which he well describes as a rodent with the habits of a mole. 'The Tucutuco,' says that author, 'is extremely abundant in some parts of the country, but is difficult to be procured, and still more difficult to be seen when at liberty. It lives almost entirely under ground, and prefers a sandy soil with a gentle inclination. The burrows are said not to be deep, but of great length. They are seldom open; the earth being thrown up at the mouth into hillocks, not quite so large as those made by the mole. Considerable tracts of country are so completely undermined by these animals, that horses, in passing over, sink above their fetlocks. The tucutucos appear, to a certain degree, to be gregarious. The man who procured specimens for me had caught six together, and he said this was a common occurrence. They are nocturnal in their habits; and their principal food is afforded by the roots of plants, which is the object of their extensive and superficial burrows. Azara says they are so difficult to be obtained, that he never saw more than one. He states that they lay up magazines of food within their burrows. This animal is universally known by a very peculiar noise, which it makes when beneath the ground. A person, the first time he hears it, is much surprised; for it is not easy to tell whence it comes, nor is it possible to guess what kind of creature utters it. The noise consists in a short but not rough nasal grunt, which is repeated about four times in quick succession; the first grunt is not so loud, but a little longer, and more distinct than the three following: the musical time of the whole is constant, as often as it is uttered. The name Tucutuco is given in imitation of the sound. In all times of the day, where this animal is abundant, the noise may be heard, and sometimes directly beneath one's feet. When kept in a room, the tucutucos move both slowly and clumsily, which appears owing to the outward action of their hind legs; and they are likewise quite incapable of jumping even the smallest vertical height. Mr. Reid who dissected a specimen which I brought home in spirits, informs me that the socket of the thigh-bone is not attached by a *ligamentum teres;* and this explains, in a satisfactory manner, the awkward movements of their hinder extremities. When eating, they rest on their hind legs and hold the piece in their fore paws; they appeared also to wish to drag it into some corner. They are very stupid in making any attempt to escape; when angry or frightened, they uttered the tucutuco. Of those I kept alive, several, even the first day, became quite tame, not attempting to bite or to run away; others were a little wilder. The man who caught them asserted that very many are invariably found blind. A specimen which I preserved in spirits was in this state; Mr. Reid considers it to be the effect of inflammation in the nictitating membrane. When the animal was alive I placed my finger within half an inch of its head, and not the slightest notice was taken: it made its way however about the room nearly as well as the others.'

Locality.—The east entrance of the Strait of Magalhaens at Cape Gregory and the vicinity. (King.) Mr. Darwin says (*loc. cit.*) that the wide plains north of the Rio Colorado are undermined by these animals; and that near the Strait of Magalhaens, where Patagonia blends with Tierra del Fuego, the whole sandy country forms a great warren for them.

N.B. Mr. Darwin further states that at the R. Negro, in Northern Patagonia, there is an animal of the same habits, and probably a closely allied species, but which he never saw. Its noise was different from that of the Maldonado kind, and was repeated only twice instead of three or four times, and was more distinct and sonorous; when heard from a distance it so closely resembled the sound made in cutting down a small tree with an axe, that Mr. Darwin sometimes remained in doubt concerning it.

Ctenomys Magellanicus. (Bennett.)

The genus *Sigmodon* of Say and Ord occupies, in their opinion, a station between the genera *Arvicola* and *Mus*, having the habits and some of the external characters of the former, with teeth remotely allied to the latter. The genus *Neotoma* of the same zoologists, must, in their opinion, be also placed near *Arvicola*. (See *Journal of Nat. Acad. Sc. Phil.*, vol. iv.; and *Zool. Journ.*, vol. ii.)

Hypudæus. (Ill.)

Closely allied to the *Arvicolæ*, from which they differ but little except in the number of the anterior toes, and in the shortness of the tail, are the true *Lemmings*.

Generic Character.—Molars composite, with an even crown presenting enamelled angular laminæ; ears very short; anterior feet generally pentadactyle and formed for digging; tail very short and thickly haired.

Dental Formula:—Incisors, $\frac{2}{2}$; molars, $\frac{3-3}{3-3} = 16$.

Example, *Hypudæus Norvegicus*.

Description.—Head not quite so blunt as in the *Arvicolæ;* whiskers long; eyes small but black and piercing; mouth small; ears small; fore-legs short, pentadactyle, but the thumb hardly perceptible though the claw is very sharp; hind-legs pentadactyle; skin thin: head and body black and tawny, irregularly disposed; belly white with a yellowish tinge. Length from nose to tail five inches or thereabout,* the tail half an inch.

This is the *Lemmar or Lemmus* of Olaus Magnus; the *Leem or Lemmer* of Gesner; *Mus Norvegicus vulgò Leming* of Wormius; *Mus Lemmus* of Linnæus; *Fial-mus* and *Sabell-mus* of the Laplanders; *Lummick* of the Swedes; *Le Leming* of Buffon; *Lemming* of the British; *Lemmus Norvegicus* of Desmarest; and *Mus Lemmus* of Pallas and Linnæus.

Habits, Food, &c.—The ordinary food of the *Lemming* consists of grass, the rein-deer lichen, and the catkins, &c. of the dwarf birch; but at intervals of time, generally once or twice in a quarter of a century, a great army of them appears: pouring onward in vast hosts, they devour every green thing in their path of desolation. Great bands descending from the Kolen, traverse Nordland and Finmark, ending their journey and their lives in the Western Ocean, which they enter and there perish. Others, taking a direction through Swedish Lapland, are drowned in the Gulf of Bothnia. Their march is stated to be in parallel lines about three feet apart, without stop or stay, unless the obstacle is insurmountable: rivers and lakes they cross without deviation, and they are said to gnaw through corn and haystacks. (*Phil. Trans.*, ii.) Pennant, who states that they appear in numberless troops in Norway and Lapland, where they are the pest and wonder of the country, thus graphically describes one of these irruptions. 'They march like the army of locusts so emphatically described by the prophet Joel; destroy every root of grass before them, and spread universal desolation: they infect the very ground, and cattle are said to perish which taste of the grass which they have touched: they march by myriads in regular lines: nothing stops their progress, neither fire, torrents, lake, or morass. They bend their course straight forward, with most amazing obstinacy; they swim over the lakes; the greatest rock gives them but a slight check, they go round it, and then resume their march directly on, without the least division: if they meet a peasant, they persist in their course, and jump as high as his knees in defence of their progress: are so fierce as to lay hold of a stick, and suffer themselves to be swung about before they quit their hold: if struck, they turn about and bite, and will make a noise like a dog.'

The *Carnivora* are close attendants upon these wandering multitudes, which Olaus and others believed to have been generated in the clouds and to have fallen from thence in storm and tempest. They are, says Pennant, 'the prey of foxes, lynxes, and ermines, who follow them in great numbers: at length they perish, either through want of food or by destroying one another, or in some great water, or in the sea. They are the dread of the country: in former times spiritual weapons were exerted against them; the priest exorcised and had a long form of prayer to arrest the evil: happily it does not occur frequently; once or twice in twenty years: it seems like a vast colony of emigrants from a nation overstocked; a discharge of animals from the great northern hive, that once poured out its myriads of human creatures upon Southern Europe. Where the head-quarters of these quadrupeds are is not very certainly known; Linnæus says the Norwegian and Lapland Alps; Pontopiddan seems to think that Kolens rock, which divides Nordland from Sweden, is their native place; but wherever they come from, none return: their course is predestinated, and they pursue their fate.'

When seeking the rein-deer lichen in the winter, the Lemmings get under the snow, making lodgments and opening spiracles to the surface to secure air: the *Arctic Fox* pursues them in these retreats. It does not appear that they lay up any magazines of food, and to this improvidence perhaps, as Pennant observes, may be traced the great migrations that they are compelled to make in certain years; hunger urging them to quit their usual residences.

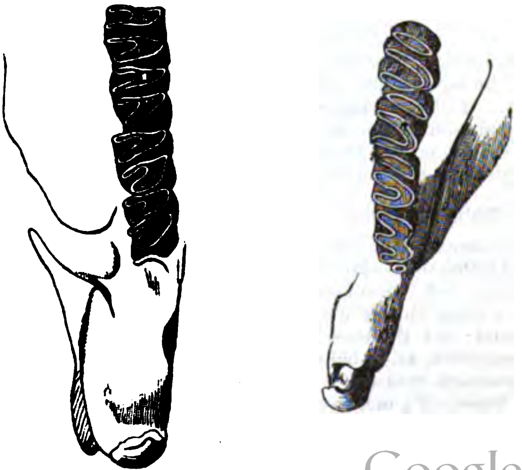
They breed often in the course of a year, producing five or six young at a birth, and they bring forth sometimes on their migrations. They are said to carry some of their young in their mouths and some on their backs.

The Laplanders, who compare their flesh to that of squirrels, eat them.

Echimys (Geoff.; Loncheres, Ill. part.)

Generic Character.—Four unguiculate toes and a vestige of a fifth on the anterior feet. Tail very long, scaly, and nearly naked. Hairs, especially those on the upper parts, flat and aciculated. Molars with transverse laminæ, united to each other by twos at one end or isolated.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.



Teeth of Echimys (dactylinus, young) enlarged. (F. Cuv.)

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* Individuals from Russia and Lapland are said to be less than those from Norway and Sweden.

Example. — *Echimys chrysurus* (*Echimys cristatus*, Desm.?) The *Gilt-tail Dormouse* of Pennant; *Lerot à queue dorée* of Allamand.

Description.—Ears short and broad, whiskers strongly developed, a gold-coloured line extending longitudinally from the nose to the space between the ears; head, body, and upper part of tail marone or shining purplish chesnut, ruddy marginate bristles being scattered between the hairs, which give the splendour to the animal; lower part of tail, which is thick at the base and longer than the body, golden. Length from nose to tail, five inches.

Habits, Food, &c.—This species is said to climb trees, and live principally on fruits.

Locality, Surinam.

Cercomys. (F. Cuvier.)

Generic Character.—In shape resembling the Black Rat, but with the chanfrein more arched and the ears larger. Anterior limbs considerably shorter than the posterior, which are terminated with five toes, the three middle ones longest; the anterior with four only, and the rudiment of a thumb with a small flat nail; all the other toes with compressed nails curved and pointed, and seeming more proper for climbing than burrowing. Tail very long, and like that of the Brown Rat. Fur composed of long, straight, firm hairs of a uniform texture, and of hairs which are finer, softer, and much thicker; no bristle as in *Echimys*. Molars with distinct roots of equal size, and their slightly elevated crown nearly circular, presenting at the surface a notch and three ellipses surrounded with enamel, as is the tooth itself. The notch is on the internal side in the upper molars, and on the external side in the lower molars. Great suborbital hole considerably extensive.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.

Example, *Cercomys cunicularius.*

Description.—Deep brown above, paler on the sides and the sides of the cheeks; jaws and neck beneath, as well as the under parts generally, whitish. Eyes and ears large.

Locality, Brazil.

Cercomys cunicularius.

Myoxus. (Schreber; Gmelin.)

Generic Character.—Four toes and the vestige of a fifth on the anterior feet; five toes behind. Fur very soft and fine. Tail very long, sometimes well clothed with hair and round, sometimes depressed, and sometimes tufted at the extremity only. Molars with transverse ridges of enamel projecting and hollowed.

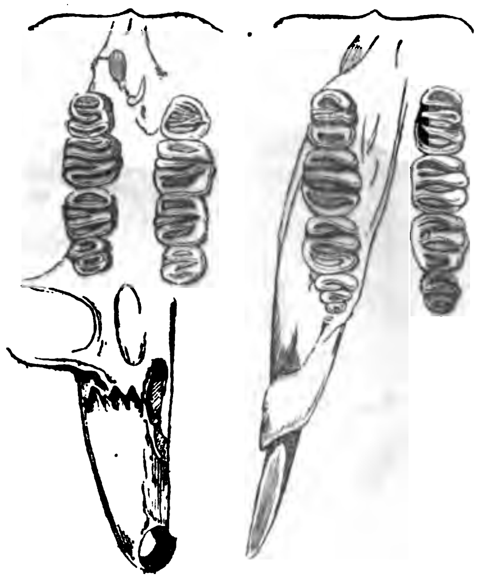
Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.

Example, *Myoxus avellanarius.*

Description.—Head proportionally large; eyes large, black, and prominent; muzzle not blunt; ears broad, about one third the length of the head; body plump and round; tail flattened, the hairs rather long and bushy; head, back, sides, belly, and tail tawny red; length that of a common mouse.

Young of a mouse-grey, head and flanks only tinged with red.

This is the *Muscardin*, *Croque-noix*, and *Rat-d'or* of the French; *Moscardino* of the Italians; *Liron* of the Spanish; *Rothe Wald-maus*, *Hasel-maus*, and *Hasel-schläfer* of the Germans; *Skogsmus* of the Swedes; *Kassel-muus* of the Danes; *Pathew* of the antient British; and *Dormouse* or *Sleeper* of the modern British.



Teeth of Myoxus, enlarged. (F. Cuv.)

There is little if any doubt that this species is the *Glis* of the Roman authors. Thus Pliny, in his chapter, 'De faginâ glande,' &c. (xvi. 6), says, 'Fagi glans muribus gratissima est ... glires quoque saginat;' and Martial (xiii. 59, 'Glires') writes—

> 'Tota mihi dormitur hyems, et pinguior illo
> Tempore sum, quo me nil nisi somnus alit.'

Nor does the occasional short awakening caused by a warm sunny day, to which the animal is subject, militate against the application of Martial's lines; for the occasional disturbance is the exception to the rule.

Mr. Bell places the Dormouse among the *Sciuridæ* (Squirrels); and indeed zoologists have assigned it to both the genus *Sciurus* and *Mus*. In its habits it comes near to the squirrel, but in its dentition it is nearer to the mice. It is in truth one of those forms by which Nature glides from one race of animals to another. Mr. Bell gives the following synonyms:—*Mus avellanarius minor* (Ray), *Mus avellanarius* (Linn.), *Sciurus avellanarius* (Desm.), *Myoxus Muscardinus* (Schreb.), *Myoxus avellanarius* (Desm.), *Le Muscardin* (Buff.), *Dormouse* (Penn.). He considers the specific name *Avellanarius* as not well chosen, inasmuch as the hazel-nut is not the principal food of the Dormouse; 'indeed,' he continues, 'I have never seen any that could gnaw through the shell of that nut when fully ripe and dry.'

Habits, Food, &c.—Dense thickets, bushy dells, and tangled hedgerows are the favourite retreats of the Dormouse. There it constructs its easy dormitory, and there providently lays up its winter store, consisting of acorns, beech-mast, corn, young hasle-nuts, haws, &c. It seems inclined to be gregarious; and indeed Mr. Yarrell told Mr. Bell that he had seen not less than ten or a dozen, or even more, of their nests built in the shrubs of a thicket. The latter zoologist well describes its habits.

'It takes its food holding it in its hands, and sitting on its haunches like a squirrel,* and often suspending itself by its hind-feet, in which position it feeds as easily and comfortably as in the more ordinary position. Towards the winter it becomes exceedingly fat; and having laid up a store of food, retires to its little nest, and coiling itself up into a ball, with the tail over the head and back, becomes completely torpid. A mild day calls it into transient life; it then takes a fresh supply of food and relapses into its former slumber; and finally awakening in the spring, at which time it has lost much of its fat, it enters upon its usual habits, and the enjoyment of the conjugal and paternal affections. The young, which are generally about four in number, are born blind; but in a few days the eyes are opened, and in a short time they are enabled to seek their

* So do the Rats, both the black and brown species.

food independently of the parent's care. I have reason to believe that, in some cases at least, the Dormouse has a second brood early in the autumn, as I have received from one locality in the month of September an adult, one about half-grown, evidently of the spring brood, and three very young ones apparently not more than a fortnight or three weeks old.' (*British Quadrupeds.*) This pretty little animal is nocturnal in its habits. In *The Naturalist* (vol. iii.) will be found a well related instance of its behaviour on being aroused from its nap during the winter. One of them having been taken in its nest in the middle of December, the heat of its captor's hand and the warmth of the room completely revived it, and it nimbly scaled the furniture, finding no difficulty in ascending and descending the polished backs of the chairs, and leaping from chair to chair with great agility. On being set at liberty it sprang at least two yards to a table. It did not seem alarmed at being taken into the hand. In the evening it was placed with its nest in a box, and the next morning had relapsed into torpidity. Another account in the same volume informs us that a Dormouse, which had been sent a distance of 140 miles, was apparently but little disturbed by its ride. 'From that time till the 1st of April, 1838,' says Mr. Piggot, 'it slept in its snug dormitory, a deal box lined with wool, when it awoke and readily ate of apples and nuts. It is easily alarmed, being more timid than tame, but shows no signs of anger on being taken in the hand. As it sleeps the greater part of the day, I cannot then closely watch its habits; but towards evening it wakes up, and is very lively and frolicsome, running, on being let out of its cage, up the bell-rope, where it will sit for hours in the folds of the knot, timidly watching our movements.'

Geographical Distribution, Europe.

Dormouse.

Graphiurus. (F. Cuvier.)

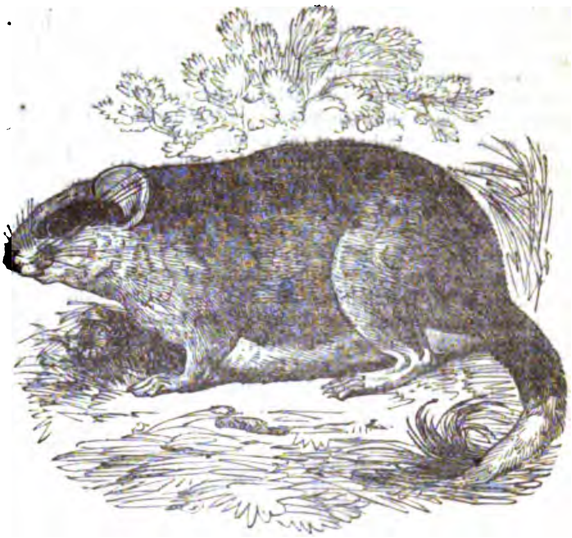
Generic Character.—Limbs short, delicate, and not differing much from each other in length. Anterior feet terminated by four nearly equal toes, and with a flat nail on the internal tubercle of the palm, which indicates the thumb. Posterior feet with five toes, the two external, but the thumb principally, the shortest. All the toes armed with pointed, compressed, arched, and strong claws. Tail short, very fleshy, and seemingly thicker at its extremity than at its root. Molars eight in each jaw, remarkable for the comparative smallness of their size. The first in each jaw only a linear rudiment; the three following are a little smaller in the lower jaw than they are in the upper, equal in size to each other, with the surface of the crown united, and in this respect resembling those of the Aye-Aye; no figure was traceable, but this may have been from detrition.

Example, *Graphiurus Capensis.*

Description.—Eyes not so large as in *Myoxus*, with which the animal has much relationship; ears round. Fur thick; upper parts of the head, neck, shoulders, back, sides, rump, and upper part of the limbs deep brownish-grey; tip of the muzzle, sides, and lower part of the head and limbs reddish white; a large band of blackish brown from the eyes to below the ears; lower parts of the body greyish white with a reddish tinge; tail brown, grey, and whitish above, with its extremity entirely reddish white; there is a tuft of white hairs at the upper and anterior part of the base of the ear Size of the *Lerot*, Buff., *Mus quercinus*, Linn.

Habits unknown. (F. Cuv.)

Locality, Cape of Good Hope.

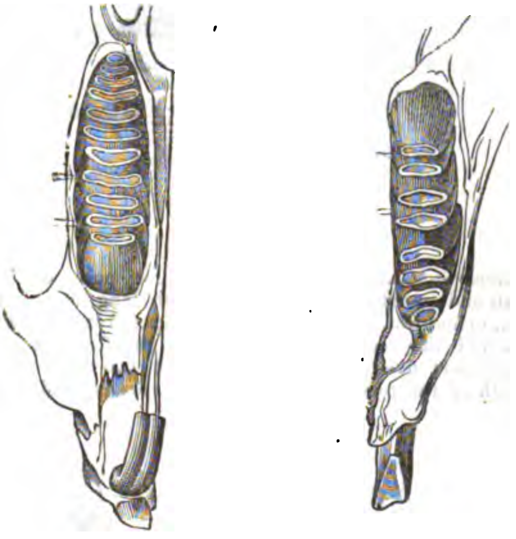


Graphiurus Capensis.

Otomys. (F. Cuvier.)

Delalande brought back from his voyage to the Cape of Good Hope two species of rodents remarkable for their physiognomy, which sufficiently resembles the rats, but differing externally from those animals in having their large ears covered with hairs, the head more rounded, and a short tail, and especially in their dentition.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{3-3}{3-3} = 16$



Teeth of Otomys. (F. Cuv.)

Example, *Otomys unisulcatus*, *Caffre Otomys.*

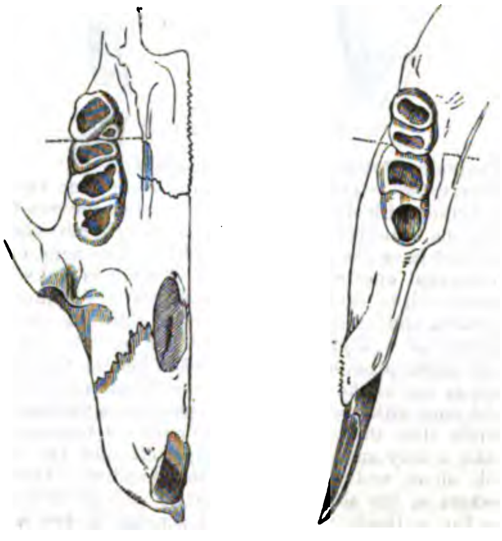
Description.—The anterior limbs have four complete toes, armed with delicate nails, which are compressed and sharp, and a rudiment of an unguiculated thumb; the posterior feet have five toes, armed with the same nails, but the two external ones are very short. The tail is but scantily covered with hairs, and is scaly and short. The muzzle is very thick and obtuse, entirely covered with hair, with the exception of a slight ridge round the nostrils, which are small, and approximated to each other below; the eyes are large, as well as the ears, which have an internal projecting membrane, which, when its edges (parois) are approximated, entirely shut the entrance of the auditory passage. The mouth is very small, the upper-lip cleft, and the tongue thick, short, and covered with soft papillæ. There are whiskers on the sides of the muzzle and above the eyes. The fur is thick, very soft, and consists of two sorts of hairs; the shortest and most numerous, which determine the colour of the animal, are woolly, and, when viewed through a microscope, appear to be formed of very small rings, alternately bright and obscure; the others, rare and longer than the first, are also stouter and more stiff; these, when viewed through a microscope, present only a uniform texture, and so it is with the whiskers. The woolly hairs are of a slaty-grey for two-thirds of their length, and then of a yellowish-white, with the point black, whence results the dirty yellow tint with which the animal is coloured above; below, yellowish-white predominates. The very short hairs of the tail are of the colour of those of the back; the extremities have the tint of the under parts. Length about six inches (French), from the tip of the muzzle to the origin of the tail, which last measures three inches and a half. Mean height, two inches and a half. (F. Cuv.)

Habits, &c.—The habits of this species do not appear to be known, nothing respecting them having been found in the notes of M. Delalande. M. F. Cuvier thinks that it is doubtless omnivorous, like the rats; but from the size of its eyes, it may be conjectured that its life is not passed in such obscurity as theirs; and from the delicacy of its sharp claws, and the softness of its fur, that it does not burrow

Otomys unisulcatus.

Hydromys. (Geoffroy.)

Generic Character.—Muzzle rather pointed; ears small and rounded. Body covered with long hairs. Tail long, cylindrical, rather scaly, with scattered hairs. Four toes and the vestige of a thumb on the fore-feet. The hinder feet five-toed, and palmated for two-thirds of the length of the toes. Molars with the crowns divided into obliquely quadrangular lobes, the summits of which are hollowed into a spoon-shape.



Teeth of Hydromys. (F. Cuv.)

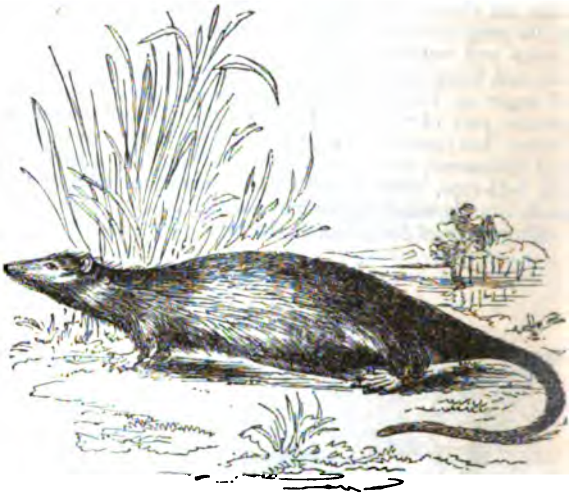
Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{2-2}{2-2} = 12$.

Example, *Hydromys leucogaster*.

Description.—Fur short, soft, marone-brown above, white below; tail black at the base and white at the other extremity. Size sometimes twice that of the Common Brown Rat.

M. Geoffroy has recorded two species, that described above, and another with a yellow belly, *H. chrysogaster;* the last he states to be nearly one-half less than the *Coypou*, but they are generally considered to be only varieties of the same species. M. Geoffroy speaks highly of the quality of the fur of the yellow-bellied variety, and says that it is more valuable than that of the *Coypou.*

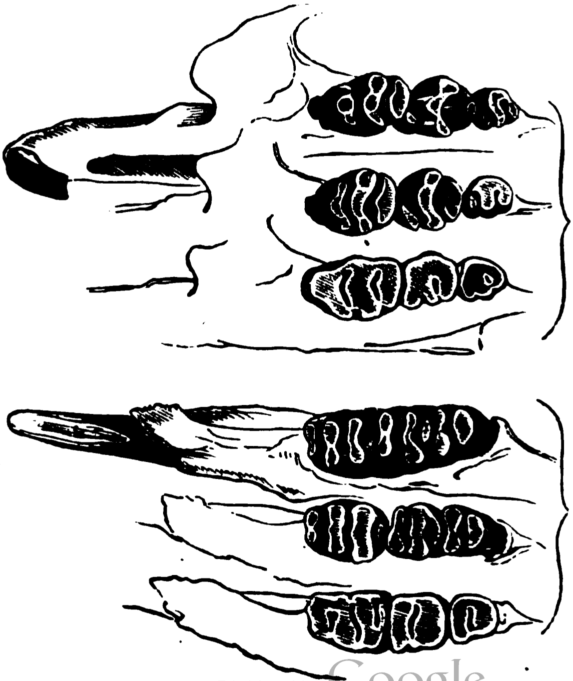
Habits, Locality, &c.—These animals are aquatic, and were found in the islands of D'Entrecasteaux Channel. That named *H. Chrysogaster* was killed by a sailor at the moment when it was taking refuge under a heap of stones: *H. Leucogaster* was taken in the island Maria, in the same channel.



Hydromys leucogaster.

True Rats and Mice.

M. F. Cuvier (*Dents des Mammifères*) observes that up to the time of his writing, animals provided with the same teeth as the Rat (*Mus Rattus*), the Brown Rat (*Surmulot* of the French—*Mus decumanus*), or the Mouse (*Mus Mus-*



Teeth of Mus.

culus), formed a single and very natural genus. He then goes on to state that the possession of a cranium, the origin of which he knows not, in presenting the type of a new genus provided with the same teeth as the rat, confers on those teeth a more elevated rank than they had previously held, and begins to form the character of a family. The preceding is a copy of M. F. Cuvier's plate, and he informs us that the species which gave him this dentition are *Mus Rattus*, *Mus decumanus*, *Mus Musculus*, *Mus Pumilio*, &c.

In endeavouring to give a sketch of the swarms of this group, we shall treat of them according to their geographical distribution.

European Rats and Mice.

The Long-tailed Field Mouse, Wood Mouse, or *Mus sylvaticus*, and the Harvest Mouse, *Mus minimus* of White, and *Mus messorius* of Shaw, may be considered as indigenous in Europe. Whether the old English or Black Rat (Mus Rattus) and Domestic Mouse are aborigines, or imported, is not so clear. The latter is only found in inhabited countries; and, like the Black Rat and Brown Rats, is a cosmopolite, following civilized man wherever he is to be found.

The Long-tailed Field Mouse.—This is the *Llygoden ganolig* and *Llygoden y maes* of the antient British; *Le Mulot* of the French; and *Voed* of the Danes; *Mus sylvaticus* (Linn.), *Mus agrestis major* (Briss.), and *Mus domesticus medius* of Ray. The length of the head and body, as given by Mr. Bell, is 3 inches 8 lines, and that of the tail 3 inches and 6 lines. Pennant makes its measurement from the nose to the setting on of the tail four inches and a half, and the tail four inches. If the last-mentioned dimensions are correct, they must have been taken from a very large individual. Mr. Macgillivray gives the dimensions of three individuals; the length (to the end of the tail) of the largest was 6 inches 8 lines, that of the next 6 inches 6 lines, and that of the least 6 inches only.

The animal is well described by Mr. Bell as larger than the Common Field Vole, but varying considerably in size; the head long and raised, the muzzle tapering; the whiskers very long; the eyes remarkably large and prominent; the ears large, oblong, oval, with the anterior margin turned in at the base, and a projecting lobe arising within the ear, near the base of the posterior margin; the tail nearly as long as the body, slender and tapering; the legs long. The upper part and sides of the head, neck, and body, and the outer surface of the legs, of a yellowish-brown, darker on the back, each hair being grey or ash-coloured at the base, then yellow, and the tips of some of them black: under parts whitish, with a very slight greyish tint in some parts, and a yellowish grey patch on the breast. Tail brown above, white beneath. (*British Quadrupeds.*)

This is a most destructive species, and a bitter enemy to the horticulturist, the agriculturist, and the planter. It is very prolific, bringing forth from seven to ten at a birth, and is not always stinted to one brood in a year. The hoards that it collects in its subterranean retreats (which are sometimes the results of its own labour, but more frequently excavations which it finds ready made, but which it enlarges, such as those under roots of trees, old mole-runs, &c.) are enormous for the size of the animal, and Pennant is of opinion that the great damage done by hogs in rooting up the ground, or 'mooting,' as it is called in some counties, is caused chiefly by the search of the swine for the concealed treasure of this Field Mouse.

Geographical Distribution.—The whole of temperate Europe.

The *Harvest Mouse.* White, of Selborne, who suggests the name of *Mus minimus*, appears to be the first who drew the attention of naturalists to this the smallest of British quadrupeds. He wrote an account of it to Pennant, who called it the *Less long-tailed Field Mouse* and the *Harvest Mouse.* It is the *Mus messorius* of Shaw, and Mr. Bell adds the following synonyms:—*Mus minutus* (Pall.)—*Mulot nain?* and *Rat des Moissons* (F. Cuv., 'Mamm.'); *Minute Mouse* of Shaw.

Description, Food, Habits, &c.—White thus introduces his discovery to Pennant: 'I have procured some of the mice mentioned in my former letter, a young one and a female with young, both of which I have preserved in brandy. From the colour, size, shape, and manner of nesting, I make no doubt but that the species is nondescript. They are much smaller and more slender than the *Mus domesticus medius* of Ray, and have more of the squirrel or dormouse colour; their belly is white; a straight line along their sides divides the shades of their back and belly. They never enter into houses; are carried into ricks and barns with the sheaves, abound in harvest, and build their nests amidst the straws of the corn above the ground, and sometimes in thistles. They breed as many as eight at a litter, in a little round nest composed of the blades of grass or wheat. One of these I procured this autumn most artificially platted, and composed of the blades of wheat, perfectly round, and about the size of a cricket-ball; with the aperture so ingeniously closed, that there was no discovering to what part it belonged. It was so compact and well fitted that it would roll across the table without being decomposed, though it contained eight little mice that were naked and blind. As this nest was perfectly full, how could the dam come at her litter respectively so as to administer a teat to each? Perhaps she opens different places for that purpose, adjusting them again when the business is over; but she could not possibly be contained herself in the ball with her young, which moreover would be daily increasing in bulk. This wonderful procreant cradle, an elegant instance of the efforts of instinct, was found in a wheat-field suspended in the head of a thistle.' And again: 'As to the small mice, I have further to remark, that though they hang their nests for breeding up amidst the straws of the standing corn above the ground, yet I find that, in the winter, they burrow deep in the earth, and make warm beds of grass; but their grand rendezvous seems to be in corn-ricks, into which they are carried at harvest. A neighbour housed an oat-rick lately, under the thatch of which were assembled near an hundred, most of which were taken, and some I saw. I measured them, and found that from nose to tail they were just two inches and a quarter, and their tails just two inches long. Two of them, in a scale, weighed down just one copper halfpenny, which is about the third of an ounce avoirdupois; so that I suppose they are the smallest quadrupeds in this island. A full-grown *mus medius domesticus* weighs, I find, one ounce lumping weight, which is more than six times as much as the mouse above; and measures from nose to rump four inches and a quarter, and the same in its tail. . . . As my neighbour was housing a rick, he observed that his dogs devoured all the little red mice they could catch, but rejected the common mice; and that his cats ate the common mice, refusing the red.' Thus far White. Dr. Gloger describes one of these nests as beautifully constructed of the panicles and leaves of three stems of the common reed interwoven together, and forming a roundish ball, suspended on the living plants about five inches from the ground. On the side opposite the stems, rather below the middle, was a small aperture, which appeared to be closed during the absence of the parent, and was scarcely observable even after one of the young had made its escape through it. The inside, when examined with the little finger, was found to be soft and warm, smooth, and neatly rounded, but very confined; it contained only five young; but another less elaborately formed sheltered no less than nine. The panicles and leaves were slit into minute strips or strings by the teeth of the animal in order to assist the neatness of its weaving. Mr. Macgillivray found one of these nests in Fifeshire composed of dry blades of coarse grass, arranged in a globular form, and placed in the midst of a tuft of *Aira cæspitosa*, nine inches from the ground: it contained six or seven young naked and blind. The food of this little mouse consists of corn and grass seeds, insects, and earth-worms: one to which a bit of the tail of a dead blind worm, *anguis fragilis*, was presented, devoured it greedily. Of insects it is very fond. Mr. Bingley says, 'One evening, as I was sitting at my writing-desk, and the animal was playing about in the open part of its cage, a large blue fly happened to buzz against the wires. The little creature, although at twice or thrice the distance of her own length from it, sprang along the wires with the greatest agility, and would certainly have seized it, had the space between the wires been sufficiently wide to have admitted her teeth or paws to reach it. I was surprised at this occurrence, as I had been led to believe that the Harvest Mouse was merely a granivorous animal. I caught the fly and made it buzz in my fingers against the wires. The mouse, though usually shy and timid, immediately came out of her hiding-place, and running to the spot, seized and devoured it. From this time I fed her with insects whenever I could get them; and she always preferred them to every other kind of food that I offered her.' Mr. Macgillivray figures one in the coils of an earth-worm, which it devoured, though the worm at first upset it by twisting round its body. (*Naturalist's Library—Mammalia*, vol. vii.; *British Quadrupeds*, pl. 27.)

Col. Montagu failed to keep it in confinement, but it has been so kept. The Rev. W. Bingley and Mr. Broderip observed that the tail is in a degree prehensile. The latter had a pair in a dormouse's cage for some time, and frequently saw them coil the end of their tails round the bars, especially when they were clambering along the sides or on the top of it. They became very familiar, soon recognised their friends, and would lie down or rear themselves up to be tickled with a straw or a pen; an operation which they evidently enjoyed much. We know of no instance when the female has brought forth in confinement where she has not eaten her young. One just born that was saved from the teeth of the mother is in the Museum of the Royal College of Surgeons, and is perhaps one of the smallest placental quadrupeds that ever breathed.

Geographical Distribution.—Europe, perhaps generally. It has been found in Siberia, Russia, and Germany. In Britain it is recorded as having occurred in Hampshire, Gloucestershire, Wiltshire, and Devonshire; in the three last counties by Col. Montagu, and noted as not uncommon. It has been found also in Cambridgeshire. Mr. Macgillivray had one sent to him from Aberdeenshire, and another from the neighbourhood of Edinburgh: he found, as we have seen, the nest in Fifeshire.

Harvest Mouse: nest in background.

There are, it appears, in Trebisond, mice (*Mus Alleni* and *Mus Abbottii*) smaller than *Mus messorius*. (*Zool. Proc.*, 1837.)

We shall here notice those cosmopolites, the *Black Rat*, the *Brown Rat*, and the *Common Mouse*, the pests of civilised man.

The Black Rat. This is *Le Rat* of the French; *Ratto* and *Sorico* of the Italians; *Raton* and *Rata* of the Spaniards; *Rato* of the Portuguese; *Ratze* of the Germans; *Rot* of the Dutch; *Rotta* of the Swedes; *Rotte* of the Danes; *Llygoden ffrengig* of the antient British; *Black Rat* of the modern English; and *Ratton* of the Scotch. It is the *Mus Rattus* of Linnæus, and the *Mus domesticus major* of Ray.

That this animal is indigenous may be doubted. Mr. Macgillivray observes that the 'Old English or Black Rat,' as it has been called, is as much French or Irish as English. That it was in Britain long before the introduction of the *Brown Rat*, before whose superior strength it is rapidly disappearing, can be doubted as little. Pennant, who gives the British name above stated for the *Black Rat*, has no British name for the brown species; and we suspect that the king's rat-catcher, noticed by Pennant, with his scarlet dress embroidered with yellow worsted, on which are figures of mice or rats destroying wheat-sheaves, owed his office in this kingdom to the *Black Rat*. 'It is believed,' says Mr. Macgillivray, 'to have been originally imported from the Continent, where it first made its appearance in the beginning of the sixteenth century, and is supposed to have come from the East. Vessels in port were formerly liable to be infested by it, so that it soon became as common in America as in Europe; although in the maritime parts of that country it has now become nearly as scarce as with us, and from the same cause, the predominance of the more enterprising and stronger Brown Rat.' Mr. Bell had previously fixed the middle of the same century for its appearance in this country. 'At least,' says he, 'no author more antient than that period has described or even alluded to it, Gesner being the first who described and figured it.' The figure of Gesner leaves no doubt that the animal represented is the *Black Rat*, and it is spoken of in such terms that it may well have been a long resident in England:—'Mus domesticus major, quem Rattum appellârim cum Alberto, quoniam hoc nomine non Germani tantum, sed Itali etiam, Galli et Angli utuntur;' and again, among the names given to the animal by various nations, 'Anglicè, *Rat, Ratte.*' Shakspere's lines,

'But in a sieve I'll thither sail,
And, like a Rat without a tail,
I'll do—I'll do—and I'll do!'

show that the animal must have been familiarly known to his audience; and it must have been very common early in the seventeenth century, when the white variety was probably well known; for we read in the 'Dysart Kirk Session Minutes' (May, 1626), that a suspected witch, one Janet, came to John White's house, 'and span on his wife's wheel in her absence, and thereafter there came a *white Ratton* at sundrie times and sat on his cow's back, so that thereafter the cow dwined away.' Mr. Bell notices the usurpation of the haunts of this species by the Brown Rat. The Black Rat, he says, 'is now rarely found, excepting in old houses of large cities, as in London, in Edinburgh, and some other places, where it still exists in considerable numbers, especially in the cellars and stables of the city of London, in many of which it is more common than the other.' Mr. Macgillivray remarks that in Edinburgh it appears to be completely extirpated. 'I have not,' he continues, 'seen a specimen obtained there within these fifteen years.' The last-mentioned author also tells us that the Rev. Mr. Gordon, minister of Birnie, some years ago sent him several individuals alive, which were caught in Elgin, where however the species is much less frequently met with than the Brown Rat. In Leith, he says, which is at a greater distance from the coast, it is not very uncommon; and in other inland towns and villages in Scotland it is still to be procured. 'Whether,' adds Mr. Macgillivray, 'the destruction of this animal has been effected by the larger and more ferocious Brown Rat, or, like that of many tribes of the human species, has resulted from the diminution of food, caused by the overwhelming increase of an unfriendly race, it is impossible to determine.'

The Black Rat is greyish black above and ash-coloured beneath; the ears are half the length of the head, and the tail is rather longer than the body.

Mr. Bell gives the following dimensions:—

	Inch.	Lines.
Length of the head and body .	7	4
Length of the head . . .	1	10
Length of the ears . . .	0	11
Length of the tail . . .	7	11

It breeds often in the year, and the female ordinarily produces from seven to nine at a birth. Like the Brown species, it is omnivorous. Mr. Bell thinks it probable, from the proximity of the two countries, that it was introduced into this kingdom from France, and observes that the Welsh name for it, which signifies 'French Mouse,' appears to favour this opinion. From Europe, he adds, it has been sent with the Brown Rat to America, the islands of the Pacific, and to many other places.

Mr. Thompson (*Zool. Proc.*, 1837) notices an Irish Rat with a white breast, which he is inclined to consider distinct from *Mus Rattus*, and which he names *Mus Hibernicus*.

Dr. Richardson did not observe the *Black Rat* in the Fur Countries; and he says that he may venture to affirm that it had not, when he wrote, advanced farther north than the plains of the Saskatchewan.

Brown Rat. This is *Le Surmulot* of the French; *Norway Rat* of the English; *Mus decumanus* of Pallas and Gmelin; and *Mus Norvegicus* of Brisson.

Why this overwhelming pest has obtained the name of *Norway Rat* does not appear: so far from its being aboriginal in that country, it was not known to exist there when the name was first applied to it. 'It is,' says Pennant, 'an animal quite unknown in Scandinavia, as we have been assured by several natives of the countries which form that tract, and Linnæus takes no notice of it in his last 'System.' It is fit here to remark an error of that able naturalist in speaking of the common Rat, which he says was first brought from America into Europe by means of a ship bound to Antwerp.* The fact is that both Rat and Mouse were unknown to the New World before it was discovered by the Europeans, and the first Rats it ever knew were introduced there by a ship from Antwerp. This animal never made its appearance in England till about forty years ago..... I suspect that this Rat came in ships originally from the East Indies. They are found there, and also in vast numbers in Persia, from whence they have made their way westerly even to Petersburg.' It made its appearance in the neighbourhood of Paris about 1750. Mr. Bell states that the original country of this Rat can no longer be ascertained, although there is reason to believe that it comes from a warmer climate than our own. Mr. Macgillivray says that it is supposed to have been introduced from Persia and the East Indies about 1730, and gradually to have spread over the greater part of the continent of Europe, as well as America, by means of the frequent commercial intercourse established among the nations of these regions. It is not, he observes, confined to cities and villages, but establishes colonies in farm-steadings, on the banks of canals and rivers, and even in islands at a considerable distance from the mainland, or from larger islands, to which it has been introduced by shipping. Thus, he states, it is found on many of the islets of the Hebrides in considerable numbers, feeding on grass, shell-fish, and crustacea, and burrowing in the banks; 'for although not essentially amphibious, like the Water Rat, it does not hesitate on occasion to betake itself to the water, and flocks have been seen swimming from one island to another.'

According to Dr. Harlan the *Brown Rat* did not make its appearance in North America until the year 1775. When Dr. Richardson wrote (*Fauna Boreali-Americana*) it was very common in Lower Canada; but he was informed that, in 1825, it had not advanced much beyond Kingston in Upper Canada. He did not observe it in the Fur Countries; and if it does exist there, he thinks that it is only at the mouth of the Columbia river, or at factories on the shores of Hudson's Bay.

This species is eminently carnivorous, bold, ferocious, and most destructive in the game-preserve and poultry-yard, where the eggs and young birds are preyed upon by them without mercy. In towns carrion and offal form their chief subsistence. An official report to the French government on the proposition for removing the establishment for slaughtering horses at Montfauçon gives an account of their numbers and voracity almost appalling; indeed one of the chief arguments against the removal was the danger to the neighbourhood of suddenly depriving these voracious animals of their usual food. The carcasses of the slaughtered horses, sometimes to the amount of thirty-five per diem, are found next morning picked to the bare bone by the rats. A part of this establishment is enclosed by solid walls, at the bottom of which several holes are made for the entrance and exit of these vermin. Into this place Dusuassois, the proprietor, put the dead bodies of two or three horses; and having stopped up all the holes towards midnight, with as little noise as possible, he, with several workmen, each bearing a torch in one hand and a stick in the other, suddenly entered the enclosure, shut the door, and began a general massacre. Wherever a blow was directed, even without aim, a rat was killed; and those which attempted to escape by running up the walls were quickly knocked down. The dead of one night amounted to 2650; the result of four hunts was 9101; and by repeating the experiment at intervals of a few days, Dusuassois destroyed 16,050 rats in the space of a month. Now when it is recollected that the yard in which these numbers were killed does not contain more than a twentieth of the area over which the dead horses are spread, some idea may be formed of the multitudes that infest this place; indeed the adjoining fields and eminences are riddled with their burrows, and their paths thereto may be traced from the enclosures where the horses are slaughtered.

This rat is greyish-brown above and greyish-white beneath, and the tail is shorter than the head and body. Mr. Bell gives the following dimensions, from which its superiority in size to the Black Rat will be evident:—

	Inches.	Lines.
Length of the head and body . .	10	8
„ head	2	4
„ ears	0	8
„ tail	8	2

White or yellowish-white varieties, being albinoes with red eyes, and variegated individuals, sometimes occur.

The *Common* or *Domestic Mouse* needs no description. It seems to be entirely dependent on civilized man, and has never been found at a distance from his dwelling. White varieties with pink eyes are kept and propagated as pets by those who admire such albinoes: they are pretty little animals, and soon become familiar. This well-known species is *La Souris* of the French; *Topo, Sorice*, and *Sorgio di Casa* of the Italians; *Rat* of the Spanish; *Ratinho* of the Portuguese; *Maus* and *Hausmaus* of the Germans; *Muys* of the Dutch; *Mus* of the Swedes; *Muus* of the Danes; *Llygoden* of the antient British; *Mus domesticus communis vel minor* of Gesner; *Mus domesticus vulgaris s. minor* o. Ray; and *Mus Musculus* of Linnæus.

Dr. Richardson saw a dead mouse in a storehouse at York Factory filled with packages from England, and he thinks it probable that the species may have been introduced into all the ports on the shores of Hudson's Bay; but he never heard of its being taken in the Fur Countries at a distance from the sea-coast. Mr. Say informed him that it was introduced at Engineer Cantonment on the Missouri, by Major Long's expedition.

Asiatic Rats and Mice.

It seems to be certain that the *Brown Rat* is an Asiatic species, and the Black Rat is not without claims to a similar geographical origin; but among the most formidable of the Oriental Rats is the *Mus Giganteus* of Hardwicke, *Mus Malabaricus* of Shaw. Of this rat General Hardwicke gives a faithful figure, of the size of life, in the seventh volume of the *Transactions of the Linnean Society*: it has the appearance of a *Brown Rat* dilated to gigantic proportions, and it is impossible to look at it without thinking what the consequences might be if it were ever to be imported and naturalised in Europe. Above it is most hairy and black; beneath inclining to grey. The animal figured was a female, and weighed two pounds eleven ounces and a half. Its total length was 26½ inches, of which the tail measured 13 inches. The male grows larger, and weighs three pounds and upwards. 'This rat,' writes the late lamented General, 'is found in many places on the coast of Coromandel, in Mysore, and in several parts of Bengal between Calcutta and Hurdwar. It is partial to dry situations, and hardly ever found distant from habitations. The lowest caste of Hindus eat the flesh of this rat, in preference to that of any other species. It is a most mischievous animal, burrows to a great depth, and will pass under the foundations of granaries and storehouses, if not deeply laid. Mud, or unburnt brick walls, prove no security against its attacks, and it commonly perforates such buildings in all directions. It is destructive in gardens, and roots up the seeds of all leguminous plants sown within its haunts. Cucurbitaceous plants and fruits also suffer by its depredations. When grain and vegetables are not within its reach, or scarce, it will attack poultry, but the former is its choicest food.' Mr. Gray remarks that the geographical range of *Mus giganteus* appears to be very extensive, Mr. Charles Hardwicke having transmitted to the British Museum a specimen from Van Diemen's Land.

Mus Setifer. (Horsf.) The *Tikus-wirok* of the Javanese was considered by M. Temminck and others to be the young of this species: but this opinion is corrected by Mr. Gray (*Zool. Proc.*, 1832), who points out the differences. Dr. Horsfield states that it is found in Java at the confines of forests and woods, and, according to his observations, rarely approaches the villages and dwellings of the natives, who describe it, however, as a bold and mischievous animal, and the Doctor says, that the robustness of its form and the remarkable size and strength of its front teeth agree with this character: its nose, he adds, is evidently employed in burrowing the ground in search of its food, and its tail has the character of those species which are in the habit of frequenting the water. Mr. Hodgson states that *Mus decumanus* and *Mus Rattus* are both very numerous and troublesome in Nepâl; that *Mus Musculus* is very uncommon, and that *Field Mice* are frequently met with.

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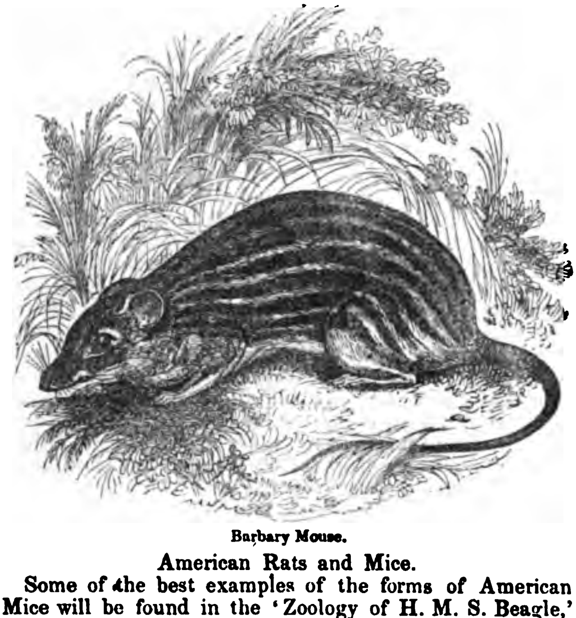
* N. B. Linnæus only mentions this on the authority of another. His words are; 'Ex America navi quadam Antwerpiana primum in Europam pervenisse refert Foppin. cab. illustr. 166.'

African Rats and Mice.

Mus Barbarus, the *Barbary Mouse*, will serve as an example of the African species.

Description.—Darkish brown with five or six yellowish longitudinal stripes on each side, about half as wide as the intervening spaces, and becoming confused towards the under parts, which are nearly white. Mr. Bennett observes, that on the fore-feet only three of the toes are at first visible; and that this circumstance, mentioned in the specific character given by Linnæus, has led many subsequent naturalists to doubt whether the *Barbary Mouse* really belonged to the genus with which it was associated. Linnæus himself, continues Mr. Bennett, had however stated, in his description of the species, that rudiments of a thumb, and also of a fifth toe, were observable on a closer inspection; and this statement, he adds, was fully confirmed by the examination of the specimens in the Menagerie of the Zoological Society of London, which were intermediate in size between the Common Rat and Common Mouse.

Locality, Barbary, where they are not rare, and where the name given to them by the natives is *Phār-Azēff*, the *Palmetto Mouse*.



Barbary Mouse.

American Rats and Mice.

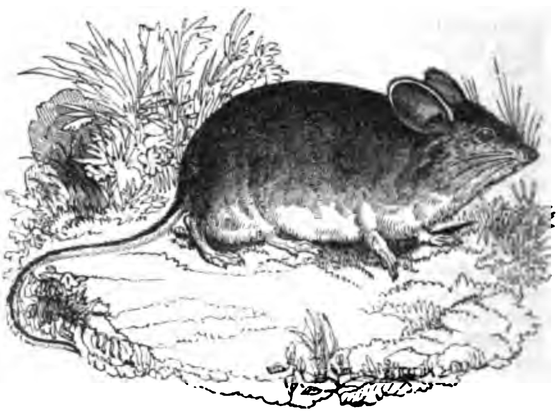
Some of the best examples of the forms of American Mice will be found in the 'Zoology of H. M. S. Beagle,' where many species are figured: they were collected by Charles Darwin, Esq., at various parts of the southern coast of South America, viz., Coquimbo, Valparaiso, Port Desire, Maldonado, Bahia, Blanca, &c. Mr. Waterhouse first described these in the Proceedings of the Zoological Society of London (1837), dividing them into several subordinate groups, to which he assigns the subgeneric titles of *Scapteromys*, *Oxymycterus*, *Abrothrix*, *Calomys*, and *Phyllotis*, which last, in Mr. Waterhouse's opinion, indicates an aberrant form of the *Muridæ*.

We select as an example *Mus (Phyllotis) Darwinii.*

Description.—Fur above, cinnamon and blackish intermixed; in front of the eyes, ash-colour; cheeks, sides, and tail, near the base, yellow cinnamon; under parts and feet white; ears very large and leaf-like, nearly naked; the tail, which is nearly equal to the head and body, blackish brown above, white beneath. Length from the tip of the nose to the end of the tail 10 inches, 9 lines, of which the tail measures 4 inches, 9 lines.

Locality, Coquimbo.

Mr. Waterhouse also characterises from the same collection two new genera of small Rodents, *Reithrodon* and *Abrocoma*. The affinity of the first is stated to be with the *Muridæ*, and the second Mr. Waterhouse considers to be evidently allied on the one hand to *Octodon*, *Ctenomys*, and *Poephagomys*, and on the other to the *Chinchillidæ*. See further, post, 518.



Mus Darwinii.

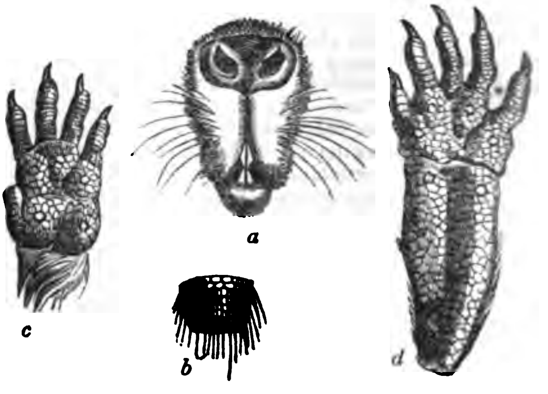
Before we take leave of this part of the subject, we must refer to an observation of Mr. Gray, who remarks (*Zool. Proc.*, 1832) that the comparative length of the hinder feet, and the relative distance of the tubercles of the sole from the end of the toes and from the heel, appear to furnish very good distinctive characters for the species of this difficult genus. Thus in the *Wood Mouse*, *Mus sylvaticus*, the hinder tubercle of the sole is about a line nearer to the heel than to the end of the toes, while in the *Common Mouse*, *Mus Musculus*, which has a shorter hind foot, the hinder tubercle is nearly equidistant between the heel and the tip of the toes.

Mr. Darwin (*Journal* and *Remarks*) observes that mice, and other small rodents, subsist in considerable numbers in very desert places, as long as there is the least vegetation. In Patagonia, even on the borders of the Salinas, where a drop of fresh water can never be found, they swarm. Next to Lizards, he adds, mice appear to be able to support existence on the smallest and driest portions of the earth, even on the islets in the midst of great oceans. He believes it will be found, that several islands, which possess no other warm-blooded quadruped, have small rodents peculiar to themselves. Sir Woodbine Parish (*Buenos Ayres*, &c.) states, that after the great drought of 1830, 1831, and 1832, there was a prodigious increase of all kinds of vermin, especially field mice, myriads of which overran the country, and entirely destroyed the maize harvest of 1833.

Capromys. (Desmarest; *Isodon*, Say.)

Generic Character.—Fore-feet four-toed; thumb rudimentary. Hind-feet strong, thick, five-toed. Tail moderate, thick at the base, scaly, with few hairs. Molars prismatic, with their crown traversed by folds of enamel, which penetrate rather deeply, and resemble those in the crown of the teeth of the Beavers.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.



a, muzzle; *b*, portion of tail enlarged to show its scales and hairs; *c*, under part of fore-foot; *d*, under part of hind-foot of Capromys.

Example, *Capromys Furnieri*, Desm.; *Isodon pilorides*, Say.

Description.—Size of a rather small rabbit. Fur coarse, greenish or blackish brown, tinged with specks of obscure yellow above, except on the rump, where the hairs are stiffer and which is reddish-brown; belly and chest dirty brownish-grey; muzzle and feet blackish.

Habits, &c.—M. Desmarest was presented with two males from Cuba by M. Fournier. Of the habits of these animals in the wild state, the latter knows only that they are found in woods, that they climb trees with great facility, and that they live on vegetables. In the domesticated state, M. Desmarest remarked that their intelligence appeared to be developed as much as that of rats and squirrels, being much beyond that of rabbits and Guinea pigs. They showed great curiosity, and were very wakeful at night, but their sense of hearing did not seem so fine as that of rabbits and hares. Their nostrils were incessantly in motion, especially when they smelt any new object, and their taste was sufficiently delicate to enable them to distinguish and reject vegetables which had been touched by animal substances, which last appeared to be odious to them. They agreed well, sleeping close together, and, when they were apart, they called to each other with a sharp cry differing little from that of a rat: they expressed pleasure by a low soft kind of grunting. They hardly ever quarrelled, except for food, as when one piece of fruit only was given between both; one would then seize it and run away till the other was able to take it from him. They sometimes played for a long time together, holding themselves up in the manner of kangaroos, firmly supported upon the broad soles of their feet and the base of the tail, and striking each other with the hands, until one of them finding a wall or some other body against which to support himself, acquired additional power and gained advantage, but they never bit each other. They manifested the greatest indifference to other animals, paying no attention even to cats. They were fond of being caressed, and particularly of being scratched under the chin. They did not bite, but slightly pressed with the incisive teeth the skin of those who caressed them. They did not ordinarily drink, but M. Desmarest saw them occasionally suck up water as squirrels do. Their food was solely vegetable, such as cabbage, succory, grapes, nuts, bread, apples, &c. &c.; and they were not very difficult in their choice of it, though they were very fond of highly flavoured herbs and aromatic plants,—wormwood, rosemary, pimpernel, geraniums, celery, &c., for instance. Grapes too pleased them mightily, and to obtain the fruit they climbed up a long pole on which it was placed: they were fond of bread steeped in aniseed or wine. Their excrements were long black lumps similar in consistence to that of rabbits. Their urine reddened, in drying, white linen wetted with it.

Capromys Furnieri.

They were almost absolutely plantigrade, and their movements were slow, the hinder parts appearing to be embarrassed, as it were, when they walked, as may be observed in the bear. They took occasional leaps, suddenly turning round from head to tail, like the field mouse, and galloped, when at play, making a considerable noise with the soles of their feet. They climbed with ease, assisting themselves with their tails as a support and using the same in descending. In certain positions, on a stick for example, the tail served as a balance to preserve equilibrium. They often raised themselves to a listening posture, sitting erect, with the hands hanging down, like rabbits and hares; and, in eating, they employed, sometimes both, at other times one of their hands only. The latter happens when the substance they are holding is small enough to be held between their fingers and the tubercle at the base of the thumb.

This species appears to be known in Cuba by the name of *Utia*, and M. Desmarest thinks that it is the animal described by Bomare, Oviedo, and others, more than 300 years since. According to Bomare, the Utias is a species of rabbit of the size of a rat, which inhabits the West Indies, and is hunted at night by the light of a luminous insect, named *Acadia* (probably *Elater noctilucus*), of which M. Fournier brought large quantities from Cuba.

Another species, also from Cuba, *Capromys prehensilis* (Pöppig), is also recorded, but Dr. Fischer places the mark of doubt before it.

For Mr. Owen's observations on the comparative anatomy of *Capromys* see the *Zool. Proc.* for 1832 and 1835.

Cricetus [Hamster]. And see further, p. 518.

Jumping Mice.

The race of Jerboas, or *Dipodidæ*, appears to be ordained by nature for living upon desert and sandy plains.

Schreber, and he was followed by Gmelin and others, appears to have been the first who characterised the genus *Dipus*.

Mr. Gray (*Annals of Philosophy*, 1825) makes the *Jerboïdæ* the fourth family of the *Glires*, and thus characterises it: cutting-teeth two in each jaw; grinders simple or compound, rooted; ears moderate; eyes large, prominent; clavicles distinct; fore feet short (used as hands); hind feet very long; tail long, hairy, used in leaping or walking; fur soft. And he thus divides the family—

†

Grinders compound or rootless.

1. *Pedestina.* Pedestes, *Illig.* 2. *Dipina.* Dipus, *Schreb.* Meriones, *F. Cuv.*, not *Illig.*

††

Grinders simple, roots divided; legs nearly equal.

3. Gerbillus, *Desm.* 4. *Myoxina.* Myoxus, *Gm.* 5. *Sciurina.* Sciuropterus, *F. Cuv.* Pteromys, *Cuv.* Macroxus, *F. Cuv.* Sciurus, *Linn.* Tamia, *Illig.* The latter genus very closely allied to *Arctomina.*

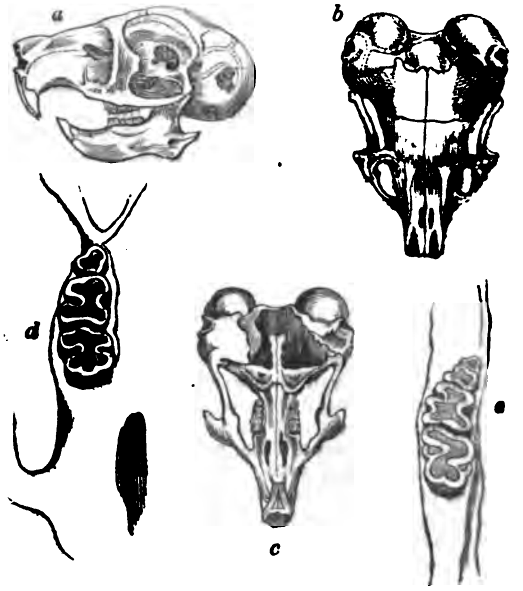
Mr. Swainson (*Classification of Quadrupeds*) observes that the Jerboas (*Dipus*) are remarkable for possessing the longest hind legs of any quadrupeds yet discovered, while the fore legs are disproportionally short; this structure he remarks is seen also in the Kangaroos, which seem to be represented in miniature by these little animals, which, 'like their pouched prototypes, use the fore feet only as organs of rest upon the ground; for if they are frightened or wish to proceed at a quick pace, they stand upon the hind legs only, and take prodigious leaps.' That the tail is necessary for the efficient performance of these feats, is proved by the fact that individuals deprived of their tails were unable to assume the erect position or to leap at all. The fore feet are employed in conveying food to the mouth, and seem to be of little or no use as organs of progression. Those that we have seen alive seemed to use their posterior extremities only as organs of locomotion, and appeared to walk on the toes of those extremities. They are very bird-like in some of their movements, and there is something in their general appearance that would lead an imaginative mind to the fancy that they were birds suddenly transformed to quadrupeds and were hardly reconciled to the change. Parts of their internal structure, in the skeleton particularly, are bird-like.

Mr. Swainson says, 'The best-known species is the Gerbo, or Egyptian Jerboa (Dipus Sagitta), in which country it is very common. It lives in large societies and constructs burrows under ground: it is shy and timid, nor can it be kept in confinement any considerable time. Of four typical species already known, three inhabit the sandy deserts in the heart of Asia, and the shores of the Caspian; the rest have been separated as a subgenus, under the name of Gerbil (*Gerbillus*); but their distinctions are so very slight that we have not adopted the name. The genus *Pedetes*, represented by the Cape Jerboa, clearly belongs to the same group. America, which has no Jerboas, nevertheless presents us with their prototypes in the Jumping Mice of Canada (*Meriones*, Illig.).'

The Jerboas have, in truth, presented considerable difficulties to zoologists, and the distinction of the species is often not clearly made out. Sonnini was one of the first who endeavoured to dissipate the confusion which prevailed on the subject. He comes to the conclusion that there exists but one variety of them in Egypt, where they are multiplied without end. 'In fact,' says M. Sonnini, 'among all those which I have observed at different times and in different places, I never remarked the least dissimilitude of either form or colour.' His paper, M. Berthout van Berchem's letter on the true nomenclature of the Gerboise, and M. Sonnini's reply to the same, will be found in the 'Travels' of the latter in Upper and Lower Egypt. That these Jerboas were known to the antients is evident. Herodotus (iv. 192) alludes to them as inhabiting Africa. Aristotle (*Hist. Anim.*, vi. 37) speaks of them as those Egyptian Rats which walk on two feet, because the hind feet are great and the fore feet small. They are noticed by Ælian (xv. 26), who quotes Theophrastus. The description of Theophrastus (Fr. xiv.) cannot be mistaken. He says that these rats have indeed fore feet, but do not walk upon them and use them as hands. When they flee, he adds, they leap. They are clearly the *Ægyptii mures* of Pliny, who says '*bipedes* ambulant' (x. 65), and Pennant gives an engraving of a gold coin with the plant *Silphium* and one of these animals represented on it, and says that these symbols were used to denote the country of Cyrene, where both were found.

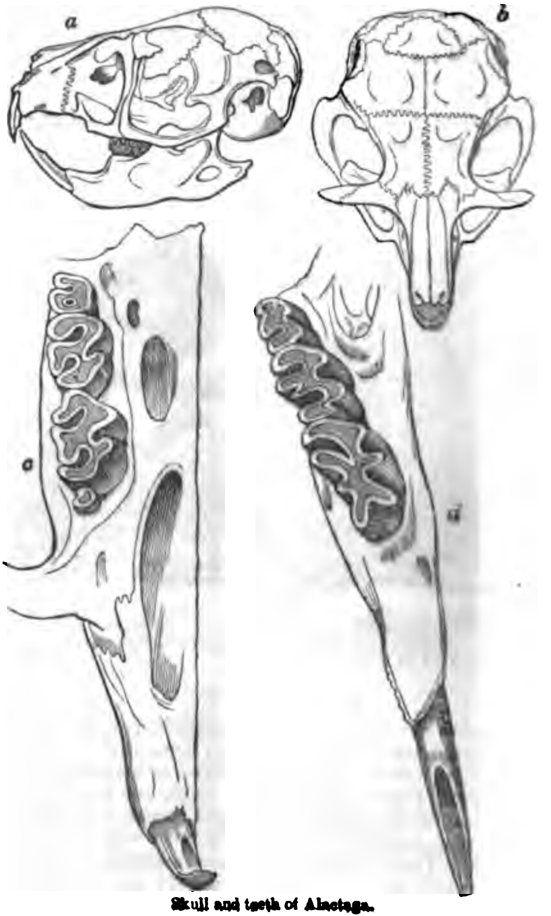
One of the best monographs of the genus *Dipus* is that of M. Lichtenstein: the species he gives are numerous, and it may be doubted whether some of them are not varieties. A very elaborate memoir on the Jerboas and Gerbillas, by M. F. Cuvier, was read before the Zoological Society of London in 1836, and is published, with beautiful illustrations, in the 'Transactions' of that Society (vol. ii.).

M. F. Cuvier commences this memoir with observing that his attention had been particularly directed to the *Rodentia*, with a view of arriving at a natural classification of the numerous species composing that order, among which considerable confusion had hitherto prevailed, particularly in the genera *Dipus* and *Gerbillus*, the relations of which to other allied groups had been but very imperfectly understood by previous writers. The species included in the genus *Dipus* had been formed by M. Lichtenstein into three divisions, which are distinguished by the absence and number of rudimentary toes upon the hind feet. In the first section are placed those with three toes, all perfectly formed; in the second, those with four, one of which is rudimentary; and in the third, those with five, two of these being rudimentary. M. Cuvier states that he is unacquainted with the second division of M. Lichtenstein; but in the examination of the species belonging to the first, in addition to the absence of rudimentary toes, he finds that they are also distinguished from those of the third by the form of the teeth and the osteological characters of the head. These points of difference he considers of sufficient importance to justify a distinct genus for the Jerboas with five toes, adopting the name *Alactaga*, given by Pallas to a species, as the common generic appellation. M. Cuvier remarks that the three principal toes of the *Alactagas*, as well as the three only toes of the Jerboas, are articulated to a single metatarsal bone, and that the two rudimentary toes of the first genus have each their metatarsal bone; whence it results that the penultimate segment of the foot is composed of three bones in the *Alactagas*, and of one only in the *Jerboas*. The incisors of the *Alactagas* are simple, whilst those in the upper jaw of the Jerboas are divided longitudinally by a furrow. The molars of the latter genus are complicated in form, and but little resemble those of the former They are four in number in the upper jaw, and three in the lower; but the first in the upper is a small rudimentary tooth, which probably disappears in aged individuals. After a detailed account of the structure of the grinding teeth, M. Cuvier observes that the general structure of the head of the *Alactagas* and *Jerboas* is evidently the same, and is characterised by the large size of the cranium, the shortness of the muzzle, and, above all, by the magnitude of the suborbital foramina. The cranium of the *Jerboa* is distinguished by its great breadth posteriorly, resulting from the enormous development of the tympanic bone, which extends beyond the occipital posteriorly and laterally, as far as the zygomatic arch, which is by no means the case in the *Alactagas*, where all the osseous parts of the ear are of moderate dimensions. Another differential character between the two genera is presented by the maxillary arch, which circumscribes externally the suborbital foramina, and which, in the *Alactagas*, may be said to be linear, presenting a very limited surface for the attachment of muscles. He then notes a difference in the relative development of the jaws, the lower being comparatively much shorter in the *Alactagas* than in the *Jerboas*. Having described a new species of *Alactaga*, a native of Barbary, under the name of *Alactaga arundinis*, M. F. Cuvier proceeds to consider the characters and affinities of the genera *Gerbillus* and *Meriones*, and enters into a critical examination



Skull and teeth of Dipus hirtipes. (F. Cuv.)

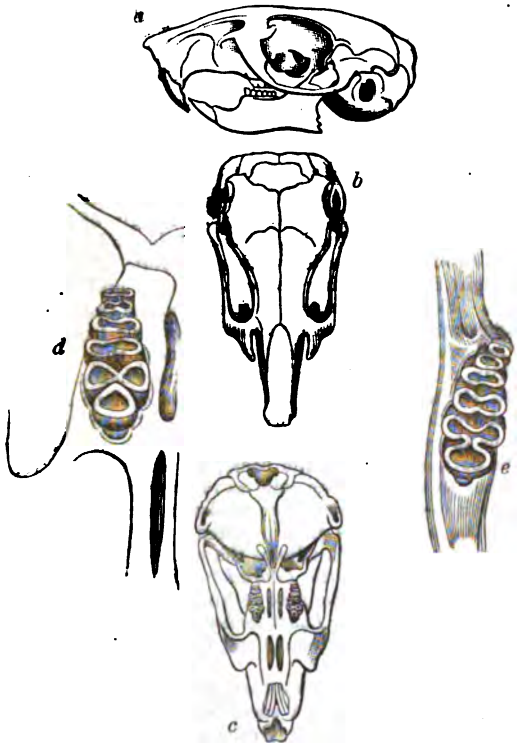
a, skull, profile; b, same, seen from above; c, same, seen from below; d, e, teeth of same.



Skull and teeth of Alactaga.

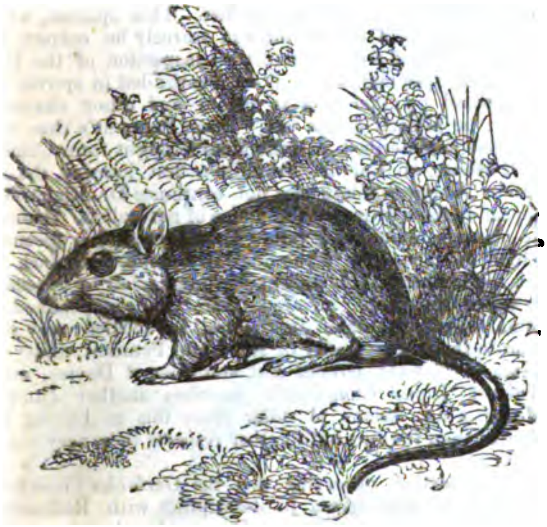
a, b, cranium, one-third larger than natural size; c, d, teeth of the same, five times larger than nature.

of all the species referred to that group. To these he adds another species, the habits of which he describes, and to which he gives the name of *Gerbillus Burtoni*. The species he includes are:—1. *Gerbillus Ægyptiacus*. Syn. *Dipus Gerbillus*, *Meriones quadrimaculatus*, Ehrenberg. 2. *Gerbillus pyramidum*. Syn. *Dipus pyramidum*, Geoff.; *Meriones robustus*, Rüpp. 3. *Gerbillus pygargus*. Syn. *Meriones Gerbillus*, Rüpp. 4. *Gerbillus Indicus*. Syn. *Dipus Indicus*, Hardwicke. 5. *Gerbillus Africanus*. Syn. *Meriones Schlegelii*, Smutz; *G. Afra*, Gray. 6. *Gerbillus brevicaudatus*. 7. *Gerbillus Otaria*. 8. *Gerbillus Burtoni*. For the detailed descriptions of these, we must refer the reader to the 'Transactions of the Zoological Society,' in which will also be found M. F. Cuvier's views with regard to the affinities of the *Gerbillas* and *Alactagas* to the *Jerboas*, and which lead him to the conclusion that the Gerbillas have a much nearer affinity to the *Muridæ*.

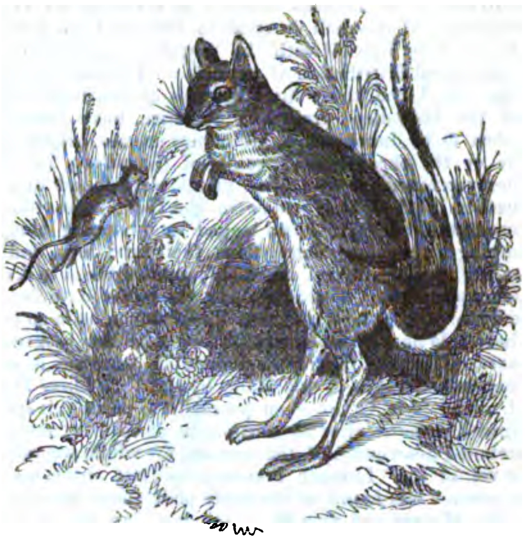


Cranium and teeth of Gerbillus Burtoni.

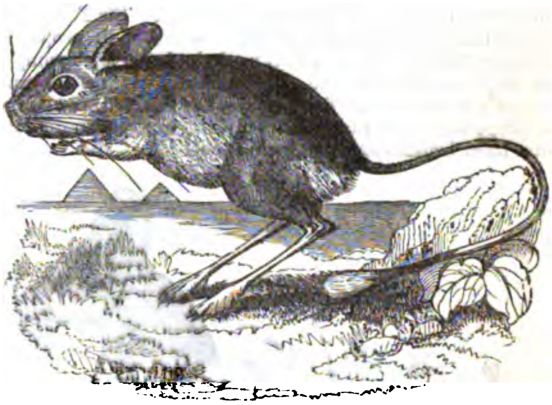
a, skull, profile; *b*, same, seen from above; *c*, same, seen from below; *d*, *e*, teeth of same.



Gerbillus Burtoni.



Dark-banded Jerboa.



Egyptian Jerboa (Dipus Ægyptius, *Hempr.* and *Ehren.*)

Habits, &c.—General Hardwicke gives the following interesting account of his *Dipus Indicus*:—'These animals are very numerous about cultivated lands, and particularly destructive to wheat and barley crops, of which they lay up considerable hoards in spacious burrows near the scenes of their plunder. They cut the culms of the ripening corn just beneath the ears, and convey them thus entire to one common subterraneous repository, which, when filled, they carefully close, and do not open for use till supplies abroad become distant and scarce. Grain of all kinds is their favourite food; but, in default of this, they have recourse to the roots of grass and other vegetables. About the close of day they issue from their burrows, and traverse the plains in all directions to a considerable distance; they run fast, but oftener leap, making bounds of four or five yards at a time, carrying the tail extended in a horizontal direction. When eating, they sit on their hind legs like a squirrel, holding the food between their fore feet. They never appear by day, neither do they commit depredations within doors. I have observed their manners by night, in moonlight nights, taking my station on a plain, and remaining for some time with as little motion as possible. I was soon surrounded by hundreds at the distance of a few yards; but on rising from my seat, the whole disappeared in an instant, nor did they venture forth again for ten minutes after, and then with much caution and circumspection.

'A tribe of low Hindus, called Kunjers, whose occupation is hunting, go in quest of these animals at proper seasons, to plunder their hoards of grain; and often, within the space of twenty yards square, find as much corn in the ear as could be crammed into a common bushel. They inhabit dry situations, and are often found at the distance of some miles out of the reach of water to drink. In confinement this animal soon becomes reconciled to its situation, and docile; sleeps much in the day, but when awake feeds as freely as by night. The Hindus above mentioned esteem them good and nutritious food.' (*Linn. Trans.*, vol. viii.)

In concluding this sketch, which we hope will be found to contain the leading information on the subject of the *Jerboïdæ*, we must not omit to mention Mr. Ogilby's notice of the discovery of a true Jerboa on the central downs of

Australia, by Sir Thomas Mitchell, an event, as Mr. Ogilby justly says, of no small interest to the scientific zoologist who occupies himself with the important question of the geographical distribution of animals. 'The arid deserts of Asia and Africa, the solitary steppes of Southern Siberia, and the boundless prairies of America, have been long known to be inhabited by numerous species belonging to this or the closely allied genus of *Gerbilles;* in short, wherever extensive and open plains were found to exist, whether in the Old World or in the New, there likewise were found these little two-legged rats, hopping along or running with great velocity upon their hind legs, and appearing as if nature had expressly intended them to occupy such a situation. Australia alone was believed to form an exception to the general rule in this instance, as in so many others. Who will undertake to say that the progress of discovery may not destroy its anomalous character in many other instances, as it has done in this?' (*Linn. Trans.*, vol. xviii.) Mr. Ogilby then proceeds to name this species *Dipus Mitchellii*, after its meritorious discoverer, and gives a detailed description of the species, for which we refer to the vol. of the 'Linnean Transactions' last above quoted. The animal was found on the reedy plains near the junction of the Murray and the Murrumbidgee, on the northern boundaries of Australia Felix. The cut is taken from the figure in Sir T. Mitchell's account of 'Three Expeditions into the Interior of Eastern Australia.' Sir T. Mitchell states that its fore and hind legs resembled in proportion those of the Kangaroo; and it used the latter by leaping on its hind quarters in the same manner. It was not much larger than a common field-mouse, but the tail was longer in proportion even than that of a Kangaroo, and terminated in a hairy brush about two inches long.

Dipus Mitchellii.

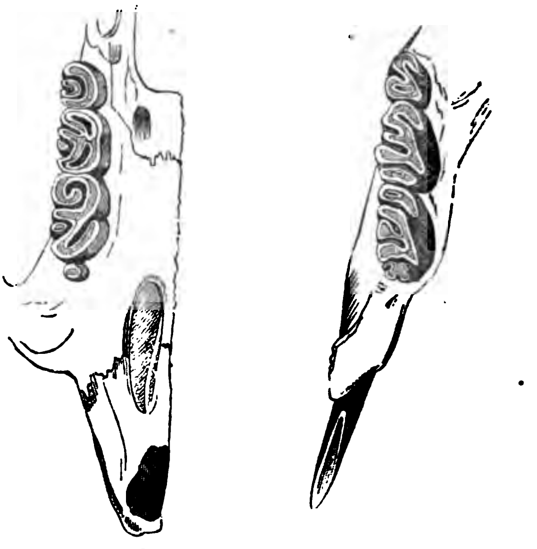
Here we may perhaps notice that Mr. Ogilby, in the same paper as that wherein he describes *D. Mitchellii*, characterises another new genus of Australian Rodents, which he thinks most probably belongs to the extensive and complicated family of the *Muridæ*. In some of the characters the genus very much resembles the Campagnols (*Arvicola*) and Gerbilles (*Meriones*), to the latter of which genera Mr. Ogilby says that *Conilurus* is more particularly related by the length and development of the posterior members.

Meriones. (Ill., F. Cuv.)

Generic Character.—Differing from the other **Rats with long feet in the form of its molars, which are composite.**

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{3-3} = 18$.

Example, ***Meriones Labradorius; Labrador Jumping Mouse.***



Teeth of Meriones. (F. Cuv.)

***Description.*—Back and upper parts of the head dark** liver-brown mixed with brownish-yellow; sides brownish-yellow slightly sprinkled with black; margin of the mouth, chin, throat, and all the lower parts of the body white; yellowish-brown of the sides joining the white of the belly by a straight line extending between the fore and hind extremities. Fur not so long or so fine as that of the common or meadow mice. Total length nine inches nine lines, of which the tail measures five inches three lines; this last tapers slightly, is scaly, and thinly set with short hairs.

Dr. Richardson, from whose *Fauna Boreali-Americana* the above description is abridged, states that in some specimens the yellowish-brown colour occupies as much space as the darker colour of the back; in others the latter encroaches so much on the sides as to leave merely a narrow yellowish line next the white; whilst in autumn specimens, where the animal has just acquired a new coat of fur, the dark colour of the back adjoins the white of the belly.

This appears to be the *Labrador Rat* of Pennant; *Gerbillus Hudsonius* of Rafinesque-Smaltz; *Mus Labradorius* of Sabine; *Gerbillus Labradorius* of Harlan; *Labrador Jumping Mouse* of Godman; and *Katse* (the leaper) of the Chepewyan Indians.

Dr. Richardson remarks that Pennant, in his 'Arctic Zoology,' first described a specimen of this animal, sent from Hudson's Bay by Mr. Graham, to the museum of the Royal Society. Afterwards, in the third edition of his 'History of Quadrupeds,' he is inclined to consider it as identical with the *mus longipes* of Pallas (the *Dipus meridianus* of Gmelin), an inhabitant of the warm sandy deserts bordering on the Caspian Sea. This opinion, which, in the opinion of the Doctor, can scarcely be correct, was, he says, formed from an imperfect inspection of the Hudson's Bay specimen whilst it was suspended in spirits, and is opposed by differences in colour and other characters which he himself points out. From Pennant's time until Mr. Sabine described an individual brought from Cumberland House, on Captain Franklin's first journey, the *Labrador Jumping Mouse* does not, continues Dr. Richardson, appear to have attracted the notice of naturalists. Pennant, he observes, mentions a yellow lateral line in his specimen, which did not exist in the one Mr. Sabine described, but this difference Dr. Richardson attributes solely to the season in which they were procured. Mr. Sabine's specimen, he remarks, was mutilated in the tail, an accident very common to the whole family of rats; and Pennant, under the name of *Canada Jerboid Rat*, and Colonel Davies, under that of *Dipus Canadensis*, describes another Jumping Mouse, which seems to differ from this in having ears shorter than the fur, but in other respects to be very similar to it.

After further observing that the *Gerbillus Canadensis* of Dr. Godman agrees in description with Rafinesque-Smaltz's *Gerbillus soricinus* (Desm.), but has larger ears than the Canada Rat of Pennant, and that a specimen in the Philadelphia museum, described by Dr. Harlan under the name of *Gerbillus Canadensis*, appears to be entirely similar to the Labrador species, Dr. Richardson concludes by remarking that it is evident that the Jumping Mice inhabiting different districts of America require to be compared with each other before the true number of species and their geographical distribution can be ascertained.

Locality.—Common in the Fur Countries as far north as Great Slave Lake, and perhaps farther; but Dr. Richardson was not able to gain any precise information respecting its habits.

Labrador Jumping Mouse.

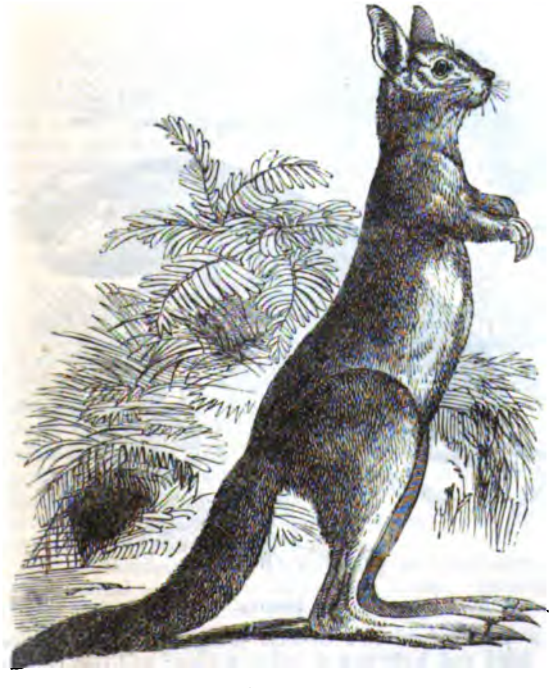
Pedetes (Ill.; *Helamys*, F. Cuv.)

Generic Character.—Head large, flattish, muzzle thick, ears long. Anterior extremities with five toes armed with very long claws; posterior extremities very long, four-toed. Tail long and very bushy. Four pectoral mammæ. Molars simple, with two laminæ.

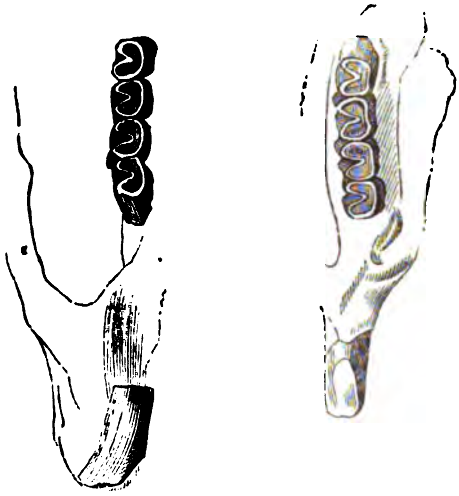
Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.

Example, *Pedetes Capensis.*

Description.—Bright yellowish-tawny above, varied with blackish; white below, with a line of the same colour in the fold of the groins; legs brown, tail reddish above at its origin, grey below, and black at the tip. Length from nose to tail about one foot two inches; of the tail, near fifteen; of the ears, three.



Pedetes Capensis.



Teeth of Helamys.

This is the *Grand Gerbo* of Allamand, *Spring-Has* or *Jumping Hare* of the Dutch, *Aerdmannetje* of the Hottentots, *Dipus Caffer* of Zimmerman, Schreber, and Gmelin.

Locality, Habits, &c.—Cape of Good Hope, where it sleeps during the day, going forth by night, and leaping twenty or thirty feet at a bound. It eats sitting nearly upright, with the hind legs extended horizontally, and using the small fore-feet to bring the food to its mouth. It is a very strong animal, and with these same fore-feet, which are admirably formed for digging, burrows so expeditiously as quickly to hide itself. It sleeps in a sitting position, placing the head between the legs, and holding its ears over its eyes with its fore-legs.

Tail moderate or short. Sand and Mole Rats. Pouched.

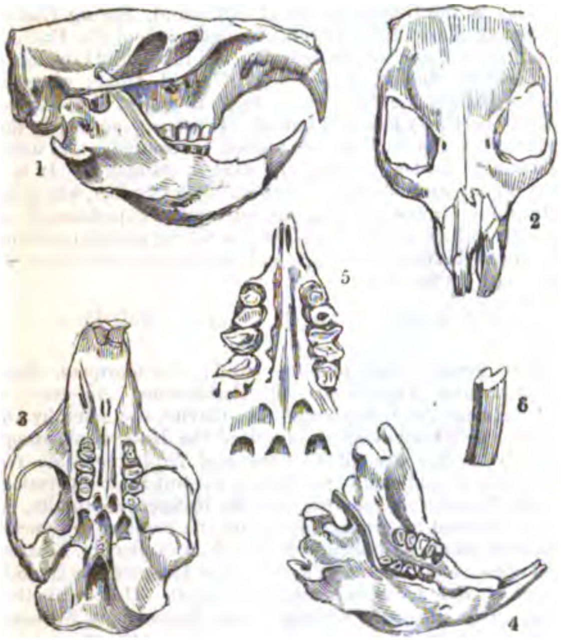
The genera *Saccophorus*, Kuhl; *Pseudostoma*, Say; *Geomys* and *Diplostoma* of Rafinesque; *Ascomys* of Lichtenstein; and *Saccomys* of F. Cuvier, are given by Dr. Fischer as synonymous; and indeed the distinctions, except perhaps in the case of *Geomys* and *Diplostoma*, do not appear to be sufficiently marked to warrant their separation.

Dr. Richardson remarks that M. Rafinesque-Smaltz, in 1817, founded his genus *Geomys* on the hamster of Georgia (*Geomys pinetis*), described by Mitchell, Anderson, Meares, and others, and referred to it, as a second species, the *Canada pouched Rat* (*Mus bursarius* of Shaw). Under another genus, *Diplostoma*, he arranged some Louisiana or Missouri animals, known to the Canadian voyagers by the appellation of *gauffres*, and remarkable for their large cheek-pouches, which open forwards exterior to the mouth and incisors, to which they form a kind of hood. These two genera, observes the Doctor, have been adopted by few naturalists: and the American systematic writers have either overlooked M. Rafinesque's species entirely, or referred them all to *Mus bursarius*. In the latter case, Dr. Richardson says, they are undoubtedly wrong, for there are at least six or seven distinct species belonging to one or other of these genera, which inhabit America, and he thinks that both *Geomys* and *Diplostoma* will eventually prove to be good genera· the *Sand-rats* belonging to the former having cheek-pouches, which are filled from within the mouth, and the *gauffres* or *camas-rats* of the latter genus having their cheek-pouches exterior to the mouth, and entirely unconnected with its cavity. Dr. Richardson had no opportunity of examining *Geomys pinetis*, the type of the genus, but he had inspected an undescribed species from Cadadaguios and another (*Geomys Douglasii*) from the banks of the Columbia; from these two Dr. Richardson's characters of the genus were drawn up. With regard to the *Canada pouched Rat*, great doubt, he observes, still exists as to whether it belongs properly to *Geomys* or to *Diplostoma*. Judging from the description of Dr. Shaw and the figure in 'Linn. Trans.' (vol. v., pl. 8), Dr. Richardson has little doubt of the cheek-pouches opening into the mouth, and of their being precisely similar in form and functions to the cheek-pouches of the *Sand-rats;* but he states that he was told, on good authority, that the identical specimen described by Shaw (which, at the sale of Bullock's museum, passed into the hands of M. Temminck) is, in fact, similar to the *gauffres*, in having cheek-pouches that open exteriorly, and that consequently Major Davies's drawing represented them in an unnatural and inverted position. Mr. Say gives the characters of a Missouri *gauffre*, with cheek-pouches opening exteriorly; and he identifies his specimen with *Mus bursarius*. The same zoologist alludes to the Georgia hamster as belonging to the same genus, without giving any further account of its characters than merely quoting Dr. Barton's remark of its being only half the size of the Missouri one. His account of the dentition of the Missouri *gauffre*, observes Dr. Richardson in conclusion, corresponds, as far as it goes, pretty closely with that of the Columbia *Geomys*. Dr. Harlan and Dr. Godman refer the Georgia, Canada, and Missouri animals to one species. (*Fauna Boreali-Americana.*)

The following is the dental formula of Geomys given by Dr. Richardson:—

$$\text{Incisors, } \frac{2}{2}\text{; canines, } \frac{0-0}{0-0}\text{; grinders, } \frac{4-4}{4-4} = 20,$$

and below is given the skull and teeth of the genus from the same authority.



Skull and teeth of Geomys. (Richardson.)

1, 2, 3, skull, nat. size; 4, lower jaw, nat. size; 5, palate and upper teeth, magnified; 6, first upper grinder, magnified.

The dental formula of M. F. Cuvier's genus *Saccomys* is:—

$$\text{Incisors, } \frac{2}{2}\text{; molars, } \frac{4-4}{4-4} = 20,$$

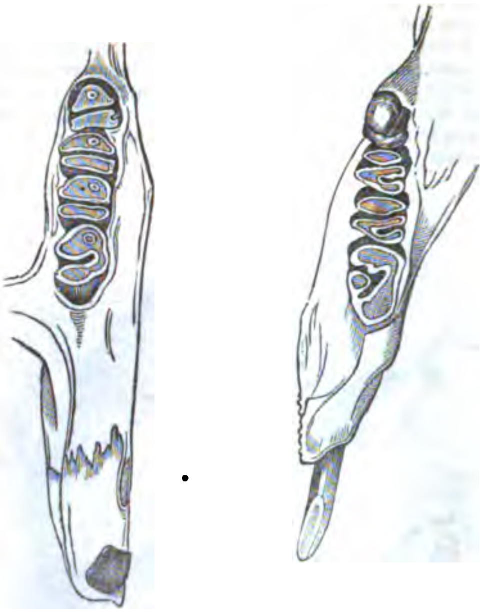
and the following cut is taken from his figure of the dentition.

The following is Dr. Shaw's description of *Mus bursarius*:—

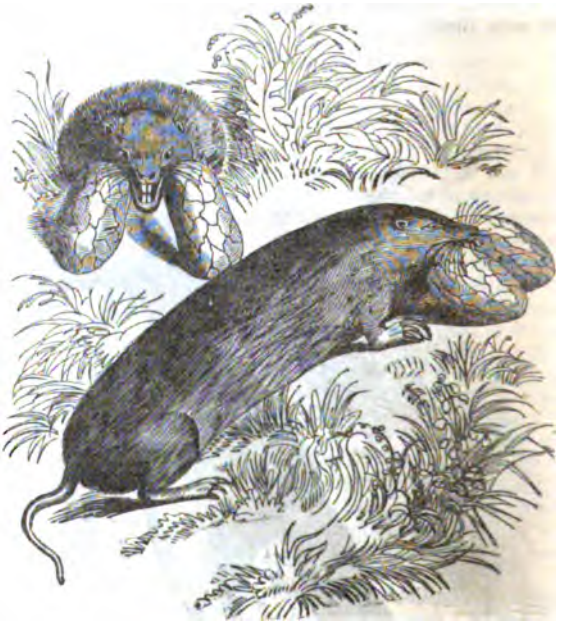
'Ash-coloured rat, with short nearly naked tail, pouched cheeks, and the claws of the fore-feet very large and formed for burrowing.'

(Mus bursarius, *Linn. Trans.*, vol. v., p. 227, pl. 8.)

'This, which is a species but lately discovered, seems to be the most remarkable of all the pouched rats for the proportional size of the receptacles. It is a native of Canada, and the individual here figured was taken by some Indians in the year 1798, and afterwards presented to the lady of Governor Prescot. It is about the size of a brown or Norway rat, and is of a pale greyish-brown colour, rather lighter beneath: the length to the tail is about nine inches, and that of the tail, which is but slightly covered with hairs, about two inches: the legs are short; the fore-feet strong, and well adapted for burrowing in the ground, having five claws, of which the three middle ones are very large and long; the interior much smaller, and the exterior very small, with a large tubercle or elbow beneath it. The claws on the hind-feet are comparatively very small, but the two middle are larger than the rest, and the interior one is scarce visible: the teeth are extremely strong, particularly the lower pair, which are much longer than the upper; the ears are very small. This species is described in the 5th vol. of the *Trans. of Linn. Soc.*, but I must observe, that, by some oversight in the conduct of the figure there given, the claws on the fore-feet are represented as only three in number, and are somewhat too long, weak, and curved; the engraving in the present plate is a more faithful representation, and is accompanied by an outline of the head, in its natural size, as viewed in front, in order to show the teeth and cheek-pouches. The manners of this species are at present unknown, but it may be concluded that it lays in a stock of provisions, either for autumnal or winter food. The pouches of the individual specimen above described, when first brought to Governor Prescot, were filled with a kind of earthy substance: it is therefore not improbable that the Indians who caught the animal might have stuffed them thus, in order to preserve them in their utmost extent.'



Teeth of Saccomys, enlarged. (F. Cuv.)

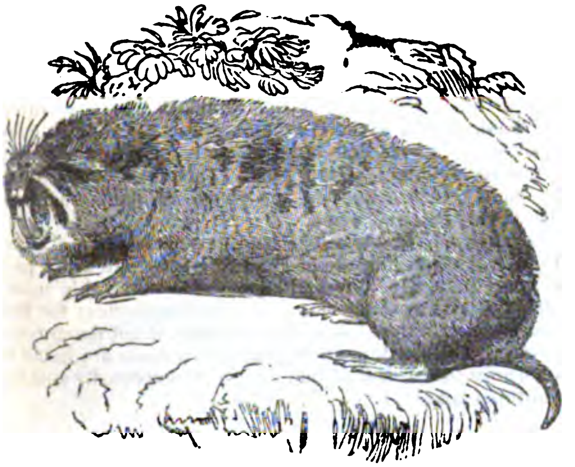


Mus bursarius.

In Dr. Richardson's *Geomys Douglasii*, the length of the head and body was 6 inches 6 lines; and that of the tail (vertebræ) 2 inches 10 lines. Cheek-pouches large, much resembling the thumb of a lady's glove in form and size, and hanging down by the sides of the head. The specimen was a female, and was taken in her nest with three young ones, near the mouth of the Columbia, by Mr. Douglas. When it came into the hands of Dr. Richardson, the fur had mostly fallen off, but the specimen was in other respects perfect, and what was wanting to the description was supplied from Douglas's notes. The state of ossification of the skull showed the animal to be an old one. Douglas informed Dr. Richardson that the outside of the pouches was cold to the touch, even when the animal was alive, and that on the inside they were lined with small, orbicular, indurated glands, more numerous near the opening into the mouth. When full, the pouches had an oblong form, and when empty, they were corrugated or retracted to one-third of their length; but, it is added, they are never inverted so as to produce the hood-like form of the pouch of a *Diplostoma.* When in the act of emptying its pouches, the animal sits on its hams like a Marmot or squirrel, and squeezes his sacks against the breast with his chin and fore-paws. (*Fauna Boreali-Americana.*)

Habits, &c.—Dr. Richardson states that these little sand-rats are numerous in the neighbourhood of Fort Vancouver, where they inhabit the declivities of low hills, and burrow in the sandy soil. They feed on acorns, nuts (*corylus rostrata*), and grass, and commit great havoc in the potato-fields adjoining the Fort, not only by devouring the potatoes on the spot, but by carrying off large quantities of them in their pouches.

The following figure is copied from Dr. Richardson's *Diplostoma ? bulbivorum.*



Diplostoma bulbivorum.

Not Pouched.

Aplodontia. (Richardson.)

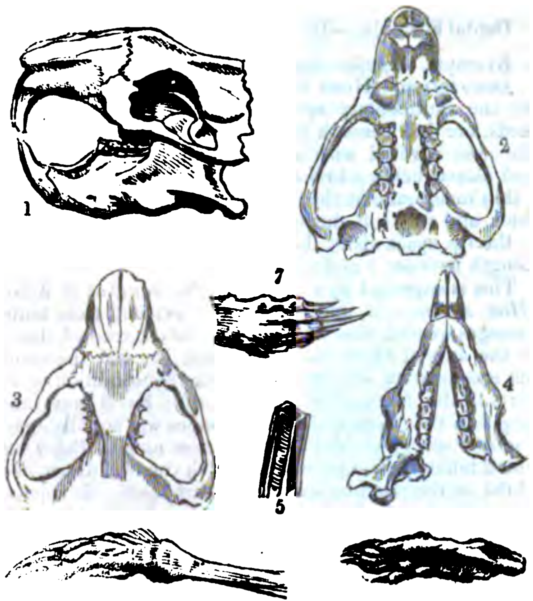
Generic Character.—Head large, depressed; ears short and round; no cheek pouches. Feet five-toed, with large, strong, and compressed claws. Tail very small and concealed by the fur. First molar in upper jaw small, cylindrical, and pointed, placed within the anterior corner of the second one, and existing in the adult.

Dental Formula:—Incisors, $\frac{2}{2}$; molars, $\frac{5-5}{4-4} = 22$.

Example, *Aplodontia leporina.*

Description.—Head large; nose thick and obtuse, covered with a dense coat of short fur; eye very small; ear resembling the human in form. Body short, thick, and rabbit-like. Legs very short, and covered down to the wrists and heels with fur similar to that on the body: a little above the wrist joint, on the inner side, is a small tuft of stiff white hairs. Fur like that of a rabbit out of season, amber and chesnut-brown above; greyish or clove-brown beneath; lips whitish; a rather large spot of pure white on the throat; some white hairs dispersed through the fur. Tail slender, cylindrical, hardly half an inch long.

Dr. Richardson gives the following as the synonyms of this animal:—*Sewellel*, Lewis and Clark; *Anisonyx ? rufa*, Rafinesque-Smaltz, Desm.; *Arctomys rufa*, Harlan; *Marmot*, No. 17, Hudson's Bay Museum; and he says that amongst Mr. Douglas's specimens there was a young one, with more white hairs interspersed through its fur, and some differences in the form of its skull, which seem to point it out as a second species, but the specimen was not sufficiently perfect to enable Dr. Richardson to give its characters as a distinct species, though he has little doubt of its being so. The Doctor adds, that since the account of the genus was published in the 'Zoological Journal' (vol. iv.), Mr. Douglas had placed in his hands an Indian blanket or robe formed by sewing the skins of the *Sewellel* together. The robe contained twenty-seven skins, which had been selected when the fur was in prime order. In all of them the long hairs were so numerous as to hide the wool or down at their roots, and their points had a very high lustre. The general colour of the surface of the fur was between chesnut and umber-brown, lighter, and with more lustre on the sides. Some of the skins, which were in the best order, had the long hairs on the back of the head and between the shoulders almost black. Dr. Richardson observes further, that it is probable that there were the skins of two species of *Sewellels* in the robe, and that one of them wants the white mark on the throat. The down of all the skins of the robe had a shining blackish grey colour.



Skull, teeth, and paws of Aplodontia.

1, anterior half of skull, with lower jaw, profile; 2, anterior half of skull, seen from below; 3, the same seen from above; 4, lower jaw, with right condyle broken, seen from above; 5, upper molar tooth; 6, ", fore-feet, upper surface; 8, sole of hind-foot.

Habits.—These animals live in small societies, in burrows, and feed on vegetable substances.

Locality.—Neighbourhood of the Columbia river, most abundant near the great falls and rapids.

Mr. Gray makes the *Aspalacidæ* the fifth family of the *Glires*, with the following character:—

Cutting teeth two in each jaw, lower chisel or awl shaped, often very much exposed; grinders compound or simple, rarely rootless; ears and eyes often very small, sometimes hid; clavicles strong; limbs proportionate; tail none, or hairy, cylindrical; fur very soft. He thus subdivides it into five subfamilies.

† 1. *Aspalacina.* Orycterus, *F. Cuv.* Bathyergus, *Ill.* Aspalax, *Oliv.* 2. *Lemnina.* (Lemmina?) Arvicola, *Lacép.* Sigmodon, *Say.* Neotoma. *Say.* Lemnus (Lemmus), Lin. †† 3. *Cricetina.* Cricetus, Lacép. 4. *Pseudostomina.* Pseudostoma, *Say.* Diplostoma and Geomys, *Rafin.* 5. *Arctomina.* Arctomys, *Gmel.* Spermophilus, *F. Cuv.*

Dr. Fischer thinks that Cretzchmar's genus *Psammomys* should be placed before *Aspalax.* (See Rüppel, *Zool. Atl.*). *Psammomys obesus*, on which the genus is founded, lives gregariously in the sandy deserts of Alexandria, forming multifarious burrows, and is a nocturnal and root-eating animal, without cheek-pouches.

Aspalax (Oliv. and others; *Spalax*, Güld., Ill., and others.)

Generic Character of Aspalax.—Muzzle obtuse. Eyes rudimentary, and hidden under the skin. Ears null, or mere obsolete margins of the auditory passage. Body thick and cylindrical. Feet short, pentadactyle, with falcular claws, proper for digging. Tail null or very short. Molars simple.

Dental Formula:—Incisors, $\frac{2}{2}$; molars, $\frac{3-3}{3-3}$ = 16.

Example, *Aspalax typhlus*.

Description.—Head broader than the body, no aperture for the rudimentary eyes, which, no bigger than poppy-seeds, are hid beneath the skin; no external ears; end of the nose covered with a thick skin, nostrils very remote, and placed below; limbs very short, toes separated, except a thin membrane at the base, claws short; hair or fur short, thick, and very soft, dusky at the bottom and cinereous grey at the tip, space about the nose and above the mouth white. Length between 7 and 8 inches.

This is supposed by some to be the ἀσπάλαξ of Aristotle (*Hist. Anim.*, i. 9, and iv. 8). It is evident, from both the passages quoted, that he had accurately examined that part of the animal where the eye should be, and the result of his examination clearly agrees with the condition of those parts in the *Aspalax* of the moderns; but it must not be forgotten that those and other passages will equally apply to a second species of Mole (*Talpa*), now named *Talpa cæca*, which inhabits Europe, and in which the eyelids are closed, whilst in the common species they are open. It appears to be the *Spalax typhlus* of Illiger; *Aspalax typhlus* of Desmarest; *Mus typhlus* of Pallas and others; *Marmota typhlus* of Blumenbach; *Georychus typhlus* of Lesson; the *Zemni* of Rzaczynski; the *Slepez* of Gmelin; the *Podolian Marmot* of Pennant; and the *Blind Rat* of Shaw.

Habits, &c.—This species, which the Russians name *Slepez*, or the blind, and the Cossacks *Sfochor Nomon*, signifying the same defect, burrows extensively beneath the turf, driving at intervals lateral passages in its search for roots, particularly that of the bulbous *Chærophyllum*. Openings to the surface occur at distances of some yards from each other, and there the earth is raised into hillocks, sometimes of two yards in circumference, and of considerable height. It works stoutly and rapidly, and on the approach of an enemy instantly digs a perpendicular burrow. Though it cannot see, it lifts its head in a menacing attitude towards its assailant, and, when irritated, snorts and gnashes its teeth, but emits no cry: its bite is very severe. In the morning it often quits its hole, and during the season of love basks in the sun with the female. It is worthy of notice that there runs a superstition in the Ukraine that the hand which has suffocated one of these animals is gifted with the virtue of curing the *king's evil* (as it is still called), in the same way that it was supposed to vanish before the royal touch of the Stuarts in this country.

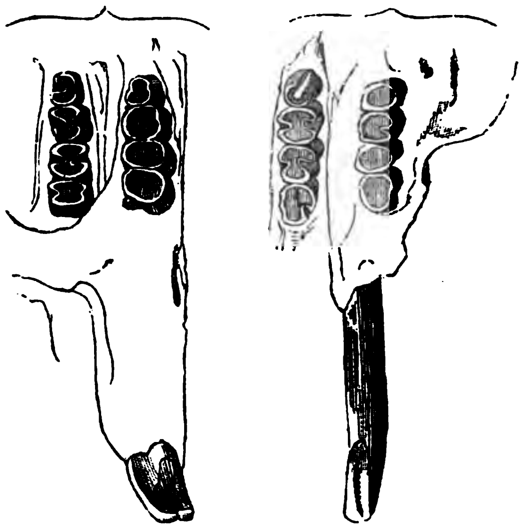
Locality.—The southern parts of Russia, from Poland to the Volga, but not to the east of that river; common from the Sysran to the Sarpa; frequent along the Don, even to its origin, and about the town of Rœsk, but not in the sandy parts.

Aspalax typhlus.

Bathyergus (Brants; *Orycterus*, F. Cuv.)

M. F. Cuvier assigns to *Bathyergus* only three molars in each jaw; whilst to *Orycterus* he assigns four.

The Dental Formula of the first, according to this statement, would be:—Incisors $\frac{2}{2}$; molars $\frac{3-3}{3-3}$ = 16; an of the second, incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4}$ = 20.



Teeth of Orycterus. (F. Cuvier.)

Dr. Fischer quotes Professor Kaup for the opinion that the *Bathyergus Capensis* of Brants (*Cape Rat* of Shaw and Pennant) and *Bathyergus maritimus* of Brants (*Coast Rat* of Shaw, *Orycterus maritimus* of F. Cuvier) are identical, the former being the animal in a comparatively early stage of life. The latter is the *Zand Moll* of the Dutch and *Kauw-howba* of the Hottentots: it is of a reddish grey or ash-colour above, and hoary beneath. Length from tip of muzzle to origin of tail, 1 foot 1½ inch; of tail without the hair, 1 inch 1 line; of the pencil of hairs, 10 lines. There is a variety all white.

Locality and Habits.—The sand-flats of the Cape of Good Hope, wherein it burrows in great numbers. In every part of those flats Mr. Burchell observed innumerable mole-hills, and his foot often sunk into their galleries: for this reason, he remarks, it is very unpleasant, if not dangerous, to ride on horseback in such places, as persons are liable to be thrown by the feet of their horses unexpectedly sinking into these holes.

Coast Rat.

The following genera are placed by Mr. Swainson among the Squirrels, and, indeed, there is much about them to indicate a near approach to that family of Rodents.

Not Pouched.

Arctomys. (Gmelin.)

Generic Character.—Head and eyes large; ears short; body stout; fore feet with four toes and an obsolete thumb, hind feet five-toed. Tail short. Upper surface of molars ridged and tuberculous.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{5-5}{4-4}$ = 22.

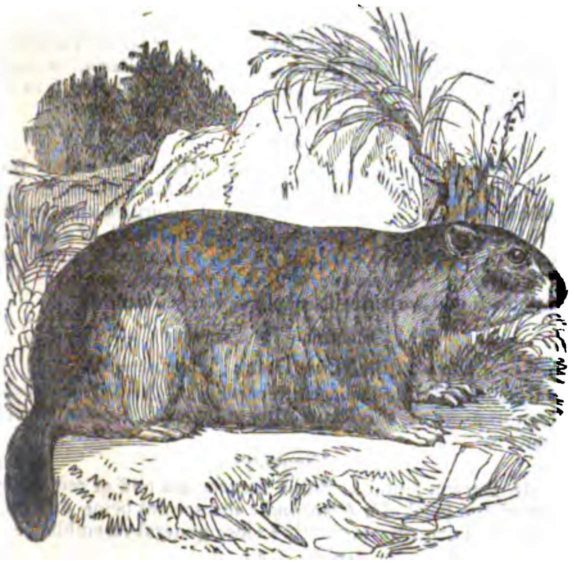
Examples, *Arctomys Marmota*, Schreb., and *Arctomys Empetra*, Schreb.: the latter as an example of the American Marmots.

Arctomys Marmota.—This is the *Mus Alpinus* of Gesner and others; *Mus Marmota* of Linnæus and others; *Glis*

Marmota of Klein; *Marmota Alpina* of Blumenbach; *Marmotte* of Buffon; *Murmelthier* of Kramer and of Meyer; and *Alpenmurmelthier* of Schrank.

Description.—Cheeks large; ears round and short, hid in the fur; body stout; head and upper parts brownish ash mingled with tawny; legs and under parts reddish; tail rather full; length from nose to tail, about 16 inches; of the tail, 6.

Habits, Locality, &c.—This well-known species is found in the Alps and Pyrenees, even, it is said, on the summits of those mountain-chains. They live in little societies, feeding on roots and vegetables, and occasionally on insects. Their holes are formed in the ground, generally with three chambers in the shape of a Y, with two entrances. These apartments are comfortably lined with moss and hay, and to them the Marmots retire about Michaelmas, having stopped up the entrances with earth, there to doze away the inclement months, till the warm suns and showers of April arouse them from their torpidity to partake of the renewed vegetation. From five to a dozen are said to be lodged in a chamber. They lift their food to their mouths with their fore-feet, eat it sitting, and will walk on their hind-feet. When on their feed a sentinel is placed to watch, and on the approach of danger his whistle drives them instantly to their subterranean retreats. They are playful creatures, but when angry or before a storm pierce the ear with their shrill whistle. Though they soon become tame, and will eat almost anything, they bite very hard when offended. Milk pleases them greatly, and they lap it with satisfactory murmurs. They become fat, and are sometimes eaten; but they are taken by the Savoyards and others principally that they may be exhibited by those itinerants. The number of young at a birth is generally three or four.



Alpine Marmot.

Arctomys Empetra.—Hoary above, mixed with black, and bright brown shining through; reddish orange beneath; head and feet blackish brown; cheeks whitish; ears flat, round, moderate; tail about half the length of the body, black at the tip. Length of head and body, from 17 to 20 inches; of tail (vertebræ), 5½ inches.

This is the *Quebec Marmot* of Pennant and Godman; the *Common Marmot* of Langsdorff; the *Thick-wood Badger* of the Hudson's Bay residents; the *Siffleur* of the French Canadians, who apply the same name to the other species of Marmot and to the Badger; *Tarbagan* of the Russian residents on Kodiak?; *Weenusk* of the Crees; *Kath-hillœ-Kooay* of the Chepewyans; *Mus Empetra* of Pallas; and *Arctomys Empetra* of Sabine and others.

Locality, Habits, &c.—Dr. Richardson, who gives the above synonyms, states that the Quebec Marmot inhabits the woody districts from Canada to lat. 61°, and perhaps still farther north. He says that it appears to be a solitary animal, inhabits burrows in the earth, but ascends bushes and trees, probably in search of buds and other vegetable productions, on which it feeds. Mr. Drummond killed two, one on some low bushes, and the other on the branch of a tree. According to Mr. Graham it burrows perpendicularly, selecting dry spots at some distance from the coast, and feeding on the coarse grass which it gathers on the river-sides. The Indians capture it by pouring water into its holes. The flesh is considered delicate when the animal is fat. The fur is valueless. It much resembles the *Bobac* of Poland in form and general appearance. (*Fauna Boreali-Americana.*) Pennant says, 'Mr. Brooks had one alive a few years ago; it was very tame, and made a hissing noise.'

Quebec Marmot

N.B. This species has a slight folding of the lining of the mouth, forming the rudiment of a cheek-pouch. (Richardson.)

Pouched.

Spermophilus. (F. Cuvier.)

Dental Formula as in *Arctomys* the molars are narrow. Cheeks with large pouches. Toes narrow and free. Heel covered with hair, hind toes naked.

Example, *Arctomys* (*Spermophilus*) *Parryi.*

Description.—Ears very short, body thickly spotted above with white on a grey or black ground, pale rust-coloured beneath, face chestnut-coloured, the tail one-third longer than the hind feet, stretched out flat, black at the extremity, with a narrow white margin, rust-coloured beneath; length of head and body 8 inches 6 lines, of tail (vertebræ) 1 inch 6 lines.

This, according to Dr. Richardson, who first named the species, is the *Ground Squirrel* of Hearne; the *Quebec Marmot* of Forster; the *Seek-Seek* of the Esquimaux; the *Thœ-thiay* (Rock Badger) of the Chepewyans; and the *Arctomys Alpina* of Parry's 'Second Voyage.'

Locality, Habits, &c.—The Doctor informs us that this Spermophile inhabits the barren grounds skirting the sea-coast from Churchill in Hudson's Bay round by Melville Peninsula, and the whole northern extremity of the continent to Behring's Straits, where specimens precisely similar were procured by Captain Beechey. It is abundant in the neighbourhood of Fort Enterprise, near the southern verge of the Barren Grounds, in lat. 65°, and is also plentiful on Cape Parry, one of the most northern parts of the continent. It is found generally in stony districts, but seems to delight chiefly in sandy hillocks amongst rocks, where burrows, inhabited by different individuals, may be often observed crowded together. One of the society is generally observed sitting erect on the summit of a hillock, whilst the others are feeding in the neighbourhood. Upon the approach of danger, he gives the alarm, and they instantly hurry to their holes, remaining however chattering at the entrance until the advance of the enemy obliges them to retire to the bottom. When their retreat is cut off, they become much terrified, and, seeking shelter in the first crevice, they not unfrequently succeed only in hiding the head and fore part of the body, whilst the projecting tail is, as is usual with them under the influence of terror, spread out flat on the rock. Their cry, in this season of distress, strongly resembles the loud alarm of the Hudson's Bay Squirrel, and is not very unlike the sound of a watchman's rattle. The Esquimaux name is an attempt to express this sound. Hearne states that they are easily tamed, and very cleanly and playful when domesticated. They never come abroad during the winter. Their food appears to be entirely vegetable; their pouches being generally filled, according to the season, with tender shoots of herbaceous plants, berries of the alpine arbutus, and of other trailing shrubs, or the seeds of grasses and leguminous plants. They produce about seven young at a time. (*Fauna Boreali-Americana.*) Dr. Richardson's figure, from which the cut is taken, was drawn from a specimen procured from the banks of the Mackenzie.

Spermophilus Parryi.

The genus *Aulacodus* of Temminck is placed by Dr. Fischer between *Dipus* and *Arctomys*.

Mr. Waterhouse, in his interesting 'Observations on the *Rodentia*, with a view to point out the groups, as indicated by the structure of the *Crania*, in this order of Mammals' (*Mag. Nat. Hist.*, 1839), states the following as the principal genera of his section *Murina: Sciurus, Arctomys, Myoxus, Dipus, Mus, Arvicola, Geomys*, and *Castor*. The principal genera in the section *Hystricina* are, according to the same author, *Bathyergus, Poephagomys, Octodon, Abrocoma, Myopotamus, Capromys, Echimys, Aulacodus, Hystrix, Dasyprocta, Chinchilla*, and *Hydrochærus*.

In the 'Zoology of H. M. S. Beagle' (Sept., 1839), Mr. Waterhouse says that he has been induced, by the differences there pointed out in the molar teeth of the two groups, to separate the South American Mice from those of the Old World, or rather from that group of which *Mus decumanus* may be regarded as the type, and to place them, together with such North American species as agree with them in dentition, in a new genus bearing the name of *Hesperomys*. Mr. Waterhouse will not venture to say whether this group be confined to the western hemisphere or not; but he thinks that he may safely affirm that that portion of the globe is their chief metropolis. In the species of *Hesperomys*, he observes, the molar teeth are always rooted; and in the form of the skull and lower jaw they agree with the *Muridæ*, and do not present the characters pointed out by him as distinguishing the *Arvicolidæ*; and, as regards the cranium and lower jaw, it is only in the genus *Neotoma* that any approach is evinced, in his opinion. Under the family *Octodontidæ* he places the genera *Ctenomys, Poephagomys, Octodon*, and *Abrocoma*, which last he states to be allied on the one hand to the genera *Octodon, Poephagomys*, and *Ctenomys*, and on the other to the family *Chinchillidæ*. The *Octodontidæ* appear to him to bear the same relation to *Echimys* as the *Arvicolæ* do to the *Muridæ*. [Rodentia.]

Mr. Waterhouse has also characterised a new species of Hamster, *Cricetus auratus*. (*Zool. Proc.*, 1839.)

Fossil Muridæ.

Arvicola. (Lacép. *Lemmus*, Link.)

1. *Campagnol des schistes de Bohème* (Cuv.). Bohemia. 2. *Campagnol des Cavernes* (Cuv.). Bone-caves, Kirkdale. (Buckland, 'Reliqu. Diluv.') 3. *Petit Campagnol des Cavernes* (Cuv.). Bone-caves, Kirkdale (Buckland, 'R. D.'), where it would seem that there may be other species. *Arvicolæ* also occur in the Bone Breccias of Cette, Nice, Corsica, and Sardinia; in the tertiary of Puy de Dome? and in the Bone-caves of Gailenreuth, Sundwick, &c.

Dr. Buckland notices the extreme abundance of the teeth of *Water Rats* in the Kirkdale Cave. The same author remarks that the teeth and bones of *Water Rats* had been found by Cuvier to occur abundantly in many of the osseous breccias from the shores of the Mediterranean and Adriatic, and that the Baron had also in his collection a large mass from Sardinia, composed exclusively of the bones and teeth of these animals, nearly as white as ivory, and slightly adhering together by delicate stalagmite. (*Reliquiæ Diluvianæ.*)

Myoxus.

1. *Loir des plâtrières* (Cuv.), Gypsum of Montmartre. 2. *Second Loir des platrières* (Cuv.), Gypsum of Montmartre. 3. *Myoxus primigenius* (Meyer, *Arctomys primigenia*, Kaup). Another *Myoxus* is recorded from the Œningen beds. Dr. Buckland, in his 'List of Vertebral Animals found in the gypsum of the Paris Basin,' records two small species of Dormouse, those above noticed in all probability, as extinct species.

Mus.

1. *Mus Musculus fossilis* (Karg). Œningen beds. Remains of Mice have also been found in the bone-caves and osseous breccias. Thus Dr. Buckland describes and figures ('Reliq. Diluv.,' p. 15, pl. 11) the jaw and teeth of a mouse from Kirkdale Cave. In the Eocene formation (lacustrine) of Cournon, in Auvergne, a *Rat* is recorded as one of the animals found with the fossil eggs of aquatic birds.

Cricetus. [Hamster.]

Dipus. (*Gerbillus*, Desm.; *Meriones*, Ill.)

Remains of this form are recorded in the Tertiary beds. Bean iron-ore of the Rauh Alp. (Jæger.) Russia. (Fischer.)

Ctenomys.

Mr. Darwin found at Bahia Blanca, in a cliff of red earth, part of the head of a *Ctenomys*; the species being different from the Tucutuco, but with a close general resemblance.

Spermophilus.

Spermophilus superciliosus (Kaup). Tertiary: Eppelsheim sand.

End of Volume the Fifteenth.

Printed by William Clowes and Sons, Stamford-street.

THE
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OF
THE SOCIETY
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MURILLO, BARTOLOMEO ESTEBAN, the most eminent artist of the school of Seville, and the most distinguished colourist of the Spanish painters, was born at Seville in the year 1618. As he manifested at a very early age an inclination to painting, he was placed under his uncle, Juan del Castillo, an artist of merit, whose favourite subjects were fairs and markets, and whose pupils, Alonso Cano, Murillo, and Pedro Moya, rank as the best Andalusian artists. Under him Murillo made rapid progress, and painted several pictures while he remained with his uncle. After leaving him he continued to improve in drawing as well as in painting. For some time he painted in the Florentine style, which then prevailed in Spain, and several works of this his first period are still preserved at Seville. In order to improve himself in drawing, he was on the point of going to England to see Vandyck, when he heard of the death of that great master. He then applied with great diligence to the painting of small pictures of saints, for the trade with America, by which he obtained funds sufficient to undertake, in 1643, a journey to Madrid. Here he derived great advantage from the instruction of his countryman Velazquez, who likewise obtained for him permission to copy the master-pieces of Titian, Rubens, Vandyck, and Ribera, in the royal collection. Returning to Seville in 1645, he excited general admiration by his paintings in the convent of St. Francis. They were in the style of Spagnoleto (José Ribera) and Velazquez, then unknown at Seville, and procured him many commissions. He painted several historical pictures for the king of Spain, which gained him great reputation in his own country, and, being sent to Rome as a present to the pope, so highly pleased the Italians, that they called him a second Paul Veronese. He likewise painted many grand altar-pieces for the churches and convents in Madrid, Seville, Cordova, Cadiz, and Granada. Among these are eight large pictures representing the works of Mercy, for the church of St. George in the hospital 'De la Caridad' of Seville, which are distinguished for their admirable composition and force of colouring. Other equally excellent works adorned the church of Los Venerables and the Capucin convent, for which latter he painted twenty-eight pictures, which were afterwards sent to America. He was engaged on an altar-piece representing the marriage of St. Catherine, for the Capucin convent at Cadiz, when he met with an accident on the scaffolding, from which he never recovered, and he died at Seville, on the 3rd of April, 1685.

But though Murillo was thus eminent in the higher departments of the art, his favourite subjects were beggar boys as large as life engaged in various amusements, which he generally designed after nature. His pictures of such subjects are highly esteemed for their merit, and may be seen in the collections of the English nobility; but there are numberless copies. Murillo excelled likewise in portraits and landscapes. His works are distinguished by their striking character of truth, nature, and simplicity; by the entire absence of the servility of imitation; and by the delicacy of his touch, and the mellowness of his colouring, which in fact seem perfect in every particular. Among his finest pictures are 'Moses striking the Rock,' and 'Christ feeding the Five Thousand,' in the convent of St. Francis, at Seville; and 'St. Antony of Padua,' in the cathedral of that city and in the National Museum at Madrid. Many of his works are in France, particularly in the collection of Marshal Soult,* and in the collections of the English nobility and gentry. The Dresden Gallery has a fine 'Virgin and Child' by his hand. Several of his pictures are at Munich, and others at Vienna, in the possession of Prince Esterhazy. By the collection of several Murillos from the convents of Seville, a museum has recently been formed in the cathedral of that city; and there are many more in the National Museum at Madrid. The picture which Murillo preferred to all his other works was that of 'St. Thomas de Villa Nueva distributing Alms to the Sick and the Poor.' This, we presume, is the picture in the possession of Mr. Wells, of which Dr. Waagen says, 'This fine picture was formerly in the church of the Franciscans at Genoa. The subject was a peculiarly happy one for Murillo. In the head of the saint, in which priestly dignity and gravity are admirably expressed, he proves his ability in treating such religious subjects from the legends of the monkish saints. The cripples and the sick afforded him, on the other hand, an ample field to show his skill in representations from common life, which we so highly admire in his beggar boys.' Dr. Waagen describes likewise another picture of the same subject, 10 feet high and 6 feet wide, now in Lord Ashburton's collection, purchased by his lordship of General Sebastiani, and which was formerly at Seville. We refer to Dr. Waagen's work on 'Arts and Artists in England' for descriptions of the numerous pictures by Murillo in our English collections. Murillo raised the art of painting in Spain not only by his own works, but by founding an academy at Seville, of which he was president from the year 1660 till his death. (Cean Bermudez, *Diccion. de Profes. Españo. de Bellas Artes*; Pons, *Viage de España*; *El Artista*, 1835; *La Revista de Madrid*, Enero, 1839.)

MURPHY, ARTHUR, a dramatic and miscellaneous writer, was born near Elphin, in the county of Roscommon, Ireland, December 27, 1730. His father was a merchant in Dublin. In 1740, Arthur Murphy was entered at the college of St. Omer, where he remained nearly seven years, and, on his return to Ireland, passed two years in a merchant's counting-house at Cork. From thence he came to London, and obtained a situation as clerk in a banking-house, shortly after which he commenced his career as a public writer. On the 21st of October, 1752, he started 'The Gray's Inn Journal,' a periodical in the style of the 'Spectator,' which he carried on to October 12th, 1754. On the 18th of the same month he tried his fortune as an actor on the stage of Covent Garden, and in the character of Othello. His success was but moderate, and after a second season, during which he acted at Drury Lane, he quitted the boards for ever, and resumed his former occupation as a writer by commencing a periodical political journal called 'The Test.' He also began to study the law, but was refused admission to the societies of the Temple and of Gray's Inn on the ground of his having been an actor. He succeeded finally in obtaining admission to Lincoln's Inn, was called to the bar, appointed a commissioner of bankrupts, and died at Knightsbridge, June 18th, 1805, in the seventy-fifth year of his age. His principal works were a translation of Tacitus, which is in a diffuse style, and is a somewhat loose and inaccurate performance; the Lives of Fielding (whose works he edited), Johnson, and Garrick; and upwards of twenty dramatic pieces. The most esteemed of his dramatic pieces are the comedies of 'The Way to keep him,' 'All in the wrong,' 'Know your own Mind,' and 'Three Weeks after Marriage.' His plays, poems, and miscellanies, in 7 vols. 8vo., edited by himself, were published in 1786.

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* Two of these, the 'Prodigal Son' and 'Abraham and the three Angels have been purchased by the Duke of Sutherland.

MURRAY RIVER. [Australia.]

MURRAY, W. [Mansfield, Lord.]

MURRAY, JAMES STUART, EARL OF, known in Scottish history by the name of the 'Good Regent,' was the eldest of three illegitimate brothers, children of King James V. His mother was the Lady Margaret, daughter of John lord Erskine of Mar, a nobleman of rank and influence at court, and one of those to whom the custody of the king, when an infant, had been committed.

He is supposed to have been born about the year 1533, but the precise time of his birth is not known, nor any particulars of his early life, except only this, that when but a few years old, his father made him prior of St. Andrew's, with all the revenues of that rich benefice. He afterwards acquired also the priory of Pittenweem, and, after obtaining a dispensation from the holy see to hold three benefices together, that of Mascon in France in commendam; and in 1544 he took the oath of fealty to Pope Paul III. In 1548 however he gave proof of that intrepidity and military genius for which he was afterwards so distinguished. This was on occasion of the descent into Scotland by the lords Grey de Wilton and Clinton. When the fleet of the latter landed at St. Monan on the coast of Fife, the lord James (as he was then called) collected a little band as determined as himself, and, placing himself at their head, attacked the invaders and drove them back to their ships. Shortly before this he had been in France, having gone thither in the retinue of his youthful sister Queen Mary, when it was resolved she should be sent over to the Continent for her education; and at different times afterwards we find him again abroad. He was also present at Mary's marriage with the dauphin of France; and was soon afterwards deputed to carry to the latter the crown and other ensigns of royalty. Circumstances occurred however in Scotland which prevented the execution of this appointment: the Reformation was now rapidly diffusing itself among all classes of the community, and dissolving in its mighty progress the nearest and tenderest ties. In these struggles the prior of St. Andrew's joined the reformers, or, as they were called, the *congregation*, among whom, by his courage and military skill, the success of his undertakings, the sanctity or rather austerity of his character, and the bluntness of his manner, aided by the advantages of birth, countenance, and person which he possessed, he gradually acquired a very high degree of consideration. The queen regent (to whom he was opposed) of course endeavoured to destroy his influence, representing him in particular as an aspiring ambitious man who, under pretence of a reformation in religion, sought to overturn the existing government. That argument however had little weight, or rather it worked a contrary way: his influence continued to increase; and when, in the end of the year 1559, the congregation resolved on taking the government into their own hands, he was one of the council appointed for civil affairs. On the death of the queen regent he was made one of the lords of the articles; and on the dauphin's death he was directed by the convention of estates to proceed to France and invite Mary to return to her native country. Such an appointment suited the views of the prior well: for previous to the death of Francis the lord James had entered into a correspondence with the young queen, soliciting the renewal of his French pension, and in reply Mary had assured him not only of that, but of the highest favours, civil or ecclesiastical, which could be conferred upon him, provided he would return to his duty. He had also at the same moment applied through Throckmorton to Cecil, the English minister, requesting some pension or allowance in recompence for the losses he had sustained in the cause of the Reformation. He therefore willingly undertook the proposed mission, and setting out on the service accordingly, reached the palace and quickly gained admittance to the queen. He then found that an envoy from the Roman Catholic party in Scotland had preceded him; and in the interview which the prior had with his sister, he learnt that the disturbed state of the country and his own ambitious views had been strongly insisted on. Mary however adopted her brother's suggestions, and agreed to return to Scotland without that armed force which the Roman Catholic envoy had represented as wholly indispensable. The lord James immediately communicated the result of the conference to Throckmorton, the English ambassador, but in a secret manner; and, contrary to Mary's express wishes, in returning home he waited on Elizabeth, to strengthen, no doubt, the friendship which subsisted between her and the reformers in Scotland, and no doubt also to acquaint her with the determination which Mary had been induced to form. It is observable that the letters from Throckmorton at this period strongly urge upon Elizabeth to secure the lord James's regard; and from one of them it may even be inferred that Elizabeth had done him some 'good turn,' as Throckmorton expresses it, for this very end.

The lord James returned to Edinburgh in the beginning of June, 1561, having been absent on his mission about two months. In ten weeks after, Mary embarked from Calais, and after a voyage of five days arrived in the port of Leith. On her arrival she found the prior among the first men in the kingdom; and he then naturally became her prime minister, confidant, and adviser. In this situation he acted with great tact and judgment, and at the same time with much tenderness to the queen. He protected her in the exercise of her own religion, and in return obtained from her a proclamation highly favourable to the reformers: he restrained the turbulence of the borders, moderated the zeal of the people against popery, and at once kept down the enemies of Mary's dynasty and strengthened the attachment of her friends. Mary rewarded his services by conferring on him the title of Earl of Mar, and honoured his marriage with the lady Agnes Keith, eldest daughter of the earl marischal, which took place about the same time, with a series of splendid entertainments. The greatness of the banqueting indeed, and the vanity thereof, offended the more strict of the reformers, and Knox took occasion to read the lord James a solemn admonition; 'for (said the preacher) unto this day the kirk of God hath received comfort by you and by your labours, in the which if hereafter ye be found fainter than before, it will be said your wife hath changed your nature.'

The earldom of Mar, which the prior had just obtained from Mary, having been claimed by Lord Erskine as his peculiar right, was soon after resigned with the property belonging to it; but in its place the prior received the earldom of Murray, which had been long the favourite object of his ambition. This grant was scarcely a less matter of jealousy to the prior's great rival, the Roman Catholic earl of Huntly, than the grant of Mar was to the lord Erskine. But all dispute on that head was soon ended; for Huntly was shortly after proclaimed a traitor for various overt acts of insubordination and rebellion, originating in disappointed ambition; and not long after that he suddenly expired. Murray was now left in undisputed possession of the chief authority in the kingdom next to the queen, who reposed in him almost unlimited confidence. An incident occurred about this period which showed the influence he possessed in the government, and at the same time how he was thought occasionally to use it. His services in the cause of the Reformation were manifest and important, yet the lord James was not all that the reformers wished; his religious zeal was not hot enough; and they lamented the protection he afforded to the queen in her use of the mass. But they were not prepared to find him now extending his protection to her and her ladies in what Knox calls 'the superfluities of their clothes,' which he said would bring down the vengeance of God 'not only on the foolish women but on the whole realm.' Knox imputed Murray's conduct on this occasion to a selfish fear of offending the queen, lest she should repent of her munificence and refuse to confirm her grant of the new earldom; and denouncing such motives in strong terms, accused him of sacrificing truth to convenience, and the service of God to the interests of his ambition. Murray was so incensed at this attack, that for a year and a half Knox and he scarcely exchanged words together. The queen's marriage with Darnley seems to have been among the first things to bring them together again; as it was also the first step in the subsequent estrangement between Murray and the queen. To this marriage Murray, Knox, and Elizabeth, and their respective followers, were all opposed. Knox and the reformers were opposed to it on religious grounds, and it was opposed by Murray and Elizabeth partly on the same grounds, but partly also on personal or political considerations. Murray was not accessory however to Darnley's murder: he knew of it indeed; but, as he said, he did not wish to meddle with the business, and would neither aid nor hinder it. Accordingly he left Edinburgh abruptly on the morning of Sunday, the 9th of February, 1567, the last day of Darnley's life, alleging his wife's illness at St. Andrew's as the cause of his departure; and we do not hear of him in Edinburgh again till about a fortnight after all was over, when he had Bothwell (the perpetrator of the horrid deed) and Huntly, Argyle and Lethington, all parties to it, at dinner at his house. Nor did Murray remain in Edinburgh so as to be present at Bothwell's trial, for in the beginning of April he asked leave to go away to the Continent, but on what grounds is not known; and on the 9th, which was just two days before the trial, he set off, visiting London and the court of Elizabeth on his way. He remained abroad till the end of July, returning only a few days after the coronation of the young prince James. He was therefore absent from the parliament which was held immediately after Bothwell's acquittal, and from the famous supper at Ainslie's, when the principal nobility signed the bond acquitting Bothwell of all concern in Darnley's murder, and engaging to support him in obtaining Mary's hand in marriage. And he was thus also absent during the important occurrences attendant on the queen's marriage with Bothwell. He was not ignorant of all that was going on: Cecil too was in constant communication with him: and soon after the queen's surrender of herself to 'the prince's lords' at Carberry Hill, he sent an accredited agent into Scotland to attend to his interests.

He was at length proposed as regent of the kingdom. Before agreeing however, he resolved to visit Mary in person; and accordingly repaired to Lochleven Castle, where she was now a prisoner When Mary saw her brother, she burst into tears, and they had afterwards a private conference together, the particulars of which are not fully known, but it is said that Mary was frequently bathed in tears with his upbraidings.

On the 22nd of August, 1567, he was proclaimed regent; and with his usual vigour he immediately proceeded to establish himself in the government. He now held the situation even against the queen herself; for when, having made her escape from Lochleven, she called on him to resign the regency, he at once refused, and took the field against her at Langside, where she sustained a complete defeat. Nor did his determination end here; for being summoned by Elizabeth to bear testimony in the trial which had been instituted by that queen against Mary, he immediately repaired to the appointed place, and did not hesitate in bearing witness against the unhappy prisoner. His own fate however was settled before that of his sister. For while passing through the streets of Linlithgow, on the 23rd of January, 1570, he was shot through the body by a bullet fired from a window by James Hamilton of Bothwelhaugh, nephew to the archbishop of St. Andrew's, in revenge for some personal injury committed by the regent years before. Murray survived till midnight, when he died, in the thirty-eighth year of his age.

MURRAY, SIR ROBERT, son of Sir Robert Murray of Craigie, entered in early life into the French service, where, by the favour of Cardinal Richelieu, he soon obtained the rank of colonel. He returned to Scotland when the difficulties of King Charles I. were beginning to assume their most alarming aspect; and at Newcastle he had a design for the king's escape, which seems to have been frustrated only by Charles's want of resolution. 'The design,' says Burnet, 'proceeded so far that the king put himself in disguise and went down the back stairs with Sir Robert Murray; but his majesty, apprehending it was scarce possible to pass through all the guards without being discovered, and judging it highly indecent to be catched in such a condition, changed his resolution and went back, as Sir Robert informed the writer.' (*Mem. of Duke of Hamilton*, 307.)

On the fall of the royal cause he appears to have gone again to France; and on the 22nd of May, 1650, two letters from that kingdom were read to the parliament of Scotland, one from the young king, the other from the queen-regent, in answer to a letter from the parliament in favour of Sir Robert Murray, in both which they promised, 'from their respect and love to the Scots nation, that they would see their desire performed, so far as possibly the convenience of their affairs would permit, and that he should be paid off his arrears.' (4 *Balf. Ann.*, 17.)

He must have returned to Scotland soon after this; for on the 21st of May, 1651, while Charles was in command of the army there, Murray was appointed justice-clerk, an office which appears to have remained vacant since the deprivation of Sir John Hamilton, in the month of February, 1649. A few days after this appointment Sir Robert was sworn a privy-counsellor; and on the 6th of June, 1651, he was nominated a lord of session; but the court being suspended by Cromwell's proceedings, he never sat on the bench. At the Restoration his appointments as a lord of session and justice-clerk were renewed. He was then also made one of the lords-auditors of exchequer. In speaking of the second of these appointments, Mr. Laing falls into an error: he says, 'Sir Robert Murray, whom the Royal Society should revere as its father, was appointed justice-clerk, and the people were pleased and gratified when *a judicial office so important and dangerous* was conferred on the most upright and accomplished character which the nation produced.' (Laing, *Hist. of Scotland*, iv. 51.) At that time however the office of justice-clerk was not the important situation which it now is; nor was it for a dozen years after that the justice-clerk became vice-president of the justiciary court. He was however an assessor to the justiciar or justice-general; he was the first who had the style of lord-justice-clerk; and it is highly probable that his character and reputation paved the way for the advancement of his successors. It does not appear that Murray ever sat on the bench at all. He was made a judge of three courts at one time, not perhaps that he might be a judge in any, but that the emoluments might attach him as a partisan. He was not bred to the law, and does not appear ever to have been in circumstances to acquire a knowledge of it. In the above passage however Laing refers to an event in Sir Robert's life of great interest and importance: he was the father of the Royal Society. That body had existed as a debating club previous to the time of the Commonwealth, when its members were dispersed. At the Restoration the Society assembled again, and conducted their proceedings on a more extensive scale. On the 28th of November, 1660, we find Sir Robert present at what was probably the first meeting, when it was proposed 'that some course might be thought of to improve this meeting to a more regular way of debating things; and that, according to the manner in other countries, where there were voluntary associations of men into academies for the advancement of various parts of learning, they might do something answerable here for the promoting of experimental philosophy.' (1 Kirch., *Hist. Royal Soc.*, 3.)

It was Sir Robert Murray who undertook to communicate the views of the Society to the court, and at the next meeting he returned an answer indicative of encouragement from that quarter; and after rules for the government of the Society were established, Sir Robert was chosen first president. He was a member of almost all committees and councils, contributed several papers, and prepared and exhibited various experiments. The authors of the 'Historical Account of the Senators of the College of Justice' say he was re-appointed justice-clerk in 1667, and sent down to Scotland, which he continued to rule with a gentleness quite unknown to the counsels of his predecessors. But this is scarcely correct. Sir John Home of Renton, who was a great zealot in the cause of episcopacy, which Charles wished to introduce into Scotland, was appointed justice-clerk in 1663, in the room of Sir Robert Murray; and on his death, in 1671, he was succeeded by Sir James Lockhart of Lee.

Sir Robert Murray died suddenly, in the month of June, 1673. Burnet says, 'He was the most universally beloved and esteemed, by men of all sides and sorts, of any man I have ever known in my whole life. He was a pious man, and in the midst of armies and courts spent many hours a day in devotion, which was in a most elevating strain. He had gone through the easy part of mathematics, and knew the history of nature beyond any man I ever yet knew. He was the first former of the Royal Society, and its first president; and while he lived he was the life and soul of that body. He had an equality of temper in him which nothing could alter, and was in practice the only Stoic I ever knew. He had a most diffused love to all mankind, and delighted in every occasion of doing good, which he managed with great discretion and zeal. He had a superiority of genius and comprehension to most men, and had the plainest but withal the softest way of reproving people for their faults that I ever knew of.' (1 *Burnet's Own Times*, 59.)

MURRAY, PATRICK, fifth LORD ELIBANK, eldest son of Alexander, fourth lord, was born in February, 1703; and on the 22nd June, 1723, he passed advocate. (*Fac. Reg.*) He did not prosecute the legal profession however; perhaps he never meant to do so, but only, in accordance with a feeling in behalf of 'learning,' which prevailed and still prevails in Scotland, he acquired the name and status of a Scottish advocate. The same year he entered the army; and in 1740, which was about five years after he had succeeded by his father's death to the family honours, we find his lordship a lieutenant-colonel in the expedition to Carthagena, of which expedition he wrote an account, which remains in manuscript, it seems, in the library of the Board of Trade. From that time he frequently committed his thoughts to paper, and was known among the literati of Edinburgh, his contemporaries, for the acuteness of his understanding and the varied nature of his information. In 1758 he published 'Thoughts on Money, Circulation, and Paper Currency;' and soon afterwards an 'Inquiry into the Origin and Consequence of the Public Debts.' In 1765 he published 'Queries relating to the proposed Plan for altering Entails in Scotland;' and in 1773, a 'Letter to Lord Hailes on his Remarks on the History of Scotland.' The same year, when Dr. Johnson visited Scotland, he addressed a letter to him, and had afterwards various interviews with him. In 1774 he published some 'Considerations on the present State of the Peerage of Scotland.' In political life he was an opposition lord; and is now known to have maintained a correspondence with the exiled house of Stuart. His younger brother Alexander Murray was likewise so enthusiastic a Jacobite as to propose leading an insurrection in favour of the Pretender. That brother, it may also be mentioned, was in 1750 confined, by order of the House of Commons, for violent interference with a Westminster election; and as he refused to express contrition on his knees according to the order of the house, he was detained in confinement upwards of a twelvemonth, and might have been confined longer had not a prorogation of parliament at that time occasioned his release. The fourth and youngest brother of Lord Elibank likewise attracted considerable notice, distinguishing himself greatly as an officer in high command during the Canadian war. Lord Elibank died without issue, 3rd August, 1778, in the seventy-sixth year of his age.

MURRAY, Dr. ALEXANDER, was born at Dunkitterick, in the stewartry of Kirkcudbright, on the 22nd October, 1775. He was the eldest child of his father's second marriage. His father Robert Murray had by his former marriage, which had subsisted full forty years, a numerous family; and in the course of about four years after his wife's death, himself now entering his 70th year, he married again, and had two children more. Robert was a healthy and vigorous shepherd or pastoral farm servant in one of the mountain districts of Galloway, and distinguished for his sagacity and habitual good conduct: his whole property consisted of four muirland-cows and some two or three scores of sheep, his reward for herding the farm of Kitterick for Mr. Laidlaw in Clatteringshaws. He had been a shepherd all his days, like his father before him, and both had constantly remained in the same neighbourhood. His wife was the daughter of a neighbouring shepherd: all the sons of his first marriage became shepherds; and to the same line of life he designed Alexander.

Alexander however was, in his father's opinion, a lazy useless boy, always committing some blunder or other when sent to herd or bring in the cattle. He was in fact a weakly child, not unhealthy, yet not stout; and he had neither the rapidity nor reach of vision which are indispensable to form a good *herd:* he was also of a sedentary and recluse turn; and thus quite unfitted for the vacant, indeed, but vigilant life of a shepherd. To the old man therefore, whose world was the dark and lonely glen where his cottage lay, and the adjoining hills which he sometimes ranged, young Murray must have been an object of no great concern. Accordingly it was not till he had reached his sixth year that he was taught the alphabet of his mother-tongue. The old man in that year laid out a halfpenny in the purchase of a catechism, and from the letters and syllables on the face of the book he began to teach his son the elements of learning. It was however emphatically *a good book*, and only to be handled on Sundays or other suitable occasions; it was therefore commonly locked up, and, throughout the winter, the old man, who had been himself taught reading and writing in his youth, drew for his son the figures of the letters in his *written* hand on the board of an old *wool-card* with the black end of a burned heather-stem. In this way young Murray was initiated into literature; and working continually with his board and brand, he soon became both a reader and writer. The catechism was at length presented, and in a month or so he could read the easier parts of it. In the the summer of 1782 he got a Psalm-book, then a New Testament, and at last a Bible, a book which he had heard read every night at family worship, which he often longed to get hold of, but which he was never allowed to open or even touch. He now read constantly, and having a good memory, he remembered well and would repeat numerous psalms and large portions of scripture. In 1783 his reading and memory were become the wonder of the rustic circle in which he lived; and a wish began to be generally entertained that he should be sent to school. The idea of school-wages however frightened his father; and in all likelihood nothing would have been done, had not William Cochrane, a brother of his mother's, paid a visit to the place in the harvest of the above year. He had made a little money as a travelling merchant, and being informed of the *genius*, as it was called, of his young nephew, he generously undertook to place him next spring at the New Galloway school, which was about six miles off, and to lodge him in the house of the boy's grandfather by the mother's side, who lived about a mile from New Galloway. Accordingly at the Whit-Sunday term of 1784, young Murray, then in his ninth year, was brought to the New Galloway school; where, for a month at least, his pronunciation and awkward gait were a source of perpetual merriment to the scholars. They soon began however to regard him with other feelings. Being utterly neglected by his aged grandfather, he learned to curse and swear, to lie and do all sorts of bad tricks; but before the vacation in August he was also repeatedly *dux* of the Bible class. He continued at school for about a fortnight after the vacation had ended; but in the beginning of November he was seized with an illness which obliged him to be taken home. Here, so soon as his health got a little better, he was put to his old employment of a *herd*, with the rest of the family; and this course of life now continued for about three years. During all that time he spent every penny which he procured from friends or strangers in the purchase of books and ballads, carried bundles of these in his pockets, and read them in the glen or on the hills when tending the cattle, and was ever puzzling and surprising his illiterate neighbours with recitals of what he had learned. In 1787 he borrowed from a countryman Salmon's 'Geographical Grammar,' which delighted him beyond measure, particularly by the specimens it contained of the various languages of the world. In the winter of that year, being able to read and write, he was engaged by the heads of two families in a neighbouring parish to teach their children. He returned home in March, 1788, and with part of his fees, which were 15*s.* or 16*s.*, he bought books of history and arithmetic. The following year his father and the family left Kitterick, and went by engagement to herd at a place four miles above Minnigaff, the school of which place Murray immediately resolved to attend. He entered himself accordingly, and during the summer months walked three days every week to Minnigaff school. Here he read incessantly, not only his own books, but, by coming an hour before the school met, the books of all the other scholars which were left in the school. At Martinmas, 1789, he was engaged by three families in the moors of Kells and Minnigaff to teach their children; and during that winter he migrated about, remaining six weeks in one family at a time, the families living at considerable distances from each other. He returned home a little before Whit-Sunday, 1790, and found that from that term his father was engaged as a shepherd on a farm within two miles of Minnigaff. To this farm the family accordingly removed, and Murray, having now easy access to the school, went thither regularly, and also determined on adding to his former acquisitions a little French, which he found was necessary for a clerk intending to go to America or the West Indies, a situation he had some thoughts of obtaining. He immediately borrowed a French grammar, and set to learning the language so hard that in less than a fortnight, his indulgent master giving him whole pages of lessons at a time, he could read portions of the 'Diable Boiteux.' He then found one of the boys in possession of a Latin Rudiments: he borrowed it too, and by incessant reading and a little help from the master, before the vacation in August he beat a class of scholars who had been a considerable time at the study. At Martinmas, he went to teach in a family reading, writing, arithmetic, and Latin.

In this situation he applied to his books with his usual zeal; and having, among other works, bought an old and bulky edition of Ainsworth's 'Dictionary,' for eighteenpence, he literally read it through from A to Z, and again from Z to A. On Whit-Sunday, 1791, he returned to school, and finding a schoolfellow in possession of a Greek grammar, he commenced that language, after spending part of his winter's wages in the purchase of a grammar and lexicon. He had also by this time mastered the Hebrew alphabet, at first from an old Psalm-book, where the letters were marked in succession in the 119th psalm; and afterwards, together with some Hebrew vocables, from his Ainsworth. He now determined on learning that language also, and, accordingly, sent to Edinburgh for a grammar by the man who rode with the post: the man brought him the first edition of Robertson's 'Grammar,' which, over and above the Hebrew, contained on the last leaf the Arabic alphabet, to which, without delay, Murray next applied. At Martinmas of the above year he was again engaged to teach, but at the increased fee of 35*s*. or 40*s*., and in this situation he devoted every spare moment to French, Latin, Greek, and Hebrew. In summer he was again at school, and again, in the winter, teaching in a family; but on this occasion at a somewhat lower allowance than before, Murray having chosen the place from its convenience to a school which he wished to attend in the winter evenings. In this school he got hold of Bailey's 'English Dictionary,' which introduced him to the Anglo-Saxon language. He proceeded in this way, taking advantage of every circumstance to increase his knowledge of languages; and at length, in November, 1794, he came to Edinburgh, under the countenance and protection of the Rev. Dr. Baird of that city. Murray was at this time in the nineteenth year of his age. His subsequent progress was comparatively easy. In the course of two years he obtained a bursary or exhibition to the university of Edinburgh; and never relaxing in his pursuit of knowledge, he soon made himself acquainted with all the European languages, and began to form the design of tracing up all the languages of mankind to one source. His acquirements as a linguist naturally pointed him out to Constable, the well-known publisher, as a fit person to superintend a new edition of Bruce's 'Travels;' and in the preparation of that work he was employed for about three years, from September, 1802, Murray residing during that time chiefly at Kinnaird-house, where he had access to the papers left by the traveller. He was also at different times employed in contributing to the 'Edinburgh Review' and other periodicals. By the advice of his friends, he prosecuted the studies necessary for the Church, to which his attention was directed as a permanent source of employment; and at length, in Dec., 1806, he was appointed assistant and successor to Dr. Muirhead, minister of Urr, in the stewartry of Kirkcudbright, a charge to which he in 1808 succeeded as full stipendiary. Within six months after, he married the daughter of a farmer in the neighbourhood. He still continued his philological pursuits. In 1811 an incident occurred which brought him into prominent notice as a linguist: on the recommendation of Mr. Salt, envoy to Abyssinia, he was applied to by the Marquis Wellesley, as the only person in the British dominions qualified to translate a letter written in Geez, from the governor of Tigrê to his Britannic Majesty; and he performed the task in the most satisfactory way. The following year a vacancy occurred in the chair of Oriental languages in the university of Edinburgh, of which the town-council of the city are the patrons. The income from this chair was small; the gross emoluments of the present professor, who was a competitor with Murray, and afterwards his successor, are considerably short of 300*l*. per annum. It was however perfectly suited to Murray's taste and habits: it brought him to Edinburgh, where his literary labours could be both assisted and valued; and there was a great probability that some other situation would soon, as at present, be conjoined with it. Great exertions were accordingly made to secure his election; and notwithstanding some fears of his health giving way under it, his appointment took place. (*Scots Mag.*, July, 1812.) He was elected on the 8th July, 1812, and on the 15th the university conferred on him the degree of Doctor in Divinity. On the 26th of August he was formally inducted to the chair, and he began to lecture on the 31st October following. Soon after that he published, for the use of his students, a small work entitled 'Outlines of Oriental Philology,' which is known to have been both composed and prepared for publication after his arrival in Edinburgh; the subject indeed was perfectly familiar to him. He continued to teach his class with little interruption till the end of February or the beginning of March; and at such times as his health would not permit him to attend his public lecture, he taught a small Persian class in his own room. The pulmonary complaint however, with which he had been struggling through the winter, at length compelled him to suspend his prelections; yet, with its characteristic deceit, it always flattered him with hopes of resuming them; and, quite unconscious of his real situation, he continued engaged in his favourite studies till within a few days of his death, which took place on the 15th April, 1813, in the thirty-seventh year of his age. His body was interred in the Grey Friars' Churchyard, at the north-west corner of the church.

This great linguist was an eminent example of the pursuit of knowledge under difficulties. His life however may be described rather as the preparation for some result than as having accomplished much; and the performance by which he will be known in the literary world, though distinguished by profound and various learning, was both imperfect and posthumous. It appeared under the auspices of the Rev. Dr. Scot of Corstorphine, and is entitled a 'History of the European Languages, or Researches into the Affinities of the Teutonic, Greek, Celtic, Sclavonic, and Indian Nations.' An extensive acquaintance with these languages convinced the author that all the European languages were closely connected; and in the work now named, it is his object to show that they all derive from, and may be traced to, nine euphonic primitives, which primitives he states to be *ag*, *bag*, *dwag*, *gwag*, *lag*, *mag*, *nag*, *rag*, and *swag*. 'By the help of these nine words and their compounds,' says he, 'all the European languages have been formed.'

MURRHINE (sometimes written *Myrrhine*) **VASES**, vessels used by the antients, were made of the stone or hard substance, whatever it might be, termed *murrha* (μύῤῥα). They are frequently noticed by the classic writers, and usually described as transparent, though sometimes spotted or clouded, like our cups of agate. Pliny speaks of them as coming from the East, from Parthia and Carmania. He adds that they were first brought to Rome by Pompey after his victory over Mithridates. 'The same victory,' he observes, 'introduced Murrhine vessels into the city, and Pompey was the first who dedicated to Jupiter of the Capitol precious stones and cups, after his triumph on that occasion. They afterwards came into common use.' (Plin., *Hist. Nat.*, li. xxxvii., edit. Harduin, vol. ii., p. 767.) The abbé Le Blond, in the 43rd volume of the 'Mémoires de l'Acad. des Inscriptions,' supposes that these vessels were made of the oriental sardonyx. Others have supposed the material to have been a kind of Chinese stone. The best alabaster in antient times was furnished from the quarries of Carmania, which may possibly have supplied the materials for the murrhine vessels.

MURVIEDRO. [SAGUNTUM.]

MUS. [MURIDÆ.]

MU'SA, IBN NOSSEYR, Governor of Mauritania. The origin and genealogy of this conqueror are differently stated by the Arabian writers. Some make him the son of Nosseyr, son of Abd-el-rahman, son of Zeyd, of the tribe of Bekr; others assert that he belonged to the illustrious tribe of Lakhm; while there are not wanting genealogists who deny his ever having had any connexion with either of the above-mentioned tribes, and suppose him to be the son of a liberated slave of Muawiyah Ibn Abí Sufyán, the first khalif of the race of Umeyyah in the East. All however agree that his father Nosseyr was a *mauli*, or adherent of Muawiyah, that he served under his banners against Ali, and, as a reward for his services, was raised to the post of commander of the khalif's body-guard.

According to all accounts, Músa's birth is placed in the year 19 of the Flight (A.D. 640). He seems to have made his first campaigns under his father, and to have been present at almost all the battles then fought by the Moslems. His bravery and the military talents which he displayed on several occasions made him a favourite with 'Abd-el-'azíz Ibn Merwan, a prince of the royal family then governor of Egypt, who attached him to his person, raised him in command, and, having previously obtained leave from his brother the khalif, appointed him general of the armies destined to achieve the conquest of Africa, in the year 79 of the Flight (A.D. 698-9). What the first expeditions of Músa were, is not satisfactorily ascertained. The Arabian writers say, in vague terms, that he pushed his conquests far into the West, and penetrated into the interior of Africa, returning with a rich spoil and thousands of captives. But he seems to have achieved nothing brilliant until the year 88 (A.D. 707), when the khalif Al-walíd named him governor of Mauritania, with instructions to complete the conquest of the country.

Músa took his departure from Egypt at the head of a numerous army, and, partly by persuasion, partly by force, succeeded in reducing to obedience the motley tribes that inhabited the northern shores of Africa. He seems to have experienced no difficulty in uniting under his standard men whose habits were not dissimilar from those of the Arabs, and who, relying on antient traditions current among them, believed themselves to be sprung from the same stock as their invaders. [BERBERS.] Under such a belief, which Músa dexterously tried to strengthen, whole tribes flocked to his banners, embraced the religion of the Prophet, and, led by his lieutenants, marched to new conquests. Tangiers, Arsilla, and Ceuta, three insulated fortresses which still held out for the Goths, were speedily reduced; a fleet commanded by Abdullah, Músa's eldest son, scoured the Mediterranean, and ravaged the islands of Sicily, Sardinia, and Mallorca; and in the year 91 of the Flight (A.D. 709) the whole of northern Africa, from the Pillars of Hercules to the delta of Egypt, acknowledged the laws of the conqueror.

At this critical moment, when the restless ambition of the African governor had been stimulated by so much success, a favourable occasion presented itself to satisfy his appetite for conquest. Gothic Spain was a prey to the most horrible anarchy. After the death of King Wittiza, Roderic, the son of a provincial governor, had usurped the throne to the prejudice of Eba and Sisebuto, the two sons of that monarch, who had taken up arms in support of their rights. Unable however to keep the field against Roderic, the sons of Wittiza and the noblemen who followed their party (among whom was a certain Julian or Ilyán) despatched a messenger to Músa, inviting him to invade Spain, and promising to aid him in his enterprise.

No sooner was Músa made acquainted with the divisions among the Goths, than he eagerly seized on the opportunity of interfering in them. By his orders Tarif Ibn Málik, one of his servants, made a slight incursion in the month of Ramadhán, A.H. 91 (July, A.D. 710), and returned to Africa loaded with spoil. A second expedition, commanded by Tárik Ibn Zeyád, landed on the coast of Spain, in April, 711, and two months afterwards [MOORS] Roderick was defeated and killed in the battle of Guadalete.

On the news of this signal victory reaching Africa, Músa, who was far from expecting so complete success, felt a desire to share in the laurels reaped by his lieutenant; and while he hastily made the necessary preparations to cross over into Spain, he sent orders to Tárik not to move from his position, and to wait for further instructions. But the Arabian general had gone too far to be stopped by a mere message from his master. Eager for plunder, and bent on the subjugation of the whole country, he penetrated into the heart of Spain, and, before his master Músa had set his foot on the peninsula, the opulent city of Toledo, the capital of the Gothic monarchy, together with an immense booty, had fallen into his hands.

At this period Músa arrived in Spain, breathing vengeance against the man who, by disobeying his commands, had deprived him of so rich a harvest of glory and wealth. He landed at Algesiras, in June, A.D. 712, at the head of 18,000 men. He took with him three of his sons, Abdulaziz, Merwán, and Abdulola, leaving his eldest son Abdullah to govern Africa in his stead. His first step was to subdue such provinces as, by Tárik's precipitate march upon Toledo, had remained untouched. He laid siege to Seville, which he reduced in a month (July, 712). Carmona and other neighbouring cities shared the same fate. Thence he passed into Lusitania, and, almost without halting in his rapid march, seized on Niebla, Beja, and other considerable cities (August, 712). His victorious career was stopped for a time before the walls of Merida, which he reduced, after an obstinate defence on the part of the garrison, towards the end of November, 712. From Merida Músa marched to Toledo, where, having had an interview with Tárik, he publicly reproached him with his disobedience, caused him to be beaten with rods, confiscated his property, and had him cast into a dungeon, where he remained until orders came from the khalif to release him, and give him, as before, the command of one of the divisions of the army.

The remainder of Spain was speedily subdued. Tárik, at the head of his troops, marched eastwards, and, after reducing the intermediate provinces, laid siege to Saragossa. Músa took a northern direction, reduced Salamanca, advanced as far as Astorga, and thence, returning to the Douro, followed the course of that river to Seria, passed the mountains, and arrived in sight of Saragossa, which Tárik was then investing, and which surrendered in July, 713.

From thence Tárik proceeded to Valencia, which, together with Murviedro, Xativa, and other considerable cities of those districts, were reduced with amazing rapidity; while Músa himself, after detaching some forces under the command of his son Abdulaziz to subdue and plunder the plains of Murcia, marched towards the Pyrenees, reduced on his passage the cities of Calahorra, Lerida, Barcelona, and, crossing that mountain barrier, penetrated into France.

How far Músa advanced into that country is not satisfactorily ascertained. According to Al-makkari, an Arabian writer, who compiled a history of Spain from the best sources (*Arab. MSS.*, in the Brit. Mus., 7334), Músa subdued not only Narbonne, but the greatest part of the province known by the name of Gallia Gothica; but, as other Arabian historians are silent on the subject, and as the Christian chroniclers of France have not made the slightest mention of this invasion, we are authorised in thinking that, if Músa did really cross the Pyrenees, his invasion was unattended with any important results. On his return from this expedition to the Pyrenees, a messenger from the khalif Al-walíd, who now became alarmed at Músa's increase of power, reached his camp, and summoned him, together with Tárik, to the royal presence.

Tárik hastened to obey the orders of the khalif, and departed immediately for the East (Sept., 713); but Músa, who, if any faith can be placed in the Arabian writers, had conceived the ambitious project of subduing Gaul, Italy, and Germany—and forcing his way from Spain to Constantinople, thus connecting the eastern and western possessions of the Arabs—refused to comply with the summons. Having prevailed upon the envoy Mugheyth to accompany him in his conquests, by promising him a large share of the spoil, he directed his course towards Asturias and Gallicia, which the Moslems had not yet visited. But his reluctance to obey the imperial mandate added to the suspicions already entertained about his views, which were represented as aiming at independence, and a more peremptory order was sent for his return. The khalif's second messenger, whose name was Abú Nasr, reached him at Lugo, in Gallicia, caught the bridle of his horse, and, in presence of the army, commanded him to repair to Damascus. Músa did not venture to disobey the order of the khalif, and, entrusting the government of Spain to his son Abdulaziz, reluctantly commenced his journey, in March, 714.

On arriving in Africa, where he made some stay, he confirmed his son Abdullah in his government of Cairwán, gave to his son Abdulola the command of Tangier and other important fortresses on the coast, and taking the road to Egypt, proceeded to Syria with a numerous escort, and long trains of camels heavily laden with the spoil of the conquest, besides being followed by thousands of captives, among whom were 400 Gothic nobles, sumptuously arrayed.

Músa did not reach Syria until the end of 714 or the beginning of 715. Tárik had arrived many months before, and not only had justified himself against the charges brought against him, but had succeeded in throwing all the blame upon Músa. To this must be added that Al-walid was then suffering under an acute disease, which soon after caused his death, so that Músa's reception was not so brilliant as he had anticipated. But if Al-walíd's treatment of the man who had added so rich a jewel to his crown was tainted with deep ingratitude, that of his brother and successor Suleymán was not only unjust but cruel. It is generally asserted that while Músa and his escort were approaching the capital, he received from that prince an intimation not to enter Damascus in his brother's lifetime, but to delay his entrance until the commencement of the new reign, in order that the Spanish treasures and captives might grace his accession. This command, Músa, from motives of fidelity towards his sovereign, imprudently disregarded; and on the accession of Suleymán, remained exposed to all his vengeance. He was cast into prison, beaten with rods, exposed to the sun until he was nearly dead, and lastly, fined two hundred thousand pieces of gold, a sum which all his treasures amassed in Spain were insufficient to satisfy, and which was raised among his friends. Suleymán's vengeance did not stop there; the two sons whom Músa had left to govern Africa in his absence were deprived of their governments, and orders were despatched to Spain (Aug., 716) to put to death Abdulaziz, whose head was brought to Damascus and shown to his disconsolate father by Suleymán himself, who asked him, with a bitter smile, if he recognised it. The afflicted father turned away at the sight, exclaiming, 'Cursed be he who has slain a better man than himself.'

Músa died in the greatest poverty at Wádí-l-korá, in the Hejáz, in 717, at the age of seventy-nine lunar or Arabian years.

(Conde, *Hist. de la Dom.*, Mad., 1820-21; Cardonne, *Histoire de l'Afrique*, Paris, 1765; *The History of the Mohammedan Empire in Spain*, London, 1816; Casiri, *Bibl. Arab. Hisp. Esc.*, Madrid, 1760; Ibn Khallekán's *Wafiyatu-l-a'yán* (or the Lives of Illustrious Moslems), MS.; Al-makkari, and other historians of Mohammedan Spain.)

MUSA, ABU ABDALLAH MOHAMMED BEN, of Khowarezm, the earliest Arabic writer on algebra, whose treatise on that science, 'Al Jebr e al Mokābalah' (restoration and reduction), was composed for popular use at the command of the caliph Al Mamun. It contains rules and illustrations (rather than demonstrations) for the solution of simple and quadratic equations, with their application to various questions, mostly of a mercantile character. From internal evidence it appears to be drawn from Hindu writings, with which the author is known to have been acquainted; and the works of Diophantus were not translated into Arabic till after the time of Mohammed Ben Musa.

This work was (partially at least) translated into Latin at an early period; and M. Libri (*Hist. des Sci. Math. en Italie*, vol. i., note 12) has printed all the part of Ben Musa's treatise which the Latin manuscripts in the Bibliothèque du Roi at Paris contain. The complete work, in Arabic, with an English translation and notes by the late Dr. Rosen, was published by the Oriental Translation Society, in 1831, from a manuscript in the Bodleian Library.

It is from this work that (so far as Europe is concerned) algebra derives both its name and introduction; and the writings of Leonard Bonacci, Lucas di Burgo, and the earlier Italians, bear strong marks not only of their Arabic masters, but even of the particular work before us. Accordingly Mohammed Ben Musa was frequently called the inventor of Algebra, a title to which he has no claim.

In our account of the VIGA GANITA a comparison is made of the Arabic algebra, as far as it goes, with that of the Hindus.

MUSA, ANTONIUS, was a physician of some celebrity at Rome. He was at one time the medical attendant of the emperor Augustus, whose slave he had formerly been; and he gained considerable reputation by the benefit which the emperor obtained, when, having been long under the care of Æmilius for arthritic pains, which had been unsuccessfully treated with warm applications, Musa ordered him cold affusions, and some other means equally contrary to his previous prescriptions. He prescribed a similar remedy also for Horace (*Epist.*, i. 15).

MUSA, a name given to a genus of plants having eatable fruit in tropical countries. They consist of herbaceous plants, having a gigantic simple stem, thickly clothed with the sheathing petioles of long, broad, horizontal leaves, which form a tuft, like that of some palm, on the apex of the stem. These leaves are of a firm but thin texture, and are undivided; but having simple veins running directly from the margin towards the midrib, and presenting a broad surface to the wind, they are always torn into broad strap-like divisions, which give them a compound appearance. From the midst of these leaves proceeds the inflorescence, consisting of a compound spike of great size, each of whose divisions is enclosed in a large bract or spathe, loaded with male flowers at its base, but bearing females or hermaphrodites at the upper end. The perianth consists of six superior divisions, five of which are grown together into a tube, slit at the back, while the sixth is small and concave. There are six stamens, one or more of which are imperfect. The ovary is inferior, 3-celled, with a double row of numerous ovules in each cell; the style is short; the stigma is funnel-shaped, and obscurely 6-lobed. The fruit is an oblong fleshy body, obscurely 3-5-cornered, containing numerous seeds buried in pulp. The latter are roundish, the size of a pea, flattened, with a hard brittle shell, which is indented at the hilum.

This genus is one of the most important of those found in tropical countries, to which the species are confined in a wild state. The *M. Sapientum*, or *Plantain*, of which the *Banana*, or *M. Paradisiaca*, is a slight variety, has a fruit used to a prodigious extent by the inhabitants of the torrid zone; and, from its nutritious qualities and general use, it may, whether used in a raw or dressed form, be regarded rather as a necessary article of food than as an occasional luxury. In equinoctial Asia and America, in tropical Africa, in the islands of the Atlantic and Pacific oceans, wherever the mean heat of the year exceeds 24 centigrade degrees (75° Fahrenheit), the plantain is one of the most interesting objects of cultivation for the subsistence of man. Three dozen fruits will maintain a person, instead of bread, for a week, and appears better suited to him in warm countries than that kind of food. Indeed the plantain is often the whole support of an Indian family. The fruit is produced from among the immense leaves in bunches,

Musa Sapientum.

weighing 30, 60, and 80 lbs., of various colours, and of great diversity of form. It usually is long and narrow, of a pale-yellow or dark-red colour, with a yellow farinaceous flesh. But in form it varies to oblong and nearly spherical; and in colour it offers all the shades and variations of tints that the combination of yellow and red, in different proportions, can produce. Some sorts are said always to be of a bright green colour. In general, the character of the fruit to an European palate is that of mild insipidity; some sorts are even so coarse as not to be edible without preparation. The greater number however are used in their raw state, and some varieties acquire by cultivation a very exquisite flavour, even surpassing the finest pear. In the better sorts the flesh has the colour of the finest yellow butter, is of a delicate taste, and melts in the mouth like marmalade. To point out all the kinds that are cultivated in the East Indies alone would be as difficult as to describe the varieties of apples and pears in Europe, for the names vary according to the form, size, taste, and colour of the fruits: sixteen principal kinds are described at length by Rumphius from which all the others seem to have diverged. Of these the worst are, *Pisang Swangi*, *P. Tando*, and *P. Gabba-Gabba;* and the best are the round, soft, yellowish sorts, called *P. Medji* and *P. Radja*. Some cultivators at Batavia boast of having eighty sorts. Rheede distinguishes fourteen varieties by name, as natives of Malabar. In Sumatra alone twenty varieties are cultivated, among which the *Pisang Amas*, or small yellow plantain, is esteemed the most delicate, and next to that the *P. Raja*, *P Dingen*, and *P. Kallé*. In the West Indies, plantains appear to be even more extensively employed than in the Eastern world. The modes of eating them are various. The best sorts are served up raw at table, as in the East Indies, and have been compared for flavour to an excellent reinette apple after its sweetness has been condensed by keeping through the winter. Sometimes they are baked in their skins, and then they taste like the best stewed pears of Europe. They are also the principal ingredient in a variety of dishes, particularly in one called mantégue, which is made of slices of them fried in butter and powdered over with fine sugar. Of the many cultivated sorts, that called by the French *La Banane musquée* is considered the best; it is less than the others, but has a more delicate flavour. There are uncoloured figures of the plantain fruit in Rheede's 'Hortus Malabaricus,' vol. i., plates 12, 13, and 14; and coloured ones in Tussac's 'Flore des Antilles,' plates 1 and 2. All hot climates seem equally congenial to the growth of this plant: in Cuba it is even cultivated in situations where the thermometer descends to seven centesimal degrees (45° Fahrenheit), and sometimes nearly to the freezing point. There is a hardy variety called *Camburi*, which is grown with success at Malaga.

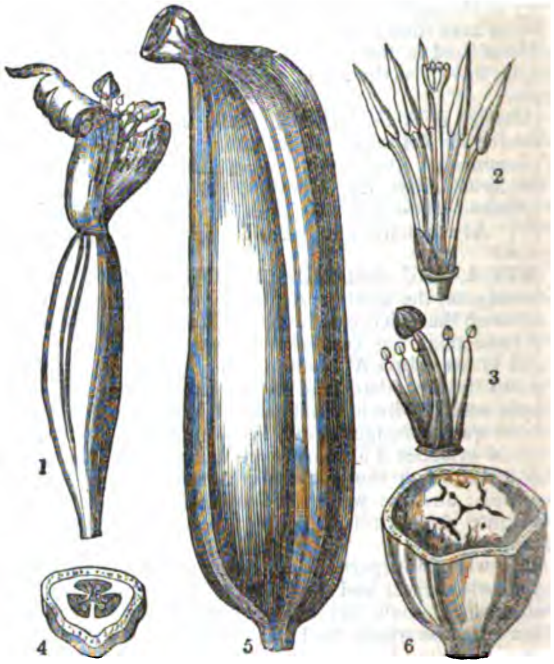
The plantain prefers a rich fat soil; for in sandy places, where it flowers abundantly, it produces no fruit.

In the climates that suit it, there is no plant more extensively useful, independently of its being an indispensable article of food. A tough fibre, capable of being made into thread of great fineness, is obtained from its stem; and the leaves, from their breadth and hardness, form an excellent material for the thatch of cottages. An intoxicating liquor is also made from the fruits when fermented, and the young shoots are eaten as a delicate vegetable.

The banana of hot countries is a mere variety of the plantain, distinguished by being dwarf, with a spotted stem and a more delicate fruit. Botanists call it *Musa paradisiaca*, in allusion to an old notion that it was the forbidden fruit of Scripture: it has also been supposed to be what was intended by the grapes, one bunch of which was borne upon a pole between two men, that the spies of Moses brought out of the Promised Land. The only argument of any importance in support of the latter opinion is, that there is no other fruit to which the weight of the fruit of Scripture will apply.

All the genus is Asiatic; the wild plantain is found in the forests of Chittagong, where it blossoms during the rains; *Musa coccinea*, a dwarf sort, with a stem not more than three or four feet high, is found in China; *M. ornata* and *superba* inhabit the forests of Bengal; *M. glauca* is from Pegu; *M. textilis* is from the Philippines, where it furnishes the valuable thread called *Manilla hemp*. There is also in the gardens of England a plant called *M. Cavendishii*, not above three feet high, and fruiting abundantly at that size, the origin of which is said to be the Isle of France.

MUSA'CEÆ are a natural order of Endogens, of which the last genus is the representative. They are generally stately and always beautiful herbaceous plants with the aspect of a plantain, and with large bracts or spathes, which are usually coloured of some gay tint. The characteristic marks of the order are to have an inferior ovary, with very irregular and unsymmetrical flowers, whose sexual apparatus is not consolidated. It is chiefly by these distinctions that it is known from Amaryllidaceæ. In some the fruit is fleshy, as in the plantain; in others it is dry and capsular. Only four genera are known of this order; all consisting of species of striking beauty. The *Heliconias* are the principal American form, nearly all the others being found in the Old World; of these the species are conspicuous for their brilliantly coloured rigid boat-shaped bracts, sometimes yellow, sometimes scarlet, and even a mixture of both. The *Strelitzias* are Cape plants with rigid glucous leaves, and singularly irregular flowers of considerable size, coloured yellow and blue, or pure white. Finally, the *Ravanala* of Madagascar, *Urania speciosa*, a noble palm-like plant, is remarkable for the brilliant blue colour of the lacerated pulpy aril which envelopes the seeds; the latter are used for dyeing in Madagascar, but none of the order are of any important use to man, with the exception of the Musas themselves.



1, a flower, with its inferior ovary; 2, the sexual apparatus of a male flower; 3, ditto of a female flower; 4, a section of an ovary; 5, a ripe fruit; 6, the same cut through transversely.

MUSÆ'US. Two, if not more, Greek poets of this name are known. 1. The oldest of them lived in the mythic ages of Greece, and is said to have been by birth an Athenian, and the son, or at least the disciple, of Orpheus. Plato and Hermesionax, in a passage quoted by Athenæus (xiii. 597), state him to have been the son of Selene, or the moon. Diogenes Laërtius says that he was buried at Phalerum, and mentions his epitaph. His works, which are lost, have been quoted by Plato, Philostratus, Pausanias, Clemens Alexandrinus, and other antient writers: they consisted of religious hymns, a poem on the war of the giants, a theogony, a work on mysteries, and moral precepts to his son. A few scattered lines, gathered from the quotations of the above writers, were inserted by Henri Etienne in his collection of philosophical poetry. 2. Musæus, styled the Grammarian in the MSS., is the author of the very interesting Greek poem entitled 'Hero and Leander.' The age in which the author lived has been a subject of much dispute. Scaliger, against all probability, ascribed the poem to the Musæus of the mythic ages. The most general opinion is, that he lived in the lower ages of the Roman empire. Schrader, Schoell, and other critics suppose him to have lived in the fifth century of our æra, and to have been a contemporary of Nonnus, the author of the 'Dionysiaca.' (Schrader's *Preface* to his edition of Musæus, Leeuwarden, 1742.) The poem of 'Hero and Leander' was first discovered about the thirteenth century. It consists of 340 hexameter lines, which contain the whole account of the beginning of the loves of Leander and Hero, the daring of the former in swimming by night across the strait from Abydos to Sestos to visit his mistress, and the tragical end of both lovers. Ovid has treated the same subject in Latin verse in one of his Heroides, in which Hero writes to Leander to urge him to swim across the Hellespont, as formerly, although the winter had set in, and yet at the same time expresses her fears of his risking his life. The story appears to have been an old tradition of a real fact.

The poem of Musæus has been a favourite with scholars, and has been repeatedly published, commented on, and translated into various languages. Heinrich's edition, Hanover, 1793, and Schäfer's edition, Greek and Latin, Leipzig, 1825, which is an improved republication of Schrader's edition already mentioned, are among the best. The poem has been translated into Italian by Salvini, Pompei, and others; French by Marot, Gail, and Mollevant, Paris, 1805; English, with notes by Stapylton, in 1649, and again in 1797; and into German by Passow, Leipzig, 1810.

MUSÆUS, JOHANN KARL AUGUST, the admired author of the 'Volkmärchen der Deutschen,' or 'Popular Legends of Germany,' was born at Jena in 1735, in which university he studied theology with the intention of taking orders, but did not do so. His first literary production, which appeared in 1760, was his 'Grandison the Second,' a parody on Richardson's celebrated novel, at that period extravagantly admired in Germany. This satirical performance was so well received as to pass through several editions; yet, notwithstanding its success, several years elapsed before the author resumed his pen as a candidate for literary fame; for, in order to eke out his small salary as a professor at the gymnasium of Weimar, he took pupils into his own house, and had consequently little leisure for studious occupation. At length, after an interval of eighteen years, he published his 'Physiognomical Travels,' intended, if not as a satire upon Lavater's system, to correct by wholesome ridicule the extravagant abuse of it into which his countrymen had fallen. The success of this work induced him to throw off his incognito and avow himself the author; whereupon he became the literary idol of the day, and was for awhile an object of attraction to 'lion-hunting' visitors anxious to have a sight of the retired schoolmaster who had mystified them by his pleasantry. This sudden acquisition of celebrity and importance had no other effect upon Musæus than to encourage him to proceed. Accordingly, he forthwith set about his 'Volksmärchen,' which were actually what they professed to be, for he is said, while composing them, to have collected all the stories of the kind he could, from old women at their spinning-wheels, and even from children in the street. But if this circumstance in some measure deprives him of the merit of invention, the fascinating charm of narrative with which he dressed up such homely materials, the humour and naïveté which he imparted to them, were all his own. The success of these popular tales was complete, for they have become a classical and standard work of their kind, while a legion of original novels and romances, all favourites with the public for awhile, have now sunk into utter oblivion. His next production was that entitled 'Freund Heins Erscheinungen, in Holbeins Manier,' a kind of literary 'Dance of Death' (Freund Hein being a jocose appellation for that grim personage), where, in a series of moral and satirical sketches, he shows how many human projects and follies are suddenly cut short by the unwelcome yet inevitable visitor. Excepting a collection of novellettes and tales, entitled 'Straussfedern,' and another for the use of children, 'Freund Hein'. was his last work, for he himself had his summons from him about two years after, October 28, 1787.

In 1791 a collection of his posthumous pieces, to which was prefixed 'Some Traits of the Life of the Good Musæus,' was published by his pupil Augustus von Kotzebue. To the epithet so markedly bestowed upon him few have had a better claim than Musæus: a mild philosophy, of which his own life furnished a practical example, together with shrewd good sense and quiet humour, pervades all his writings.

MUSCA (the Fly), a constellation so called by Lacaille, being the Apis of Bayer. It is situated immediately below Crux, and between the latter and the South Pole.

Character.	No. in Catalogue of		Magnitude.
	Flamsteed.	Astron. Society.	
γ	1090	1441	4
α	1092	1453	4
β	1104	1471	4
δ	1119	1494	4

MUSCAT, or MUSKAT. [Arabia.]

MUSCHELKALK, a calcareous rock interposed in the midst of the new red-sandstone system, receives this name in Germany, and though it is not more carboniferous than some other limestones, yet it is much richer in organic remains than the average of the strata with which it is associated. This rock occupies a considerable space in the vicinity of the Harz, Schwarzwald, and Vosges Mountains, but is unknown in the British Isles, though several small bands of calcareous rock interlaminate the variegated clays of the red-sandstone system. Brown ('Lithæa Geognostica') presents the following synopsis of the strata in this formation, as it appears on the flanks of the Black Forest:—

Keuper formation.

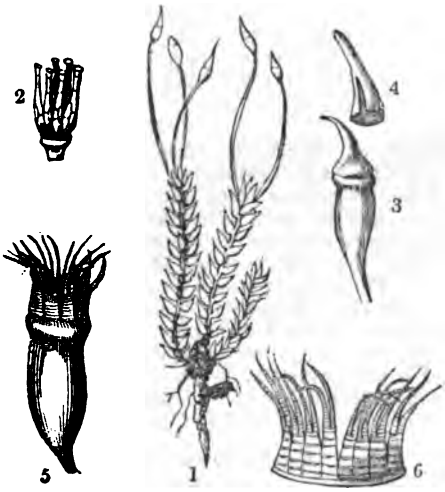
Muschelkalk.	Dolomite	Dolomite (Nagelfels, Malbstein).
	Limestone of Friedrichshall.	Pectinite limestone.
		Rogenstein (oolitic).
		Encrinitic limestone. Palinurenkalk. Encrinitic limestone.
	Anhydrite	Dark clay and anhydrite, with dolomite, swinestone, and rock-salt.
	Wellenkalk	Limestone and dolomitic marls, with gypsum and rock-salt.

Bunter Sandstein.

The fossil remains of the muschelkalk participate in the more common species of the Bunter sandstein below, and the Keuper above; but among the peculiar species may be reckoned Encrinus moniliformis and Ammonites (ceratites) nodosus. Saurian reptiles occur in this rock.

MUSCI, or MOSSES, constitute a group of cryptogamic or flowerless plants, of considerable extent and of great interest on account of their very singular structure. They are in all cases of small size, never exceeding a few inches in height, and though often of almost microscopical minuteness, are furnished with leaves arranged over a distinct axis of growth, and are propagated by means of reproductive apparatus of a peculiar nature. They have no trace of spiral or other vessels in their tissue, but are formed entirely of cellular tissue, in the stem lengthened into tubes. For long time they were thought to be destitute of a breathing apparatus, but the apertures through which this function is performed have at length been discovered by Treviranus and Unger, and especially by Mr. Valentine. (*Transactions of the Linnean Society*, vol. xviii., p. 239.) It is however remarkable that they should be confined to the organs of fructification, and not found on those of vegetation.

The organs of fructification are of two kinds; the most universal and most conspicuous is the urn (*sporangium*, or *theca*) in which the spores, or seed-like bodies, are generated. If the axils of the leaves of a moss are examined at the proper season of the year, there will be found in some of them clusters of articulated filaments swollen at the base, from among which some one will be larger than the remainder, and go on growing while they are arrested in their development. After awhile this body is found to have an exterior membranous coating, which separates from the base by a circular incision, but which otherwise adheres to the part beneath it. The latter, which is the young urn, gradually acquires a stalk, called the *seta*, upon which it is elevated above the leaves, carrying the outer membrane upwards on its point, so that when full grown it is covered by it as with a cap; then called a *calyptra*. The urn itself is closed by a lid, or *operculum*, and contains the spores arranged in a cavity surrounding a central column, or *columella*. Its rim is bordered by a double row of processes, often resembling jointed teeth, and called the peristome; one set of which appears to belong to the outer shell of the urn, and the other to the inner. Usually the urn grows from a fleshy tubercle called the *apophysis*, the station of which is in most cases at the base of the seta, but in Splanchnum forms a curious process at the apex of the seta, immediately below the urn

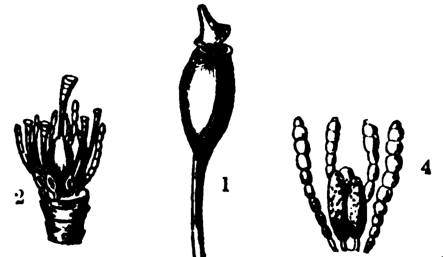


Fissidens Adiantoides.

1, an entire plant, much magnified; 2, a cluster of young urns; 3, an urn, full grown, with its calyptra, 4, removed; 5, the urn with the operculum fallen off; 6, a portion of the peristome.

In some mosses there occur organs of a second kind, by some supposed to be male, but whose use is really unknown, to which the name of *antheridia* or *staminidia* has been applied. These are also found clustered in the axils of leaves; they consist of membranous, cylindrical, jointed or jointless bodies, irregularly opening at the point, and discharging a mucous turbid fluid; they are surrounded by *paraphyses*, or jointed filaments, like the urns themselves.

When the spores of mosses germinate, they produce a jointed filament from any part of their surface, of which one part rises upwards, forming the beginning of a stem, while the other is directed downwards as a root; from the axils of the branches of the stem-filament the leaves are eventually developed.



Gymnostomum Ovatum.

1, a seta, bearing on the apex an urn, from which the operculum is rising, proceeding from an apophysis at the base, where it is surrounded by paraphyses; 2, a group of young urns, among which a few paraphyses are mixed; 3, a cluster of staminidia and paraphyses, surrounded by scale-like leaves; 4, three staminidia surrounded by four paraphyses; 5, a spore; 6, the same in the first stage of germination; 7, the same in a more advanced state.

The genera of mosses are principally characterised by peculiarities in the peristome, or by modifications of the calyptra, and of the position of the urn. Linnæus admitted very few genera, but modern muscologists have elevated the number to more than 120; concerning the goodness of which there is however some difference of opinion. In the most recent enumeration of the genera the old order Musci is broken up into three · of which **Andræaceæ** have an urn splitting into four valves; **Sphagnaceæ**, a valveless urn, a calyptra separating in the middle, and a toothed ring surrounding the peristome; **Bryaceæ**, a valveless urn, a calyptra separating at the base, and a ringless peristome.

Mosses are among the first plants that spring up on the surface of inorganic matter, at first appearing like a green stain, when they merely consist of germinating spores, but soon clothing themselves with leaves and then by their decay producing the earliest portion of decomposed vegetable matter with which the soil is fertilised. (Bridel, *Bryologia Universalis;* Hedwig, *Theoria Generationis, &c. Plantarum Cryptogamicarum;* Endlicher, *Genera Plantarum* Hooker and Taylor, *Muscologia Britannica.*)

MUSCICA'PIDÆ, *Flycatchers;* a family of insectivorous birds, so named from their mode of taking their prey. Thus, M. Temminck states, that the Flycatchers (*Gobe-mouches*) feed entirely on flies and other winged insects, which they catch as they fly (*Manuel d'Ornithologie*); and our countryman White says, 'There is one circumstance characteristic of this bird (the Spotted Flycatcher, *Muscicapa grisola*) which seems to have escaped observation; and that is, it takes its stand on the top of some stake or post, from whence it springs forth on its prey, catching a fly in the air, and hardly ever touching the ground, but returning still to the same stand for many times together.' (*Nat. Hist. of Selborne.*)

Linnæus, in his last edition of tho *Systema Naturæ*, places the genus *Muscicapa*, containing the true flycatchers, the *Tyrants* (*Muscicapa Tyrannus*), and several other species, to the amount of twenty-one, between the genera *Fringilla* and *Motacilla.*

Cuvier places the *Gobe-mouches* (*Muscicapa*, Linn.) between the *Pies Grièches* (Butcher-birds, *Lanius*, Linn.) and the *Cotingas* (*Ampelis*, Linn.).

He describes the group as having the bill depressed horizontally, and furnished with hairs or *vibrissæ* at its base, and its point more or less hooked and notched; and he makes the Flycatchers consist of the *Tyrants* (*Tyrannus*, Linn.); the *Moucheroles* (*Muscipeta*, Cuv.); the *Platyrhynques* or *Broad-bills;* certain species high on the legs and with a short tail (*Turdus auritus*, Gm.—*Conopophaga*, Vieillot); the *True Flycatchers* (*Muscicapa*, Cuv.); and other variations of form, principally in the bill, which becomes more slender in some, thus approximating to the *Figuiers*, and, in others, has the *arête* a little more elevated, whilst it is curved towards the point, thus leading to *Saxicola.* Cuvier finishes by observing that there are various genera or subgenera which come very near to certain links of the series of Flycatchers, though they much surpass those birds in size, such as the *Bald Tyrants* (*Gymnocephalus*, Geoff.), and *Cephalopterus* (Geoff.). [Coracina, vol. viii., pp. 4, 5.)

M. Temminck places his genus *Gobe-mouche* (*Muscicapa*, Linn.) between *Lanius* (Linn.) and *Turdus* (Linn.).

M. Vieillot places the *Myothères* or Flycatchers between the *Chélidons* (Swallows and Gootsuckers) and the *Collurions* (Butcher-birds).

Mr. Vigors, at the commencement of the section treating of the order *Dentirostres*, observes that the depressed bill and insect-food of the *Todidæ* introduce us at once to the *Muscicapidæ*, with which they are immediately connected by the genus *Platyrhynchus*, Desm. The species that compose the latter group were, he remarks, originally included in the genus *Todus*, and were separated from it only on account of the comparative strength of their legs. 'The whole of the *Muscicapidæ*, indeed,' continues Mr. Vigors, 'with which family *Platyrhynchus* is now united, have a decided affinity to the last tribe, or the birds which feed upon the wing, in their broad-based bills, the *vibrissæ* that surround them, and their similar habits of darting upon their prey while on the wing. Separated from them chiefly by the strength and more perfect structure of the leg and foot, they form the extreme of the succeeding tribe, in which they are numbered in consequence of these distinguishing characters. The line of affinity between the two tribes may thus be assumed as established.' Mr. Vigors then states that the families composing the order *Dentirostres* appear to succeed each other as follows:—*Muscicapidæ; Laniadæ; Merulidæ; Sylviadæ; Pipridæ.* These families are thus grouped by him in their typical disposition:—

Normal Group

Rostris fortioribus	*Laniadæ.* *Merulidæ.*

Aberrant Group.

Rostris debilioribus	*Sylviadæ.* *Pipridæ.* *Muscicapidæ*

He further remarks that the *Muscicapidæ* contain a multitude of species, diffused over every quarter of the globe, and differing in many points of generic distinction; but hitherto so ill-defined, and so unsatisfactorily grouped, that any attempt to trace them in detail through their affinities in their present confusion would be hopeless. They are all however, he adds, well united together by the essential characters which distinguish the type of the group—the notched, depressed, and angular bill, and the strong hairs or vibrissæ that surround its base. In these characters, as well as in their manners, they partially correspond with the *Laniadæ*, from the earlier families of which they chiefly differ in their inferior power and robustness. Mr. Vigors then enters among the *Laniadæ* by the genus *Tyrannus*, Cuv., which, in his opinion, unites them with the *Muscicapidæ*, in which family indeed that genus has generally been classed, and from which he would separate it, chiefly on account of the strength of the bill, wherein the character of a *Shrike* is more conspicuous than that of a *Flycatcher*.

M. Lesson makes the Muscicapidæ consist of the genera *Tyrannus, Monacha, Eurylaimus, Platyrhynchus, Todus, Myiagra, Muscicapa, Alectrurus, Drymophila, Formicivora, Rhipidura, Seisura, Psophodes*, and *Enicurus*.

Mr. Swainson (*Classification of Birds*) is of opinion that the Water-chats (*Fluvicolinæ*) seem to connect the Tyrant Shrikes with the Flycatching family, or *Muscicapidæ*, the most insectivorous of the *Dentirostres*; a group, he remarks, hardly less numerous than that of the Warblers, and composed, like them, almost entirely of small birds. Both families, he continues, are insectivorous, that is, habitual-devourers of insects; but very many of the warblers (even in the more typical genera) feed also upon fruits, of which the robin, the blackcap, and the whitethroat are notable examples. 'The Flycatchers however,' adds Mr. Swainson, 'properly so called, seem to be strictly and exclusively insectivorous, or, at least, it has not yet been ascertained that any of the species composing the typical group *Muscicapinæ* ever partake of fruits. This peculiarity of diet, independent of many others, separates them from the warblers on one side, and from the *Ampelidæ*, or Chatterers, on the other; while another is to be found in the mode or manner of their feeding. The warblers fly about, hunting down their prey, searching among trees, and roaming from place to place after their favourite food; hence they become ambulating flycatchers, and their feet are consequently large and strong in comparison to the size of their bodies. We need only look to the gold-crested and wood warblers as exemplifications of this remark, even among those species which frequent trees; but in such, as in the Stonechats, *Saxicolinæ*, and *Motacillinæ*, as habitually walk, the feet are much stronger and the shanks more lengthened. Now, the very reverse of this structure is the typical distinction of the Flycatchers; their legs are remarkably small and *weak*,—more so, perhaps, than those of any dentirostral birds,—showing at once that their feet are but little used; and such we find to be the case. The Flycatchers constitute the fissirostral type of form among the leading divisions of the *Dentirostres*, and they consequently exhibit all the chief indications of that primary type of nature, as it is exhibited in the feathered creation. These, as the intelligent ornithologist already knows, are manifested in a large and rather wide mouth and bill; short, feeble, and often imperfect feet; great powers of flight and often a considerable length of wing: the development of this latter structure is not always apparent, but it is the peculiar power of their flight upon which they chiefly depend for procuring subsistence. They are mostly sedentary, and only dart upon such insects as come within a sudden swoop, without attempting to pursue their game further, if unsuccessful in the first instance: they return, in fact, to the spot they left, or to another very near, and there await patiently until another insect passes within the proper distance. This habit of feeding at once explains the reason of the feet being so small and weak, by showing that they are merely used to support the body; or, at least, that they are not employed in constant exercise or exertion, as in the generality of other birds. Other characters accompany these, no less indicative of birds which feed exclusively upon the wing: the bill is always considerably depressed or flattened, particularly at its base; and the sides of the mouth are defended with stiff bristles, to confine the struggles of their prey.'

Mr. Swainson thinks that the primary divisions appear to be represented by the genera *Eurylaimus, Muscicapa, Fluvicola, Psaris*, and *Querula*, and these, according to his views, constitute the types of so many subfamilies, very unequal indeed, in their contents, yet blending sufficiently into each other to point out their circular succession. He considers the first two of these to be the typical and subtypical groups; and the three next to be aberrant.

The Prince of Musignano (*Geographical and Comparative List*) places the *Muscicapidæ* between the *Turdidæ* and the *Laniadæ;* and he makes the *Muscicapidæ* consist of the following subfamilies and genera.

a.

Muscicapinæ.

Genera:—*Setophaga*, Sw. *Tyrannula*, Sw. *Tyrannus*, Vieill. *Milvulus*, Sw. *Butalis*, Boie. *Muscicapa*, Linn. *Erythrosterna*, Bonap.

b.

Vireoninæ.

Genera:—*Icteria*, Vieill. *Vireo*, Vieill. *Vireosy* Bonap.

In considering this arrangement, the student should remember that it only applies to the birds of Europe and North America.

Mr. Swainson thus defines the family:—

Stature small. Bill considerably depressed its entire length, broad: the edge of the upper mandible folding over that of the lower; the tip abruptly bent and notched. Rictus wide, defended with strong rigid bristles pointing forwards. Feet almost always short (except in the rasorial types, where of course they are longer), small, and weak. Feed solely upon insects captured during flight. Habits sedentary.

Subfamily *Querulinæ*.

Bill strong, broad, much depressed; gape wide. Rictus with strong bristles. Feet short, resembling those of the typical *Ampelinæ*. Lateral scales minute. (Sw.)

Mr. Swainson is of opinion that the genus *Querula* is the type of this family, and he observes that by some of the Linnean writers this remarkable bird is classed as a *Muscicapa;* while by others, even among the moderns, it is considered an *Ampelis;* and he thinks that both of these opinions may be reconciled, by viewing it—as it stands in his arrangement—as the connecting link between these families. He remarks that all the other Flycatchers, according to his system, so far as we yet know, feed entirely upon insects; but there is unquestionable testimony that this species lives also upon fruits, thus uniting in itself the characteristic of the two families which it connects. In the bill, he adds, there is much of the form and strength of that of *Psaris*, but it is wide and more depressed; whilst the stiff bristles at the rictus betray its insectivorous habit: the feet are remarkably short for the size of the bird, and are calculated only, like those of the *Ampelidæ*, for perching. All these characters, in the opinion of Mr Swainson, not only point out this genus as the fissirostral type, but perfect the union of the families of *Muscicapidæ* and *Ampelidæ*.

Genera.

Querula, Vieill. and *Lathria*, Sw. Of these we select the former as an example.

Generic Character.—Bill large, broad, and strong. Gonys long and straight. Nostrils concealed by incumbent reflected feathers. Wings long and broad, fourth quill longest. Toes unequal; inner toe shortest, of equal length with the hind toe. Tail even.

Example, *Querula rubricollis, The Common Piahau.*

Description.—Black with a purple throat. It is the *Muscicapa rubricollis* of Gmelin.

Locality and Habits.—America, where they go in troops in the woods in pursuit of insects.

Querula Rubricollis.

Psarianæ.

Bill large, thick, subcylindrical. Culmen convex, and without any ridge; the tip abruptly bent and notched. Head large, depressed. Mouth very wide. Feet weak: lateral toes unequal; interior scales of the tarsi transverse; lateral scales small, numerous. Wings long.

Psaris Cayanensis.

Mr. Swainson (who gives the above as the characters of the subfamily to which, in his opinion, *Alectrura* immediately leads) states that in the *Psarianæ* there are but three ascertained genera. 'These birds,' says Mr. Swainson, 'like their representatives, *Monacha* and *Psarisoma*, depart considerably from the types of this family: the bill is less depressed than in any other of the flycatchers, and its structure is altogether stronger and thicker; they are all natives of Tropical America, and are generally found only in thick forests. *Gubernetes* is the genus by which they appear to be connected with the waterchats, through the medium of *Alectrura*. One species only is yet known, the *Gubernetes forficatus*, remarkable for its long forked tail: to this succeeds *Psaris*, where we find nearly all the species coloured alike; that is, they are more or less of a grey or pearl white, with black head, wings, and tail: they remind us immediately of the gulls, and this analogy is one of the most beautiful, when worked out, in the whole family. The smaller birds of the genus *Pachyrynchus* immediately follow. Two or three already prepare us for the next[*] division (*Querulinæ*), by the great depression of their bills, and the singularly formed red feathers on the throat.' (*Classification of Birds*, part iii.) In the *Synopsis* (part iv.) only two genera are given, *Psaris*, Cuv., and *Pachyrynchus*, Spix. Of these we select *Psaris* as an example.

Generic Character.—Bill large. The rictus smooth, often naked round the eye. Wings lengthened; the first quill equal to or longer than the fourth. Tail short, even. Inner toe shorter than the outer. (Sw.)

Example, *Psuris Cayanensis.*

Description.—Ash-coloured: head, wings, and tail black. This is the *Lanius Cayanensis cinereus* of Brisson; *Lanius Cayanus* of Linnæus and Gmelin; *Pie-grièche grise de Cayenne* of Buffon; *Cayenne Shrike* of Latham; and is the type of Cuvier's genus *Psaris.*

Locality and Habits.—South America. Cayenne particularly. Cuvier says that its manners are those of the *Shrikes.*

Fluvicolinæ.

Legs formed for walking. Tarsi lengthened, strong. Inhabit the sides of marshes and rivers in Tropical America *Seisura* alone is Australian. (Sw.)

Mr. Swainson states that the *Fluvicolinæ*, or waterchats, with the exception of one genus, whose situation is still somewhat doubtful, are entirely restricted to the warm latitudes of America, where they seem to represent the stonechats and the wagtails of the Old World. 'They are,' continues this author, 'strictly ambulating Flycatchers, and constitute the rasorial division of this family. The legs are consequently very long, and formed especially for walking; the toes are also long, quite divided to their base, and furnished with long and slightly curved claws. This structure enables these birds to run with great celerity; and they are generally seen on the sides of streams and rivers, feeding upon flying insects which resort to such situations; for they never hunt among trees, and rarely perch; such at least are the manners of the typical species; but there are of course various modifications of habit, corresponding to those, which will now be glanced at, in their structure.' Mr. Swainson exhibits some variation in his views as to this group in the third and fourth parts of the *Classification of Birds.* In the third part the first genus, with which he begins the series, is that of *Seisura*, differing only from *Rhipidura* by its more lengthened bill and feet: indeed he by no means feels satisfied that *Seisura* is naturally separated from *Rhipidura*, although, for the present, he adopts the group as proposed by Mr. Vigors and Dr. Horsfield. He nevertheless expresses his suspicion that *all* the genera of the *Fluvicolinæ* may prove to be natives of Tropical America, and that *Seisura* is only composed of aberrant species of *Rhipidura* which pass into the *Fluvicolinæ*. Both these divisions (*Seisura* and *Rhipidura*), as well as that of *Seicircus*, have broad fan-shaped tails, which, he observes, plainly indicate the type to which they belong, although the rank they respectively hold cannot, in our present state of knowledge, be clearly ascertained. 'Leaving this group,' says Mr. Swainson in continuation, 'we reach that of *Fluvicola*, by means of certain black and glossy birds of Brazil, some of which have distinct crests: these latter conduct us to the typical *Fluvicolæ*, having the legs unusually long, the bill depressed, the tail lengthened, and the plumage differently varied with white and black. One of the most characteristic of these singular birds is the *Fluvicola cursoria*, of the size of a lark; but some are nearly equal to a small thrush. *Perspicilla*, so called from the naked fleshy lobe which surrounds the eyes like spectacles, is the next genus this is succeeded by *Alectrura*, one of the most distinct and well defined groups in the whole circle of ornithology: the remarkable development of the tail-feathers in this group only finds a parallel in the genus *Vidua* among the finches and that of *Gallus* on the rasorial circle. Besides these genera, there are several black and white coloured birds having a general resemblance to the foregoing, which would seem to enter among the waterchats; yet, as we have not sufficiently analyzed the group, we must leave this point undetermined: among these are the white-headed tody of the old writers, which is either a *Tyrannula* or an aberrant *Fluvicola*, as well as the *Muscicapa leucocilla* of Hahn, which, in outward appearance, so much resembles a manakin, that it may possibly prove a *representative* of that family in the present circle.' In the fourth part the subfamily is made to consist of the following genera, arranged in the order here given .—

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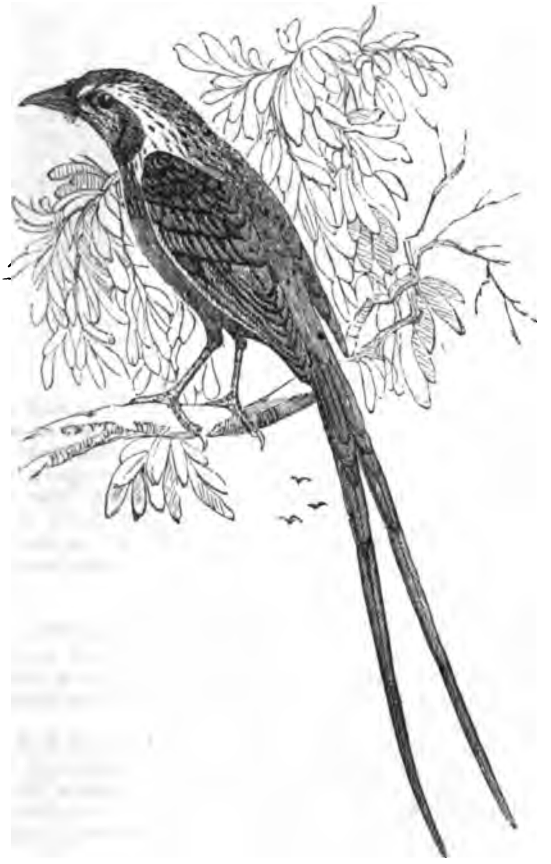
[*] In the third part of Mr. Swainson's 'Classification of Birds,' the subfamilies stand in the following order:—*Eurylaiminæ, Muscicapinæ, Fluvicolinæ Psarianæ, Querulinæ*. In the fourth part ('Synopsis')they are thus arranged:—*Querulinæ, Psarianæ, Fluvicolinæ, Muscicapinæ, Eurylaiminæ.*

Gubernetes, Vig. *Alectrurus*, Vieill. *Fluvicola*, Sw. (with its subgenus *Blechropus*, Sw. *Pepoaza*, D'Azar.). *Seisura*, Horsf. and Vig. *Perspicilla*, Sw. Of these we select *Gubernetes*.

Generic Character.—*Bill* thick, subdepressed, raised at the base, culmen rounded; upper mandible slightly notched at the apex; nostrils rounded; the rictus furnished with close-set rigid vibrissæ. *Wings* moderate; quills, from the 1st to the 5th nearly equal, the first the shortest, the second the longest; the external beards (pogoniis), except the beards of the first feather, notched in the middle; internal beards entire. *Feet* with moderate tarsi; the acrotarsia and paratarsia scutellated; soles reticulated with oval scales. *Tail* very long and forked. (Vig.)

Example, *Gubernetes Cunninghami*.

Description.—Ash-coloured, longitudinally lineated with brown, throat and rump white, lunulated pectoral band purplish-brown, wings and tail brownish-black; quills longitudinally banded with ferruginous.



Gubernetes Cunninghami. (Vig., *Zool. Journ.*)

Mr. Vigors, whose generic and specific descriptions we have given above, says that this bird, which he named after Colonel Cunningham of Rio Janeiro, appears to have a considerable affinity to the genus *Psaris* of Cuvier in the structure of its bill and wings, but that it differs from it by other such essential characters, as to have induced Mr. Vigors to place it in a separate genus. Besides the difference in the structure of the tail, an important character, he observes, in the group of the *Laniadæ*, which still retain some of the powers of flight belonging to the *Fissirostres*, he notes the following differences between the two forms. The rictal bristles of his bird are strong and numerous, while in Psaris they are scarcely perceptible. The *tarsi*. though somewhat weaker than those of *Psaris*, are in a slight degree weaker, while the toes are longer and stronger The lateral scales of the tarsi are square and far asunder, while in *Psaris* they are rounded and numerous. The hinder scales also are less rounded, less close, and less conspicuous than in the latter genus. (*Zool. Journ.*, vol. ii.)

Muscicapinæ.

Feet weak, formed only for perching, generally short (excepting in *Todus*), but always very slender, and often syndactyle. Bill more or less depressed. Gape with stiff bristles. Claws small, considerably curved. Lateral toes unequal. Inhabits warm and tropical latitudes, but excluded from North America. (Sw.)

This extensive subfamily contains the ordinary Flycatchers, the generality of which do not exceed the dimensions of *Muscicapa grisola*. Mr. Swainson remarks that the bill, although it is rarely so broad as in the *Eurylaiminæ*, is much more flattened, and the bristles at the gape are more developed. 'Their whole structure also,' continues Mr. Swainson, 'is more slight and delicate; but their colouring, although sometimes elegant, is almost devoid of vivid tints. The different form and length of the bill and feet furnish the characters by which the genera and subgenera are distinguished; while the species, which are exceedingly numerous, with the exception of the genus *Todus*, are only found in the Old World. The typical genera are *Todus* and *Muscicapa;* the aberrant are *Megalophus*, *Monacha*, and *Rhipidura:* the two first are so numerous in species as to contain subgenera.' Mr. Swainson then enters into a lengthened notice of the different genera and subgenera; exhibits the circle of *Todus*, which he considers to be complete with that of *Muscicapa;* and gives the following as a table, showing the comparison of *Todus* with the orders of birds, and the tribes of the *Perchers*.

Subgenera of TODUS.	Genus TODUS. Analogies.	Tribes of Perchers.	Orders of Birds.
Todus.	Bill lengthened, conic, slightly notched.	CONIROSTRES.	INSESSORES.
Platyrhynchus.	Bill short; tip abruptly hooked; notch or tooth very distinct.	DENTIROSTRES.	RAPTORES.
Conopophaga.	Feet syndactyle; head large.	FISSIROSTRES.	NATATORES.
Platystera.	Bill slender.	TENUIROSTRES.	GRALLATORES.
Lepturus.	Feet large; toes cleft; wings short; tail long.	SCANSORES	RASORES.

This illustration Mr. Swainson considers to be perfect. (*Classification of Birds*, part iii.)

The genera and subgenera of the *Muscicapinæ* are, in the fourth part of the work last quoted, placed in the following order:—

Rhipidura, Horsf. and Vig.; *Monacha*, Horsf. and Vig.; *Megalophus*, Sw.; *Todus*, Auct. (with the following subgenera:—*Conopophaga*, Vieill.; *Platyrhynchus*, Desm.; *Todus*, Linn.; *Lepturus*, Sw.; *Platystera*, Jard. and Selby); *Muscicapa*, Linn. (with the following subgenera:—*Cryptolopha*,* Sw.; *Muscipeta*, Cuv.; *Myiagra*, Horsf. and Vig.; *Muscicapa*, Linn.; and *Hyliota*, Sw.).

Our limits will not permit more than a selection of some of these forms, and we must confine ourselves in this article to an attempt to illustrate those of *Rhipidura*, *Todus*, and *Muscicapa*.

Rhipidura.

Generic Character.—Bill short, depressed, broad at the base, compressed at the apex, the culmen arched; upper mandible notched at the apex; *nostrils* basal, oval, nearly covered with bristles and plumules; *rictus* furnished with close-set bristles, generally exceeding the mandibles in length. *Wings* moderate, subacuminate; the first quill shortest, the second longer by twice, the third and fourth (which last is the longest) gradually longer. *Tail* elongated, patulous, rounded at the tip. *Feet* moderate, slender; the *acrotarsia* and *paratarsia* entire. (Vig. and Horsf.)

Example, *Rhipidura flabellifera*.

Description.—Brown-black; superciliary and postocular spot, throat, points of the wing-coverts, and stems and tips of the tail-feathers white; abdomen inclining to ferruginous. (V. and H.) This is the *Muscicapa flabellifera* of Gmelin; the *Fan-tailed Flycatcher* of Latham.

Mr. Vigors and Dr. Horsfield remark that the figure of this species given by Dr. Latham has much more white on the lateral tail-feathers than the bird described by them, but they add that the Dr. affirms that the species is subject to much variation.

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* Substituted for *Seicircus*.

Habits.—Mr. Caley, speaking of this species under the name of *Fan-tail*, says, 'There is something singular in the habits of this bird. It frequents the small trees and bushes, from whence it suddenly darts at its prey, spreading out its tail like a fan, and, to appearance, turning over like a *tumbler Pigeon*, and then immediately returning to the same twig or bough from whence it sprung. These actions it continues constantly to repeat. The skin is very tender; and it is difficult, after having taken it off the body, to restore it again to its proper shape.'

Localities.—Australia. Mr. Caley says that the species is very common about Paramatta, and he does not recollect having missed it at any period of the year. Gmelin, quoting Forster, gives New Zealand as the habitat.

Rhipidura flabellifera.

Todus.

Generic Character.—Bill lengthened, broad throughout, contracting suddenly at the tip, very flat. Bristles short, weak, or none. Tail short, very slender, rounded. Legs long, weak. Toes short; the outer more or less united to the middle one. Tropical America only. (Sw.)

Example, *Todus viridis.*

Description.—Bright-green above, whitish beneath; throat scarlet; sides rosy; lower tail-coverts yellow. This species appears to be the *Rubecula viridis elegantissima, Green Sparrow*, or *Green Humming-bird* of Sloane (*Jam.*, vol. 2, p. 306; Ray, *Syn. Append.*, p. 187); *Todus viridis, pectore rubro, rostro recto* of Brown (*Jam.*, p. 476); *Todier de St. Domingue* of Buffon; the *Green Tody* of English authors.

Habits, Food, &c.—Sloane says of this specimen that the belly or stomach was pretty thick, and very well filled with *cimices* and small vermin of the like kind. It loves, he adds, melancholy places, and scarce will stir from any one till they take it. 'It is,' says Sloane in conclusion, 'one of the most beautiful small birds I ever saw.' Browne states that it is a very familiar and beautiful bird, and will often let a man come within a few feet, and look for minutes together at it, before it moves. 'It keeps,' he adds, 'much about houses in the country parts, flies very slow, and probably may be easily tamed.'

M. Lesson, who places the genus with doubt between *Platyrhynchus* and *Myiagra*, says that the birds composing the genus have the greatest approximations to the Kingfishers, near which, and in the syndactylous tribe, Cuvier has arranged them. M. Lesson is of opinion that they are united to the Kingfishers by his genus *Todiramphus*, though he at the same time observes that M. Temminck admits only one Tody, viz. *Todus viridis*, placing it near *Platyrhynchus* and before the *Moucherolles*, an opinion which appears to M. Lesson to be well founded. The Todies, he adds, are very small birds of America, living upon insects which they catch in the mud or in the water. 'They are,' says he, 'in truth, water *Moucherolles;* their wide and flattened bill, furnished with asperities, or teeth, permits them to sift the mud and retain their prey: they also seek for small insects under the moss and on the banks of small streams.'

The bird is placed by Mr. Vigors among the *Fissirostres.*

Locality.—The Antilles.

Todus viridis.*

Muscicapa. (*Butalis*, Boie.)

Generic Character.—*Bill* moderate, triangular, and not much dilated at the base, which is furnished with long and stiff hairs. *Nostrils* basal, lateral, ovoid, partially covered with hairs directed forwards. *Wings* rather pointed; first quill small and spurious, second rather shorter than the third and fourth, which are the longest. *Tail* rather short or moderate, even or slightly forked. *Feet* rather strong; tarsus and middle toe lengthened; inner toe almost as long as the outer toe.

Example, *Muscicapa grisola.*

Description.—All the upper parts ash-brown; forehead approaching to whitish; a longitudinal stripe of a deep brown on the head; throat and middle of the belly white, sides of the neck, breast and sides sprinkled with longitudinal stains of ash-brown.

This is the *Gobe-mouche proprement dit* of Buffon; *Gobe-mouche gris* of Temminck; *Fliegenfänger* and *Gefleckter Fliegenfänger* of the Germans; *Stoparola* of Aldrovandus and Ray; *y Gwybedog* of the antient British; *Spotted Flycatcher* and (provincial) *Beam-bird, Rafter, Post-bird*, &c., of the modern British.

Geographical Distribution, Food, Habits, Reproduction.—The Spotted Flycatcher, one of the latest of our summer visitants, rarely arrives in these islands before the latter part of May, when its insect food, which consists principally of flies and other dipterous insects, abounds. Its mode of capturing them is well described by White in the passage quoted at the commencement of this article. Temminck says that it rarely eats caterpillars and ants. Pennant states that it is very fond of cherries; but Mr. Selby says that he has not been able to verify this, and that he is inclined to believe that the Greater Pettychaps (*Sylvia hortensis*), a keen devourer of all the smaller fruits, has in most instances been mistaken for the present bird. The same author tells us that it is of rare occurrence in Scotland; Mr. Gould says that it is found throughout England and a portion of Scotland, wherever there exists a locality suitable to its economy. It quits us in September and October, having bred and brought up its young here. M. Temminck says that it is spread in Europe as far as Sweden, and that it is found in the temperate provinces of Russia; but that it is rare in Holland. Mr. Selby states that its summer or polar migration extends as far as Sweden and Norway. The Prince of Musignano (*Specchio Comparativo*) notes it as rare in the summer near Rome; and as found in Europe generally. (*Geographical and Comparative List.*) Mr. Gould says, 'The Spotted Flycatcher appears to enjoy a wide range over the continent of Europe, being generally dispersed from the border of the Arctic circle to its most southern boundary; and we have also frequently observed it among collections from India.' The nest, loosely constructed of moss, fibres, catkins of the hazel, or small twigs lined with straw and wool or hair and feathers, is often placed upon the jutting ends of beams and rafters in tool-houses, or other garden or farm buildings, whence its name of *Beam-bird.* The four or five eggs are greyish-white, with pale orange-brown spots. When the young are able to leave the nest, the parents lead them to some place where insects abound. There the young soon learn to capture their prey after the manner of the old birds.

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* The attitudes are taken from the figures in Mr. Swainson's second series of 'Zoological Illustrations,' as being the most characteristic known to us.

The sexes are alike in plumage. The young, for a short time after they begin to fly, have the feathers tipped with yellowish-white, which gives them a mottled appearance. The chirp of this Flycatcher, its only note, is weak.

Muscicapa Grisola (male).

Eurylaiminæ.

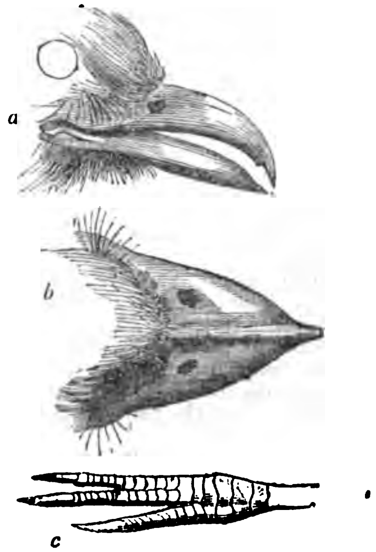
Size large. Structure powerful. Bill short, excessively broad; the upper mandible convex above, dilated at its base, and the margins folding over those of the upper mandible; the tip abruptly hooked. Wings rather short. Feet strong, moderate. The outer toe connected for half its length to the middle toe; hinder toe long; inner toe shortest.

Mr. Swainson, who gives this as the character of the sub-family, observes that the *Eurylaiminæ* are the most remarkable birds of the whole family; the species are very few, and their geographical limits seem to be restricted to the hottest parts of India, where they inhabit the forests. 'In size,' continues Mr. Swainson, 'they exceed all others, save the genus *Querula*, in this family, being about the size of starlings, while the enormous breadth of their bills and the peculiar brightness of their colouring render it impossible for the student to mistake them for any other genus. The bill is not only excessively broad, but the margins of the base are so dilated that they often project over those of the lower mandible, while its substance seems much more solid than in the ordinary Flycatchers. Although very few species have hitherto been discovered, it is quite clear that the five leading types have come to light, although only one example of the genera *Serilophus*, *Psarisoma*, and *Platystoma*, are yet known. It may here be observed that notwithstanding the great width of the bill in all these birds, it is nevertheless much more convex above, and in some instances is even more raised on the culmen than any of the others; the feet also and the whole structure of the body are more robust. Hence, although the width of the mouth and the great size of the head would indicate this to be the pre-eminent typical group, yet all the other characters would place it as the typical. *Serilophus* is evidently the rasorial or crested type; and it departs considerably from the others by the only species yet known being very fond of fruits; this is in conformity with the strong and remarkable analogy it shows, even in its outward appearance, to the wax-winged chatterers (*Bombycilla*).'

The genera given by Mr. Swainson in the 'Synopsis' are —*Eurylaimus*, Horsf.; *Cymbirhynchus*, Vig.; *Platystomus*, Sw. (both of which are placed by M. Lesson in his genus *Erolla*); *Psarisomus*, Sw.; and *Serilophus*, Sw. Mr. Swainson considers *Eurylaimus* to be the pre-eminent type; *Cymbirhynchus* the subtypical type; *Platystomus* the fissirostral type; and *Serilophus* the rasorial type; by which last and *Megalophus regius* he considers that the *Eurylaiminæ* and *Muscicapinæ* are united. Of these genera we select

Eurylaimus.

Generic Character.—Bill broader than the head; under mandible very thin, particularly at the base. Nostrils basal, transverse, oval; the aperture naked. First quill slightly, second almost imperceptibly graduated. Tail short, rounded.



a, bill of Eurylaimus Javanicus seen in profile; *b*, seen from above; *c*, anterior toes of the same, to show their relative connexion. (Horsfield.)

Example, *Eurylaimus Javanicus* (*Eurylaimus Horsfieldii*, Temm.).

Description.—Entire length eight inches. Head, sides of the neck, and the whole of the neck and body underneath violet, or rather vinous, varying in intensity. The part of the forehead around the bill nearly black. Upper part of the neck brown, darker towards the back, where the tint is sooty. Wings very deep blackish-brown above, more intense near the shoulder, and lighter towards the extremity. A yellow streak between the coverts and secondary quills. Wings beneath from the axillæ to the shoulder yellow, which borders the wing externally. Tail-coverts black at the base and yellow at the tips, so that the rump appears yellow, which is the colour at the vent. Two intermediate tail-feathers black, four next on each side black, with a white transverse band near the extremity. On the two external feathers the band is near the middle, and rather broader. Bill reddish-brown at the base, with both mandibles irregularly variegated, and striped towards the extremity; culmen yellowish; cutting-edges intensely black and shining. Tarsi and toes dusky yellowish; claws brown, inclining to black.

Geographical Distribution and Habits.—Dr. Horsfield is of opinion that from the observations of Sir Stamford

Raffles in the catalogue of a zoological collection made in the island of Sumatra under his direction, and communicated to the Linnean Society, we can also in some measure determine the range of this genus: 'It extends,' continues the Doctor, 'from Sumatra eastward to Singapura, and thence south to the eastern extremity of Java near the Straits of Baly, where I discovered it in the year 1806; since that period I have not met with it again. We are indebted to Sir Stamford Raffles for the following remarks on the first species:—'It frequents the banks of rivers and lakes, feeding on insects and worms. It builds its nest pendent from the branch of a tree or bush which overhangs the water.' I found it in Java, in one of the most distant and inaccessible parts covered with extensive forests and abounding with rivers and marshes.'

Eurylaimus Javanicus

Dr. Horsfield placed the genus among the *Meropidæ* or *Syndactylæ*.

MU'SCIDÆ, a family of Dipterous insects of the subsection Athericera. The insects of this family were for the most part included in the genus *Musca* by the older authors, and *Muscidæ* may be regarded as the typical group of the second great division of two-winged flies (the *Brachocera*), in which the antennæ are short and composed of only three joints, and the joints of the palpi are reduced to one or two.

In the most recent work on Dipterous insects* the section Brachocera is divided into three groups:—first, the *Hexachœtes*, in which the proboscis is composed of six setæ in the females; the palpi are ovate and elevated in the males, conical and decumbent in the females, and adhering to the base of the setæ; the third joint of the antennæ curved.

The second subdivision, *Tetrachœtes*, is thus characterised:—proboscis composed of four setæ; palpi generally adhering to the base of the setæ; third joint of the antennæ either curved or simple, with the stylet usually terminal; wings generally with four or five posterior cells.

In the third subdivision, *Dichœtes*, the proboscis has only two setæ, the palpi are generally placed on the base of the proboscis, and the stylet is situated on the upper surface of the third joint of the antennæ: the wings have usually but one submarginal cell; three posterior cells; the anal cell is usually short, and there are sometimes no transverse cells.

The subsection *Athericera*, which forms one of the subdivisions of the great group *Dichœtes*, is distinguished by the sucker being enclosed in the proboscis; the antennæ having the last joint usually patelliform. In the *Muscidæ* the proboscis is always very distinct and susceptible of being entirely retracted within the oral cavity; the sucker is composed of two pieces; the stylet of the antennæ is usually plumose to the apex; the body is short and tolerably broad; the eyes, in the male sex, are usually contiguous.

The genus *Musca*, as now restricted, contains such species as have the third joint of the antennæ twice or three times as large as the second; the first posterior cellule of the wings extends to the margin.

The common house-fly (*Musca domestica* of authors) affords a familiar example of this genus, and is too well known to require description. The larvæ, called maggots, live in putrid substances.

MUSCLE is an animal tissue composed of bundles of soft and usually reddish fibres, endowed with a peculiar power of contracting.

The muscles are divided into two classes; the voluntary and the involuntary. The former class, those over which the will exercises a direct control, are subservient to all the actions by which the animal is placed in active relation with the external world, as in all the motions of the limbs, of speech, of the eyes, ears, &c., and they are therefore often called the muscles of animal life; the latter class, comprehending those whose actions are connected with the internal and nutritive functions of the body, over which the will has no immediate or constant control, form the muscular system of organic life, as the heart, the muscular coat of the stomach, &c.

Each voluntary muscle is composed of a number of parallel or nearly parallel fleshy bundles, enclosed in coverings of cellular tissue, by which each is connected with and at the same time isolated from those adjacent to it. Each bundle is again divided into smaller fasciculi similarly ensheathed, and so on through an uncertain number of gradations till one arrives at the muscular fibre, the only definite and fixed form in the system, and the only part which possesses characters common to the muscles of all classes of animals The muscles being thus divided, each fibre or each fasciculus may be regarded as a separate contractile organ, which though usually acting in concert with those adjacent to it, is capable of independent contraction; and the power of a whole muscle will thus be equal to the sum of the powers of its separate fibres, and will bear a direct proportion to their number.

The voluntary muscular fibre is of a cylindrical or prismatic form; its diameter (taking the average of the results of several observations) is $\frac{1}{400}$ of an inch, and it varies in length in different muscles. Each fibre is enclosed in a sheath of extremely delicate cellular tissue, and is marked externally by transverse striæ, by which it is at once distinguished from the fibre peculiar to any other tissue.

The muscular fibre is hollow, and contains a small quantity of glutinous fluid and numerous very minute filaments. These filaments are delicate cylindrical threads, about $\frac{1}{1200}$ of an inch in diameter, and about 100 of them are arranged parallel to each other within the fibre.

In the involuntary muscles the fibres and fasciculi are not arranged in parallel lines, but form varied interlacements, crossing and appearing to anastomose with each other, so as to present only a trace of the general direction in which they act. The fasciculi are connected by less cellular tissue than those of the voluntary muscles. They are generally of a paler colour, and the fibres are not marked by transverse striæ, except those of the heart, on which they are faintly visible.

All the muscles receive large arteries and veins from the trunks passing near to them, whose branches run in the cellular interspaces between the fasciculi, and form at last an irregular network among the fibres. They receive also a large supply of nerves, probably more than any other organs in the body. Nearly one-half of the brain and spinal chord is for the supply of nerves through which the will may act upon the voluntary muscles, or through which their motions may be excited by other stimuli. The involuntary muscles are chiefly supplied from the ganglionic or sympathetic system of nerves. [NERVE.]

Chemically, the muscles are composed chiefly of fibrine. Those of animals, which form a large portion of our food, have been carefully analyzed by Berzelius and many others, who have found that the muscular tissue generally contains about 77 per cent. of water, the rest being composed of fleshy fibre or fibrine, a small quantity of fat and gelatine, albumen, and colouring matter, and a number of peculiar extracts, of which the chief are osmazome, on which the odour of meats depends, and zomidine, from which they acquire their peculiar flavour. The nutritive qualities of meat are, *cæteris paribus*, in direct proportion to the quantity of fibrine which it contains; and this may generally be judged of by the strength and ruddiness of the fibres: hence the more nutritious quality of the muscles of adult than of young animals and of those parts of animals which are most exercised; though for cooking it is necessary to avoid the toughness of fibre which usually coincides with great strength and a large quantity of fibrine.

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* 'Histoire Naturelle des Insectes—Diptères,' par M. Macquart, in the 'Suites à Buffon.'

The colour of the muscles is dependent partly on the blood which they contain, but chiefly on a peculiar colouring matter, very similar to that of the blood, which is fixed in their tissue. Their colour is distinctly though remotely connected with the quantity and condition of red blood in the system, and its depth is one of the best signs of robustness and full health. Thus in all quadrupeds and birds the muscles are more or less red, and the colour is deepest in the parts which are most actively employed, but pale and scarcely perceptible in those which have not been frequently exerted, and also in those animals which, by being closely stalled and stabled, are killed in a condition of great debility; hence the difference between red and white meats. In amphibia, which have less red blood than mammalia and birds, the muscles are usually pale: in fish, which have still less, they are, with the exception of the heart, and those which move the fins and are particularly exerted, quite white. There are however some exceptions, as the salmon and tunny. In animals of a still lower order, the muscles, though still preserving the same structure, are all quite white.

The peculiar vital power of the muscular tissue is its contractility; that is, the power which its fibres possess, when stimulated by the will or other means, of shortening themselves, and thus approximating the points to which their extremities are attached. When muscles contract, they become shorter, harder, and thicker, but their actual size remains the same, for what they lose in length they exactly gain in breadth and thickness. The fasciculi are also wrinkled or thrown into undulated lines, which are most visible when the contraction is least powerful and rather trembling, and the fibres vibrate so as to produce a distinct sound. The more powerful the contraction, the more rapid are the vibrations of the muscular fibres, the higher the note which they produce, and the greater the difficulty of perceiving them with the eye. The simplest method of observing the sound of muscular contraction is that which Dr. Wollaston pointed out ('Croonian Lecture,' 1809); when the tip of the thumb or of one of the fingers is put into the external ear, while some of the muscles of the former are in a state of contraction, a sound is heard like that of carriages running rapidly over a distant stone pavement. This sound is not heard when the same degree of pressure is applied to the same part by any other means than those in which muscular contraction is concerned. By rubbing a piece of stick over the notched edge of a board so as to produce a similar sound, and counting the number of notches whose edges were struck in a given time, Dr. Wollaston concluded that the number of vibrations of a contracted muscle is between twenty and thirty in a second. The sound thus produced has acquired great importance from its application in auscultation. It is the cause of the first sound of the heart [Heart], and as some modification in its tone and intensity must be produced by the morbid changes to which that organ is subject, it affords one of the indications for the diagnosis of its diseases.

The relaxation of a muscle presents phenomena exactly the converse of those of its contraction. The power by which the voluntary muscles are lengthened after having contracted is generally the extension to which, when they cease to act, they are subjected by some other muscles (their antagonists), whose action is the opposite of their own. The hollow involuntary muscles are usually extended after contraction by the accumulation of fluids or other substances forced into their cavities by some external power. It may be yet a question whether muscles have a vital and independent power of dilatation as well as of contraction, but on the whole the evidence is in favour of their possessing such a power, for the heart will contract and dilate when empty, if external stimuli are applied, and the hearts of reptiles when hung in the air will sometimes go on contracting and dilating till they are nearly dry and stiff. Were there no vital power of dilatation, it is difficult to conceive how the heart or any other muscle when separated from the body should, after having once contracted, be dilated so as to be able to contract again.

When muscles shorten however it is not always by an exercise of their peculiar vital contractility, but often by their elasticity, by which, like all the other tissues, they are always maintained in a certain degree of tension. Thus when a muscle is divided, its ends retract as well after death, or when its nerves are cut, as during life and health. It is by this power that muscles, after having been much extended, generally return to their natural size; thus when a muscle on one side of the joint of any limb shortens, it is evident that its antagonist on the opposite side must be lengthened in the same proportion, and when the contracting muscle ceases to act, the elasticity of the extended one (increased by the tension to which it has been subjected) will be alone sufficient in most cases to restore the limb to its position of rest.

The actual power with which a muscle contracts is in direct proportion to the number of its fibres and inversely as their length. Hence in all the muscles in which great strength is required, as in the chief muscles of the shoulder and hip, the fibres do not run straight from the general point of origin to that of insertion, but the whole mass of the muscle is divided into a number of small portions, in which a multitude of short fibres are attached to separate points within the muscle, so that they may act separately, or, when great exertion is necessary, altogether, and with far greater power than a smaller number of long straight fibres could. The strength of a muscle is very commonly increased by its fibres not running parallel to the line in which the muscle has to draw the part to which it is attached, but with various degrees of obliquity to that line. Thus in many muscles the fibres and fasciculi are attached obliquely to one or both sides of a tendon, as the fibres of a feather are attached to its shaft; by which arrangement, though each muscular fibre contracts in its own direction, the general result of their contraction and the direction in which the resistance will act upon them forms an oblique angle with their direction and much of the danger of their being ruptured is removed. There are indeed but few instances of rectilineal muscles in the body; in nearly all, the fibres are placed more or less obliquely to the line in which they have to draw the part to which they are attached; a plan by which, though individually they lose in active power, they gain in resistance, and by which a far greater number may in the the same space be brought to bear upon a given point.

An almost infinite variety of arrangement is found in the muscular fibres adapted to the especial purpose which each muscle has to fulfil, whether it be chiefly strength of action, or rapidity or extent of motion; and all are guided by the nicest mechanical rules. Wherever strength is more necessary than a wide extent of motion, the fibres are increased in number and placed obliquely to the direction of the resistance; wherever extent of motion is more needed than strength, the fibres are long and run almost straight from one point to the other, so as to give the full benefit of their contraction; where velocity is required, they are placed at a part of a lever close by the centre of motion, the resistance being placed on a part more distant from the centre. In general the absolute power exerted by a muscle in contracting is much less than its efficient power, a great part of its force being lost in its being inserted obliquely on the lever which it has to move, or in the distance of the resistance from the centre of motion, or in the resistance which other muscles and the adjacent tissues, which have to be extended, present, &c. But it is constantly found that where power is lost, a corresponding gain of velocity or extent of motion, or of convenience and compactness of form, and readiness of action, is obtained.

MUSCLE, or MUSSEL. [Mytilidæ.]

MUSES (*Musæ*, in Latin; Μοῦσαι, in Greek), the name of certain sister goddesses in the Greek mythology, who were supposed to preside over the arts of poetry and music, and the sciences of history and astronomy. The original conception of the Muses must be sought for in that disposition of the human mind which prompts us to embody abstract ideas in a sensuous form. Such seems likewise to have been the origin of the Graces, Fates, Furies, and other mythological personages of that class. [Graces.] In the instance of the Muses, the powers of memory, music, and song were personified into individual goddesses, who were supposed to inspire men with these gifts. At first the Muses were said to be only three: Mneme, that is, 'memory;' Melete, or 'meditation;' and Aoide, or 'song;' and they resided of old on Mount Helicon in Bœotia. (Pausanias, ix. 29.) According to the poet Alcman, they were the daughters of Uranus and Gæa, or the earth. Cicero (*De Natura Deorum*, iii. 21) mentions four, namely, Thelxinoe, 'mind-soother; Arche, or 'beginning;' Aoide; and Melete; and he says that they were the offspring of the second Jupiter. [Jupi-

TER.] He goes on to say that there were other Muses, nine in number, born of the third Jupiter (the son of Saturn) and of Mnemosyne; and also a third family of Muses, called Pierides by the poets, who were the daughters of the third Jupiter and Antiope, and were similar in their names and equal in number to the preceding. Hesiod, in his 'Theogony' (53), reckons nine Muses, daughters of Zeus and Mnemosyne, and gives their names as follows:—Calliope, Clio, Melpomene, Thalia, Euterpe, Terpsichore, Erato, Polyhymnia, and Urania, and he says that Pieria in Macedonia was their first dwelling-place. These are the Muses generally alluded to by the poets. It appears that the worship of the Muses was introduced from Macedonia into Bœotia, Phocis, and other parts of Hellas. The story of the contest of the Muses with the nine daughters of Pierus, a Macedonian, who pretended to rival the Muses in singing, but were vanquished and changed into magpies (Ovidius, *Metamorph.*, v.) may have been, as some critics have conjectured, an allegory originating in the national vanity of the Greeks, to show their superiority in the arts and sciences over their Macedonian neighbours. The Thracian bard Thamyris tried a like chance, with a like result· he had his eyes put out and was deprived of his lyre.

Homer mentions the Muses as the goddesses of song, who inhabited lofty Olympus, but he does not specify their number or names. In the second book of the Iliad he invokes them, 'to whom all things are known,' to assist his memory while he is enumerating the leaders of the Greek forces at Troy. The occupations of the Muses were singing, dancing, and attending the banquets of the Gods. They were the attendants of Apollo and also of Bacchus. The name Musa is supposed by some to be derived from a Greek verb which means 'to discover,' because the Muses were said to be acquainted with recondite mysteries and future events; but this etymology is mere trifling, and the origin of the name is unknown. They were represented as handsome and modest virgins, dressed in long tunics, with wreaths of laurel, ivy, or palm leaves on their heads. It was only in later ages that peculiar attributes were given to each of them by the artists, and a peculiar department of science was assigned to each by the poets. In several paintings of Herculaneum they are represented with their respective attributes, and with their respective names written under each. By comparing these with several rilievos, medals, and mosaics, their identity becomes confirmed. (Millin, *Galérie Mythologique*, plates 19 to 23, and explanation thereof.) The following is a list of them, with the allegorical meaning of their names:—

Clio, from *cleio*, 'to celebrate glorious deeds,' is represented with a scroll in her hand, and also sometimes with a 'scrinium' to keep MSS. in, by her side. She has been styled the Muse of History.

Calliope, 'fine voice,' is represented with tablets and a style; sometimes with a trumpet in her hand; in some instances, as at Herculaneum, with a scroll like Clio. She was the Epic Muse.

Melpomene, 'the singer,' wears a royal diadem round her head, and a wreath of vine leaves, with cothurni on her feet; a mask in one hand, and a club in the other. She was the Muse of Tragedy.

Thalia, 'the joyous,' the Muse of Comedy, is also crowned with vine leaves, has a crook in one hand and a grotesque mask in the other.

Euterpe, 'the pleasing,' carries a double flute. She presided over music.

Terpsichore, 'dance-loving,' carried a lyre, and presided over lyric poetry and dance.

Erato, 'the lovely,' carries also a lyre. She was the Muse of elegy and amatory song.

Polyhymnia, 'of many songs,' is represented wrapped up in her cloak, and buried in meditation, with the fore-finger of her right hand across her mouth, in token of reserve and caution. She was the Muse of religious song, allegories, and mythical strains.

Urania, 'the heavenly,' has the globe and compasses in her hands, which are the emblems of her calling, astronomy.

The corruption which, in the course of ages, pervaded mythological symbols, did not spare the Muses, and accordingly we find their chastity denied by several writers. According to Apollodorus, Ovid, and others, Clio had Orpheus by Apollo, Euterpe had Rhesus by the Strymon, Calliope was the mother of the Sirens by Achelous, &c.

The favourite haunts of the Muses were, Mount Parnassus in Phocis, Helicon in Bœotia, Pierius, Pindus, and Olympus, in Thessaly, &c. The swan, the nightingale, and the grasshopper were sacred to them. The Roman poets called the Muses Camenæ, an Etruscan name—for it appears that the Etruscans had also their Muses (Micali)—and also Pierides.

(Creuzer, *Symbolik und Mythologie*; Petersen, *De Musarum Origine*, in Münter's *Miscellanea Hafniensia*; Hermannus, *De Musis fluvialibus*; Millin, *Galérie Mythologique*; Keightley's *Mythology of Antient Greece and Italy*.)

MUSE'UM, a place dedicated to the Muses, from the Greek *Mouseion* (Μουσεῖον); hence any place where learning is pursued, or which is set apart as a repository for things that have some immediate relation to the arts, is so termed. The earliest institution we are acquainted with which received this appellation was the museum founded at Alexandria by Ptolemy Philadelphus. The buildings of this institution were afterwards enlarged by the emperor Claudius. (Suet., *Claud.*, 42.)

MUSGRAVE, WILLIAM, born in 1657, in the county of Somerset, studied at Oxford, where he took his degree of M.D. In 1684 he became secretary to the Royal Society of London. In 1691 he fixed his residence at Exeter, where he practised as a physician, and where he died in 1721. Dr. Musgrave was a good scholar, and well versed in antiquity. He published—1, 'Geta Britannicus,' being the life of Geta by Capitolinus, with notes, to which he added a dissertation by way of commentary. 2, 'Julii Vitalis Epitaphium, cum Notis Criticis H. Dodwelli, et Commentario Guil. Musgrave.' This is a commentary on a Roman epitaph found near Bath. 3, 'De Aquilis Romanis Epistola.' 4, 'De Legionibus Epistola.' 5, 'Belgium Britannicum, in quo illius Limites, Fluvii, Urbes, Viæ Militares, Populus, Lingua, Dei, Monumenta, aliaque permulta clarius et uberius exponuntur,' 8vo., 1719. He wrote also several medical works.

MUSGRAVE, SAMUEL, M.D., the grandson of the above, also practised as a physician in Exeter, and died there in 1782. Besides a few works on medical subjects, he was the author of 'Exercitationes in Euripidem,' 8vo., Leyden, 1762; 'Animadversiones in Sophoclem,' 3 vols. 8vo., Oxford, 1800; and 'Two Dissertations—1, On the Mythology of the Greeks; 2, An Examination of Sir Isaac Newton's Objections to the Chronology of the Olympiads.' He also assisted in the edition of Euripides, 4 vols. 8vo., Oxford, 1778. Schweighaüser, in his edition of Appian, has cited many of Musgrave's emendations and conjectures on that author from the marginal notes in Musgrave's copy of Appian. Schweighaüser justly calls him a good Greek scholar and an acute critic.

MUSHROOM. The species of mushroom usually cultivated is the *Agaricus campestris*. In the order of fungi, which includes that plant, most species are poisonous, and fatal consequences have resulted from ignorance of the characters by which the wholesome mushroom is distinguished from such allied species as are liable to be mistaken for it. These characters have been already pointed out. [AGARICUS.] What remains to be noticed relates to cultivation.

Mushrooms are indigenous; they spring up abundantly in fields where cattle have been pastured, if the soil and temperature prove favourable for the development of the *spawn*, a term which is applied to the substance in which the reproductive principle is embodied, which presents to the naked eye the appearance of whitish mouldiness, and which is in reality the flocculent subterranean stem, while the mushroom itself is the fruit. In this state spawn may be kept for years if moisture be withheld; but if the latter be supplied, in conjunction with a proper degree of temperature, it is further developed into white filaments and tubercles, which ultimately rise above the soil in the form of mushrooms. These spring up sometimes singly, but frequently in a gregarious manner.

Mushrooms appear in the fields chiefly after Midsummer, in the months of July, August, and most abundantly in September. On a ten years' average the temperature of these months respectively in the neighbourhood of London has been found to be 64°, 62°, and 57°; and in the same periods the temperature of the earth one foot below the surface is a few degrees higher; but at the depth of two or three inches, where the vegetating spawn is situated, the temperature in hot sunny weather is frequently as high as 80°. Whilst such hot weather continues, mushrooms are rarely met with; but when the atmosphere changes to a humid state, and when the earth becomes sufficiently moistened and lowered in temperature, in consequence of rain and absence of sun-heat, to between 60° and 65°, mushrooms become plentiful. Hence it may be concluded that spawn will not be injured by a heat of 80° during what may be termed its underground state of progression. This is corroborated by the fact that spawn introduced into melon-frames when the beds are moulded, increases whilst the melons are grown in a heat of about 80°, and when the melon crop is over, the frame cleared, and the heat of the bed naturally abated, a gentle watering, with shade, is all that is necessary to bring up an excellent crop of mushrooms from the spawn so deposited. It is evident from what has been stated that the spawn requires a high temperature for its diffusion; but when this has taken place a declining temperature is requisite, till gradually the bottom heat is lowered to 60° or 65°, and the temperature of the air limited between 55° and 65°, when the production first appears above the soil.

With regard to moisture it may be observed that a dry atmosphere is injurious, not only to artificial crops, but also to those in the fields; for the latter warm foggy mornings are most favourable, and these should be imitated as closely in cultivation as circumstances will permit. A gentle steam is more easily maintained in mushroom-houses than in structures adapted for other subjects of cultivation where light is an object of importance; but mushrooms do not require its agency, and consequently a glass roof is unnecessary: on the contrary, the roof and walls where they are intended to be grown should be composed of such substances as will cause the least possible condensation of the internal vapour, and which are in other respects eligible for the purpose.

A thatched roof of a good thickness is very proper; a slated or tiled one is on the contrary objectionable unless a ceiling be formed under it. If the cavity between the ceiling and the external covering were filled with dry moss, a more complete protection would be formed against any sudden vicissitudes of cold and heat, an object of importance towards success either in the cold winter months or during the greatest heat of summer.

The materials of which beds for the growth of mushrooms are composed usually contain spawn; but as they may or may not happen to do so, it is necessary to be provided with some, in order that it may be introduced when the beds are in the best state for accelerating its development. Spawn may be purchased; or a small quantity having been procured about old melon-beds, horse-tracks under cover, dry places where cattle usually take shelter, or elsewhere, it may be propagated by incorporating to the consistency of mortar a quantity of horse-droppings, cow-dung, and loam; and if the last be taken from places where mushrooms have been grown, so much the better. This composition, or in fact any one of a similar kind that may be equally adapted for a matrix wherein the spawn may extend itself, should be spread to the depth of three inches, and afterwards cut into cakes, or formed into small flat bricks with one or two holes in each, into which portions of the previously collected spawn are inserted. The bricks should be in a firm state when the spawn is introduced, but not dry. The whole should then be formed into a pile, not too compact, some spawny soil being sprinkled as the strata are being deposited, if such can be readily obtained, and a covering of hot dung applied. In a short time the spawn becomes diffused throughout the mass; and whenever this is found to be the case, the bricks must be uncovered and allowed to dry, for the purpose of arresting the progress of vegetation in the spawn till it is required for use.

Various compositions have been successfully employed in the formation of mushroom-beds. Horse-dung, chiefly fresh droppings, or with only some of the shortest litter intermixed, is however principally esteemed; and such should be collected when the horses are not on green food, but are being fed on corn, or on corn and hay. If the beds are intended to be formed of considerable thickness, which some prefer because they continue longer in a bearing state, then it is proper that the fresh dung should be mixed with some old hot-bed materials, or with light loam, in such proportion as will prevent a too violent fermentation. In all cases the composition should only possess sufficient moisture to induce fermentation. It may then be compactly deposited in any dark situation where the temperature and moderate moisture of the atmosphere can be rendered congenial, either in boxes that are moveable or in such as are fixed on purpose along the walls of a shed or mushroom-house, the construction of which may be that of any convenient form, provided its adaptation to the principles here mentioned be kept in view. The bed should not however be in immediate contact with the ground, unless under circumstances which may occasion the latter to possess a temperature of between 60° and 65°.

It is desirable that the materials should not ferment higher than 80°; when slowly on the decline from this temperature, the spawn should be introduced by inserting small pieces merely within the surface of the bed, through which it will soon become diffused; and whilst this is being effected, a covering of rich loam to the depth of two inches is spread over the bed, which, as well as the whole of the materials, should be rendered very compact.

Extremes of moisture and dryness are alike to be avoided. Waterings, when at all necessary, should be light; and it is particularly essential that the water should be of an equal temperature with the bed. A covering of hay and mats is very useful for preserving uniformity of temperature and moisture in the beds, especially in situations not adapted for having the regulation of these conditions fully at command.

As wooden shelves or boxes are soon rotted by the dung, brick arches have been in some cases substituted; but these occupy much space. Slate would be a better material, since it can be had of ample dimensions and of sufficient strength. The shelves may be of any convenient width; but in order to contain a sufficient depth of materials for producing the requisite degree of fermentation, the front ledge ought to be at least eight inches deep.

Objections have been made to the use of slate on account of its not absorbing moisture, whilst at the same time it occasions condensation. Moisture may indeed be observed to be very copiously deposited on slate, but this only takes place when the temperature of the slate is lower than that of the air in contact with it. Therefore in a mushroom-house properly regulated no condensation would take place, for as the materials of the beds are at least always as warm as the atmosphere of the house, and in generally more so, the slates in contact must be equally warm, and consequently not liable to the above objection.

MUSIC (*Musique*, Fr.; *Musica*, Lat.; **Μουσικη**, Gr., from *μοῦσα*, a *muse* or *song*) is the artistic union of inarticulate sounds and rhythm, exciting agreeable sensations, and raising mental images and emotions directly or indirectly pleasing. Such is pure unmixed music. When conjoined to poetry, it is an art not of diminished importance, but of a dependent nature, its office then being to enforce the meaning of the words and add a colouring to them. As an adjunct it is a beautiful illustration of language; combined with the sister art, it becomes a highly ornamented kind of eloquence. Hence it will be seen that we widely differ from one who has been looked up to as an unquestionable authority, from the celebrated Rousseau, whose well-known definition of music—'l'art de combiner des sons d'une manière agréable à l'oreille' (*the art of combining sounds in a manner agreeable to the ear*)—has been so generally received, and even adopted by those whose capacities and knowledge might have enabled them to take a much more enlarged view of the subject. One very learned Frenchman however has repudiated the degrading description given by his distinguished countryman: M. Villoteau stamps it with the epithets insignificant and vulgar, considering it absurd and puerile; for with as much propriety might oratory be be described as *the art of combining words in a manner agreeable to the ear*, or painting as *the art of combining colours in a manner agreeable to the eye*.

Music is a kind of language, and as such, says Metastasio, it possesses that advantage over poetry which a universal language has over a particular one; for this last speaks only to its own age and country; the other speaks to all ages and countries. James Harris, in his philosophical *Discourse on Music, Painting, and Poetry*, expresses the same opinion, even going to the length of asserting, that while a description in words has rarely any relation to the several ideas of which those words are the symbols, 'musical imitations are intelligible to all men.' Music is a language that speaks by imitating, and as such it is understood by those who have successfully studied the art, and likewise by mere amateurs, who, with little if any knowledge of its principles, have learnt the meaning of its expressions by long practice, by frequently hearing and enjoy ing its performance; but it can only express passion and sentiment very generally, and commonly fails when it attempts to particularise. This want of absolute decision in what is called musical language is by some writers reckoned among its advantages, because it gives the hearer great latitude in interpreting it, which he usually does in a manner as congenial as possible to his own feelings at the time. Madame de Staël goes so far as to prefer instrumental to vocal music, on account of the *vagueness* which she thinks one of the attributes of the former—that very same vagueness which Fontenelle meant to impute to it as an egregious fault, when, in a transport of impatience, he exclaimed, '*Sonate, que me veux tu?*' Burke's opinion however coincides with Madame de Staël's, if it did not actually prompt it. He says, 'the passions may be considerably operated upon, without presenting any image at all, by certain sounds adapted to that purpose, of which we have a sufficient proof in the acknowledged and powerful effects of instrumental music.' He however soon afterwards adds, that 'in reality a great clearness helps but little towards affecting the passions, as it is in some sort an enemy to all enthusiasm whatever.' This is rather startling as a general proposition: if we admit it as applied to vocal music, we must, *à fortiori*, allow that the finest compositions of that kind, which certainly leave nothing to the imagination of the hearer, exercise little if any influence over the passions. But being decidedly opposed to such an opinion, we must condemn it, though advanced by the eminent writer of the *Enquiry concerning the Sublime and Beautiful*, and supported by the distinguished author of *Allemagne*. No one has written in a more enthusiastic strain on the power of music in imitating than Rousseau. The reader of the article 'Imitation,' in his Dictionary, will find little difficulty in believing all that is said of Orpheus and Amphion, if he suffers himself to be convinced by the florid, declamatory, extravagant passage to which we allude. The writer of the first *Bridgewater Treatise*, Dr. Chalmers, has argued no less earnestly in favour of that musical language of which we are speaking. 'Music,' he says, 'apart from words, is powerfully fitted both to represent and awaken the mental processes, insomuch that, without the aid of spoken characters, many a story of deepest interest is most impressively told, many a noble or tender sentiment is most emphatically conveyed by it. . . . . . The power and expressiveness of music may well be regarded as a most beauteous adaptation of external nature to the moral constitution of man. . . . . . Its sweetest sounds are those of kind affection: its sublimest sounds are those most expressive of moral heroism, or most fitted to prompt the aspirations and resolves of exalted piety.' Fontenelle, on one side, and Rousseau, with Dr. Chalmers, on the other, are at the two extremes on this question: the one, from a deficiency of musical feeling, granting too little; the others, from an excess of it, admitting too much.

A musical sound,—which is a curious compound of other sounds, called harmonics, resulting from a number of vibrations in equal times,—when produced by a fine voice, a rich-toned violoncello, or a 'mellow horn,' excites in all who possess a moderate share of nervous sensibility, a pleasurable sensation; and this, Sir John Herschel observes, 'is perhaps the only instance of a sensation for whose pleasing impression a distinct and intelligible reason can be assigned.'

Dr. Beattie does not think it absurd to suppose that the body may be mechanically affected by sound. 'If,' he says, 'in a church one feels the floor and the pew tremble to certain tones of the organ; if one string vibrates of its own accord when another is sounded near it, of equal length, tension, and thickness; if a person speaks loud in the neighbourhood of a harpsichord, and often hears the strings of the instrument murmur in the same tone, we need not wonder that some of the finer fibres of the human frame should be put in a tremulous motion when they happen to be in unison with any notes proceeding from external objects.' Most persons must have witnessed the effect of a street-organ on some of the canine species, apparently willing auditors, who, if not driven away, continue to howl all the while the instrument is playing. Whether they are painfully affected, and their tones those of distress, or agreeably, and they become responsive, does not appear; though if distressed, the probability is that they would fly from the cause. But Dr. Mead tells us that a celebrated violinist of his acquaintance, perceiving that his dog betrayed symptoms of great suffering on hearing a certain passage performed, repeated it for some time, in order to try the result, and the experiment proved fatal to the poor animal, who 'dropped down at the feet of his master, where in a few seconds he died in the most horrid convulsions.' The surprising and hitherto unexplained connection between form and vibrations producing musical sounds, so beautifully shown in Chladni's experiments on plates of glass strewed with sand, and put into sonorous vibration, thereby throwing the sand into various symmetrical figures, may be here incidentally mentioned, though it does not now seem to shed any new light on the subject before us; nevertheless by proving something like sympathy, and of a much more extraordinary kind than that between two strings, in mere matter, it may at a future period lead to interesting discoveries.

The effect of Rhythm, or measure, is universally felt and admitted: the most polished inhabitants of Europe, and the most barbarous natives of the arctic regions, are alive to its influence; it is that which reduces unmeaning sounds to order, converts them into melody, and bestows on them proportion and a power to charm. The chirping, or whistling, or singing as it is called, of most birds, being devoid of rhythm, affords no pleasure but what is derived from association; while the single note of a drum beaten in time, combining sound and measure, is gratifying in a certain degree to every hearer. Indeed, with the antients rhythm was of paramount importance, if not almost everything, in what they denominated music, a term under which was included much that it does not imply in modern language. Aristides Quintilianus, the best of the seven Greek writers on music collected by Meibomius, remarks that rhythm is the object of three senses, namely, the sight, as in dancing; the hearing, as in music; and the touch, as in the pulsations of the arteries.

Much of the effect of music on the mind is ascribed to Imitation, which is either direct or indirect. And it must be understood that we are still speaking of music strictly instrumental, not vocal. The power of direct imitation is confined within very narrow limits indeed, though composers have often attempted to enlarge the boundaries, exposing their own weakness and that of their art. The song of some birds, the whistling of winds, the roaring of the tempest, the sound of cannon, the ringing and tolling of bells, and perhaps the tones of the human voice expressive of certain emotions, are legitimate objects of direct imitation; but the rattling of hail, the fall of snow, the motions of animals, actions at sea, battles on land, &c., are not only unrepresentable by any kind of musical instrument at present known, but unfit for imitation if instruments could be constructed for the express purpose. Greatly we admire the introduction to the oratorio of *The Creation*, considered as a most original and ingenious composition, but cannot bring ourselves to believe that any idea of *chaos* is to be excited by exquisite harmony. Still less can we be convinced that *silence* can be imitated by sound, though the author of this musical solecism (which appears in a symphony intended to be descriptive) is a man of rare talent, whose works are highly esteemed in England, and still more so where better known, in Germany, his native country. Music can imitate in a direct manner only by its actual resemblance to the sound of the thing imitated. Of all the powers of music, in the opinion of an admirable critic, the Rev. Thos. Twining, that of raising ideas by direct resemblance is the weakest and least important. 'It is indeed so far from being essential to the pleasure of the art, that unless used with great caution, judgment, and delicacy, it will destroy the pleasure by becoming offensive or ridiculous. The highest power of music, and that from which it derives its greatest efficacy, is undoubtedly its power of raising emotions.'

Professor Hutcheson, in the early part of the last century, expressed nearly the same opinion. What he adds concerning the imitation of the human voice and accents is entitled to particular attention. He says, 'There is a charm in music to various persons which is distinct from the harmony occasioned by its raising agreeable passions. The human voice is obviously varied by all the stronger passions: now, when our ear discerns any resemblance between the air of a tune, whether sung or played on an instrument, either in its time or modulation, or any other circumstance, and the sound of the human voice in any passion, we shall be touched by it in a very sensible manner, and have melancholy, joy, gravity, thoughtfulness, excited in us by a sort of sympathy or contagion.' (*Enquiry into our Ideas of Beauty, &c.*)

Plato, in the third book of his 'Republic,' speaks of a warlike air inspiring courage, because imitating the sounds and accents of the courageous man; and of a calm and sedate air producing tranquillity and gravity, on the same principle. This leads us to the consideration of indirect imitation, to which part of our subject it perhaps more properly belongs.

Indirect Imitation is that by which some quality common to music and the thing imitated is indicated by sounds, strong or weak, quick or slow. Rage is loud, anger is harsh, love and pity are gentle; therefore loud and harsh sounds raise ideas of the former passions and others of the same class; soft and tranquil sounds raise ideas of the latter and others of a similar character. Hence it will be seen, as before observed, that the hearer may interpret music in a manner corresponding in some degree to the state of mind in which it shall find him, but under certain restrictions from which he cannot be released. If agitated by any turbulent passion, he will find it impossible to convert smooth and delicate music into a language in unison with his irritated feelings; and if under the softening influence of some tender attachment, or of sorrow for the loss of one beloved or valued, he will be unable to construe bold and brilliant sounds as expressions of sympathy. But music that is not of a decided character will prove more or less convertible. And it is to this latter kind probably that Mr. Twining alludes, when, speaking of good instrumental music 'expressively' performed, he says, 'the very indecision of the expression, leaving the hearer to the free operation of his emotion upon his fancy, and, as it were, to the free choice of such ideas as are to him most adapted to react upon and heighten the emotion which occasioned them, produces a pleasure which nobody, I believe, who is able to feel it will deny to be one of the most delicious that music is capable of affording.' (*Dissertation on the word Imitative, &c.*)

It is proper to add that this very learned and able commentator on Aristotle considers the word *imitative* inapplicable to music, and proposes instead of it the term *suggestive*. This is perhaps an amendment in the case of what we have called 'indirect imitation;' but *direct imitation* does more than *suggest* the idea; it may be said, without any violent distortion of language, to represent it.

Association, which has so large a share in the operations of the human mind, often contributes much to the effect of music. Indeed some airs possessing no intrinsic merit owe their influence solely to this principle, and among these the famous *Rans des Vaches*, which, in times happily gone by, acted with such irresistible force on the expatriated Swiss soldier. It was many years after the battle of Culloden, and not till all fears of the Pretender had subsided, that the Scotch bagpipers ventured to play any of the Jacobite tunes, which, when revived, were heard with delight, though hardly one of them would have continued to be listened to but as connected with the history of the country. When Sir Joshua Reynolds was at Venice—we are told by Mr. Malone—'in compliment to the English gentlemen then residing there, the manager of the opera one night ordered the band to play an English ballad-tune. Happening to be the popular air which was played or sung in almost every street, just at the time of their leaving London, by suggesting to them that metropolis with all its connections and endearing circumstances, it immediately brought tears into the artist's eyes, as well as into those of his countrymen who were present.' To compositions of a very ordinary kind, association, Dr. Beattie remarks, gives a significancy. We have heard them,' he says, 'performed, some time or other, in an agreeable place perhaps, or by an agreeable person; or have heard them in our early years, a period of life which we seldom look back upon without pleasure. Nor is it necessary that such melodies or harmonies should have much intrinsic merit. . . . . If a song, or piece of music, should call up only a faint remembrance that we were happy the last time we heard it, nothing more would be needful to make us listen to it again with peculiar satisfaction.' To this latter part, however, we can only give our assent generally: painful experience has taught many that there is an exception to the rule. A composition which had been listened to with unalloyed pleasure when executed by one possessing all our tenderest and warmest affection, only excites the idea of lost, of irrecoverable happiness, if heard when death has deprived us of the performer who had imparted to the music its greatest charm. Except in this particular instance, we fully agree with the elegant author of *Essays on Poetry and Music*, in the preceding observations; though Boethius, in his treatise 'De Consolatione Philosophiæ,' and after him Dante, in his *Inferno*—both high authorities—express the opposite opinion, namely, that in distress and adversity the greatest misery is the recollection of former happiness. But the poetical notion of the Hindus regarding musical effect, which they strictly connect with past events, seems to us the finest that ever was conceived;—they say that it arises from our recalling to memory the airs of Paradise, heard in a state of pre-existence.

After all, however, that has been written and said, from the days of Aristotle down to the present period, of music as an imitative art, it must be conceded that modulated sounds please, by some mysterious means, many to whom they present no imitation of anything material or immaterial, and who associate with them no other idea than that of melody or of harmony. These are, probably, the persons whom Rousseau had in view when, mistaking the exception for the rule, it seems to have been his design, in one of his wayward moments, to reduce that which is at once an art and a science, to the low rank of a sensual gratification. But in justice to that eloquent writer, it should be added, that, in his *Essai sur l'Origine des Langues*, he at once demolishes his own definition—which, unfortunately, has been so widely circulated—by the interposition of a simple negative: e.g.—'La musique *n'est pas* l'art de combiner des sons d'une manière agréable à l'oreille.'

Thus far our attention has been directed to instrumental music, or that which is dependent on no auxiliary for effect, on no words to explain its meaning, on no gesticulation or scenery to illustrate it. We have now to consider music as produced by the human voice in alliance with language, whether poetical or prose, and with or without instrumental accompaniment.

Vocal music is entirely devoid of that ambiguity which some think a merit in instrumental music, and some consider a defect. Words fix the intention of musical sounds, leaving nothing for the hearer to conjecture; for though the more or less of truth in the expression will depend on the skill of the composer, yet he must be utterly destitute of reason to give to revenge the tones of love, or to joy those of despair. It is true that he does not always read with discriminating judgment the words selected by him, or committed to his charge—that in emphasis he is sometimes erroneous, and in accentuation frequently faulty; and for these failings in the artist, the art itself has been unjustly condemned by writers whose repute gives weight to their censure. But the heaviest charge brought against composers of vocal music, and that which has exposed them to the keenest ridicule, is their eagerness to express the literal meaning of a particular word rather than the sentiment, the sense of the entire passage. This exceedingly vulgar kind of imitation, which has not unaptly been called *musical punning*, may be traced to a gross misapprehension of the rule, that 'the sound should seem an echo to the sense,' and is the vice not only of composers of an inferior order, but, occasionally, of some of the highest class. The great Handel himself is not wholly exempt from its influence. In the fine chorus, 'Wretched lovers, quit your dream' (in *Acis and Galatea*), when the line 'Hark! how the thund'ring giant *roars*' occurs, he makes the bases roar in a long division, till they nearly gasp for breath. But this is a verb that proves very seductive to composers; in two of our best glees it sets the voice a-roaring through several bars:—in the one, because the poet (Ossian) asks, 'Who comes so dark from ocean's *roar*?' In the other, because the poet (Gray) says, 'The rocks and nodding groves rebellow to the *roar!*' Handel's favorite air, 'What passion cannot music raise and quell?' from Dryden's *Ode to St. Cecilia's Day*, sends the voice tumbling down a full octave at the words 'faces fell.' In the same work the singer is condemned to ascend to a note which few can reach, and none can sustain without lungs of very unusual capacity, merely because the author says, 'The trumpet shall be raised on *high*.' Our greatest English composer, Purcell, could not resist the temptation offered by the words 'They that go *down* to the sea in ships,' from the 107th Psalm, in setting which he commits the base voice to so very low a deep, that there was only one man in his day who could sing the anthem. 'Some eminent musicians,' Sir William Jones observes, 'have been absurd enough to think of imitating laughter and other noises; but if they had succeeded, they would not have made amends for their want of taste in attempting it; for such ridiculous imitations must necessarily destroy the spirit and dignity of the finest poems.' This discerning and elegant writer most likely points at the song and chorus, 'Haste thee, nymph,' in Handel's setting of Milton's *L'Allegro*, in which is the line, 'And Laughter holding both his sides.' The singers in this, it must be allowed, never baulk the intention of the composer, but affect to laugh almost convulsively. To carry out the design to its utmost extent, they should cast away their books, press their ribs firmly with both hands, and, by adding action to sound, complete the living picture. In another song by Handel, which was once very popular, in the oratorio of *Semele*, is a remarkable instance of a mistaken attempt at imitation. The words are—

'The morning lark to mine accords his note,
And tunes to my distress his warbling throat.'

These lines (foisted into Congreve's poem) are silly enough; but the composer has rendered them perfectly ludicrous, by one of those long-winded *divisions* which were the besetting sin of the age, on the word 'warbling.' In the midst of her distress, Semele and two fiddles—the latter representing the bird—strive who shall best mimic the soaring songster, till the lady is obliged to yield, from pure exhaustion. The mention of the lark has entrapped many a composer; the musical follies committed in his name are innumerable. Handel's song, 'Sweet Bird,' from *Il Penseroso*, always has been, and most likely always will be, admired as music, and it affords an opportunity for the display of talent in the singer and the flute-player, but it cannot stand the test of criticism. The same objection exists to this as to the air just noticed; the divisions are in themselves absurd, but as imitations are still more so. Surely the composer must have been aware that the note of the nightingale is the simplest that is practised by the feathered race, yet he has here given the melancholy bird sounds which, as regards variety, rapidity, and compass, only able performers can produce from a fine voice and a perfect instrument. Handel's supremacy in the art renders him especially liable to animadversion when misled by an erroneous conception of the words; but he has been charged with many supposed imitations which he never contemplated, such as the *whipping-chorus*, the *rocking-chorus*, &c. We have however said as much as is necessary on this part of our subject.

In the accompaniment to vocal music, much greater freedom of imitation is allowable than in the voice part: kept within those bounds which good sense and cultivated taste prescribe, it affords very efficient aid, by giving greater force to the poetry, and contributing to the completion of the general design. It also adds harmony to song, a most important, if not an indispensable support. Nearly all that imitation can do, should—as the elder Dr. Gregory, of Edinburgh, in some admirable remarks on music has observed—be assigned to the accompaniments, as these, on account of the greater compass and variety of instruments, are better adapted to such a purpose than the voice, which ought to be left at liberty to express the sentiments. If Handel has sometimes failed in imitations by the voice, he has often succeeded in those by the accompanying instruments. We need but refer in proof to his beautiful song in *Il Penseroso*—

'Oft on a plat of rising ground
I hear the far-off curfew sound,'—

where he has imitated the bell by the deep-toned strings of the bases, confining the voice to those notes of pleasing, contemplative melancholy, the idea of which the words so completely excite. The same skill and discrimination are shown in the song of Galatea, 'Hush! ye pretty warbling quire,' in which the flute imitates the birds, leaving the singer to express in simple sounds that languishing tenderness indicated by the poetry. Handel was the first who endeavoured to excite the idea of light through the agency of musical sounds: his chorus in the oratorio of *Samson*, 'O first created beam!' was written with this design; and moreover suggested to Haydn that grand composition on the same subject which is admitted to be one of his noblest triumphs. But the still bolder attempt of the former great master was to convey to the mind, through the same medium, a notion of darkness. With this view he composed the sublime chorus in *Israel in Egypt*, beginning, 'He sent a thick darkness over all the land,' the accompaniments to which, assisted by the words, produce on persons susceptible of musical impressions, all that solemnity of effect, not unmixed with awe, intended by the author.

Haydn, though sometimes ambitious of achieving by musical means more than the art can accomplish, was often most happy in indirect imitation by instrumental accompaniments; witness the magnificent burst of sound in the first chorus—to which we have just alluded—in *The Creation*, at the words, 'and there was light.' Witness also his musical picture, in the same oratorio, of the rising sun, the slow swell of the instruments in ascending notes describing the gradual progress of the luminary towards the horizon, and the full power of the band depicting its refulgent splendour. And how beautifully the composer contrasts with the solar blaze, the soft, serene beams of the comparatively small orb which reflects its borrowed light! Madame de Staël heard the first of these most masterly compositions performed at Vienna, 'in a manner,' she tells us, 'worthy of the great work,' and describes the sound of the combined voices and instruments as *a terrible noise!* She adds, that *at the appearance of light it was necessary to stop one's ears*. We forgive the bad taste for the sake of the wit. This generally sagacious and acute, and always brilliant, writer, is quite an Italian in her musical criticism: she says that the Germans 'put too much mind in their works; they reflect too much on what they are doing.' Of Mozart, whose illustrations of the poet are enumerated among his excellencies by most critics, Madame de Staël speaks in what we consider highly laudatory terms, but by which she means to express some degree of disapprobation. She thinks that 'of all musicians he has shown most skill in "marrying" the music to the words:' that in his operas, particularly *Don Giovanni*, he makes us sensible of all the effect of dramatic representation: that 'this ingenious alliance of the musician and poet gives us a sort of pleasure, but it is a pleasure which springs from *reflection*, and *that* does not belong to the wonderful sphere of the arts.' (*De l'Allemagne*.) The 'alliance' here complained of could not have been alleged as a fault in Rossini's earlier works, beautiful as some of them are in other respects; though the air 'La Calunnia,' the first finale in *Otello*, and two or three other things, offer as fine examples of what is meant by musical imitation as can be found. But in his 'second style'—the manner in which his later operas are written—he seems to have been *infected*, as Madame de Staël would have said, by German intellectuality. We know not if the highly-talented lady whose judgment in music we have ventured to impugn was acquainted with the compositions of Weber; if she ever heard his *Freischütz* or *Oberon*, he must have been placed by her very high on the list of those who damage and degrade music by rendering it expressive,—who, as Pope ironically says, in some lines complimentary to Handel,

'—— meanly borrow aid from sense.'

Music, which is both a science and an art, is divided into *Speculative* or theoretical, and *Practical*. Speculative Music explains the nature of musical sounds; shows, by demonstrating their ratios, how they are related to each other; and investigates their physical and moral effects when in a simple or in a combined state: it is, in few words, the philosophy of the art. Practical Music is the application of theoretical principles,—the proper conduct of sounds as to their progression, duration, union, and adaptation to words, voices, and instruments, and is the art of composition. The performer, who merely executes, stands in the same relation to music as the actor does to the drama, or the reciter to the poem: though he requires, in order to excel, considerable knowledge of the subject and superior taste, yet he is but an operator—a singer or a player, and not, strictly speaking, a musician.

Speculative Music is subdivided into Acoustical, Mathematical and Metaphysical. [Acoustics; Harmonics; Sound; Temperament.] Practical Music, into Vocal and Instrumental, the several kinds of which are noticed under their respective heads. The chief component parts of practical music are, Melody, Harmony, and Rhythm, to which we refer. See likewise Accent, Air, Chord, Composition, Counterpoint, Modulation, Thorough-Base, Time, &c.

MUSIC, HISTORY OF The origin of music is involved in an obscurity which no ingenuity, no labour, has hitherto been able to dispel; analogy and conjecture therefore have supplied the want of facts, in the absence of any assistance except what doubtful histories and the fables of mythologists have afforded, which at best have held out but a dim light, and more often misled than aided the inquirer in his researches.

It has been supposed by some writers whose names stamp a value on all that has proceeded from them, that song and speech are coeval, an opinion which will hardly be disputed, if by song are meant sounds which, though vocal and sustained, are devoid of rhythm, governed by no scale, and consequently productive of no melody, in the modern acceptation of the word: but if the term is intended to signify a regular system of tunable, measured notes, then we shall not hesitate to say, that such advance towards art could only have been made by people proceeding fast in civilization, and communing through the medium of a language adequate to all the ordinary purposes of man in a social state.

We are told by Lucretius, in a passage often quoted from the fifth book of his poem *De Rerum Natura* (*Of the Nature of Things*), that the birds taught man to sing, and that the invention of musical instruments of the inflatile kind was suggested to him by the sounds produced from reeds when the western wind blew over them.

> '———————— the birds instructed man,
> And taught him songs before his art began.
> And while soft evening gales blew o'er the plains,
> And shook the sounding reeds, they taught the swains;
> And thus the pipe was fram'd, and tuneful reed.'

This has certainly the merit of being very poetical, whatever reliance the historian may place on it. The same notion concerning wind instruments is found in Ovid's beautiful account of the transformation of the nymph Syrinx into reeds. But Thomas Aquinas, the 'Angelic doctor,' cited by the good Padre Giambattista Martini, in his *Storia della Musica*, disdains to follow the example of the heathen author of the 'Metamorphoses,' or the disciple of Epicurus, and leaves the origin of music to chance; on the contrary, the noble Italian saint informs us that the first man was endowed by the Creator with every kind of knowledge, and that he excelled in music, as well as in all other arts and sciences.

But quitting the ingenious guesses and fictions of poets and the reveries of enthusiasts, we find Jubal, the seventh in descent from Adam, mentioned in Scripture as 'the father of such as handle the *harp* and *organ*.' These terms however must not be understood quite literally; they are generic, and signify all instruments of the stringed and tube kind. The different versions vary in the translation of the original: the French render the word *harp* by *violon*. Though the earliest authentic record of music extant is that in *Genesis*, yet it is nearly certain that the Jews acquired their knowledge of it from the Egyptians. That Moses himself was educated by Pharaoh's daughter as her own son, and was 'learned in all the wisdom of the Egyptians,' is stated in the *Acts of the Apostles*; and Clemens Alexandrinus adds, that 'he was instructed by them, in his maturer age, in arithmetic, geometry, rhythm, harmony, but, above all, in medicine and music.' The whole generation of the Israelites led forth by the lawgiver from their captivity were born in Egypt, in which it seems to be agreed music as an art originated; though Diodorus Siculus even denies that it was ever practised there: but his assertion is not only in opposition to Herodotus, and at utter variance with what Plato says, who travelled into that country to become acquainted with the arts and sciences, but is proved by modern discoveries to be the very reverse of truth. The fresco painting of a harp, found by Bruce in an antient tomb near the ruins of Thebes, which is undoubtedly of very high antiquity, is an indisputable proof of the progress made by the early Egyptians in music. In form, dimensions, and ornament, this instrument might be mistaken for one of modern date, insomuch that when a drawing of it was first shown in London, considerable doubts were entertained of its fidelity. Forty years after, however, M. Denon bore testimony to the truth of Bruce's description and the accuracy of his sketch; since which Rosellini's *Monumenti dell' Egitto*, a splendid work published in 1832, has confirmed all that the two former had said on the subject. Another instrument, which is found sculptured on an Egyptian obelisk brought to Rome by Augustus, furnishes additional evidence of the state of music in Egypt in the remotest times. It is fully described by Dr. Burney, who gives a wood-cut of it, by which it appears that it was nearly the same as the Neapolitan *Calascione* of the present day. It had only two strings, but, being provided with a long neck, was capable of producing that series of sounds which the antients called a heptachord; and if the strings were tuned fifths, like those on the calascione, they would give a complete octave, an advantage which none of the Grecian instruments possessed till many ages later. Montfaucon says that 'in examining the representations of near five hundred antient lyres, &c., he never met with one in which there was any contrivance for shortening strings, during the time of performance, by a neck and finger-board.' These two instruments then are sufficient proofs of early Egyptian knowledge in the musical art.* That it continued to be cultivated in Egypt under the Macedonian dynasty there can be no doubt. Athenæus, in his account of a Bacchic festival given by Ptolemy Philadelphus—the munificent patron of all the liberal and useful arts, who made Egypt the mart of the world—tells us that more than six hundred musicians were employed in the chorus, and that among these were three hundred performers on the cithara, or lyre.

Of the music of the Hebrews, nearly all that is known is to be collected from the Scriptures, and the Bible is in the possession of every one. There we meet with the first recorded song, which Moses sang at the head of the tribes, after the miraculous passage of the Red Sea. To this responded Miriam the prophetess, having a timbrel or tambourine in her hand, and being attended by all the women, carrying the same instruments, and dancing. Music formed an essential part of every Jewish ceremony. The priesthood were musicians by office, which was hereditary: they were four thousand in number, divided into bodies, each of which had its chief or leader. At the dedication of Solomon's temple, a prodigious band of priests, blowing trumpets, attended. Josephus tells us that 200,000 musicians were engaged; but as his statement is unsupported by scriptural history, we may venture to consider it as a mistake arising from some misapprehension, or else as a manuscript error. A Hebrew writer enumerates thirty-six musical instruments that were kept in the sanctuary, on all of which, he says, the prophet-king David could play. These are reduced to thirty-three by another account. It is worthy of remark that many of them, under other names, are still met with in the East and in Egypt, and, as far as can be ascertained, very little changed from their original form. Martini has given, from a manuscript of 1599, what he believes to be specimens of the melodies sung by the Jews to certain Psalms; but they are printed in the obsolete notation, without bars, and having no words added to them by which the measure might perhaps have been made out, it is impossible to enter thoroughly into their meaning.

The Music of the Greeks has engaged the notice of so many searching antiquaries and patient mathematicians—such profound learning and unwearied labour have been bestowed on it—it has provoked so much controversy, and the dispute has proved so barren, that we enter on the subject reluctantly, if not fearfully; and though bound to give it as much attention as a matter of some importance is entitled to, yet we do not deem it expedient or feel inclined to afford it more than is rigorously its due. Dr. Burney, who had devoted months, if not years, to the inquiry, declared to a friend, a few months before his decease, that 'he never understood the Greek music, or found any one that did understand it.'

But before proceeding further, we think it right to say, with all possible respect for those who have toiled in this unproductive field, that, after a diligent investigation of the subject, on which we entered with an unprejudiced mind, it is our decided opinion that what is now called Greek music has hitherto proved perplexing chiefly, if not solely, on account of the term having been misunderstood. We believe that by *moúsike* (μουσική) the Greeks meant *poetry sung*, with some sort of accompaniment, and that the moderns have fallen into error by overrating the importance of the melodic part, treating this as the principal, and poetry only as an ally.

Music was a comprehensive term with the Greeks, embracing among other things which we shall have occasion to mention, melody (*Melopœia*—literally the *making*, or composition, *of the song*) and poetry. There is no one, M. Villoteau remarks, who, after an attentive perusal of the antient writers, is not convinced that eloquence, poetry, and melody were, in early times, governed by musical principles; that they were taught by the same master, and that the three arts were but one science. 'The goddess Persuasion,' says Lord Shaftesbury, 'must have been in a manner the mother of poetry, rhetoric, music, and the other kindred arts;' and tradition, he adds, 'could not better represent the first founders of large societies than as real songsters. . . . . . . Nor can it be doubted that the same artists who so industriously applied themselves to study the numbers of speech, must have made proportionable improvements in the study of mere sounds and natural harmony.' The Greeks never separated poetry from melody; the poet himself set the notes to his own verses, and in the early times sang them at the public games and festivals. The Greek tragedies were *operas*, observes Payne Knight, meaning, we presume, that they were in a kind of recitative; and he is borne out in his assertion by the best authorities. Aristotle, in his treatise on poetry, considers the *music* of tragedy as one of its most essential parts. The nature of this *music* is indicated by several writers, but is more clearly pointed out by Philodemus than by any other, in his work in abuse of music (one of the *papyri* found in Herculaneum, unrolled and published at Naples in 1793), wherein it is described as a melody nearly approaching ordinary speech; that is to say, recitative. Horace calls Apollo *the singer*. The antient poets give us to understand that their verses were *sung*, and this is to be construed literally in the case of the Greek poets. Homer, according to tradition, sang his own epics. But it is needless to multiply proofs of a fact so generally received.

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* There are some Egyptian paintings in the British Museum, which were brought from the grottoes in the western hills of Thebes. In one of them (No. 179) a female figure is represented blowing the double pipe, and another appears to be playing on a musical instrument. (*Lib. of Entertaining Knowledge: British Museum*, vol. ii., p. 76.)

Admitting, then, that Greek poetry of all kinds, religious, epic, dramatic, &c., was really sung, and perhaps granting, what many believe, that oratory partook much of the nature of song, let us inquire what was meant by the word *singing*. It is not to be imagined that Homer, Tyrtæus, Pindar, &c. were singers, in our acceptation of the word; the supposition is too absurd to be entertained for a moment. But even allowing them to have been as perfect in the vocal art as the moderns are, would they have condescended to deliver their poetry in long flights of notes, in divisions, in trills, and in passages that render it difficult, and sometimes impossible, to get at the sense? If, however, they had attempted to make their 'heaven-bred poesy' subservient to song, would they have found a patient audience?—Assuredly not; for the animating appeal, the interesting narrative clothed in poetical language, the pathetic description, were what the Greeks delighted in, and certainly would not have surrendered for the sake of a tune. Moreover, it must be recollected, and is a very important consideration, that when the art of printing was unknown, and manuscript copies of poems, &c. were unattainable by the people at large, on account of the expense, the multitude had no means of becoming acquainted with the productions of their poets but by hearing them recited; and as crowds assembled for this purpose, the best mode of rendering the voice of the reciter audible to many, and these congregated in open places, was, to pitch it rather high, and confine it to a small number of fixed musical notes. Such is still the practice, and with the same intent, in all cathedrals, and is called chanting, a usage which has doubtless been transmitted from the remotest ages. Such too is the method adopted by the *improvvisatori*, whose art, we are persuaded, is of the highest antiquity, and whose singing, it is our belief, much resembles that of the ancient Greeks in delivering their verses. Those extemporaneous poets always require an instrumental accompaniment of a simple kind, to keep the voice in tune, and, as they confess, to animate them. The Greek reciters also were accompanied, either by the lyre or the flute, and probably for the same purposes. The flute was the companion of elegiac poetry; the lyre of the epic and the ode.

By what is called Greek music, therefore, we understand the union of poetry and music, the former of the two exercising the greatest sway over the mind, because expressing noble sentiments—gracefully inculcating religion and morality—teaching obedience to the laws—exciting generous feelings—and inspiring patriotism and courage by the praise of those who had distinguished themselves by their public services and their valour. It is thus we account for the effects said to have been wrought by antient music; for it is impossible that Plato should have been thinking of mere vocal melody and the sounds of mean and imperfect instruments, when he said that no change can be made in music without affecting the constitution of the state, an opinion in which Aristotle acquiesced, and Cicero afterwards adopted:—it is not to be credited that the laws of Lycurgus, set to measured sounds by Terpander, were turned into a song, or that this Lesbian musician quelled a sedition in Sparta by singing some pretty air to the mob:—it is absurd to suppose that when Polybius tells us of a savage nation civilised by music, he means to say, by coarse pipes and guitars;—and not less ridiculous is it to imagine that men were raised to the rank of chiefs and the dignity of legislators, solely on account of their taste in singing, or their skill on the lyre and the flute.

We cannot quit the subject of the vocal music of Greece, without adding a few words concerning the Greek *Nomes* and *Scolia*. The former (from *νόμος*, nomos, *a law*) were so called, says Plutarch, because they were not allowed to transgress certain melodic rules by which they were characterised, and were at first hymns to the Gods. The latter were songs of a less restrained kind, sung at banquets and entertainments, by great proficients; hence Hesychius derives the term from *σκολιὸς* (skolios, *difficult to sing*). But others think that the word should be rendered literally,—*crooked, following a tortuous course*—because, at table, it did not pass regularly, but only to those who were skilful singers. Plutarch, on the authority of Pindar, tells us that the *scolia* were invented by Terpander. Dr. Burney has an entertaining chapter on the subject, vol. i., 464; but the reader will find it more learnedly discussed in Potter's 'Antiquities,' ii. 403.

As to the instrumental music of the Greeks, we confess our inability to treat the subject in a satisfactory manner. The accounts given of it by the ancient writers are either so suspicious or so indefinite, that nearly all our labour in endeavouring to gain some knowledge of its nature has been expended in vain. Having Bianchini's learned work on ancient instruments before us, we are enabled to form some opinion of their capabilities, and our opinion is not in their favour. They appear to have been rude, and suited only to music of the simplest description.

The Musical scale, or disdiapason, of the Greeks comprised two octaves, the lowest note of which was A, the first space in the base of the moderns. This was divided into five Tetrachords, or subdivisions of four sounds in each, the extremes being at the distance of a fourth. [TETRACHORD.] And it must here be observed, that the antient lyre had but four strings; the first and fourth fixed, the middle ones admitting of being tightened or relaxed according to the genus of the melody. Two conjoint tetrachords, with one additional note, formed the Octachord, or octave, to which the improved lyre extended. The three different divisions of the tetrachord produced as many Genera [GENERA], the Diatonic, the Chromatic, and the Enharmonic; which see. The first was composed of the sounds which the moderns name E, F, G, A; the second of E, F, F♯, A; the third of E, E×, F, A. The notes, or sounds, were represented by the letters of the alphabet, great and small, which, in order to extend their application and distinguish the various modes, were placed in different positions—the direct, the averted, the inverted, and the horizontal; and these were, as occasion required, altered in form. The time, or duration, of the notes was known by the long and short syllables to which they were set; the long syllable was in duration as two; the short as one. But we know only the comparative times of these; of the positive lengths of notes we remain in ignorance. The movement however of Greek music is supposed to have been slow. The Modes were, according to Alypius, fifteen in number: Aristoxenus makes them thirteen, each a semitone distant from the next in order. Under the word MODE we have given the table of Alypius; we here insert that of Aristoxenus, the oldest of the Greek writers on music, which commences with the Hypodorian, the lowest.

Hypodorian		B
Hypophrygian,	*Grave*	C
Ditto	*Acute*	C♯
Hypolvdian	*Grave*	D
Ditto	*Acute*	D♯

Dorian		E
Ionian		F
Phrygian		F
Æolian, *or grave Lydian*		G
Lydian	*Acute*	G♯
Mixolydian	*Grave*	A
Ditto	*Acute*	A♯
Hypermixolydian		B

It will be here observed, that what may be called the key-note of the various modes does not agree with that in the table before given. In the above we have followed the Abbé Barthélemy, after having in vain resorted to numerous authorities for some means of reconciling the discrepancy. No two writers on this obscure subject are thoroughly agreed, and it is probable that none in future will attempt to explain that which holds out so little hope to labour and patience, and offers so small a reward for success. The three principal and most antient modes had different characters: the Dorian was grave and majestic; the Lydian, soft and complaining; the Phrygian, bold, enthusiastic, and used in religious ceremonies. Plato banished the Lydian and Ionian modes from his Republic, because exciting the enervating passions; but the Dorian and Phrygian he allowed, as manly and decent. Pindar set his fourteenth Olympic ode to the Lydian, as being addressed to the Graces. According to Lucretius, the Phrygian was employed in the horrid solemnities of Cybele; and Statius introduces it in the funeral rites of Archemorus.

By the word μέλος (*melos*) the Greeks generally signified what we call air, or something like it; but sometimes, Twining remarks, 'they used it in the sense of ἁρμονία, i.e. *melody* abstracted from rhythm, or time: sometimes for *measured melody;* and sometimes as equivalent to *song*, including melody, rhythm, and words.' By ἁρμονία (*harmonia*) they intended simply to express, as we have in a former article observed, the proper relationship of one sound to another—the pleasing agreement of intervals; that is to say, melody. Metastasio believes that by this term the Greeks signified what we mean by melody, founding his opinion on the following passage from Plato (*De Legib.*, lib. ii.):—*The regulation of the movement is called* rhythm; *but the regulation of the voice is called* harmony. Rousseau says—'The sense given by the Greeks to this word, in their music, is the more difficult to ascertain because, having originally been a proper name, it has no roots by which it can be decompounded in order to arrive at its etymology. In the antient treatises which remain, *harmony* seems to be that which had for its object an agreeable succession of sounds as regards high or low, in opposition to the other parts called *rhythmica* and *metrica*, which relate to time and measure.' But though very difficult to determine with exactness the meaning of the word harmony as applicable to Greek music, yet this difficulty does not arise from the cause assigned by the French writer.

The long-contested question, whether the Greeks understood counterpoint, or music in parts, seems now to be set at rest, and determined in the negative by a preponderating weight of authority and a large majority of voices. To what we have before remarked on this subject [HARMONY], we now add, that further inquiry and reflection have only confirmed the opinion we have long entertained, namely, that though the antients, by mere accident, if not from experiment, must have been acquainted with the effect of simultaneous sounds, nevertheless that which we call harmony formed no part of their musical art, either theoretically or practically. And we repeat our belief, that in the union of poetry and song, which undeniably operated with such amazing force on all classes of the people,—which inflamed them with ardour, softened them into obedience, and melted them into pity,—music was but the ally of verse.

Of their instrumental music, or music without the voice, we are told that the flute-players by profession—who certainly were exceedingly encouraged and most extravagantly paid for their services in the later times of Greece—piqued themselves chiefly on the strength of the sounds they could produce from the instrument; and that the trumpeters thought themselves fortunate if, in their contests at the public games, they escaped without the rupture of a blood-vessel by the violence of their exertions. It is to such performances Aristotle must allude in saying, 'I disapprove all kinds of difficulties in the use of instruments, and, indeed, in music generally; I mean such tricks as are practised at the public games, where the musician, instead of recollecting what is the true object of his art, endeavours only to flatter the corrupt taste of the multitude.' Facts and remarks like these do not lead to any favourable opinion of Grecian performers. It is likely however that they pleased most when they played the airs set to the favourite poems and popular verses. And there seems some reason to believe that they extended these by additions, sometimes studied, but often extemporaneous, resembling what are in modern language called variations, or an amplification of the theme.

It was a tradition that Cadmus, with his Phœnicians, introduced music into Greece. But Plutarch, in his 'Dialogue on Music,' first makes Lycias, a professor of the art, repeat the statement of Heraclides, that Amphion, the son of Jupiter and Antiope, taught the Greeks to compose and sing lyric poetry: then, by a second interlocutor, Soterichus, contradicts the first, assigning to Apollo the merit of having converted Greece into a musical nation. The invention of the lyre of three strings is given to the Egyptian Mercury, or Thoth; that of seven strings, to the second or Grecian Mercury. Chiron, the centaur, taught Achilles music. Orpheus was the musical pupil of Linus, and master of Hercules. Then came Olympus, Terpander, and others. Terpander is said to have appeased an insurrection in Lacedæmon by his songs. He rendered a most important service to the art by inventing a method of representing musical sounds. Till his time music was quite traditional, and depended on the memory, and sometimes the caprice, of the performer Plutarch says of him, on the authority of Alexander, an historian, that he took Homer for his model in versification, and Orpheus for the style of his melodies. The musical compositions of Orpheus, the same writer adds, were wholly original.

Many very celebrated players on the flute are mentioned in musical history. Damon taught Pericles and Socrates the use of this instrument. Antigenides and Dorion were also renowned for their talents. But the performer who excited most admiration was of the gentler sex. Lamia was no less distinguished by wit and ability than by personal charms. After captivating many by her skill as a flute-player, and by her beauty, Demetrius Poliorcetes became violently enamoured of her, and, through her influence, conferred such extraordinary benefits on the Athenians, that they dedicated a temple to her. Whatever may have been the style of flute-playing, or of the music, it is certain that in Greece the performers were in great favour. Xenophon says, that if an indifferent player wished to pass for one of superior talent, he must furnish his house richly, and appear abroad with a large retinue of servants, as the great performers do. It is said that a flute used by a celebrated Theban musician, Ismenias, cost nearly six hundred pounds sterling.

Pythagoras, of whom an idle story was long current, about a blacksmith's shop, hammers, and anvils, contributed much to the improvement of music by his calculations and philosophical experiments. To him also is attributed the addition of an eighth string to the lyre. His notion concerning *the music of the spheres*—music produced by the motions of the heavenly bodies—was one of those whims in which great geniuses are apt, now and then, to indulge. He was of the sect of severe musicians, of those who reduced music to mathematical precision, and regulated all sounds by calculations, allowing no licence to the ear. Of an opposing school was Aristoxenus, born at Tarentum in Italy, about 350 years B.C., who thought the ear entitled to share with mathematical principles in determining the effect of modulated sounds. He was a most voluminous writer on many learned subjects. Of these his *Elements of Harmonics* are all that have reached us, and stand first in the collection published by Meibomius. Next in that excellent work is an *Introduction to Harmonics*, by Euclid, the geometrician; and this is followed by his *Section of the Canon*, containing short and clear explanations of the constituent parts of Greek music. Ptolemy, an Egyptian, and not the astronomer, wrote a treatise in three books on *Harmonics*, which Dr. Wallis printed, with a Latin version, a preface, and appendix, in 1682. He enters at large and deeply into the subject, and his principles have a tendency to reconcile the hostile sects of Pythagoreans and Aristoxenians. This object was pursued with success, by Sir F. H. Styles, in his paper published in the 51st volume of the *Philosophical Transactions*. In Plutarch's 'Dialogue on Music' much information concerning antient Greek music is to be found, but not of the most valuable kind. Aristides Quintilianus wrote a treatise on music, printed in the collection of Meibomius, which has proved a useful work to all subsequent writers on the subject. He was enthusiastic and fanciful, but in matters of fact and calculation is worthy of confidence.

The Romans acquired all their knowledge of the arts and sciences from the Greeks; their music therefore in no way differs from that of the latter; though they must have had some kind of song before any direct intercourse had taken place between them and the polished nations of Greece. It is certain that the art was never advanced by that warlike people, notwithstanding the share it had in all their religious ceremonies and public games, and the use made of it to animate their troops and add effect to their triumphs, and though it formed an essential part of their theatrical exhibitions of every kind, and was even adopted, or affected to be adopted, as a profession by one of their emperors.

The importance of music in the estimation of the early Romans is shown by a regulation attributed to Servius Tullius, who, in dividing the people into classes, directed that two whole centuries should consist of *trumpeters, blowers of the horn*, &c., and of such as, *without any other instrument, sounded the charge*. It is further proved by a law of the Twelve Tables, which limited the number of *players on the flute* at funerals to ten. And another of those laws enacted, that at the praises of honoured men in the assemblies of the people, there should be mournful songs accompanied by a flute. But a passage in Livy leaves no doubt on this subject, and being as curious as it is illustrative, we shall give it entire, availing ourselves of Dr. Burney's translation. 'I should omit a circumstance,' he says, 'hardly worth mentioning, if it did not seem connected with religion. The *Tibicines* (or flute-players), taking offence at the preceding censors for having refused them the privilege of eating in the temple of Jupiter, according to custom, withdrew in a body to Tibur (Tivoli), so that there were no performers left to play before the sacrifices. This created religious scruples in the minds of the senators, and ambassadors were sent to Tibur to persuade the fugitives to return to Rome. The Tiburtines promised to use their utmost endeavours to this end, and first summoning the discontented band before their senate, exhorted them to return to Rome: but finding them deaf to reason or entreaty, they had recourse to an artifice well suited to the dispositions of these men; for, on a certain festival, they were all invited, under pretence of assisting in the celebration of a feast. As men of this profession are generally much addicted to wine, they were supplied with it, till, being quite intoxicated, they fell fast asleep, and in this condition were flung into carts, and carried to Rome, where they passed the remaining part of the night in the Forum, without perceiving what had happened. The next day, while full of the fumes of their debauch, upon opening their eyes they were accosted by the Roman people, who flocked about them, and having been prevailed upon to stay in their native city, they were allowed the privilege of strolling through all the streets in their robes, three days in every year, playing on their instruments, and indulging in those licentious excesses which are practised on the same occasion to this day' (that is, to the time of Augustus). 'The privilege of eating in the temple was also restored to such as should be employed in playing before the sacrifices.' This happened 309 B.C. 'The Roman flute-players,' Burney adds, 'were incorporated, and formed into a *college* or company.' Ovid, in his 'Fasti,' (lib. vi.), acknowledges the importance of the *Tibicines*, and repeats in verse the above story of Livy, but drops the scruples of the *Patres Conscripti*.

That the Roman drama was in some way musical, is proved by the title, or *didascalia*, prefixed to each of Terence's plays. A further proof of this is found in the Institutes of Quintilian, where, after showing the necessity of instructing children in music, he adds, 'that he does not desire that they should learn such music as prevails on the stage, the modulations of which are so intermixed with impudence and wantonness, that they may justly be charged with having extinguished the poor remains of manly courage which had been left.' That the theatrical music of the Romans was similar to that of the Greeks there seems to be little doubt; that it was distorted by the performers in Quintilian's time is very likely.

It is remarked by Dr. Burney, that even during the Augustan age the Romans had no sculptor, painter, or musician, and but one architect, Vitruvius; those, he says, 'who have been celebrated in the arts at Rome having been Asiatics or European Greeks, who came to exercise such arts among the Latins as the Latins had not among themselves. This custom was continued under the successors of Augustus; and those Romans who were prevented from going into Greece contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia in all the arts.'

The Roman writers on music are few, and almost worthless. Vitruvius, in his work on architecture, treats of the sound of the voice, of reverberating vases, and of a *water-organ;* but no one has yet been able to discover what he means by this instrument. He also endeavours to make plain the harmonical system of Aristoxenus, though he acknowledges the difficulty of the task. St. Augustin wrote on rhythm and metre; Boethius devotes five books to music, merely to explain the principles of harmonics; and Aurelius Cassiodorus treats of music, among other things, but his work, or sketch, is said to consist of little more than some general definitions and divisions.

There is every reason to conclude that music remained stationary till the tenth or eleventh century. The Romans, having borrowed the art from Greece, seem to have been convinced of its perfection in the state in which they received it, for there is no evidence of their having attempted to enlarge its narrow boundaries, or in any way to improve it; though a people of more ingenuity and taste would have advanced it at least a few steps towards that point which it slowly has attained.

In the primitive Christian church the service consisted partly of music, which is supposed to have been chiefly that of the Greeks, with an admixture of Hebrew melody. Menestrier conjectures that the early ecclesiastical manner of singing was like that of the ancient theatre, and Dr. Burney concurs in this opinion; though we cannot but think it more likely that the 'songs of Zion,' as performed in the Jewish temple, and the chanting of the hymns at the Pagan altars, were chosen as vocal models for devotional purposes, rather than the airs, or recitatives, in which the comedies of Plautus and Terence were delivered. Towards the end of the fourth century, St. Ambrose digested a musical service for the church of Milan, which is called the Ambrosian chant, and was founded on four of the Greek modes. About the year 600 Gregory the Great enlarged and much improved the chant of the church, by the admission of four other modes, and gave it that form which it still retains in the Catholic service, and in which it is known by his name. According to Bishop Stillingfleet, music was introduced into the English church by St. Augustin, in the latter part of the sixth century, and was subsequently much improved by St. Dunstan, an excellent musician, who, it is said, furnished some few churches with an organ.

The organ—the most majestic and comprehensive of all musical instruments in its present almost perfect state—is supposed to have been an improvement of the hydraulicon, or water-organ, of the Greeks. The first mentioned in musical history was sent, in 757, as a present to King Pepin, from the Byzantine emperor Constantine Copronymus. In the tenth century the organ was in use in several parts of Europe; but it is reasonable to conclude that it was then exceedingly simple, possessing little power, and rude in mechanism: nevertheless, it may fairly be assumed that the invention of the organ hastened the discovery or practice of harmony. [ORGAN.]

To Guido, of Arezzo, we are indebted for many of those improvements in music which led to our present system; though the origin of counterpoint has been erroneously ascribed to that active and ingenious ecclesiastic. [GUIDO.] *Magister* Franco, a member of the cathedral of Cologne in the eleventh century, is considered as the inventor of what in the middle ages was called *Cantus Mensurabilis*, which meant, notes showing, by their forms, their time or duration. Most of those, however, have fallen into disuse, for the shortest in his table is the semibreve. Nevertheless his system, carried out further by De Muris, and by degrees extended, till it has proceeded to an extravagant length—is that of the present day, and is so sound in principle that it probably will never be abandoned.

From the eleventh to the fifteenth century, scarcely anything is known of the progress of music. For its history from the latter period, we refer to the biographical sketches of its most eminent professors which appear in our work;—to the articles ACADEMY, CONCERT, OPERA, ORATORIO, &c.;—to the names of musical instruments;—and to all the terms under which musical compositions of every kind are described. From these sources may be gathered much of the information, if not all, that will be required by the general reader.

MUSK. (Zoology.) [MOSCHIDÆ.]

MUSK. This substance is an extremely odorous secretion, lodged in a bag which is attached and peculiar to the abdomen of the male musk-animal. The elevated regions frequented by the creature, its timidity and speed in flight, render it very difficult to obtain the substance, while the high price borne by it offers great inducements to substitute other articles for that which is genuine. The musk-bag varies much in form, colour, size, and quality, circumstances which suggest the belief that it is procured either from two or more species of musk-animals, or that it has been obtained at different periods of the year, or from very differently-aged animals. In the very young animal the bag is quite empty, while in the old and feeble the musk is in small quantity and of inferior strength. It is said to be secreted in greatest abundance during the rutting season, and to have then its sensible qualities most developed. The secretion has a much stronger odour in the animal which inhabits Tibet and China than in that which frequents the more northern districts of Siberia. In the fresh state the musk has an extract-like consistence, and a reddish-brown colour, with an odour so powerful that the huntsmen can scarcely endure it. By drying this odour diminishes, and the musk acquires a friable granular state, and a dark-brownish colour. In Siberia the chase occurs in spring and summer. In Tibet the pursuit is restricted by the government to certain periods, and the bags which are obtained are stamped with the royal signet. In commerce two and occasionally three varieties of musk are met with.

1. The Tonquin or Tibet musk, received through the East India Company, occurs in small oblong-rectangular boxes, lined with lead, and covered with paper or silk. Each bag, or pod, as it is termed, is wrapped in thin blue or red paper, on which are marked some Chinese characters. Sometimes the bags are enveloped in a deep yellow-brownish nearly transparent paper, which becomes brittle by time. The most distinctive mark of this sort of musk is, that it is slightly flattened, nearly round, and very rarely pear-shaped. The yellow or yellowish-brown hairs, chiefly at the sides, are often cut, while those which remain in the centre are darker coloured, finer, and less bristly. Generally the hairs converge or point towards a small natural opening. The pods are mostly about two and a half inches long, and one and three-quarters broad. The weight of different specimens varies considerably, some being merely three drachms thirty grains, others nine drachms forty-seven and a half grains; the average is six drachms twelve grains. The average quantity of musk contained in the sacks is about two and a half drachms.

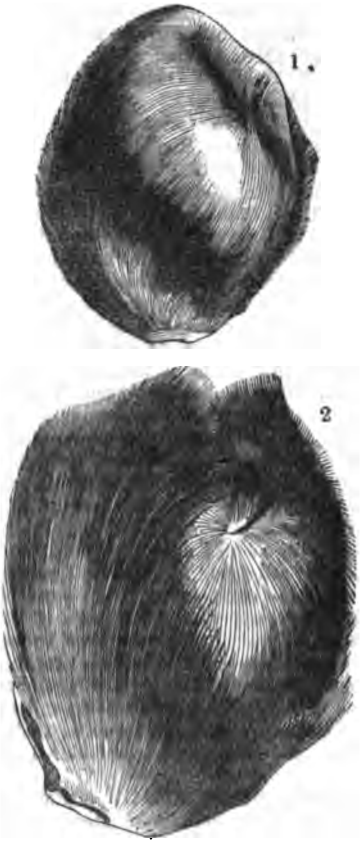
By careful removal of the bag, there remains the musk, which is solid, in grains of different sizes, adhering to each other, soft, and unctuous to the feel, of a reddish-brown colour, like a clot of blood dried, having frequently a number of hairs intermixed, derived from the inner side of the orifice already described. The taste is bitterish, acrid, disagreeable, and somewhat astringent. The odour is strong, peculiar (musky), penetrating, very lasting, and extraordinarily diffusible. It is stated that a single grain can constantly fill the air of a large apartment with a sensible impregnation for many years, without its weight being perceptibly diminished; and one part can communicate its odour to 3000 parts of an inodorous powder.

It should be kept in glass-bottles, very closely stopped, and preserved in a place neither very dry nor too damp.

By the analysis of Geizar and Reiman it appears to consist of: 1, a peculiar volatile principle (which can exist in a free state); 2, ammonia; 3, a peculiar, fixed, uncrystallizable acid (these three are in undeterminable quantity); 4, stearine and oleine; 5, cholesterine; 6, a peculiar bitter resin; 7, osmazome, with several salts; 8, a mouldy-like substance, in part combined with ammonia, and numerous salts; 9, sand; 10, water, acid, &c., with some volatile odorous matter.

It has not been ascertained upon what musk depends for its peculiar properties. It has been conjectured that a kind of putrefaction goes on which evolves the peculiar odour. Moisture seems to favour this, and musk which, when dry, yields little scent, becomes powerful when moistened. The odour is augmented by adding a few drops of the solution of subcarbonate of potass.

2. Kabardin, Russian, or Siberian musk, is either received through St. Petersburg, or, it is said, sent to China, and laid for some time among the bags of genuine Tonquin musk, to acquire the odour of the latter, and then shipped to Europe. The pods of this sort are in general larger, more oval, more compressed, and the margins often have large portions of the skin of the abdomen attached to them. The colour of the hairs is a dirty milk-white. The musk exhibits a more homogeneous and less granular appearance, having a much fainter odour and taste than the preceding kind. The odour is augmented by moisture, but is somewhat nauseous and disagreeable. The wood-cuts show the difference of aspect of the two kinds.



1, Tonquin Musk. 2, Kabardin Musk.

Musk is more soluble in water than in alcohol. Of 100 parts of genuine Tonquin musk, boiling-water dissolves 90 parts, alcohol only 50. Of Kabardin musk, water dissolves only 50 per cent. It is likewise soluble in æther, acetic acid, and yolk of egg.

3. A very small kind of pod is sometimes met with, which is not flattened, but perfectly round; the hairs of a yellowish-brown colour. This is probably the musk-bag of the Moschus Altaicus.

It is safest to purchase the musk out of the pod, as there is then less opportunity of adulteration. Infusion of genuine musk is not precipitated by a solution of bichloride of mercury (corrosive sublimate); but genuine musk is precipitated by nitric and other strong acids, by acetate of lead (sugar of lead), and infusion of galls. The musk-bags are used by perfumers to prepare 'essence of musk.' An artificial musk is sometimes made with nitric acid and oil of amber. This should never be used for medical purposes.

Taken in the dose of a few grains, musk rouses the energy of the digestive organs; and it soon afterwards produces sympathetic phenomena, the powers of the whole animal system appearing suddenly increased. By repeating the doses till half a drachm or a drachm is consumed, the active principles penetrate the whole frame, influencing all the tissues, and exciting effects demonstrative of its stimulating property; the blood circulates with more force, accompanied sometimes with bleeding from the nose: the perspiration and other secretions are perceptibly increased. Other effects prove that it also acts on the brain, spinal chord, and ganglionic nerves, such as tendency to sleep, convulsive movements, and particularly spasms of the chest and abdomen. Owing to idiosyncrasies, musk produces in some persons very extraordinary effects, at times so violent that they cannot bear the faintest odour of it.

Musk has been recommended in typhus and other fevers, when there exist low delirium, hiccup, twitching of the tendons, &c. But its beneficial action is not so constant as to justify much reliance upon it. It is much more useful in diseases purely nervous and spasmodic, where no inflammatory action has preceded or is present. Hence even in epilepsy, as well as hysteria, it is serviceable. In combination with ammonia it is useful in arresting a tendency to gangrene. Likewise in retrocedent gout it has proved successful. It was found of little avail in severe cases of Asiatic cholera, though useful in the milder forms of it.

MUSK-RAT. [MUSQUASH.]

MUSKERRY MOUNTAINS. [CORK.]

MUSKET. [ARMS, p. 373.]

MUSKINGUM. [MISSISSIPPI, River.]

MUSLIN, a thin cloth made of cotton. The name is supposed to be derived from Masalia, since called Masulipatam, from which place such fabrics were first imported into Europe. Until the early part of the present century all the muslin used in Europe was of the manufacture of India. These fabrics are still superior to any that are made in Europe, both as regards their fineness and their durability, which latter quality is not, as some people have supposed, the consequence of any superiority in the quality of the material of which they are made, for the raw cotton of India is far inferior to that which is used for these fine fabrics in Europe, and which is brought from America and from Egypt. The excellence of India muslins is owing to the skilfulness and patience of the spinners and weavers in that country. Some of the muslins of India, and especially those of Dacca, are of the most astonishing degree of fineness, so as to justify their poetical description as 'webs of woven wind.' Such however has been the result of the mechanical inventions of England in this branch of industry, that not only are muslins of British manufacture now used at home, to the exclusion of those woven in India, but large quantities are exported to all parts of the world, and find their way even far into the interior of India.

The great seat of the muslin manufacture in this country is Paisley near Glasgow. The greater part of the yarn used for these fine fabrics is spun in the cotton-mills of Manchester. Muslin cloths are both plain and figured. By a late invention they are sometimes embroidered by means of machinery.

MUSO'NIUS RUFUS, CAIUS, a Stoic philosopher of the first century of our æra, is mentioned with praise by Tacitus (*Ann.*, xiv. 59), and also by Pliny the younger, Philostratus, Themistius, and others. He was a native of Vulsinii in Etruria, and belonged to the Equestrian order. He was a friend of Thrasea Paetus, Barea Soranus, Rubellius Plautus, and other stoics, who were the victims of Nero's suspicion and cruelty. Musonius was banished to Gyaros, where he is said to have been visited by many Greeks for the purpose of listening to his lessons. Being recalled after Nero's death, he lived at Rome under Vespasian, who excepted him from the sentence of exile pronounced by that prince against the Stoic philosophers. This scanty information is all that we have concerning the biography of Musonius Rufus. (Nieuwland, *Dissertatio de Musonio Rufo, Philosopho Stoico.*) Fragments of his works are found in Stobæus, and have been collected and published, with the above dissertation and copious notes, under the title of 'C. Musonii Rufi, Philosophi Stoici, Reliquiæ, et Apophthegmata, cum Annotatione, edidit T. Venhuizen Peerlkamp, Conrector Gymnasii Harlemensis,' 8vo., Haarlem, 1822. These fragments of Musonius are full of the purest morality and wisdom.

MUSOPHA'GIDÆ (*Plantain-eaters*). Mr. Vigors* notices the genera *Musophaga* and *Corythaix* as nearly and evidently allied to the Gallinaceous families, and as being found among the Scansorial birds; and speaks of the genus *Vinago* [COLUMBIDÆ, vol. vii.] as united by their comparatively stronger and more solid bills to *Penelope* and *Crax*, which in his arrangement form the opposite extreme of the order *Rasores*, as well as to *Musophaga* and *Corythaix*, which approach the whole of the Rasorial groups and connect them with the *Perchers*. [INSESSORES, vol. xii.]

Mr. Swainson raises the group of *Plantain-eaters* to the rank of a family under the title which heads this article, and they constitute, according to his arrangement, the fifth great division of the conirostral tribe of perchers. Not that he considers it as by any means clear that *Musophaga* is the real type of the whole family, though he designates that genus as the most conspicuous of the group.

He thus characterises the family:—

Bill short, upper mandible high, the culmen arched, the margins either serrated or entire, the under mandible very thin. Feet short, formed for clinging. The toes various.

The place which this family occupies in Mr. Swainson's arrangement is next to the *Fringillidæ*, at the end of the *Perching Birds*, and immediately before the *Scansores*, intermediate between the *Finches* and the *Hornbills*. He observes that those which betray their affinity to the bullfinches are small, whilst others, whose size and peculiar structure assimilate them more to the hornbills, are of a size proportionate to those birds, remarking that, with the exception of one genus, they all possess a short but very strong and thick bill, more or less curved on the top, the cutting margins being minutely serrated, like the teeth of a saw. The food, it is stated, seems to be entirely vegetable, and of the most tender and delicate description: and Mr. Swainson remarks that it is singular to observe that the bill in this family (in outward appearance much stronger than that of the finches) should yet be employed in procuring the softest vegetable food; while the short bill, posterior nostrils, hopping gait, and purely vegetable food, are all exemplified in such birds as *Buceros galeatus*, and proclaim the affinity of the *Plantain-eaters* to the *Hornbills*.

Mr. Swainson further remarks that the economy of these birds, so far as they have been observed by travellers, is directly against the theory of their being likened to the gallinaceous order; and he quotes some of the statements of Cuvier and those of Yarrell in support of his opinion. The former, in the *Règne Animal*, states that *Corythaix* and *Musophaga* appear to him to have some analogy with the gallinaceous birds, and particularly with the Hoccos. They have the wings and the tail of those birds, and, like them, keep on trees; their bill, he continues, is short, and the upper mandible convex; their feet have a short membrane between the anterior toes; but it is true that the external toe is often directed backwards like that of the owls. Their nostrils also are simply placed in the horn of the bill, the edges of the mandibles are dentilated, and the sternum (at least that of the Touraco) has not the great notches which are ordinary in the Gallinaceous birds. Mr. Swainson observes that this admission of Cuvier, that *Corythaix* and *Musophaga* only present 'quelque *analogie* avec les gallinacés,' and that they have not the notched sternum of the latter, is directly opposed to the theory of these birds leading to the *Gallinacea*, a view of the subject which is confirmed by Mr. Yarrell's observations. The latter zoologist dissected a Touraco (*Corythaix Persa*) which had died in the menagerie of the Zoological Society of London, and he found the general appearance of the inside of the body of the bird inclining rather to that of the *Perchers* than of the *Gallinæ*. (*Zool. Journ.*, vol. iv., p. 319.) Mr. Swainson separates the family into the following subfamilies and genera:—

Phytotominæ, Plant-cutters.

Bill serrated, but not swollen. Feet with two or three toes forward and one backward. (Sw.)

Genera.

Phytotoma, Molina. *Hyreus*, Stevens. Of these we select *Phytotoma*.

Generic Character.—Bill short, compressed, the base widened; high at the base, and gradually curved; the lower mandible much weaker, straight; the commissure slightly arched, with the margins crested. Tongue short, pointed. Nostrils basal, small, rounded. Wings moderate; the two first quills graduated; tail moderate, even. Feet strong. Lateral toes unequal, the inner shortest. Claws slender, slightly curved. (Sw.)

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* On the 'Natural Affinities that connect the Orders and Families of Birds,' in 'Linn. Trans.,' vol. xiv., pp. 476-481.

Example, *Phytotoma rara.*

Description, Habits, &c.—Molina describes the *Rara* or *Chilian Plant-cutter* as nearly of the size of a quail, with the bill rather large, conical, straight, a little pointed, serrated, and half an inch in length; the tongue very short and obtuse, the pupil of the eye brown. Three well proportioned anterior toes, the fourth posterior and a little shorter. The tail moderate, but rounded. The colour is an obscure grey upon the back, rather brighter on the belly; the points of the quills and of the tail are black. The sound of its voice is hoarse and interrupted, and seems to express its name. It feeds on plants, but previously has the destructive habit of cutting them off close to the root, and often capriciously cuts off a quantity of them without touching them further. For this reason the peasants persecute this species, and carry on a continual war against these birds; moreover children who destroy their eggs are rewarded. The nest is built in obscure and but little frequented places on the most lofty trees, and thus these *Plant-cutters* escape the persecutions of their enemies. Notwithstanding such precautions however, their numbers are considerably diminished. 'I do not know,' says Molina in conclusion, 'whether this is because a price is set on its head, or on account of its naturally small degree of fecundity.'

Chilian Plant-cutter.

Mr. Swainson observes that in *Phytotoma* the four toes appear to be arranged as in the *Finches*, but in *Hyreus* the toes are only three. He compares the size and entire aspect of *Phytotoma* to that of a *Bullfinch.*

Colinæ. Colies.

The only definition of this subfamily given by Mr. Swainson is, 'all the four toes placed forward,'* and the only genus contained in it is

Colius. (Brisson and Gmelin.)

Generic Character.—Bill short, strong, conical, slightly compressed, entire, with the mandibles equal and the edges arched; nostrils rounded; nails arched and long, that of the hind-toe shortest; wings short; third quill longest; tail graduated and very long.

Habits, Geographical Distribution, &c. of the Genus.—The plumage of the species is soft and silky, and the colours generally sombre, whence they are called at the Cape, according to Le Vaillant, *Oiseaux Souris* (Mouse-birds). Africa and the East Indies are the localities where they have been found, the *Colius viridis* of Latham, said to be from New Holland, belonging probably to another genus. The Colies are gregarious, live upon fruits, and are the scourges of gardens. They walk badly, but they climb almost continually on the branches of trees, where they hold on, assisting themselves with their bills like the *Parakeets.* They build their nests, which are spacious and round, in little groups; and Le Vaillant affirms that they sleep suspended with their heads downwards, and that, when it is cold, they are found so benumbed in the morning, that they may be taken one after the other. The number of eggs is generally five or six, and the flesh of the birds is said to be delicate. (Lesson.)

Example, *Colius Senegalensis.* (Latham.)

Description.—Round the eye a naked, reddish skin; forehead yellow; colour pearl-grey, with greenish reflections; abdomen ruddy.

This appears to be the *Colius Quiriwa*—the trivial name is taken probably from its note—of Le Vaillant; and the *Coliou huppé du Sénégal* of Buffon.

Colius Senegalensis.

Musophaginæ. Plantain-eaters.

Three toes forward and one backward; the outer toe placed obliquely. (Sw.)

Genera. Corythaix. (Ill.)

Generic Character.—Bill short, rather small, high, and greatly compressed. The frontal feathers reposing over and concealing the nostrils. Culmen high, curved to the tip. Lower mandible narrow; both mandibles distinctly notched at the tip and finely serrated. Wings short, rounded; the three first quills graduated. Tail long, broad, rounded. Feet short, strong. Middle toe longer than the tarsus; lateral toes equal, hind-toe shortest; external toe capable of being turned a quarter of the way backward. Claws short, thick, and much compressed.

The Touracos are most elegant birds, and feed principally on soft fruits. The prevailing colour of these birds is green, varied in some species with purple on the wings and tail. They are natives of Africa, where they perch on the highest branches of the forest trees, and thus keep out of gun-shot, as Le Vaillant found to his cost. Having at last succeeded in bringing one to the ground, he could not find it, and, stamping in his rage at the loss, he broke through into one of the covered pits which the Hottentots employed to catch ferocious animals, particularly elephants. This accident might have been fatal. 'When I recovered my first surprise,' says he, 'I began to consider how I should extricate myself from this embarrassment, extremely happy that I had not been impaled on the sharp-pointed stake placed in the bottom of the pit; and still happier that I found in it no company. I was however apprehensive that some might arrive every moment, especially if I should be obliged to remain there during the night.' In this dilemma Le Vaillant fired his fusee at intervals; the shots at last were answered, and he was delivered by his Hottentots. But he did not forget his Touraco, and now, by the aid of his dogs, which had followed the Hottentots, found it squatted under a tufted bush. He afterwards laid snares for them on the fruit-trees, to which they resorted to feed, and took them alive.

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* Other authorities state that the hind-toe is versatile; and this would more accord with their climbing habits.

The following cuts will give but an imperfect idea of these elegant birds.

Head of Corythaix Senegalensis.*

Corythaix Senegalensis.

Perhaps the most delicate species is *Corythaix erythrolophus*, Sw.

Description.—Crest, which is red, erect and compressed; sides of the head, ears and chin, and patch round the eye (which is large, red, and brilliant), white; general plumage green, inclining to bluish on the body and belly; quills rich purple violet; tail rounded; bill yellow; feet greyish-black.

Head of Corythaix erythrolophus.

This beautiful species is the *Opœthus erythrolophus* of Vieillot; the *Musophaga Paulina* of Temminck; and *Corythaix ignioeps* of Lesson.

Our figure was taken from a specimen that lived for some time in the gardens of the Zoological Society in the Regent's Park.

Locality, Africa.

Corythaix erythrolophus.

Several specimens of Touracos are to be found in our museums, and there are at present (September, 1839) two (*Corythaix Buffonii*) living at the gardens of the Zoological Society, Regent's Park.

Chizærhis. (Wagler.)

Generic Character.—Bill large, high and thick at the base, compressed beyond. Culmen thick, convex, considerably arched. Lower mandible not half so high as the upper; the tips of both deeply notched, with their margins finely crenated. Nostrils basal, placed close to the top of the bill, naked, lunular, and pierced in the substance of the bill. Wings lengthened; the four first quills graduated. Tail lengthened, slightly rounded; the tips very obtuse. Feet as in *Corythaix*. (Sw.)

Example, *Chizærhis variegata*.

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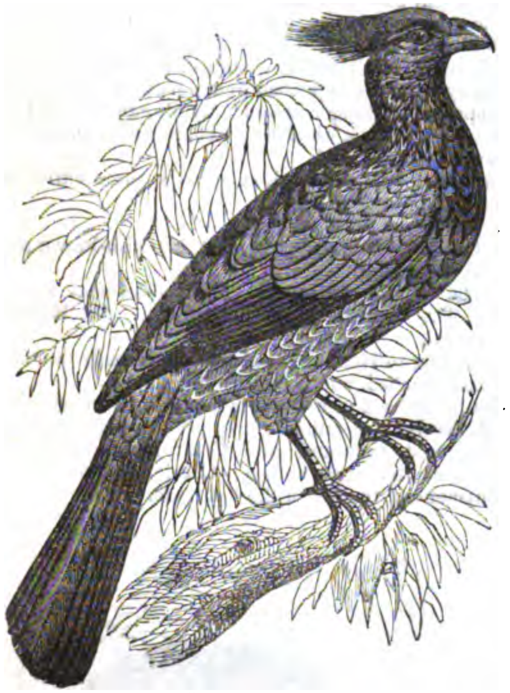
* N.B. The crest, when the bird is excited or in action, is elevated into a compressed subconical shape; and, when thus erected, it gives the head a helmeted air.

Description.—Light grey above; a blackish stripe down each feather; front, top of the head, chin, and throat as far as the breast, chestnut-brown; under plumage beyond the breast white, but each feather with a dark middle stripe; primary and secondary quills blackish, with a spot of pure white varying in size in the middle of their inner webs; tertiaries and middle tail-feathers grey, tipt with black; lateral tail-feathers black; bill yellow; feet grey. Crest placed very far back on the nape. Total length about 20 inches.

This appears to be the *Touraco huppé-col* of Le Vaillant; *Phasianus Africanus* of Latham, and *Musophaga variegata* of Vieillot.

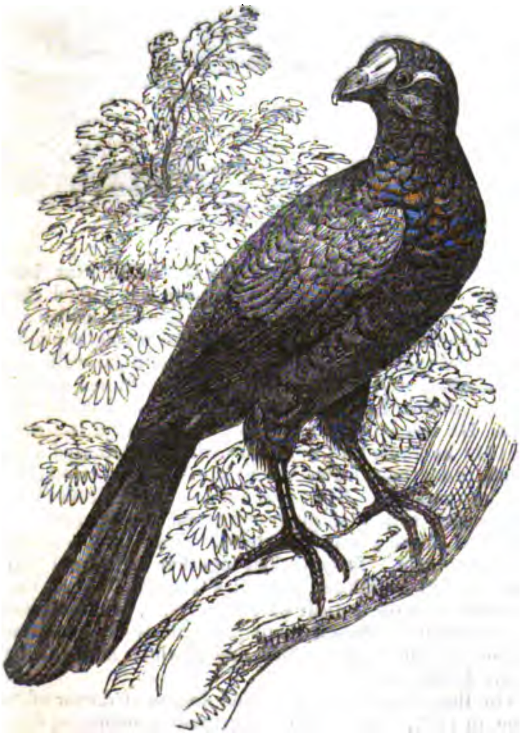
Locality, Africa.



Chizærhis variegata.

Musophaga. (Isert.)

Generic Character.—Bill resembling that of *Chizærhis*; but the base enormously dilated, so as to spread like a casque or helmet over the fore part of the head as far as the crown, where its thickened sides form a semicircle. Nostrils naked, oval, open, placed nearer to the tip than to the eyes, and pierced in the substance of the bill. Wings, feet, and tail as in the *Corythaix*. (Sw.)



Musophaga violacea

Example, *Musophaga violacea*.

Description.—Bill rich yellow, passing into crimson; orbits naked, and, like the compact velvetty feathers of the crown, glossy crimson; a white stripe beginning below the eye and extending above the ear; secondary and part of the primary quills carmine, with lilac reflections, margined and tipped with blackish violet, which is the general colour of the plumage, only that it changes into a very deep green on the under parts, and is very rich on the tail; legs strong and black; gape wide, opening beneath the eyes.

This magnificent bird appears to be the *Cuculus regius* of Shaw.

Locality, Africa: Gold Coast and Senegal.

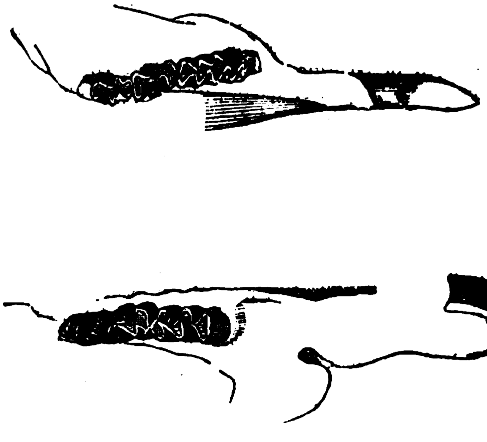
MUSQUASH, the Cree name for the *Fiber Zibethicus* of Cuvier (*Ondatra* of Lacépède), a genus belonging to the family *Castoridæ*.

Dr. Richardson (*Fauna Boreali-Americana*) gives the following synonyms of this rodent:—

Rat-Musqué of Sagard Theodat; *Castor Zibethicus* of Linnæus; *L'Ondatra* of Buffon; *Musk-Rat* of Lawson; *Musk-Beaver* of Pennant; *Musquash* of Josselyn; *Mus Zibethicus* of Lin., Gmelin; *Fiber Zibethicus* of Sabine and Harlan; *Musk-Rat* of Godman; *Ondathra* of the Hurons; *Musquash*, *Watsuss*, or *Wachusk*, also *Peesquaw-Tupeyew* (the animal that sits on the ice in a round form), of the Cree Indians.

In a tract which has for its title 'A Perfect Description of Virginia,' 1649, we find among the 'Beasts great and small,' 'A Muske Rat, so called for his great sweetnesse and shape.'

Dental Formula.—Incisors, $\frac{2}{2}$; Molars, $\frac{3-3}{3-3} = 16$.



Teeth of Musquash. (F. Cuv.)

Description.—Head short. Body thick and rather flat; legs very short; hind-feet large, not webbed.* Dark umber brown above; sides, anterior part of belly, middle of breast, lateral part of neck and cheeks, shining yellowish-brown; chin, throat, sides of the chest, and posterior part of the abdomen, ash-grey; tail compressed, convex on the sides, with its acute edges in a vertical plane, covered with a thin sleek coat of short hairs, which allow a number of small roundish scales, well separated from each other, and which, as well as the hair, are dusky-brown, to appear through them; acute margins of the tail (which is rather thicker in the middle than at the root, and tapers gradually from its middle to its extremity, which is not acute) covered with a close line of longer hairs dark brown on the upper edge and soiled white on the under one. Length of head and body 14 inches; of the tail 8 inches 6 lines.

The fur, which much resembles that of the *Beaver*, but is shorter, resists the water during the life of the animal, but is easily wetted immediately after death.

Habits; Utility to Man, Geographical Distribution, &c.—Charlevoix states that the Musk-Rat takes the field in

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* Hearne erroneously says that the hind-feet are webbed.

March, at which time its food consists of bits of wood, which it peels before it eats them. After the dissolving of the snows, he says that it lives upon the roots of nettles, and afterwards on the stalks and leaves of that plant. In summer it feeds on strawberries, &c., to which succeed the autumnal fruits. During this time, he states that the male and female are rarely seen asunder. According to the same author, they separate in winter, when each takes up its lodgings apart, in some hole or in the hollow of a tree, without any provision; and the Indians declared that not the least morsel of anything is eaten by them whilst the cold continues. 'They likewise,' adds Charlevoix, 'build cabins nearly in the form of those of the beavers, but far from being so well executed. As to their place of abode, it is always by the water-side, so that they have no need to build causeways. . . The flesh is tolerably good eating, except in the time of rut, at which season it is impossible to cure it of a relish of musk, which is far from being as agreeable to the taste as it is to the scent.'

Dr. Richardson (*Fauna Boreali-Americana*), from whom the abridged description is taken, and to whose details we refer the reader, states that the Musquashes vary considerably in size, and that though they have a strong musky smell, particularly the males, in spring, their flesh, which somewhat resembles flabby pork, is eaten by the Indians, who prize it for a time when it is fat, but soon tire of it. They have, according to this author, three litters in the course of the summer, producing from three to seven at a litter, in 55° N. lat., and begin to breed before they attain their full growth. Great numbers are destroyed by the inundations which cover the low grounds where they haunt, and in severe winters they are almost extirpated from some localities by the freezing of the swamps inhabited by them. Famine in such cases drives them to destroy each other. A great mortality, the cause of which is unknown, also sweeps them away, and the deaths at such periods (which are uncertain) are so numerous, that a fur-post, where the *Musquash* is the principal return, is not unfrequently abandoned till the fecundity of the animal has repaired, which it does in a very few years, the ravages of disease.

Dr. Richardson places the southern limit of the *Musquash* about 30° N. lat. According to Bartram, they are found in the north of Georgia and Florida, and Dr. Richardson ascertained that they extended northwards to the mouth of the Mackenzie, 60° N. lat. Small grassy lakes or swamps, or the grassy borders of sluggish streams with muddy bottoms, are favourite haunts, and there they feed chiefly on vegetables. In the northern districts the roots and shoots of the bulrush and reed-mace, and the leaves of various carices and aquatic grasses, form their staple. Pennant states that they are very fond of the Sweet-flag (*Acorus Calamus*), which, according to Dr. Richardson, does not grow to the northward of Lake Winnipeg. The last-named author often saw small collections of fresh-water mussel-shells (*Unio*), on the animals of which they are said to feed, and which, he was informed, had been left by them.

The habitations of the Musquashes and the mode of hunting them are thus described by the Doctor:—'In the autumn, before the shallow lakes and swamps freeze over, the Musquash builds its house of mud, giving it a conical form, and a sufficient base to raise the chamber above the water. The chosen spot is generally amongst long grass, which is incorporated with the walls of the house, from the mud being deposited amongst it, but the animal does not appear to make any kind of composition or mortar by tempering the mud and grass together. There is however a dry bed of grass deposited in the chamber. The entrance is under water. When ice forms over the surface of the swamp, the Musquash makes breathing-holes through it, and protects them from the frost by a covering of mud. In severe winters however these holes freeze up in spite of their coverings, and many of the animals die. It is to be remarked that the small grassy lakes selected by the Musquash for its residence are never so firmly frozen nor covered with such thick ice as deeper and clearer water. The Indians kill these animals by spearing them through the walls of their houses, making their approach with great caution, for the Musquashes take to the water when alarmed by a sound on the ice. An experienced hunter is so well acquainted with the direction of the chamber and the position in which its inmates lie, that he can transfix four or five at a time. As soon as, from the motion of the spear, it is evident that the animal is struck, the house is broken down and it is taken out. The principal seasons for taking the Musquash are, the autumn before the snow falls, and the spring, after it has disappeared, but while the ice is still entire. In the winter time the depth of snow prevents the houses and breathing-holes from being seen. One of the first operations of the hunter is to stop all the holes with the exception of one, at which he stations himself to spear the animals that have escaped being struck in their houses and come hither to breathe. In the summer the Musquash burrows in the banks of the lakes, making branched canals many yards in extent, and forming its nest in a chamber at the extremity, in which the young are brought forth. When its house is attacked in the autumn, it retreats to these passages, but in the spring they are frozen up. The Musquash is a watchful but not a very shy animal. It will come very near to a boat or canoe, but dives instantly on perceiving the flash of a gun. It may be frequently seen sitting on the shores of small muddy islands in a rounded form, and not easily to be distinguished from a piece of earth, until, on the approach of danger, it suddenly plunges into the water. In the act of diving, when surprised, it gives a smart blow to the water with its tail.'

Varieties.— Dr. Richardson records three varieties besides that above described.

1. The *Black Musquash*, rare.
2. The *Pied Musquash*, with dark, blackish-brown patches on a white ground.
3. The *White Musquash* (*Fiber Zibethicus-albus*, Sabine). This Albino is not unfrequent. Dr. Richardson saw several.

According to Hearne, the Musquash is easily tamed, soon becomes attached, and is cleanly and playful.

The fur is used in hat-making, and there is, according to Dr. Richardson, an annual importation of between four and five hundred thousand into Great Britain from North America for that manufacture. Charlevoix also notices the employment of the fur in the hat trade.

The Musquash.

MUSSCHENBROEK, PETER VAN, was born at Leyden, March 14th, 1692. He received a good classical education in the university of his native city, being a pupil of Perizonius and Gronovius, and afterwards applied himself to the study of medicine, which science, as well as those of chemistry and natural philosophy, he studied under Senguerd, Bidloo, Le Clerc, Burnard, Albinus, Boerhaave, and Rau. He was excessively fond of the mathematical sciences. In 1717 he formed an intimacy with the celebrated s'Gravesande, and their tastes being similar, they pursued their studies together. The introduction into Holland of the Newtonian system of philosophy, and the science of experimental physics, was principally owing to the labours of these two men. They worked together with equal zeal and success, but in different paths; s'Gravesande took the mathematical or theoretical part of physics, while Musschenbroeck applied himself more particularly to experimental physics, in which he excelled, and in which he made a great many discoveries.

On the occasion of taking his degree of doctor of medicine, in 1718, Musschenbroek wrote an inaugural dissertation, 'De aëris præsentia in humoribus animalium;' a very clever production, which contains a description of many careful experiments, from which accurate conclusions were drawn, and, though published more than a century ago, it may still be read with interest. The author showed in this dissertation both a fondness and talent for experimental philosophy, and he was luckily placed under favourable circumstances for the development of this talent. At the commencement of his career the speculations of Descartes were rapidly dissipating before the lights of the Newtonian philosophy, but they still retained some supporters; Musschenbroek therefore determined to visit England, for the purpose of seeing Newton and making himself fully acquainted with his system. While in London, he was introduced to Dr. Desaguliers, and other scientific men besides Newton; and on his return to Holland, he soon came into public notice. In 1719 he was appointed professor of philosophy and mathematics, and professor extraordinary of medicine in the university of Doesburg on the Rhine, where he gained great reputation by his lectures. In 1723 he was invited to fill the chair of philosophy and mathematics in the university of Utrecht, which had been long distinguished as a school for legal studies, and which Musschenbroek soon rendered equally well known in the department of natural philosophy. He remained at Utrecht many years, and this city was the seat of his principal labours. The curators of the university were so fully impressed with the importance of keeping his services, that they conferred on him, in 1732, the professorship of astronomy. In 1737 George II. of England, elector of Hanover, offered to Musschenbroek a professorship in the newly established university of Göttingen. The offer was refused, but two years afterwards he accepted the professorship of mathematics in his native city, Leyden, which had become vacant by the death of Wittichius. Musschenbroek remained attached to the university of Leyden for the remainder of his life, though he was successively invited to fill other appointments by the kings of Prussia and Spain, and by the emperor of Russia. He died on the 19th of September, 1761, in the seventieth year of his age.

The following are Musschenbroek's principal works:—

1, 'Epitome elementorum physico-mathematicorum,' 12mo., Leyden, 1726. This work went through several editions, each succeeding edition being considerably altered and improved. It was reprinted in 1734, under the altered title of 'Elementa Physicæ,' 8vo., Leyden. An English translation is mentioned as having been made of this work by Colson, in 1744, 2 vols. 8vo., but we have not been able to meet with it. The last edition of this work appeared after the death of the author in 1762, and was named 'Introductio ad Philosophiam Naturalem.' This edition is much more complete than either of the former, and contains a very good summary of all that was then known on natural philosophy. These three editions are often spoken of as distinct works, though it is only the titles that are different.

This introduction to natural philosophy (the last edition is here referred to, which is the most complete) contains many original researches, on the cohesion of bodies, on the phosphorescent properties which many substances acquire from exposure to light, and on various points in experimental physics. It also includes a much more complete table of specific gravities than had before been published, entirely formed from the author's own investigations. Rigaud de Lafond translated the 'Introductio ad Philosophiam' into French (1769, 3 vols.). This translation must not be confounded with another which appeared at an earlier date (1739) with the title of 'Essai de Physique,' which was translated by Dr. Massuet from a Dutch edition of the same work, published by Musschenbroek, which Dutch edition (containing many researches which were not included in the later Latin ones) was written in a popular style for the purpose, which it fully answered, of diffusing a taste for natural philosophy in Holland among those who were not acquainted with the learned languages.

2. The work which has gained the author most celebrity is his 'Physicæ Experimentales, et Geometricæ Dissertationes,' Leyden, 1729, 4to. This work consists of four treatises: one on the magnet, one on capillary attraction, one on the size of the earth, and one on the cohesion of bodies. All these dissertations contain many interesting researches and new experiments, which were conducted with great care. The labours of Musschenbroek on the power of cohesion between different bodies were very great; and he afterwards rendered his observations on this subject more complete in the introduction to natural philosophy mentioned above. He greatly extended the science of magnetism by his memoir in the present work, though he improved his knowledge at a later period respecting the laws of magnetic attraction, and in 1754 published,

3, 'Dissertatio Physica Experimentalis de Magnete,' 4to., Vienna.

4. In 1731 Musschenbroek published, at Leyden, in 4to., a Latin translation of the 'Saggi di Naturali Esperienze fatte nell' Accademia del Cimento,' which appeared at Florence in 1667. This work, valuable in itself, was rendered much more so in the translation by the numerous notes and additions of Musschenbroek, which contain an account of some new experiments on the dilatation of different bodies by heat, and also a description of a pyrometer which he had invented, and which was the first instrument of the kind which had been made.

Besides the above works Musschenbroek delivered several public orations, which have been published. He also wrote many papers on meteorology (a subject to which he paid considerable attention), some of which appeared in the 'Memoirs of the French Academy of Sciences,' and some in the 'Transactions of the Royal Society of London.' He published some observations on the Leyden phial, in the 'Memoirs of the French Academy of Sciences' for 1746, and a 'Dissertation on Barometers,' which was printed in the 'Memoirs of the Academy of St. Petersburg.'

MUSSELBURGH, an antient burgh of royalty in the parish of Inveresk and shire of Edinburgh. It is seated on the right bank of the Esk, near the confluence of that river with the Frith of Forth, and is about five miles east from the city of Edinburgh, with which communication is kept up by stage-coaches. The name is supposed to refer to a mussel-bank near the mouth of the Esk.

The monks of Dunfermline were the sole proprietors of all the territory comprised within the limits of the burgh, down to the time of the Reformation. After that event the property came into the possession of the king, James VI., by whom the lordship and royalty, together with the patronage of the church of Inveresk, were conferred upon his chancellor, Lord Thirlstane, from whom they have descended, by inheritance and purchase, to the family of Buccleuch, the present proprietors.

The high street is spacious, and contains many good houses, and the town is surrounded by gardens and villas. To the south is the suburb of Newbigging, which branches off to the church of Inveresk. On the opposite bank of the Esk is the suburb of Fisher-row, inhabited chiefly by fishermen, who supply the markets of Edinburgh during the greater part of the year. There is a stone pier, and the barbour, though small, is convenient. The management of the affairs of the town and suburbs is vested in a council of 18 members, of whom 10 are chosen from among the inhabitants of Musselburgh, and the rest from those of Fisherrow. The tanning of leather, making of sailcloth, hats, bricks, earthenware, &c., and the manufacture of fishing-nets by looms, constitute the principal business of the place. The salmon-fishery is carried on by 'stake-nets,' but is not very productive. A branch of the Commercial Bank of Edinburgh has been established, and elegant gas-works for the supply of the town have recently been erected.

Four bridges cross the Esk, two of which are of stone; the uppermost is of considerable antiquity; the new bridge is a handsome structure erected from a design by Rennie. In 1831 the population of the burgh and the rest of the parish of Inveresk was 8961. By the Reform Act, Musselburgh, Leith, and Portobello were erected into a parliamentary district which now returns one member.

For a description of Pinkie House, formerly the residence of the abbot of Dunfermline, and now the abode of Sir John Hope, bart., the reader is referred to Chambers's *Gazetteer of Scotland*, 8vo., 1832; from which, and the *Parliamentary Report on Scotch Burghs*, this notice is chiefly drawn. In the former work will be found many interesting particulars relative to the antiquities of the place and the historical events with which it is connected.

MUSSULMAN. [MOHAMMED.]

MUSTAPHA I., sultan of the Turks, succeeded, in 1617, his brother Ahmed I., but, a few months after, was deposed by the janizaries, who placed on the throne his nephew Othman. A few years later the janizaries revolted again, deposed Othman, put him to death, and recalled

Mustapha to the throne in 1622. Soon after a fresh revolt deposed him again, and he was taken to the castle of the Seven Towers, in 1623, where he was strangled some years afterwards. (Knolles; Rycaut.)

MUSTAPHA II., son of Mahomet IV., succeeded his uncle Ahmed II. in 1695. In the following year he defeated the Austrians at the battle of Temeswar, but was defeated in September, 1697, by Prince Eugene, near Zenta in Hungary. The seraskier in the mean time had reconquered Chios from the Venetians. By the peace of Carlowitz, in 1699, the sultan acknowledged the dominion of Venice over the Morea and several districts in Dalmatia, and gave up Azof to Russia, and Kaminiek to Poland.

Mustapha then withdrew to Adrianople, where he gave himself up to sensuality. His neglect of the public affairs caused a formidable revolt to break out in the capital, and the insurgents marched upon Adrianople, and at the same time offered the throne to Ahmed, Mustapha's brother, who took the title of Ahmed III. Mustapha died in confinement, it was reported by a natural death, six months after his deposition, in 1703.

MUSTAPHA III., son of Ahmed III., succeeded his cousin, Othman III., in 1757. He had been strictly confined in the seraglio ever since the deposition of his father in 1730, but after ascending the throne he showed considerable firmness of character, and effected several reforms in the administration. He engaged, in 1769, in an unlucky war against Russia, in which he lost the Crimea and Bessarabia, but did not live to see its termination. He died in 1774, and was succeeded by his brother, Abdul Hamid. His son Selim afterwards succeeded Abdul Hamid, in 1789. [Selim III.]

MUSTAPHA IV., son of Abdul Hamid, was placed on the throne by the janizaries, who had deposed sultan Selim III., in May, 1807. Mustapha was ignorant, weak, and cruel, and a tool in the hands of the janizaries. Mustapha Bairactar, pasha of Rudshuk, and a friend of Selim, collected an army and marched to the rescue of his master. He entered Constantinople and attacked the seraglio, demanding that Selim should be restored to him. Mustapha gave him up, but it was only the dead body of Selim, for he had been strangled by order of Mustapha at the approach of his deliverers. Bairactar deposed Mustapha, and placed his brother Mahmood on the throne, in July, 1808. In the following November a revolt of the janizaries broke out, which lasted three days, and a great part of Constantinople was burnt down. Bairactar, Mahmood's grand-vizier, perished in the flames; and the janizaries, being triumphant, were shouting for the deposed Mustapha when Mahmood gave orders to put his brother to death. Mahmood was now the sole remaining prince of the Ottoman dynasty, and the janizaries submitted to him, after making their own conditions. A vivid account of these fearful transactions is given by Macfarlane in his 'Constantinople in 1828.'

MUSTARD. [Sinapi.]

MUSTE'LA. [Weasels.]

MUSTE'LIDÆ. [Weasels.]

MUSU'RUS, MARCUS. a native of the island of Candia, emigrated to Venice about the end of the fifteenth century, and taught Greek in that city with great success. He edited several Greek works, which were printed by Aldus Manutius. Afterwards he proceeded to Rome, where Leo X. showed him great favour, and nominated him bishop of Epidaurus in the Morea. He died at Rome in 1517. He published the first edition of Athenæus, printed by Aldus, Venice, 1514. Musurus published also the 'Etymologicum Magnum Græcum,' folio, Venice, 1499, reprinted in 1549, in 1594, and 1710; and some Greek epigrams and other poetry, among others a poem in praise of Plato, which he prefixed to his edition of that philosopher's works, and which was translated into Latin verse by Zenobio Acciaioli, 'Carmen in Platonem,' Cambridge, 1797.

MUTE. [Deaf and Dumb.]

MU'TINA. [Modena.]

MUTINY ACT is a series of regulations which, from year to year, are enacted by the British legislature for the government of the military force of the country.

Laws have, at various times, been made by the authority of the crown for the maintenance of discipline in the army when in garrison, on a march, and in the presence of an enemy; these have been briefly hinted at in the article on Military Law, and may be seen at length in Grose's 'History of the English Army' (vol. ii.); but the code which is now in use is one of the first-fruits of the Revolution in 1688. Previously to that event the crown, except during the civil wars and the subsequent protectorate, had, at least practically, the supreme power over the militia (that is, over the whole military force), which, with or without the consent of the nation, might be called out and employed as long as pay and quarters could be obtained for the troops. But the efforts then recently made to carry on a series of measures tending to the maintenance and extension of arbitrary power in the crown, joined to the increasing jealousy of the people for their civil and religious liberties, led the two houses of parliament to take the earliest opportunity, after the new king had been called to the throne, of expressing in some public act of legislation their authority over the regular troops of the nation; and an opportunity almost immediately presented itself, on a serious act of mutiny taking place in the army. The Royal Scotch and Dumbarton's regiments, under Marshal Schomberg, in their progress to the coast for the purpose of being embarked for Holland, being quartered at Ipswich, a large body of men, refusing to proceed to their destination, disarmed their officers, seized the military chest, and, with four pieces of cannon, began their march for Scotland. Being pursued by General Ginckel, with three regiments of Dutch dragoons, they surrendered at discretion; but, in consequence of this event, and on the spur of the moment, a bill was passed (April 12th, 1689) by which the army was put at once under the control of the law with respect to discipline, and under its protection with respect to pay and quarters.

The enactments of this bill were particularly directed against the crimes of mutiny and desertion, for which the bill was immediately required; but the Act itself begins by laying down as maxims that the raising or keeping a standing army in the country in time of peace, unless it be with the consent of parliament, is against law; and that no man can be forejudged of life or limb, or subject to any kind of punishment in any other manner than according to the established laws of the realm. It then states that it is judged necessary, by their majesties and the parliament, during the present time of danger and for the defence of the Protestant religion, to continue and augment the forces which are now on foot. Avoiding the acknowledgment that any power exists in the crown for the appointment of courts-martial, it authorises their majesties to grant commissions to general officers to assemble such courts for the purpose of trying and punishing such offences as mutiny and desertion. Provisions are also made that nothing in the Act shall exempt an officer or soldier from the ordinary processes of law; that it shall not concern the militia troops, and that it shall only continue in force till the 10th of November in the same year. The Act has ever since, with one exception, been annually renewed: after the bill which passed in April, 1697, for one year as usual, had expired, no other was passed till March, 1702; and, on a few occasions, the bill has been suffered to expire for several days before the following one received the royal assent.

The Mutiny Act has, with time, varied in many particulars from that which was first passed, but it has been uniform in all its principal points; such as the dependence of a standing army on the consent of parliament, and the subjection of military men to all the processes of ordinary law. Instead however of the original formula above-mentioned, by which the reason of keeping up a military force was expressed, the Act now asserts that it is judged necessary by the crown and parliament to continue a body of forces (the number being exactly specified) for the safety of the United Kingdom and the preservation of the balance of power in Europe. In all the Acts which passed down to the commencement of Queen Anne's reign the articles were few in number, and some of them were very ill defined; but, from that time, parliament seems to have intended to exercise a general legislative jurisdiction over the army. Many new articles were then inserted; others have since been added, as the want became apparent; and the Mutiny Act may now be considered as a good general code of law, in which are defined strictly but briefly all military offences of the higher class, and, as precisely as possible, nearly all those of minor importance. The military offences of the higher class, thirteen in number, consist in a commissioned or non-commissioned officer, or a soldier, exciting mutiny, or not using his best endeavours to suppress it; in misbehaving before an enemy; abandoning or delivering to the enemy any garrison, fortress, or post; compelling or using means to induce the governor of such garrison to do so; quitting his post without leave, or sleeping at his post; holding correspondence with the enemy, or entering into terms with the enemy without licence; striking a superior officer, or disobeying his lawful commands; and, finally, in deserting the service. For all these offences the Act prescribes 'death, or such other punishment as a general court-martial shall award.' A clause of the Act enumerates the military offences of minor importance which may be tried before a district or garrison court-martial: these consist in a non-commissioned officer or soldier wilfully maiming himself, or tampering with his eyes; malingering, or feigning disease; stealing government stores; stealing from an officer or a comrade; procuring false accounts; embezzling public money; and, lastly, in any fraudulent or disgraceful conduct. For these offences may be awarded corporeal punishment, imprisonment, forfeiture of the additional pay to which, for length of service, the individual might be entitled, and forfeiture of pension on being discharged. And in another clause it is stated that imprisonment, with or without hard labour, or solitary confinement, may be awarded by regimental courts-martial for drunkenness, or insubordination on parade or on the line of march.

Besides the above laws, which relate particularly to the discipline of the army, the Act defines the constitution and powers of courts-martial; it contains clauses relating to the enlistment of recruits, the issue of pay and marching money, the quartering of soldiers, and the supplying of carriages for the conveyance of troops and baggage. The Act moreover contains a repetition of the original clause in which it is declared that the ordinary course of law is not to be interfered with when a soldier is accused of a capital crime; and it states that a man cannot be taken from the service for a debt under 30*l*.

The Mutiny Act is declared to be applicable to all persons employed in the recruiting-service; to the forces of the East India Company while in any part of the United Kingdom, and till their arrival in the territories of the Company; to the officers and men employed in the service of the artillery and engineers; to the corps of sappers and miners; to the military surveyors and draughtsmen in the ordnance department; and to foreign troops serving in any part of the British dominions abroad. Its provisions are also stated to extend to the islands of Guernsey, Jersey, Alderney, Sark, and Man. In one of the clauses it is expressly mentioned that nothing in the act extends to any of the militia forces, or yeomanry, or volunteer corps in Great Britain or Ireland; it is understood however that its provisions are applicable to the corps of marines when on shore, and also to officers holding rank by brevet, though not to such as are on half-pay. An effort was made in 1749, when the bill was introduced as usual into parliament, to subject officers of this class to martial law, but the clause was abandoned by the minister. Before the union of Ireland with Great Britain there was a separate Mutiny Act for the former country, but now the same act applies to both. The officers and troops of the East India Company are subject to their own Mutiny Act, which however agrees exactly with that of the government forces.

Previously to the year 1750 the members of courts-martial were bound by an oath not to disclose the ground on which they gave their votes; but in that year the act was so far mitigated as to release them from such oath when required to give evidence in any court of justice or court-martial. The power of disclosing, in that case only, the votes or opinions given is implied in the forms of the oaths which are now taken by the judge-advocate and members of the court-martial, and which are printed among the schedules to which the act refers. The act of the same year also contains a clause, in which it is stated that no sentence pronounced by a court-martial, and signed by the president, shall be more than once revised; previously to that time a general-officer had power to order the revisal of any sentence as often as he pleased, and thus he might retain in confinement a man who had been acquitted on a fair trial.

The gradual extension of the provisions of the Mutiny Act to those military offences which may be considered as secondary in the scale does not seem to have been noticed on behalf of the crown farther than by the occasional reservation of its right to make Articles of War for the better government of the forces, which is expressed in the acts passed during the reign of Queen Anne. In the first year of George I. this right of the crown was formally allowed; and the clause containing it has been repeated in all subsequent mutiny acts, with the provision that no person within the United Kingdom and British Isles shall be subject to transportation, or to any punishment affecting life or limb, for crimes specified in the Articles of War, except such as by the Mutiny Act itself are liable to the same punishments.

The Articles of War which are at present in force, and which have from time to time been promulgated, are divided into twenty-four sections. Many of these correspond exactly to clauses in the Mutiny Act; others, though relating to subjects in the latter, define the particulars of the crime and the punishment applicable to it with more precision; and there are articles which have no counterparts in the act. The first section of the Articles of War relates to divine worship, frequent attendance on which is prescribed, and punishments are awarded for profaning the places in which it is celebrated, as also for scandalous or vicious behaviour in a chaplain. The seventh section contains fifteen articles relating to quarrels and the sending of challenges; and the fourteenth contains twenty-one articles concerning the duties of troops in quarters or in the field. Many of these articles prescribe for the offence 'death, or such other punishment as a court-martial may award;' and two of them prescribe death, without leaving any discretion to the court. The first of the crimes here mentioned is that of doing violence to persons bringing provisions to the camp, and the other is that of ill-treating a person to whom a *safe conduct* has been granted; the army in both cases being on service in foreign parts. The fifteenth section settles the relative rank of officers in the regular army; and the twenty-second the rank of officers in the royal army and in that of the East India Company, when serving together. The twenty-third section appoints that officers and soldiers while employed on board any ships having a royal commission shall conform to the laws and regulations established for the government and discipline of the navy.

The above articles, being made by the crown as head of the army, or by the commander-in-chief, are to be obeyed as being the commands of a superior officer; but the writers on military law observe that the legality of the articles may itself become the subject of examination in a court-martial, whereas the Mutiny Act must be obeyed without inquiry. In this particular therefore the Articles of War are to be distinguished from the Act; and whatever case may occur the letter only of the law, as contained in the Act, must be followed in awarding the punishment due to a crime affecting life.

The bill on which are founded the Articles of War for the Navy was passed in the 22nd Geo. II., and this consolidated all the laws previously made for the government of the ships and vessels bearing royal commissions, as also of the forces at sea. Among the offences which in the Act constitute the crime of mutiny, are the running away with the ship, or with any ordnance, ammunition, or stores belonging to the same; neglect of duty, joining in or using means to produce any mutinous assemblage of persons, uttering mutinous or seditious words, or concealing any mutinous intention, and striking an officer or disobeying his lawful commands. Of the thirty-six articles, nine relate to crimes for which the punishment of death, without discretion in the court-martial, is awarded; and there are twelve to which are assigned 'death, or such other punishment as the nature and degree of the crime shall be found to deserve.' Two of these were originally in the former class, and the qualifying clause was added in the 19th Geo. III. Except this alteration, none has been made in the navy act since it was passed.

MUTTRA. [HINDUSTAN, vol. xii., p. 219.]

MUZARAB, *i.e.* a Christian living under the sway of the Arabs. Various etymologies have been assigned to this word. Some pretend that it comes from the two words *Muza* and *Arab*, and that it meant in the first instance those Christians who capitulated to Musa at the time of the Conquest, and was an epithet by which the Mohammedans of Spain designated the Christian population of their cities; others derive it from *Mixti-Arabes*, *i.e.* Christians mixed with the Arabs. The absurdity of these etymologies need not be dwelt upon. Musa granted no capitulation to the Christians of Spain in general; and if the

Arabs had wished to give a distinctive name to the Christians subject to their rule, it is not likely that they would have employed two Latin words to designate a people living under their sway and in the midst of them. The real derivation of the word *Muzarab* is the Arabic *Mustarab*, afterwards corrupted into *Muçarab*, which means a man who tries to imitate the Arabs, or to become one in his manners, language, and habits; and who, although knowing Arabic, speaks it like a foreigner. This name was given by the Moors of Spain to all Christians living under Moslem jurisdiction in Cordova, Seville, Granada, Toledo, and other large cities.

But the word Muzarab is better known to us as connected with the antient liturgy of the Goths, which governed the Spanish church down to the twelfth century, and was called 'Muzarabic office' (*Missal Muzárabe*), owing to its being preserved by the Muzarab Christians of Toledo during the time of their subjection to the Arabs. The fate of the Muzarabic liturgy is singular enough. Though involving the same doctrines, it differed widely from the other offices of the church; it also contained many hymns composed by St. Eugenius, St. Ildefonso, St. Julian, St. Leander, and other great luminaries of the Visigoths. To produce uniformity in this respect, and substitute the Roman for the Spanish missal, became the principal aim of the holy see. Early in the tenth century a legate arrived in the Peninsula from Rome, sent by John X.; but the report which he made on his return proved to be a favourable one, and by the decision of a council, held at Rome, in 924, the Muzarabic office was not only sanctioned, but even praised. Another attempt, made in 1064, under Alexander II., had a similar result. Again, in 1067, new legates were sent, with a positive injunction to insist on the abolition of the antient service; but the Spanish prelates resisting the innovation, the subject was laid before a council assembled at Mantua, and the Spanish missal was once more declared Catholic and orthodox. Still the holy see persisted in its object. No artifice or intrigue was spared; and the court of Castile was divided into two hostile factions, one in favour of and the other against the introduction of the Roman ritual. In the perplexity occasioned by this dispute the two parties resolved to leave the decision to the judgment of God, and the expedient adopted to discover the divine will was this: two wild bulls were procured, the one to represent the Roman, the other the Muzarabic ritual, and, in the presence of the king and the court, were matched against each other. After a bloody conflict, the *Muzarabic* remained victor. But this result did not deter Gregory VII. In 1087 the trial was repeated: a champion was chosen on each side, and the decision left to the fate of arms; but again victory was in favour of the antient liturgy. Fire was then tried, and both missals were cast into the flames; but, if we believe the archbishop Don Rodrigo, who was present at the ceremony, the success was still more signal; for no sooner did the Roman volume touch the fire, than it jumped out of the flames half burnt, while the Spanish remained for a considerable time in the midst of them without receiving the least injury. The object was at last gained by other means. Alfonso, the renowned conqueror of Toledo, was won over to the interests of Rome, and, after much trouble and difficulty, he prevailed on the prelates of the kingdom to receive the universal office; and from that moment the Muzarabic, although not publicly condemned, fell into disuse. There is however still a chapel in the cathedral of Toledo where mass is performed every day agreeably to the Muzarabic ritual. It was founded by Cardinal Ximenes de Cisneros.

(Aguirre and Catalani, *Collectio Magna Conciliorum*, tom. iv., p. 193, &c.; Masdeu, *Historia Critica*, lib. ii.; Mariana, *Historia General de España*, lib. ix., chap. xviii.; Flores, *España Sagrada*, tom. iii. p. 187; *Missale Gothicum secundum Regulam Beati Isidori Hispalensis*, Romæ, 1804.)

MYA. [Pyloridea.]

MYA'RIA, Lamarck's name for a family of Dimyarian conchifers, consisting of the genera *Mya* and *Anatina*. [Pyloridea.]

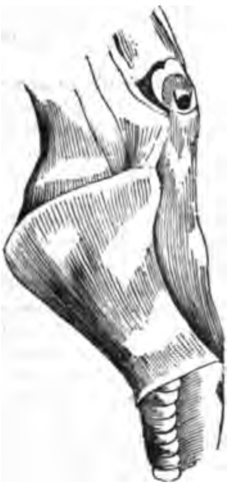
MYCALE. [Ionia.]

MYCE'NÆ, an antient town and state in Northern Peloponnesus, founded, it was said, by Perseus, and which in the time of its king Agamemnon was the most powerful state of Greece, ruling over the greater part of the Peloponnesus, besides many islands. [Agamemnon.] The small kingdom of Argos was then subject to Mycenæ. But after the death of Agamemnon and the extinction of the dynasty of Atreus, Argos gained the ascendency over Mycenæ, which however appears to have maintained a sort of independence, being protected by Sparta, with which Argos was often at variance. During the Persian war, Argos did not send any assistance to the Northern Greeks, but the contingent from Mycenæ was present at Thermopylæ. This added to the grudge which Argos bore against Mycenæ for its pride of antiquity and independence, and after the end of the Persian campaign, while Sparta was distracted by intestine commotion and afflicted by the consequences of an earthquake, the Argeii, being joined by the people of Tegea and Cleonæ, attacked Mycenæ, which they took after a stout resistance, and razed to the ground, B.C. 468. Part of the inhabitants were made slaves; the rest emigrated to Ceryneia, Cleonæ, and some even to Macedonia. (Diodorus, xi.; Herodotus; Pausanias.) Mycenæ never rose from its ruins, but these ruins, contrary to the assertion of Strabo (*Cas.*, 372-377), who evidently had not visited the spot, were, and still are, of considerable magnitude, and very remarkable. In the time of Pausanias (ii., ch. 15, 16) they consisted of a great part of the walls, with the gate called that of the Lions, from lions being sculptured above it, said to be the work of the Cyclopes; the fountain called Perseia; and the subterraneous buildings of Atreus and his sons, in which their treasures were deposited. There were likewise to be seen the tombs of Atreus, Agamemnon, of his charioteer Eurymedon, of Electra, and others. 'But Clytemnestra and Ægisthus,' adds Pausanias, 'were interred at a little distance from the walls, being thought unworthy of burial where Agamemnon lay and those who were slain together with him.'

The ruins of Mycenæ have been visited in recent times, among others, by Lord Elgin, by Cockerell, Dodwell, and Leake. We extract from the latter an account of their present appearance. Mycenæ was built upon a rugged height in a recess between two commanding summits of the range of mountains which border the eastern side of the Argolic plain, about seven miles north by east of Argos. The Acropolis, the entire circuit of which is still seen, the ruined walls being in some places from 15 to 20 feet high, resembled many other fortresses in Greece, being built on the summit of a steep hill between two torrents. Its length is about 400 yards and its breadth about 200. The ground rises considerably within the enclosure; on the summit are the openings of subterraneous cisterns or granaries built of large irregular stones lined with plaster. It has a great gate at the north-west angle and a postern towards the north-east. The door-case is formed of two massive upright blocks of stone, covered with another which is 15 feet long, 4 feet wide, and 6 feet 7 inches high. Upon this stands a triangular stone of green basalt 12 feet long, 10 feet high, and 2 feet thick, upon the face of which are represented in bas-relief two lions standing on their hind legs, one on each side of a round pillar or altar upon which they rest their fore-paws. The pillar becomes broader towards the top and is surmounted with a capital formed of a row of four circles enclosed between two parallel fillets. Below the Acropolis, in the direction of the modern village of Kharvati, are the Spiliá, or subterraneous chambers, known in the time of Pausanias by the name of the treasury of Atreus. The largest of these chambers, which is of a conical form, is about 50 feet in diameter at the base. The door-ways are ornamented with half-columns of a style resembling the Tuscan, and have some other peculiar ornaments, minutely described by Leake, who gives sections of the chambers, as well as a plan of the ruins of Mycenæ. (*Travels in the Morea*, vol. ii.) 'Nothing,' observes Leake, 'can more strongly show the extreme antiquity of the remains at Mycenæ than the singularity of some parts of them and their general dissimilarity to other Hellenic remains. We find nothing in Greece resembling the lions or the columns before the gate of the great Thesaurus, or the treasuries themselves. In the military part of the architecture there is not so remarkable a difference between the Cyclopean ruins and the other most antient ruins remaining in Greece. In the walls are found specimens of construction of various ages, but the later reparations are easily recognised from the oldest part, which is of the kind called Cyclopean; and with this exception, everything left at Mycenæ dates of the heroic ages. Notwithstanding this remote antiquity, the description of Pausanias shows that Mycenæ has undergone less change since he travelled than any place in Greece.'

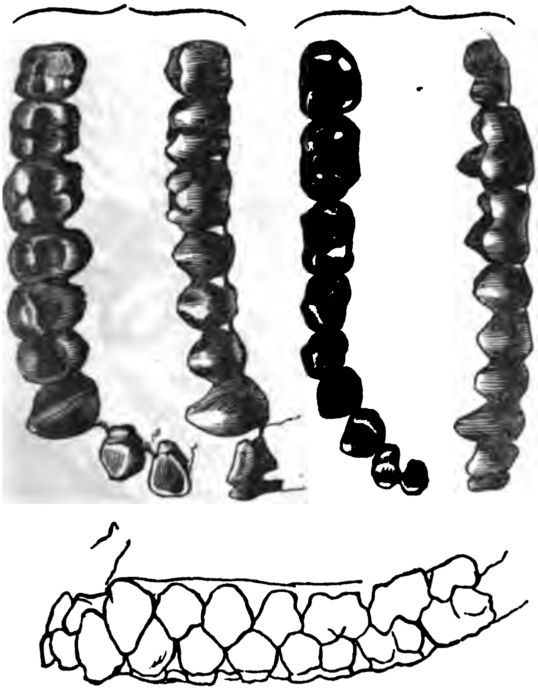
MYCETES, Illiger's name for a genus of *Quadrumana*, consisting of the largest monkeys of America, remarkable for the powerful development of the organ of the voice. The species are, as the name implies, *Howlers*, and the horrible yells sent forth by these animals from the depths of the forests are described by those who have heard the mournful sounds as surpassingly distressing and unearthly. Humboldt and Bonpland heard the *Araguato*, one of the species, at the distance of half a league.

The genus is distinguished by a pyramidal head with the upper jaw descending much lower than the *cranium*, while the lower has its ascending *rami* very high, to afford room for the bony drum formed by a convexity of the *os hyoïdes*, which communicates with the larynx, and gives to the voice the enormous volume above alluded to. Humboldt gives the following as the external form of the drum in this genus.



Drum of Howling Monkey

The tail in this genus is prehensile, and the part applied by the animal when laying hold of a branch or other body is naked below; so that such portion must have a higher sensibility of touch. M. F. Cuvier gives the following as the dentition of the Howling Monkeys, from the *Alouate fauve*.



Teeth of Howling Monkey. (F. Cuvier.)

Mr. Swainson (*Classification of Quadrupeds*) observes that it is rather singular that M. F. Cuvier should not have specially noticed the remarkable size of the canine teeth in the Howlers, which he says are uncommonly large; and adds that in a specimen before him when he wrote, they are nearly six times bigger than the cutting-teeth, a structure which at once separates this group from the genus *Cebus*. Facial angle about 30°.

Cuvier, in common with most other zoologists, places the genus at the head of the monkeys of the New Continent.

Mr. Gray (*Annals of Phil.*, 1825) places the form among the Anthropomorphous *Primates* in the second family (*Sariguidæ*), and as the sole genus of its first subfamily *Mycetina*.

M. Lesson arranges it between *Lagothrix* and *Cebus*.

Mr. Swainson makes *Mycetes* the first genus of the *Cebidæ*, the second family of his first order *Quadrumana*.

Mr. Ogilby observed in the summer of 1829 that two living individuals of *Mycetes seniculus* did not use the extremities of their anterior limbs for the purpose of holding objects between the finger and thumb, as is common among the *Quadrumana;* and he ascertained also on closer examination that the thumb, as it has generally been considered, was not in these animals opposable to the other fingers, but originated in the same line with them. Struck with the apparent singularity of the fact, he was induced to pay particular attention to all the other animals referred by zoologists to the Quadrumanous family to which he had access; and the continued observation of more than six years assured him that the non-opposable character of the inner finger of the anterior extremities, which he first observed in the specimens referred to, is not confined to the genus *Mycetes*, but extends throughout the whole of the genera of the South American monkeys, individuals of all of which had been seen by him in a living state. He remarked that a true thumb existed on the anterior limbs of none of them, and that consequently they have been incorrectly referred to the *Quadrumana* by zoologists generally. [CHEIROPODA; QUADRUMANA; SIMIADÆ.]

The habits of these animals are social, and most of them have thick beards. Their deep and sonorous yells are supposed to be a call to their mates; in short, to be a hideous love-song. In their gregarious habits and howlings they may be considered as bearing some analogy to the Gibbons of the Old World [APE, vol. ii., pp. 149, 150; HYLOBATES]; whilst their low facial angle has induced some to look upon them as representing the baboons of the antient continent.

Geographical Distribution of the Genus. — South America.

Example, *Mycetes Ursinus* (*Stentor Ursinus* of Geoffroy). The *Araguato*.

Mycetes Ursinus. Araguato.

Description, Habits, &c.—Length nearly three feet, without including the tail. Hair, which is longer than that of

Mycetes seniculus (*Mono colorado* of Humboldt), of a golden red, but the beard, which is of a deeper colour than the rest, is less bushy than it is in *M. seniculus;* and the circumference of the face where the hair is red is also paler. Humboldt states that the eye, voice, and gait denote melancholy. He saw young ones brought up in the Indian huts, which never played like the *Sagoins.* [JACCHUS.] Lopez de Gomara speaks of the *Araguato de los Cumanenses* as having the face of a man, the beard of a goat, and a grave demeanor. Fruit and the leaves of plants form their food. The females carry the young upon the shoulder. Humboldt counted above forty upon one tree, and he does not doubt that upon a square league of the wild countries frequented by them above two thousand may be found. They were in great abundance near pools of stagnant water shaded by the *Mauritia flexuosa.*

Localities, Brazil, Venezuela, &c.

MYCETO'PODA, or **MYCE'TOPUS**, a genus of conchifers with elongated valves, established by M. d'Orbigny, and referrible to the family NAIADÆ of Lamarck. M. d'Orbigny states that this genus perforates like the *Pholadæ.*

MY'CONOS, MICONI, one of the Cyclades, is situated east of Delos, from which it is separated by a narrow channel. It is about 10 miles in length and 6 in its greatest breadth. The island is mountainous and not very fertile: it produces some corn, wine, and cotton, but is deficient in wood. The population is about 4000, according to Thiersch. The men are good sailors, and the women are handsome. (Dapper, *Description des Isles de l'Archipel;* Spon; Porcacchi; Baudrand.) According to the antient fable, the Centaurs killed by Hercules were buried in this island, from whence came the proverb, 'to put all things under one Myconus,' applied to those who were apt to range under one class things naturally disparate. (Strabo, Casaub. 487.) The inhabitants, being poor in their own country, had the reputation of being parasites at other people's tables, and hence the proverb 'Myconian guests' for people who invited themselves. Miconi belongs now to the new kingdom of Greece.

MYCTE'RIA. [JABIRU.]

MYDA'US. [WEASELS.]

MY'GALE (Mammalogy). [SORECIDÆ.]

MYGDO'NIA. [MACEDONIA; MESOPOTAMIA.]

MYIAGRA. [MUSCICAPIDÆ.]

MY'LODON. [MEGATHERIIDÆ, vol. xv., p. 70.]

MYOCINCLA. [MERULIDÆ.]

MYO'PHONUS. [MERULIDÆ.]

MYOPORA'CEÆ are a natural order of plants, distinguished from Verbenaceæ by little except the ovules being pendulous and the albumen more abundant. The plants referred to Myoporaceæ are chiefly shrubs of little interest, inhabiting the Australian regions and other parts of the southern hemisphere. The most remarkable thing connected with them is the presence of cysts of oil in their leaves, which thence have a dotted structure. The White Mangrove, a shore plant rooting in mud, is a curious species. Brown describes its roots as creeping to a considerable distance, often curved above the ground as much as six feet before they fix themselves, and throwing up naked suckers out of the mud in great abundance, which look like shoots of asparagus.

MYOPO'TAMUS. [COYPOU.]

N.B. It is now ascertained that the Coypou *has* a *ligamentum teres.* In October, 1838, Mr. Owen exhibited to the Zoological Society of London a preparation of that ligament in the animal, which he had received from Mr. Otley of Exeter, and read the following extract in a letter from that gentleman:—

'I have enclosed with this the thigh-bone, and the *scapula, clavicle*, and *humerus* of a Coypou, which came into my hands after having been mangled by a stuffer of animals, and which had been preserved alive for some weeks by a gentleman of this place. I believe that not many opportunities have occurred of dissecting this animal in England; and as I found a difference between the specimen in question and that described by Mr. Martin, I thought the portions I have forwarded might be interesting to you, had it not fallen to you to dissect one of these animals. Mr. Martin states that the thigh-bone had no round ligament: you will see that there exists a well-developed one in this, as there also was on the other thigh-bone.'

Mr. Martin observed, that, or referring to his account of the dissection of this animal, it will be found that he is so far from asserting it as a fact positively determined, that the *ligamentum teres* is wanting; that, after giving an account of the state of the *acetabulum* and head of thigh-bones as he found them, he adds, 'It would be desirable that another specimen should be examined before this peculiarity (namely, the absence of a *ligamentum teres*) is insisted on as an ascertained fact.' (*Zool. Proc.*, 1838.)

Mr. Darwin (*Journal and Remarks*) notices this rodent as common among the broken islets of the Chonos Archipelago, where it exclusively frequents salt-water. The same author remarks that the *Capybara* or *Carpincho* [HYDROCHŒRUS] occasionally frequents the islands in the mouth of the Plata, where the water is quite salt, though it is far more abundant on the borders of fresh-water lakes and rivers.

MYOSO'REX. [SORICIDÆ.]

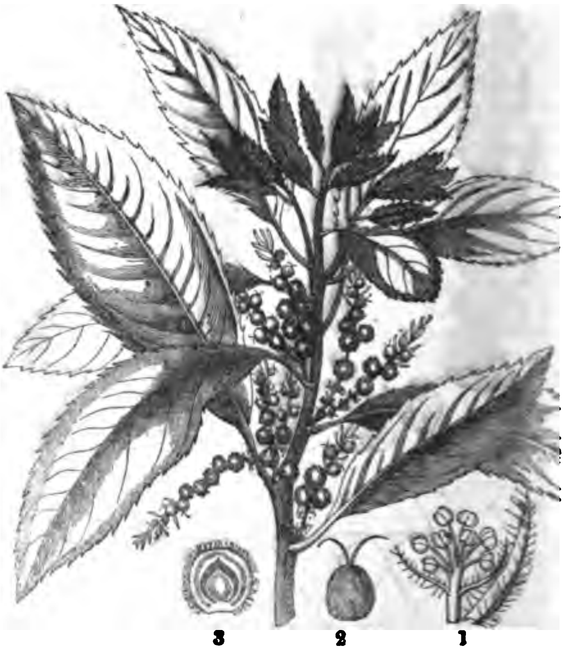
MYOTHE'RA. [MERULIDÆ.] Cuvier remarks that M. Vieillot has changed this name into *Myrmothera.*

MYOXUS. [MURIDÆ.]

MYRAFRA, Dr. Horsfield's name for a genus of birds arranged by Mr. Swainson as a subgenus of *Calendula*, in the subfamily of *Alaudinæ* of the family FRINGILLIDÆ.

MYRIAD (μυριάς), the Greek term for ten thousand, usually employed in our idiom for an indefinite but very large number.

MYRICA'CEÆ are plants constituting a very small natural order of apetalous Exogens, with separate sexes. The most essential part of their character is expressed by Endlicher in the following terms: 'Flowers unisexual. *Males:* Bractlets, 2; calyx, 0. *Females.* Hypogynous scales from 2 to 6; ovary one-celled, with 2 styles; ovule 1, erect, orthotropous; drupe one-seeded; seed erect; embryo without albumen; radicle superior.' In general their flowers are arranged in a manner similar to those of Betulaceæ and Salicaceæ, with which latter however they seem to have no real affinity. From Casuaraceæ, curious New Holland trees, with jointed leafless stems, like those of Equisetum, they are only distinguished by their erect ovule and orthotropous seeds. They are common in the temperate parts of the world, especially in North America and the Cape of Good Hope. With us the only species is the *Sweet Gale*, a common fragrant bush inhabiting wet commons. They are all more or less fragrant and aromatic; and one of them is called Myrica *cerifera*, or the wax-bearing, from the drupes being covered with a waxy secretion, which may be readily separated and manufactured into candles; whence has arisen its popular name of *Candleberry Myrtle.*



Myrica arguta.

1, a male flower; 2, an ovary; 3, a drupe cut open vertically to show the erect position of the seed within it.

MYRI'STICA MOSCHA'TA, Thunberg (the M. officinalis of Linn., but not of Martius), a tree native of the Moucca Islands, especially of Banda, but cultivated in Java, Sumatra, and elsewhere in the East, and lately in Cayenne and several of the West India Islands. It yields nutmegs and mace, the best of which are produced in the first-mentioned islands. The fruit is of the size and form of a peach, and, when ripe, the fleshy part separates into two nearly equal halves, exposing the kernel surrounded by an arillus, the former being the nutmeg, the latter the mace. The arillus is red when gathered, but being sprinkled with sea-water and dried, it assumes an orange-yellow colour. It has a fatty shining appearance, yet is horny and brittle. The odour is strongly aromatic; the taste aromatic, but sharp and acrid. It contains both a fixed oil (in small quantity) and a volatile oil. One pound of mace yields by distillation one ounce of the latter. The former is not an article of European commerce, and what is termed the *expressed oil of mace* is obtained from the nutmeg, and should bear its name. An inferior mace is obtained from various species of Myristica, especially the M. tomentosa and M. officinalis (Martius), which is a Brazilian tree. The properties of mace are similar to those of the nutmeg.

On the removal of the mace is seen the shell, of an oval or ovate shape, and of a dark brown colour, in which is contained the seed or nut. This is closely invested by an inner shell or coat, which dips down into the substance of the albumen of the seed, and gives it the character which is termed *ruminated*. Two or three gatherings of the nutmegs are made in the year, generally in July and August, in December, and in April. The third period yields the best nutmegs. The collected nuts are dried in the sun or by the heat of a moderate fire, till the shells split: they are then sorted and dipped in lime-water, to preserve them from the attack of insects. The nuts are about an inch long, of the size of a hazel-nut, but with a furrowed or sculptured surface. Those of good quality should be heavy, each weighing on an average 90 grains. The internal aspect is marbled and of a fatty appearance. The substance is grey, but the veins, which are of a reddish-brown, consist of cellular tissue abounding in oil, and are the processes of the internal coat already mentioned. Odour agreeable, strongly aromatic. Taste warm, aromatic, oily.

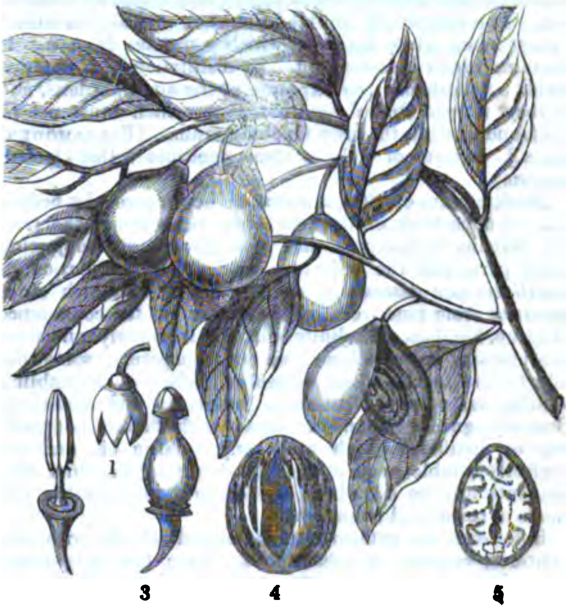
Besides the fixed oil, it contains a volatile oil, lighter than water, being of the specific gravity of 0·931-47, while a spurious oil of nutmeg is only 0·871. By keeping it deposits a stearopten, or Muscat-camphor, called *Myristicine*. The solid or fixed oil consists of stearine and elaine, with a slight portion of volatile oil intermixed. Both the fixed and volatile are used for medical purposes. Of the fixed there are two varieties, the English and Dutch, of which the former is the better. It occurs in pieces, wrapped in leaves of the banana, weighing about three-quarters of a pound. When cut into, it has a uniformly reddish-yellow colour. The Dutch sort is in larger pieces, wrapped sometimes in leaves, sometimes in paper, and of a lighter yellow colour. Both are frequently adulterated. The volatile oil is also mixed with purified oil of turpentine. Nutmegs are frequently either digested in alcohol or distilled to abstract the volatile oil, and then passed off as fresh. Such nutmegs are lighter, and, when a hot needle is inserted, do not give an oily coating to it. Old, worm-eaten, or wild nutmegs should be rejected. Genuine or cultivated nutmegs are called female, to distinguish them from the male or wild nutmegs, which are the produce either of the M. moschata, Var. sphenocarpa, or of M. tomentosa, Thunb. These are longer, heavier, weighing generally 110 grains, and of inferior quality. They are more apt to cause narcotic symptoms, giddiness, &c., than the true sort.

Nutmegs and mace, from the large quantity of volatile oil, are decidedly stimulant, and when used in abundance, produce, by exciting the circulation, narcotic effects. In moderation they promote the appetite and assist digestion. Either when grated, or when a few drops of the volatile oil are put on sugar, they relieve flatus and colicky pains. They are chiefly used as additions to other medicines, to quicken their action or cover their taste. They should be entirely abstained from by persons having a tendency to apoplexy. [Aromatics.] The fixed oil is employed externally as a rubefacient in rheumatism and other diseases.

MYRISTICA'CEÆ are tropical, fragrant, aromatic trees, with an astringent juice, alternate, coriaceous, simple leaves, without stipules, and diœcious flowers. Of the flowers the males have monadelphous stamens, the females a single one-celled ovary, containing an erect seed, and both have for calyx a tubular, coriaceous envelope, with from 2 to 4, usually 3, valvate teeth. Their fruit is a two-valved succulent capsule, containing a single seed enveloped in an aril, and consisting of ruminated albumen, abounding in a powerful and agreeable aromatic secretion; the embryo is very small, and placed in a cavity at the base of the albumen.

The order is nearly allied to *Anonaceæ*, from which however it differs very remarkably in the total want of a corolla, and in the reduction of the number of carpels to one. To station it in the artificial division of apetalous Exogens, as is usually done, is to violate every principle of natural classification.

The *Nutmeg* of the shops, which is the seed of *Myristica Moschata*, is the only product of the order employed officinally. [Myristica Moschata.] Other species bear fruit that may be employed as a substitute, but they are all inferior to the real oriental Myristica. Three genera of the order have been distinguished, namely, *Myristica*, inhabiting the tropical woods of Asia and America, with *Knema* and *Pyrrhosa*, both confined to the tropics of India.



Myristica Aromatica.

1, a calyx; 2, the monadelphous stamens of a male flower; 3, the pistil of a female flower; 4, the seed of the nutmeg, enveloped in the mace or aril; 5, a vertical section of the seed, showing the ruminated albumen and the small embryo at its base.

MYRMECO'BIUS. [Marsupialia, vol. xiv., p. 456.]

MYRMECO'PHAGA. [Ant-Eater.]

N.B. In November, 1831, a letter from Sir R. Ker Porter was read to the Zoological Society of London, giving a detailed description of the *Myrmecophaga jubata*, Linn., under the name of *Orso Hormeguero*, or *Ant-Bear*, accompanied by a drawing of the full-grown individual from which the description was taken. The writer was particularly struck with the difference in structure which exists between the fore and hinder feet, and with the curious disposition of the parts of the former in the act of progression, which has been slightly referred to by D'Azara. In the figure (in which the animal is represented in a standing position) the claws of the fore-feet do not project in front, but are doubled backwards under the wrist, evincing a mode of progression in the *Myrmecophagæ* similar to that described by Colonel Sykes as existing in the species of *Manis*. [Pangolin.] To receive the additional length and point of the middle toe, according to Sir R. Ker Porter, a protruding mass of hard flesh stood out from the wrist, wherein was a cavity destined for the reception of the ungulated elongation when the animal was in a standing position, and as, from the awkward formation of the fore-feet, quickness of motion becomes impossible, these animals may be caught in the smallest open space (when seen) with little difficulty.

Fossil Myrmecophagæ.

See the article Megatheriidæ, vol. xv., pp. 69, 72 and 73.

MYRMOTHE'RA. [MYOTHERA.]

MYROSPERMUM, or *Myroxylon Peruiferum*, yields the balsam of Peru, and probably also the balsam of Tolu, though this is generally referred to *M. Toluiferum*. It is doubtful whether these are distinct species, or the same tree slightly differing, from circumstances connected with the place of growth. The two kinds of balsam are so similar that there is no difficulty in believing the differences between them to be owning to a difference of age in the individual trunk from which each was obtained, or to differences in the mode of extraction or of preparation.

Balsam of Peru occurs in two states; one called the white, the other the black. The former results either from spontaneous exudation from the bark, or from incisions made in it; it is also found in the inside of the seed-vessel wrapping the seed. At first it is liquid, of the consistence of recent honey, of a light-yellow colour, of an agreeable odour, resembling vanilla, and a somewhat acrid, bitterish, but aromatic taste. Its specific gravity is less than that of water. Heated in a platinum spoon it burns with a white smoke (which reddens litmus paper), and leaves no residual ash. It is completely soluble in alcohol, and also in æther, except some white material which separates from it. It contains much benzoic acid. By distillation with water it yields a volatile oil. By exposure to the air it hardens, and is then termed Opobalsamum siccum, which must not be confounded with the true Opobalsamum. [BALSAMODENDRON.] Balsam of Tolu is also sometimes called Opobalsamum.

Black balsam of Peru is stated to be procured by boiling the resinous bark of the trunk and branches of the tree. Th. Martius conjectures that it is procured by subjecting these parts and the pods to a kind of dry distillation, or *distillatio per descensum*, similar to that by which tar is obtained from pine-trees. This balsam has the consistence of syrup, but does not solidify with age, is scarcely tenacious, of a blackish-brown colour, and not transparent, somewhat oily to the touch, odour agreeable, balsamic, resembling vanilla, taste acrid, balsamic, bitterish, and enduring. Scarcely igniting when in contact with flame; not yielding by distillation with water any volatile oil, and not perfectly soluble even in absolute alcohol. Its chief constituents are the oil, which cannot be termed volatile, two kinds of resin, and benzoic acid.

Both sorts are extensively adulterated, chiefly with turpentines, copaiva, or volatile oils. One test of genuine black balsam is, when 1000 parts of balsam saturate 75 parts of pure crystallized carbonate of potass.

Balsam of Tolu flows from incisions in the tree, and is of the consistence of a strong turpentine. It is sent to Europe in earthenware jars or tin cases. It becomes tenacious with age, and in cold weather may be fractured, but melts again in summer, or with the warmth of the hand. It is of a yellow or brownish colour, transparent, with the taste and odour of the white balsam of Peru. This balsam likewise is much adulterated. All the three forms possess the ordinary qualities of balsamic substances, and, either in the state of syrup or tincture, are employed where such medicines are indicated. These have been already detailed [BALSAMS], and it is only necessary to state here, that their fragrance renders them pleasant adjuncts to cough mixtures, when the acute or active stage is passed, while the difference of price is the only reason for preferring one kind to another.

MYRRH. [BALSAMODENDRON.]

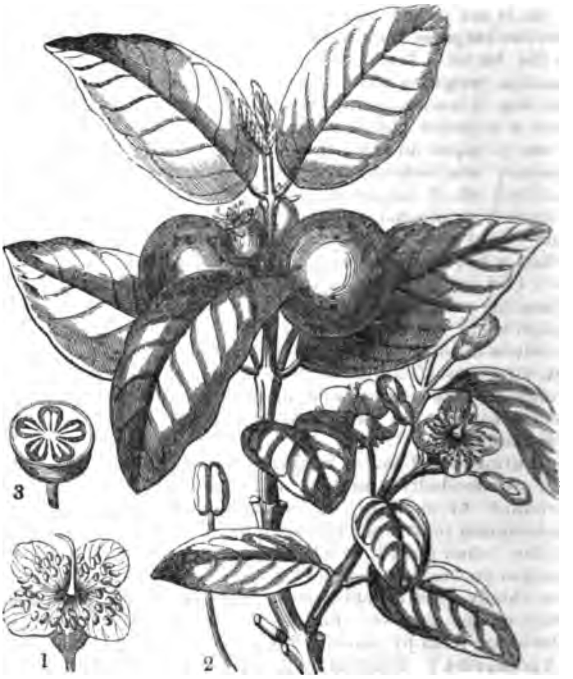
MYRSINA'CEÆ are chiefly subtropical plants of the Exogenous class, so nearly the same in their fructification as the Primulaceous species of northern climates, that scarcely any valid mark of distinction can be found between them. The indehiscent fruit in Myrsinaceæ is chiefly relied upon for the means of separating them. The general appearance of the two orders is however widely different; Primulaceæ consisting of herbs with no development of woody matter, while Myrsinaceæ, in all cases yet observed, are shrubs or trees. Many of the species have handsome foliage and gaily-coloured flowers, on which account they are frequently met with in gardens, but they are of no importance for useful purposes. Ardisia and Jacquinia are the two commonest genera.

MYRTA'CEÆ are polypetalous Exogens, forming a very extensive and important natural order of plants, exclusively inhabiting warm countries, and in all cases either shrubs or trees; an herbaceous form of the order is unknown. The most northern station of the species is the south of Europe, where the common Myrtle grows apparently wild. If this plant is taken as the type of the order, it might be said to consist of aromatic plants with opposite leaves, dotted with transparent oil-cysts, bearing icosandrous monogynous polypetalous flowers, succeeded by an inferior succulent fruit; but this is the character rather of a section of the order, than of Myrtaceæ considered as a whole. In this division are however included nearly all the species employed for the use of man. Among the table-fruits of the tropics are the *Guava*, yielded by different species of *Psidium;* the *Rose Apple* and *Jamrosade*, produced by *Eugenia Malaccensis* and *Jambos;* of spices, *Cloves* are the flower-buds of *Caryophyllus Aromaticus;* and *Allspice* is the dried berries of *Eugenia Pimenta:* all which are obtained from plants belonging to the same section as the common Myrtle; the aromatic fruits of that plant were indeed used as a spice before cloves and allspice became common.

The deviations that take place from the typical structure of the order consist partly in the fruit being dry and capsular, instead of fleshy and indehiscent, and partly in the organization of the interior of the fruit being reduced to a state of great simplicity; besides which the leaves are often alternate instead of opposite. Some of the species have no corolla, and there is in many cases a very singular tendency to consolidate the floral organs of all kinds.

The species with capsular fruit are principally found in New Holland, where, in the form of *Eucalyptus* and *Leptospermum*, they constitute one of the most striking features of the vegetation. [EUCALYPTUS.] These plants abound in a powerful astringent secretion, chiefly found in their bark, on which account they are found valuable for the tanner's purposes; while the aromatic principle is also abundantly secreted in other cases, as, for example, in *Melaleuca Cajeputi*, from which the green stimulating *oil Cajeput* is procured.

It is more particularly among these species that anomalous conditions of the floral organs occur. In *Eucalyptus* there is no corolla, and the segments of the calyx are so completely united to each other as to form a fleshy cap, thrown off by the flowers when the time arrives for extricating the stamens. In *Melaleuca*, *Calothamnus*, and several others, the stamens are united to each other by their filaments, so as to form showy, petal-like, fringed expansions; and in *Eudesmia* the petals themselves are united into a cap, thrown off upon the expansion of the flower.



Psidium pomiferum.
1, a flower; 2, a stamen; 3, a transverse section of the ovary.

The most singular form of Myrtaceæ is that which derives its name from a New Holland plant, called *Chamœlaucium*, in which the interior of the ovary contains but one cell, with from two to five ovules rising up obliquely from its base. These plants are all small heath-like shrubs, having in the majority of cases the edge of the petals prolonged into long and delicate fringes. Such plants are extremely abundant on the west coast of New Holland, where they form one of the most striking characters of the Flora.

The *Pomegranate*-tree is a most anomalous form of Myrtaceæ, remarkable for an almost total absence of transparent dotting, and consequently of aromatic qualities, and having a fruit consisting of two whorls of carpels, compacted together into an inferior ovary, the interior of which becomes altered and distended so much after the flower has fallen off, that the fruit is nothing but a collection of cavities filled with seeds, and having no apparent relation to each other.

MY'RTEA, Dr. Turton's name for a genus of conchifers founded on the *Venus spinifera* of authors.

MYRTLE, the *Myrtus communis* of botanists, is a bush with evergreen opposite leaves, which, when seen by transmitted light, appear as if pierced with small holes, in consequence of their containing a great number of little reservoirs of a transparent aromatic oil; the flowers are white, and produced in axillary clusters; they have an inferior ovary, numerous stamens growing from an epigynous disk, a single style, five petals, and are followed by a small oblong succulent fleshy purple fruit.

The Myrtle is apparently wild along the south coast of France, and in Sicily it occupies large tracts of country; but it does not appear to be really a European plant, but a native of Persia. In this country the Myrtle is seldom able to bear the winter, except when planted in front of a south wall, and protected from severe weather. In the Isle of Wight, some stations along the south coast of England, and in many of the mild parts of Ireland, it however becomes an ornamental bush, without requiring any protection whatever.

For a detailed account of the Myrtle, see Loudon's 'Arboretum Britannicum,' vol. ii., p. 962.

MYRTUS PIMENTO. [PIMENTO.]

MYSCA, Dr. Turton's name for a genus consisting of certain species of the genus *Unio*. Type *Unio Pictorum*.

MY'SIA, the name of an antient division of Asia Minor, forming the north-west extremity of that peninsula, and bounded on the north by the Propontis, on the west by the Hellespont and the Ægean Sea, on the south by Lydia, from which it was divided by the mountains which separate the valley of the Caicus from that of the Hermus, and on the east by the river Rhyndacus, which divided it from Bithynia. On the south-east the high land forming the interior of Mysia joins the central table-land of Phrygia towards the town of Azani. But the respective boundaries of Mysia, Bithynia, and Phrygia appear not to have been very clearly defined. (Strabo, b. xii.) Herodotus (vii. 74, 75) says that the Mysians were a Lydian colony; yet he adds, that the Bithynians affirmed that their ancestors had been driven from their former seat on the banks of the Strymon by the Teucrians and the Mysians. Strabo (vii., p. 295, Casaub.) says that the Mysi (Mœsians) and Getæ, who lived on the banks of the Ister, were considered by the old Greek writers to be Thracians, and that 'the Mysians of Asia, who dwelt between Phrygia, Lydia, and Troas, were a colony of the Mysians of Thrace.' [MŒSIA.] And in b. xii. he says that 'the Mysians of Asia were considered to be Lydians by some, and Thracians by others.' This may mean that Thracian immigrations became mixed with the previous inhabitants of Lydian race. Repeated Thracian immigrations are mentioned as having taken place before and after the Trojan war. Then came the Æolians, who occupied the maritime coast from the Hermus to the Æsepus, and built their cities there. [ÆOLIANS.] Geographers distinguished Æolia and Troas from Mysia. [TROAS.]

Mysia became subject to the Lydian monarchy, after the fall of which it formed part of one of the satrapies of the Persian empire which included also Lydia. It was afterwards in succession under the Macedonians, the kings of Pergamus, and the Romans. Under the Romans it formed part of the province called 'Asia.' Its principal towns were PERGAMUS, CYZICUS, ABYDOS, Lampsacus, Adramyttium, and Miletopolis, near the lake of the same name. The principal rivers of Mysia were the Caicus in the south and the Æsepus in the north; the smaller ones were the Evenus and the Granicus. The country now forms part of the Turkish province of Anadoli.

(Leake's *Asia Minor;* Charles Fellows, *Journal written during an Excursion in Asia Minor in* 1838, with an account of the remains of Assos and other towns of Mysia and Troas.)

MYSIS, the generic name for the *Opossum Shrimps.* [STOMAPODES.]

MYSORE, a large province in the southern part of the peninsula of India, lying between 11° 40′ and 15° N. lat., and between 75° and 78° 30′ E. long. Its greatest length from south-east to north-west is 210 miles, and its average breadth about 140 miles. The province is bounded on the east by the Eastern Ghauts, on the south by Coimbatore and Salem, on the west by the Western Ghauts, and on the north by the southern Maharatta country and districts formerly ceded to the English by the rajah of Mysore. The province consists of elevated table-land, with many lofty hills, among which rise several of the rivers that traverse the low countries; the chief of these rivers are the Caveri, the Vadavati, the Bhadri, the Arkanati, the Pennar, and the Palar or Palaur. The level of the province varies from 1830 to 2800 feet above the sea. Sevagunga, the highest mountain in Mysore, in 13° 10′ N. lat., 77° 20′ E. long., is 4600 feet high. Owing to the general elevation of the country, the climate is temperate and healthy. The clouds are much broken by the Ghauts which bound this territory to the east and west, and although there are frequent heavy showers in the table-land of Mysore, they are seldom of long continuance.

Mysore is governed by a native prince or rajah, with whom the English have a subsidiary treaty, concluded in 1799, after the defeat and death of Tippoo. On this occasion Coimbatore, Canara, and Soonda were transferred to the English government. The territory which remains to the Mysore rajah is divided into three districts or subayenas, viz. Patana or Seringapatam, Nagara or Bednore, and Chatracul. The first-named of these districts is by far the largest, and comprehends ninety-one subdivisions; Nagara has nineteen, and Chatracul has thirteen subdivisions: each of these subdivisions is superintended by a soubahdar. The situation of the natives who are of the superior class is upon the whole much better in Mysore than it is in the British presidencies, because the whole administration, civil and military, rests with them, instead of being vested in Europeans. In the Company's territories the natives, whatever be their station, with only few exceptions, have a master in every European, while in Mysore the governing class owns only one master, the rajah. But the lower orders of the people are, on the contrary, by no means so well off as in the British territory, the Mysore government being most oppressive to them. The province is, upon the whole, thinly inhabited. In 1804, the latest time as to which we have any statement upon that subject, the number of families was 482,612, and of individuals 2,171,754. Several times during the latter half of the eighteenth century the country was overrun by hostile armies, and ravaged to such a degree that many districts, which had previously been well peopled, were wholly deserted. During the present century the inhabitants have enjoyed a greater degree of security, and several good roads have been opened. The dwellings of the peasants, although built of mud, are more neat and commodious than in most parts of India. The population is supposed to have increased since 1804 under the improved state of things.

The rajahs of Mysore were for many years actively opposed to the extension of the British power in India. Hyder Ali Khan, who began his military career in 1749, and who assumed the sovereign power in 1760, invaded the lower Carnatic in 1780, and desolated the country to the very gates of Madras. His further progress was arrested by Sir Eyre Coote, but, being assisted by the French, he was able to continue the war until December, 1782, when he died, and was succeeded by his son Tippoo, who continued the war until the beginning of 1784. Peace being then concluded between France and England, he lost the assistance of his European allies, and concluded a treaty with the English. In 1790 Tippoo attacked the rajah of Travancore, whom the English were by treaty bound to assist, and a war ensued, which lasted until March, 1792, when a peace was concluded by Lord Cornwallis under the walls of Seringapatam, by the terms of which Tippoo was deprived of nearly one-half of his dominions. With the hope of recovering this territory, he endeavoured in 1798 to excite disaffection among the native subjects of the British, and sought the alliance of the French republic and of the sovereign of Caubul. In February of the following year the British army entered Mysore, and in April laid siege to Seringapatam, which fortress was taken by storm on the 4th of May when Tippoo was killed. Upon this event the English government placed on the throne the Maha Rajah Krishna Udiaver, then a child only six years old, a lineal descendant of the antient rajahs of Mysore, whose dynasty had been displaced by Hyder Ali. Purneah, who had been one of Tippoo's ministers, was at the same time entrusted with the government, and a treaty was concluded whereby the English undertook to maintain a military force for the defence of Mysore against all invaders, for which service an annual payment was to be made to the Company's government of seven lacs of pagodas (280,000*l.*). This treaty has continued in operation to the present time. The Rajah Krishna Udiaver, having been brought up under European guardianship, usually dispenses with much of the ceremony that is commonly observed at the courts of the native princes of India, but on state occasions he goes abroad with much pomp in a carriage capable of holding thirty persons, and drawn by elephants.

The town of Mysore, the antient capital of the province, was about 1770 superseded in this respect by Seringapatam, but it again became the seat of government on the fall of that fortress in 1799. It is situated in 12° 19′ N. lat. and 76° 42′ E. long. It occupies a considerable space of ground, and is enclosed by a wall. The streets are laid out with some regard to regularity, and the houses, which are for the most part whitened, are intermingled with temples and trees. The fort is separated from the pettah, or town, by an esplanade, and, besides the rajah's palace, contains the dwellings of the principal merchants and bankers.

MYSTERY (μυστήριον). In the religion of the Greeks there were rites and doctrines which were kept secret from the mass of the people and only communicated to a chosen few. These things were called *mysteries*. This word has been adopted by the writers of the New Testament, who apply it to things which are kept secret for a time and afterwards revealed, or to things which are kept secret from some persons though they may be revealed to others, or lastly, to things which, though not kept perfectly secret, are only made known by symbols. Thus the term answers pretty well to the English word *secret*. It is frequently opposed to words which imply *discovery*. Thus the New Testament writers speak of a *mystery revealed* (μυστήριον ἀποκαλυφθέν) or *brought to light* (φωτωθέν) or *made known* (γνωρισθέν). They call the gospel a mystery, as being a system which had formerly been kept secret, but was now revealed to them, and through them to the world (*Rom.* xvi. 25, 26; 1 *Cor.* ii. 7-10; *Ephes.* iii. 9; vi. 19; *Coloss.* i. 26, 27; ii. 2; iv. 3). So Christ said to his disciples, 'To you it is given to know the mysteries of the kingdom of heaven, but to them it is not given' (*Matt.* xiii. 11; *Mark*, iv. 11; *Luke*, viii. 10), that is, you are permitted to understand those doctrines which are at present kept secret from others. But afterwards they were commanded to proclaim these secrets to the world (*Matt.* x. 26, 27; xxviii. 19, 20; *Mark*, iv. 22; xvi. 15; 1 *Cor.* iv. 1). It is also applied to individual facts or doctrines. Thus the admission of the Gentiles to the privileges of the Christian religion is called a mystery, because it had never before been understood by the Jews (*Rom.* xi. 25; *Ephes.* iii. 3-5). The fact that the living will undergo a change at the resurrection is also called a mystery (1 *Cor.* xv. 51). To the same class belongs the only passage in which the word might perhaps be understood to imply something not merely *unknown* but actually *incomprehensible*, namely, 1 *Tim.* iii. 16, 'Great is the mystery of godliness (or religion, εὐσεβείας); God was manifest in the flesh,' &c., which means, 'Great is the secret which our religion discloses—God was manifest in the flesh,' &c. In 2 *Thess.* ii. 7, 'the mystery of wickedness' is 'wickedness which is already *secretly* at work in the church,' and of which the *revelation* is predicted in ver. 8 (τὸ γὰρ μυστήριον ἤδη ἐνεργεῖται τῆς ἀνομίας, ... καὶ τότε ἀποκαλυφθήσεται ὁ ἄνομος). The word is used in rather a singular way, but still with the same meaning, in 1 *Cor.* xiv. 2, where it is said of a person who speaks in an unknown tongue, 'in the spirit he speaketh mysteries,' that is, he communes with God in language unintelligible to those around. We have examples of the use of the word to denote the secret meaning of a figure or symbol in *Ephes.* v. 2; *Rev.* i. 20; xvii. 5, 7. This general signification of *a secret* is the only one in which the word mystery is used in the New Testament. In the Septuagint its meaning is the same (*Daniel*, ii. 18, 19, 27, 28, 29, 30, 47; iv. 9). The early ecclesiastical writers applied the word to solemn religious rites, and this is probably the reason why *μυστήριον* is translated in the Vulgate by *sacramentum*. In modern usage a *mystery* is a doctrine which is incomprehensible by the human understanding, or which appears to involve facts irreconcileable with each other. Thus the doctrine of the Trinity, the union of the divine and human nature in the person of Christ, the consistency of God's perfect foreknowledge and fixed plan of providence with the free-will of man, are spoken of as mysteries. Not that these doctrines are considered as self-contradictory; for if such contradiction be proved, the doctrine is no longer mysterious but impossible. We believe that they can be explained, though our mental powers are not strong enough to explain them. It is worthy of remark that mysteries (in the modern sense) are found in philosophy and natural religion as well as in revealed religion.

(Campbell *On the Gospels,—Dissertation on the word μυστήριον.*)

MYSTERIES, or MIRACLE-PLAYS. [ENGLISH DRAMA, p. 426.]

MYSTICS, a Christian sect which arose in the second century, and whose principles are probably to be traced to the philosophy of the Christian Platonists of Alexandria, Ammonius Saccas and his followers. They first appear as a distinct sect in the fourth century, under the teaching of a Grecian fanatic, who gave himself out to be Dionysius the Areopagite, one of St. Paul's converts (*Acts*, xvii. 34), and who is generally regarded as the founder of the sect of the Mystics.

Adopting the Platonic doctrine, that the human soul is a portion of the divine nature, they held that every man has a divine light within him which is sufficient for his guidance to present and future happiness, but that this light is obscured by the grossness of our material bodies and by the influence of external objects. To shake off these evil influences, and thus to keep the soul in as close connection as possible with its divine original, they considered to be the essence of religion; and this they endeavoured to accomplish by constant meditation on spiritual objects, secret communion with God, and an austere discipline of the body. As they considered everything external to the soul as only calculated to obscure the divine light within, they set no value upon accurate systems of doctrine nor upon religious observances as contributing to the advancement of religion. One of their leading doctrines was that real love to God must necessarily be disinterested, that is, uninfluenced by the expectation of reward or punishment.

The austere lives and apparent devotion of the Mystics caused their principles to spread extensively in the Eastern church. In the ninth century they were introduced into the West by a present which the Grecian emperor Michael Balbus made to Louis le Debonnaire, of the works of Dionysius the Areopagite, which however are undoubtedly spurious. The book was translated into Latin by the order of Louis, and the principles contained in it soon found many followers. In the thirteenth century the Mystics were the most formidable opponents of the schoolmen, and gradually many eminent men who were disgusted with the puerile conceits and lifeless religion of the latter, attached themselves to the Mystics (among these may be mentioned Thomas-à-Kempis); and just before the Reformation, nearly all the friends of spiritual religion were included in this sect. In the seventeenth century the doctrines of Mysticism were advocated by a Spanish priest, Michael de Molinos, from whose representations of religion, as consisting in the perfect tranquillity of a mind always engaged in communion with God, the sect obtained the new name of *Quietists*. At the end of the same century attention was called to Mysticism in France by the writings of Madame Guyon, whose sentiments were opposed by Bossuet and defended by Fénélon.

(Mosheim's *Ecclesiastical History*, and the works quoted by him.)

MYTHO'LOGY (μυθολογία). The mythology of a people may be said to consist of those legends and traditions which have been, at some period or other, usually believed by the majority of the nation, but which cannot be regarded as historical truths on principles of sound criticism. The term therefore is not confined to the religious systems of the Pagan nations; it includes everything that has been an object of popular belief, not merely respecting the origin, attributes, and adventures of the gods, but also concerning the early heroes, migrations, and exploits of a people. The historical inquirer has frequently great difficulty in determining at what time the mythology of a nation may be said to cease, and its history to begin; and in fact it is impossible to determine the exact time, since the transition from mythology to history must be necessarily gradual; and many traditions, which appear at first sight entirely mythological, may, upon further examination, be proved to contain some great historical truths. The scepticism which calls upon us to reject as mythological everything in the early history of a people which appears to us extraordinary and unaccountable, is as little worthy of respect as the credulity which requires us to believe everything that has been recorded respecting the exploits and adventures of the early heroes of antiquity.

Though a mythological event may be fictitious, it appears that mythology differs from fiction or fable, in having been once generally believed by a people as an account of events which actually took place. That which is regarded by us as mythological, may therefore be considered by another people as an historical or religious truth; and in the same manner as the exploits and adventures of the gods and heroes in the Mahâbhârata and Râmâyana are viewed by us as mythological, so the exploits and adventures of the Israelites in the conquest of Canaan, in many respects as extraordinary and wonderful as those of the gods and heroes in the great Hindu poems, may be looked upon by the Brahmans as the mythology of the Christian religion.

On few subjects perhaps has more learning been thrown away, than in investigating the history and origin of the mythology of the principal nations of antiquity. Among the various theories that have been proposed on this subject, the four following appear to have met with the greatest number of supporters:—

1. *The Scriptural theory*, according to which all mythological legends are derived from the facts contained in the narratives of Scripture, though the real facts have been disguised and somewhat altered. The supporters of this theory maintain that all mythic personages may be found in the Scripture; that Deucalion is only another name for Noah, Hercules for Samson, Arion for Jonah, &c. This hypothesis has been supported with a profusion of learned ingenuity and absurdity by Jacob Bryant, in his 'Analysis of Antient Mythology,' who saw the patriarchs in every minute event of heathen mythology. Sir William Jones, in his dissertations, in the 'Asiatic Researches,' on the Hindu gods, applied Bryant's arguments to the Hindu mythology, though his good sense preserved him to a great extent from the follies which distinguish Bryant's work. Most of the Christian Fathers maintained that the principal deities in the antient mythology were in reality devils, and that their worship and history had been taught to mankind by the devils themselves. This theory has been adopted by Milton, in the first book of his 'Paradise Lost,' in those lines beginning with—

> 'First Moloch, horrid king, besmeared with blood
> Of human sacrifice, and parents' tears,' &c.

2. *The Historical theory*, according to which all the personages mentioned in mythology were once real human beings, and the legends and fabulous traditions relating to them are merely the additions and embellishments of later times. This mode of accounting for the origin of mythology appears to have been in some measure adopted by the Egyptian priests, and was maintained by many of the Greek writers. The Egyptian priests told Herodotus (ii. 144) that their deities originally reigned upon the earth, and that the last who reigned was Orus, the son of Osiris, whom the Greeks called Apollo. An instance of this mode of accounting for the origin of mythology may be seen in the explanation which the Egyptian priests gave to Herodotus of the myth respecting the foundation of the oracles of Dodona and Ammon, according to which the two black pigeons which came from Thebes, in Egypt, and commanded that the oracles should be established, were in reality two Egyptian priestesses, who had been carried away from Egypt by the Phœnicians, and brought respectively to Dodona and the Libyan desert. Livy also attempts, in a somewhat similar manner, to give an historical explanation of the myth respecting the suckling of Romulus and Remus by a she-wolf (i. 4).

The author of the 'Book of Wisdom' imagines that the heathen deities were originally human beings, and accounts for their becoming objects of religious adoration in the following manner: 'For a father afflicted with untimely mourning, when he hath made an image of his child soon taken away, now knoweth him as a god, which was then a dead man, and delivered to those that were under him ceremonies and sacrifices.—Whom man could not know in presence, because they dwelt far off, they took the counterfeit of his visage from far, and made an express image of a king, whom they honoured, to the end that by this their forwardness they might flatter him that was absent, as if he were present' (xiv. 15, 17).

Among the Greeks this theory was adopted by Ephorus, and was carried to a great length by Euhemerus, in his 'Sacred History' (ἱερὰ Ἀναγραφὴ), fragments of which have been preserved by Diodorus Siculus and Eusebius. Some of the Christian fathers also adopted this view of mythology, and employed it with considerable success in their controversies with the supporters of the Pagan religion. Among the moderns this theory has been maintained by Banier, in his 'Mythology and Fables explained by History.'

3. *The Allegorical theory*, according to which all the myths of the antients were allegorical and symbolical, and contained some moral, religious, or philosophical truth, which was originally represented under the form of an allegory, but became, in process of time, to be understood literally. This view of mythology was first introduced into Greece by the Sophists, and an example of it is given by Protagoras in his explanation of the myth of Prometheus. (Plato, *Protagor.*) In later times this view of mythology was adopted by the New Platonists in their controversies with the Christians; and their object was to show that the antient mythology, under the garb of allegory, taught all the important duties and doctrines of morality and religion. Thus the view of mythology given by Homer and Hesiod, which was considered by Plato, in his dialogues on the Republic, as mischievous and dangerous, because it attributed human passions and feelings to the gods, occasioned no difficulty with the later Platonists. There is a work of Proclus, of which the curious in such matters may find a translation in the first volume of Taylor's translation of Plato, written for the express purpose of proving, in opposition to Plato, that the mythology of Homer and Hesiod contained nothing contrary to sound principles of morality and religion, since the myths of these poets ought to be understood allegorically.

This method of interpreting the antient mythology has found much favour among modern writers. It has been adopted by Bacon, in his 'Wisdom of the Antients,' in which he observes, 'I freely and willingly confess that I am inclined to the opinion, that not a few of the fables of the antient poets contained from their very origin a hidden mystery and allegory. For who can be so obstinately blind to evidence, that, when he hears that after the extermination of the giants, Fame was brought forth as a posthumous sister to them, he does not immediately apply the story to those party murmurs and seditious rumours which are wont to spread themselves among a people for awhile after the suppression of rebellions. Or when he hears that the giant Typhon cut away and carried off the sinews of Jupiter, and that they were stolen from him, and restored to Jupiter by Mercury; how can he but perceive immediately that this is to be referred to powerful rebellions, by which the sinews of kings, their revenue and authority, are cut out; yet not so but that by mildness of address and wisdom of edicts, as it were by stolen means, the minds of subjects within a short time are reconciled and the power of kings restored to them. Or when he hears that in that memorable expedition of the gods against the giants, the ass of Silenus became by his braying an instrument of great value in dispersing these giants; must he not clearly see that this was imagined of those vast projects of rebels, which are mostly dissipated by light rumours and vain consternation? There is also another not unimportant indication of the existence of a hidden and involved sense; namely, that some of the fables are so absurd and senseless in their outward narration, that they seem to show their nature at first sight, and cry for exposition by means of a parable. Above all, one consideration has been of great weight and importance with me—that most of the fables of mythology appear by no means to have been invented by those who relate them, such as Homer, Hesiod, and the rest; for were it clearly made manifest to us that they proceeded from that age, and those authors by whom they are celebrated, and thence transmitted to us, we should surely, I conjecture, not have been induced to expect anything great or lofty from such an origin as this. But he who considers the subject more attentively will discover that they are related to posterity as things already received and believed, not then for the first time imagined and offered to mankind. And this it is which has increased their estimation in my eyes, as being neither discovered by the poets themselves, nor belonging to their age, but a kind of sacred relics, the light airs of better ages, which, passing through the traditions of earlier nations, have been breathed into the trumpets and pipes of these Grecians.'

This view of mythology has been adopted and carried out to a great extent by Creuzer, in his 'Symbolik und Mythologie der alten Völker, besonders der Griechen.'

4. *The Physical theory;* according to which the elements air, fire, water, &c. were originally the objects of religious adoration, and the principal deities were personifications of the powers of nature. Thus the antient mythology of the Hindus, as developed in the Vedas, personifies the elements and the planets, and differs essentially from the hero worship of later times. The transition from a personification of the elements to the notion of a supernatural being presiding over and governing the different objects of nature was easy and natural; and thus we find in the Greek and Italian mythology that the deities presiding over the sun, the moon, the sea, &c., and not the objects themselves, are the subjects of religious adoration. The Greeks, whose imagination was lively, peopled all nature with invisible beings, and supposed that every object in nature, from the sun and sea to the smallest fountain and rivulet, was under the care of some particular divinity. Wordsworth, in his 'Excursion,' has beautifully developed this view of Grecian mythology.

'In that fair clime, the lonely Herdsman, stretched
On the soft grass through half a summer's day,
With music lulled his indolent repose;
And, in some fit of weariness, if he,
When his own breath was silent, chanced to hear
A distant strain, far sweeter than the sounds
Which his poor skill could make, his fancy fetched
Even from the blazing chariot of the Sun
A beardless youth, who touched a golden lute,
And filled the illumined groves with ravishment.
The mighty Hunter, lifting up his eyes
Towards the crescent Moon, with grateful heart
Called on the lovely Wanderer who bestowed
That timely light to share his joyous sport:
And hence a beaming Goddess with her nymphs
Across the lawn and through the darksome grove
(Not unaccompanied with tuneful notes
By echo multiplied from rock or cave)
Swept in the storm of chase, as moon and stars
Glance rapidly along the clouded heaven
When winds are blowing strong. The Traveller slaked
His thirst from rill or gushing fount, and thanked
The Naiad. Sunbeams upon distant hills
Gliding apace, with shadows in their train,
Might, with small help from fancy, be transformed
Into fleet Oreads sporting visibly.
The Zephyrs, fanning, as they passed, their wings,
Lacked not for love fair objects whom they wooed
With gentle whisper. Withered boughs grotesque,
Stripped of their leaves and twigs by hoary age,
From depth of shaggy covert peeping forth
In the low vale, or on steep mountain-side;
And sometimes intermixed with stirring horns
Of the live deer, or goat's depending beard;
These were the lurking Satyrs, a wild brood
Of gamesome deities; or Pan himself,
The simple shepherd's awe-inspiring God.'

Almost all the theories that have been brought forward, either in antient or modern times, to account for the origin of mythology, may be classed under one of these four divisions; but not one of them taken by itself is sufficient to account for all the mythological traditions of a nation. The error of most writers on mythology consists in referring the origin of all myths to one common source; whereas the mythology of almost all nations has arisen from various and distinct sources. All the theories which have been mentioned above are true to a certain extent. Even that mode of interpretation which we have ventured to call the Scriptural theory, perhaps the most unsound and unsatisfactory of all, will serve to throw light upon some myths which would otherwise be unaccountable. For instance, the legends which we find in the mythology of almost every people, respecting a period in which the world was covered with water, can hardly be explained upon any other hypothesis than that such an event actually took place as is recorded in the Mosaic books. It would therefore be more correct to say that the mythology of a nation has arisen from all the causes which have been mentioned, rather than from any one in particular; but it must also be recollected that there are many myths the origin of which cannot be accounted for on any of the hypotheses that have been proposed. A great number of legends in all countries have arisen from the desire of man to account for those natural phenomena which he cannot understand: and not a few have had their rise from a similar desire of giving a reason for the names of places and persons. The 'Metamorphoses' of Ovid will supply numerous examples of such myths.

The preceding observations are only intended to give a general view of mythology, and of the principal systems which have been proposed in antient and modern times to account for its origin. The particular mythology of any nation must be acquired by aid of the articles in other parts of this work, such as BRAHMA, VISHNU, FAIRIES, HERO, GENII, JUPITER, JUNO, APOLLO, ARES, MARS, BELLONA, &c., and more particularly by the help of such works of reference as are enumerated below.

(*Scriptores Rerum Mythicarum*, edited by Bode; Bochart's *Phaleg* and *Canaan;* Rudbeck's *Atlantica;* Bacon, *On the Wisdom of the Antients;* Banier's *Mythology and Fables explained by History;* Bryant's *Analysis of Antient Mythology;* Sir W. Jones, *On the Gods of Greece, Italy, and India;* Moor's *Hindu Pantheon;* Coleman's *Mythology of the Hindus;* Rhode, *Ueber religiöse Bildung, Mythologie, und Philosophie der Hindus;* Creuzer's *Symbolik und Mythologie der alten Völker, besonders der Griechen;* K. O. Müller's *Prolegomena zu einer wissenschaftlichen Mythologie;* Buttmann's *Mythologus, oder Abhandlungen und Aufsätze über die Sagen der Griechen, Römer, und Hebräer;* Lobeck's *Aglaophamus, sive de Theologiæ Mysticæ Græcorum Causis;* Grimm's *Deutsche Mythologie.* The English reader may refer to Keightley's *Mythology of Antient Greece and Italy.*)

MYTILA'CEA. [MYTILIDÆ.]

MYTI'LIDÆ, a family of marine conchifers.

The Linnean genus *Mytilus*, as it was left by the author in his last edition of the 'Systema Naturæ,' was divided into three sections. The first, 'Parasitici, unguibus affixi,' consisted of those species which are affixed by unguicular appendages to Gorgoniæ and other submarine bodies, both organic and inorganic, such as *Mytili Crista Galli, Hyotis,* and *Frons,* which have been since restored to the genus *Ostrea.* The second, 'Plani s. compressi, ut plani appareant et subauriti,' consisted of the *Pearl-bearing Muscle,* 'Matrix perlarum,' under the name of *Mytilus margaritiferus,* now separated generically under the names of *Meleagrina* and *Margarita* [AVICULA; MALLEACEA; MARGARITACEA], and *Mytilus unguis,* a species, if it be one, not larger than the human nail. The third, 'Ventricosiusculi,' comprised not only the true *Mytili,* of which *Mytilus edulis, the Common Muscle,* may be considered as the type, but also the *Mytilus Lithophagus,* the *Modiolæ,* the true *Avicula* (*Mytilus Hirundo*), and the fresh-water muscles (*Anodon*). The generic definition of this heterogeneous assemblage was, 'Mytilus. The *animal* an ascidia? The *shell* bivalve, rough (rudis), most frequently affixed by a byssus. The *hinge* toothless, marked (distinctus) by an excavated, longitudinal, subulate line.' Linnæus placed this genus between *Anomia* and *Pinna.*

Authors soon perceived the necessity of a reform in this arrangement, and the position which the genus occupied in the systems of the leading malacologists of more modern date will be found in the article MALACOLOGY, vol. xiv., pp. 318, 319, 324.

The genus *Pinna* of Linnæus ends the '*Bivalvia, conchæ*' of that author.

Cuvier makes the *Mytilacés* the second family of his Testaceous Acephalous Mollusks. He characterises the family as having the mantle open in front, but with a separate aperture for the excrements, adding that all these bivalves have a foot serving the purpose of creeping, or at least to draw out, direct, and fix the byssus. They are, he states, in conclusion, known under the generic name of *Moules* (Muscles).

This family Cuvier subdivides into

I. The True or Marine Muscles (Moules propres ou Moules de mer. Mytilus, Linn.).

In this subdivision are placed *Mytilus* (Mytilus edulis and its congeners); *Modiola* (Lam.); and *Lithodomus* (Cuv.).

II. The Anodonts (*Anodontes,* Brug.), vulgarly Pond Muscles (Moules d'Etang).

III. Les Mulètes (Univ., Brug.), commonly called the Painters' Muscles, including *Hyria* and *Castalia,* Lamarck.

IV. Cardita. (Brug.)

V. Cypricardia. (Lam.)

VI. Les Coralliophages. (De Blainv.)

Venericardia he considers as differing but little from *Cardita*, and he observes that both the one and the other approach *Cardium* in general form and the direction of the ribs (côtes). He states his suspicions that this is the place for *Crassatella*.

This family is placed by Cuvier between the *Ostracés* and the *Camacées*.

The genus *Pinna* is placed by this zoologist between *Avicula* and *Arca*.

Lamarck characterised his *Mytilacées* as having the hinge with a sub-internal, marginal, linear, very entire ligament, occupying a great part of the anterior border, and the shell rarely foliated. In this family he places the genera *Modiola*, *Mytilus*, and Pinna.

M. Deshayes, in the last edition of Lamarck's work, allows that nearly all conchologists have admitted the family of *Mytilaceans* or *Mytilidæ*, either as it was constituted by Lamarck, or after having made it undergo some modifications of little importance. M. Deshayes remarks that he himself adopted it in the 'Encyclopédie,' having suppressed the genus *Modiola*, which, in his opinion, has not sufficient characters, and supplied its place by *Avicula*. But, setting aside all former opinion, M. Deshayes, in the last edition of Lamarck, enters into an examination whether the family ought to be preserved. The genus *Mytilus*, he observes, has always two adductor muscles, the anterior one very small, and the posterior much larger; the lobes of the mantle are united posteriorly at a single point, so that there exists but a solitary siphon for the anus. The aperture of the mouth is not papillose within. The *Modiolæ*, he continues, differ in nothing from the *Mytili;* their anterior muscle is indeed in some species rather larger, and the anterior extremity of the animal is a little prolonged beyond the *umbones*. These differences are, in his opinion, without importance, for we pass from one genus to the other by insensible gradations. In the genus *Pinna* we no longer find the mantle with a posterior commissure; consequently there is no anal siphon; there are two unequal muscles, and the mouth as well as the lips are covered internally with membranous papillæ. The ligament of the *Mytili* is external and convex, like that of the *Uniones* (Mulettes), &c.; that of the *Pinnæ* is very narrow, elongated over nearly the whole of the posterior border, and often covered with a delicate testaceous lamina, losing nearly all the characters of external ligaments. The *Aviculæ* have no anterior adductor muscles, but, like the *Pinnæ*, their mantle has no posterior commissure; the mouth is furnished with papillæ; the ligament has none of the characters of external ligaments, but is sunk in a superficial gutter, and takes all the characters of the ligaments of the *Ostraceans* and other *Monomyaria*. If, says M. Deshayes, in conclusion, a great value is attached to the existence of the siphons and their number, it is evident that, in following the rules laid down for classification, the *Mytili* should be separated from the *Pinnæ*, and that we ought to constitute from them two very approximating families. Between the *Pinnæ* and the *Aviculæ* there would seem to be more analogy than between the *Mytili* and *Pinnæ*. Nevertheless, in this last genus there are two adductor muscles, whilst in the *Aviculæ* there is but one. Then we ought to remember that the character resting upon the number of the muscles is very important, and if we here apply that character, we shall be led to make the *Aviculæ* a small family separate from the *Pinnæ*.

M. de Blainville thus characterises the *Mytilacea*, which he places between the *Margaritacea* and the *Arcacea* or *Polyodonta*. The genus *Avicula* among the *Margaritacea* thus immediately precedes the *Mytilacea*.

Character.—Mantle adhering towards the borders, slit throughout its inferior borders, with a distinct orifice for the anus, and an indication of the branchial orifice by the more considerable thickening of its posterior borders; a canaliculated, linguiform foot, with a byssus backwards at its base; two adductor muscles, the anterior of which is very small, besides the two pair of retractor muscles of the foot.

Shell regular, equivalve, often furnished with an epidermis, or corneous, with a toothless hinge, and a linear, dorsal ligament.

The genera placed in this family by M. de Blainville are *Mytilus*, with its subdivisions, and *Pinna*.

M. Rang gives the following as the characters of the family *Mytilacés:*—

Animal having the mantle open throughout its inferior part, and adhering towards the borders; a separate aperture behind for the excrements, forming very rarely a tube; the foot linguiform, canaliculated, and furnished with a byssus behind.

Shell rather delicate, generally with an epidermis, or corneous, equivalve, but very inequilateral; the hinge toothless; the ligament linear; anterior muscular impression very small; the posterior one rather large.

Marine (the genus *Mytilus* alone presents a species which is said to live in fresh water). (*Manuel*, &c.)

The genera arranged by M. Rang under this family are, *Mytilus*, with its subdivisions, including *Modiola*, *Lithodomus* (Cuv.), and *Pinna*.

Mr. G. B. Sowerby (*Genera*), after remarking that the Linnean genus *Mytilus*, on account of its principal character being its want of hinge teeth, consists of several forms that are widely distinct from each other, and which have well served as the types of several Lamarckian genera, such as *Avicula*, *Modiola*, *Anodon*, and others, in connection with the present genus, which deservedly retains the name of *Mytilus*, both on account of its form[*] and the priority of its claim, proceeds to observe that the other genera which have been united with it, but from which it appears necessary to distinguish it, because of a certain degree of general resemblance, are *Modiola* and *Lithodomus:* from *Anodon* and *Avicula*, together with Lamarck's *Meleagrina*, it is, he adds, obviously distinct; whilst one character, namely, the pointed terminal umbones, serves to distinguish it from *Modiola* and *Lithodomus*.

Mr. Garner, in his paper 'On the Anatomy of the Lamellibranchiate Conchifera' (*Zool. Trans.*, vol. ii.), is disposed to regard the disposition and form of the *branchiæ* and *siphons* as being of great use in the classification of those animals; and he instances *Anomia*, *Pecten*, *Arca*, *Modiola*, *Unio*, &c., &c., as each having a particular disposition of the *branchiæ*, sac of the mantle, valves, *siphons*, &c., giving rise to particular modifications of the course of the aërating currents of water to the *branchiæ*. He observes that in the genera, some of which are above mentioned, no complete division of the sac of the mantle exists, while in *Solen Hiatella*, *Pholas*, &c., a different disposition takes place. With regard to the *Excretory system*, he found the oviduct distinct from the sac in *Modiola*, *Mytilus*, *Lithodomus*, &c., whilst in *Tellina*, *Cardium*, *Mactra*, *Pholas*, *Mya*, and most others, the *ova* are discharged into the excretory organs. With reference to the *Reproductive system*, Mr. Garner remarks that the ovaries of the *Lamellibranchiate Conchifera* differ much in their situation: sometimes they form distinct parts, sometimes they are found in the foot. sometimes they are ramified in the mantle, which last disposition is present in *Modiola*, *Anomia*, *Lithodomus*, *Hiatella*, and the like.

The same author in his 'Anatomical Classification of the Lamellibranchiata' (*loc. cit.*), thus arranges the genera *Mytilus*, *Modiola*, *Pinna*, *Lithodomus*, and *Unio*.

Mantle with a distinct anal orifice.	Foot small, byssiferous . . .	Anterior muscle small; retractile muscles of the foot numerous; byssus large . . .	Byssus divided to its base	MYTILUS.
			Byssus with a common corneous centre .	MODIOLA.
			Anus furnished with a long lingulate valve.	PINNA.
		Muscles equal, two pairs of retractile muscles only; byssus rudimentary . . .		LITHODOMUS.
	Foot large, not byssiferous			UNIO — Cardita, Hyria, &c.

Genera. Mytilus.

This genus is abundant on most rocky coasts, where the species are to be found moored by their coarse filamentous byssus, generally to such rocks or other submarine bodies as are exposed at some periods of the tide, where tides exist, and covered by the sea at high water. Mr. G. B. Sowerby does not think that, after being once attached, they habitually disengage themselves, though it appears to him probable that, when disengaged by the force of the sea, they may live for some time without being in any manner affixed.

M. Deshayes, in the last edition of Lamarck, thus describes the

Animal.—Oval, elongated; the lobes of the mantle simple or fringed, united posteriorly in a single point so as to form an anal siphon; mouth rather large, furnished with two pairs of soft palps, which are pointed and fixed by their summit only. Foot slender, cylindraceous, carrying at its base, and posteriorly to it, a silky byssus; abdominal mass moderate, and on each side a pair of branchiæ nearly equal; two adductor muscles, the one anterior and very small, the other posterior, large, and rounded.

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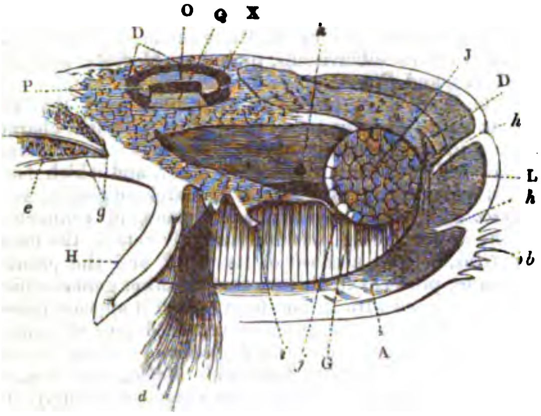
[*] The name is supposed to refer to the fancied resemblance between the shell of this Acephalan and a Mouse. The Greek word Μῦς is used to signify both a Mouse and a Muscle (Mytilus)



Gland of the byssus, mantle, oviduct, &c. of Mytilus edulis. (Garner.)

A, right lobe of the mantle; D, rectum; G, branchiæ; H, foot; J, posterior muscle; L, superior tube; O, heart; P, ventricle; Q, auricle; X, pericardium; *b*, tentacles; *d*, byssus: *e*, gland of the byssus; *g*, retractile muscle of the foot; *h*, valves of the mantle; *i*, oviduct; *j*, orifice of the excretory organ; *k*, internal ditto.

The species are numerous, and most of them are used as food; but they should be eaten with caution, for serious illness and even death have ensued from a meal made on some of them. The byssus or *beard*, as it is popularly called, should be carefully cleared away, and they should be particularly avoided when cholera is about, or even when diarrhœa is prevalent.

Captain P. P. King, R.N. (*Voyages of the Adventure and Beagle*, vol. i.), mentions the Choro (*Mytilus Choros* of Molina) as among those shell-fish of the island of Chilóe which are more particularly deserving of notice. Speaking of this large muscle, Captain King says, 'Molina has described the choro of Concepçion, which is not at all different from that of Chilóe. It is often found seven or eight inches long. The fish is as large as a goose's egg, and of a very rich flavour; there are two kinds, one of a dark brown, and the other of a yellow colour; but the last is most esteemed. There is also another sort, much larger than the choro, yet equally delicate and good, the fish of which is as large as a swan's egg: it is called cholgua; but as the shells seem to be of the same species, I think the distinction can only be owing to size. In Febres's "Dictionary of the Chileno language," the word cholchua is rendered into Spanish by "cascara de choros blancos," or shell of the white muscle. Cholhua, or Cholgua (the letters g and h are indiscriminately used), must be a corruption; for it is now used in Chilóe to distinguish the large from the small choros. The manner in which the natives of these islands, both Indians and descendants of foreigners, cook shell-fish is very similar to that used for baking in the South Sea Islands and on some parts of the coast of New Holland. A hole is dug in the ground, in which large smooth stones are laid, and upon them a fire is kindled. When they are sufficiently heated, the ashes are cleared away, and shell-fish are heaped upon the stones, and covered first with leaves or straw, and then with earth. The fish thus baked are exceedingly tender and good; and this mode of cooking them is very superior to any other, as they retain, within the shell, all their own juiciness.'

Geographical Distribution.—Very wide. Few rocky coasts are without some of the species, which are all littoral. They are sometimes found affixed to crustaceans, shells, and corals.

*

Mytili with a smooth shell.

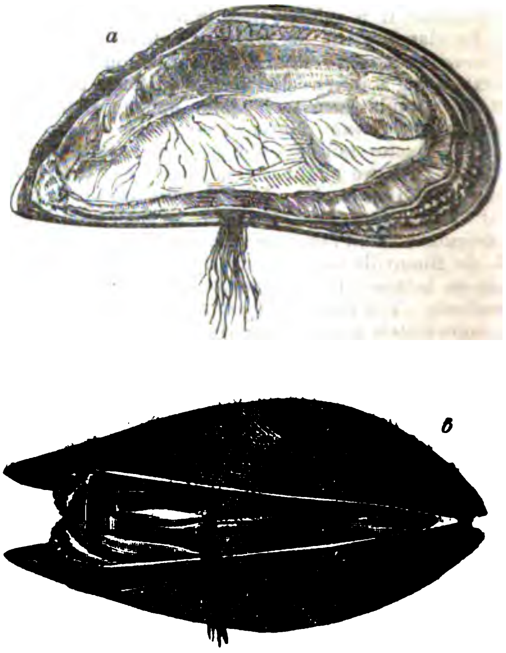
Example, ***Mytilus edulis—Common Salt-water Muscle.***

This species is too well known to require description: the figures will show the shape of the shell, which is strong: when freed from the epidermis and polished, the under surface of the external part of the shell is exposed, and is of a deep blue. In this state it is often offered for sale at watering places. The inside of the valves is white with a dark rim. The common edible muscle is found in extensive beds below low-water mark, and also at a greater depth. Rocks and stones between high-water and low-water marks are also covered with them. We once saw a lobster, which is now, we believe, in one of our museums, with its shell coated with them. The species is used largely as an article of food, and is considered rich and sapid by many; but it entirely disagrees with some constitutions, and, besides other derangements, has been known to cause blotches, swellings, &c. Some cases are recorded where these and other affections have been produced by eating these muscles, whilst some who have partaken from the same dish have escaped all evil consequences. These derangements have been attributed by some to the byssus, by others to the Pea-crab [PINNOTHERIANS], a little crustacean which shelters itself, especially at particular seasons, in the shell of the Muscle, and by others again to the muscle itself being in an unwholesome state or out of season. There can be little doubt that the muscle, like the oyster, and indeed like most other edible animals, is comparatively unfit for the food of man at certain periods; but that the Pea-crab has anything to do *per se* with the poisonous qualities of these esculents is denied by all who have written on the subject. When any symptoms of derangement occur after eating muscles, an emetic should be taken and afterwards a dose of castor-oil. Cases of this kind are however rare. Pennant remarks, that for one who is affected by eating muscles, a hundred remain uninjured. [See further, MYTILUS EDULIS.]

Particular localities are celebrated as producing this muscle in perfection. 'Ne fraudentur gloriâ sua littora,' exclaims the author last quoted. 'I must, in justice to Lancashire, add, that the finest muscles are those called *Hambleton Hookers*, from a village in that county. They are taken out of the sea and placed in the river Weir, within reach of the tide, where they grow very fat and delicious.' In 'The Forme of Cury' (1390) is a receipt for dressing 'Muskels in brewet,' and also one for making 'Cawdel of Muskels.'

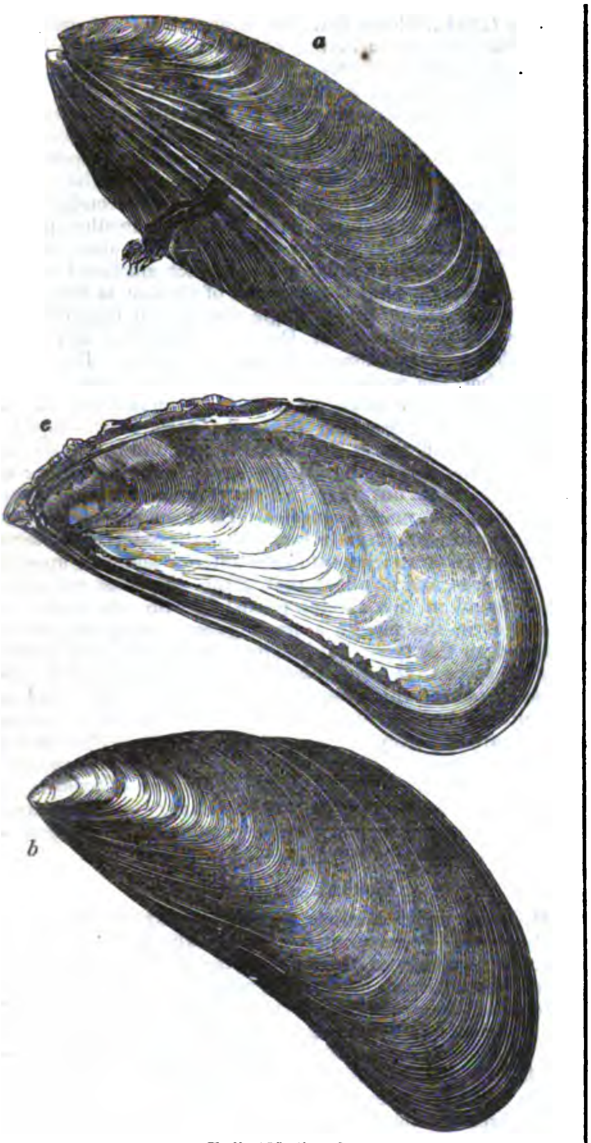
Small or seed pearls frequently occur in this species, and some years ago these were employed for medical purposes.

Ova of Mytilus edulis. ($\frac{1}{16}$ inch focus.)



Mytilus edulis.

a, detached valve;—the animal in situ with byssus:—the mantle slightly contracted; *b*, valves conjoined;—animal as seen when the shell is partly forced open, with byssus.



Shell of Mytilus edulis.

a, valves closed, with byssus; *b*, external view of one of the valves; *c*, internal view, showing the muscular impressions.

In the Museum of the Royal College of Surgeons (*Physiological Series*, No. 94) is one of the valves of this species, which has been steeped in an acid to dissolve and separate the earthy part (carbonate of lime) and show the animal part retaining the membranaceous form.

* *

Mytili with the shell striated longitudinally.

Example, *Mytilus Magellanicus*.

Description.—Shell oblong; whitish below, purple violet above, with long thick undulated furrows; the umbones acute, and not much curved. Length varying, generally from four to five inches.

Localities.—Straits of Magalhaens, Chilóe, &c.

The flesh is well-flavoured and nutritious. The shells of old individuals, when polished, are brilliant, with a nacreous deep purple tinged with violet.

It is not improbable that this species ministered in a degree to the woful wants of Byron and his wretched companions after the wreck of the *Wager*. 'Having thus established,' says that officer, 'some sort of settlement, we had the more leisure to look about us, and to make our researches with greater accuracy than we had before, after such supplies as the most desolate coasts are seldom unfurnished with. Accordingly we soon provided ourselves with some sea-fowl, and found limpets, muscles, and other shell-fish in tolerable abundance; but this rummaging of the shore was now become extremely irksome to those who had any feeling, by the bodies of our drowned people thrown among the rocks, some of which were hideous spectacles, from the mangled condition they were in by the violent surf that drove in upon the coast. These horrors were overcome by the distresses of our people, who were even glad of the occasion of killing the gallinazo (the carrion crow of that country) while preying on these carcasses, in order to make a meal of them.'

Mytilus Magellanicus—attached to a rock by its byssus.

Here may be introduced the *Mytilus polymorphus* of Pallas, Gmelin, and others, thus characterised as a genus by Dr. Vanbeneden, under the name of

Dreissina.*

Animal.—Mantle entirely shut, presenting three apertures, one of which is furnished with a siphon. Anterior extremity of the body bifurcated and lodging in the middle of the division the transverse anterior muscle. Abdomen depressed; extremities of the branchiæ floating in their posterior half.

Shell.—Regular, equivalve, inequilateral, umbo with a septum in its interior. Three muscular impressions, the middle one unique and linear.

Nervous System.—This consists of two pairs of ganglions and a great single ganglion; they are all united together, and represent a true chaplet (chapelet). The first pair of nerves, that which represents the brain, is situated on the lateral parts of the buccal opening between the two labial tentacles, but more approximated to the anterior tentacle. It cannot be said that it is placed above the œsophagus, for it is, if anything, below it. The skin, which forms the upper wall of the œsophagus, covers it, and it is placed between this skin and the anterior retractor muscle. The second or mesial pair is situated at the anterior part of the base of the retractor muscle, between it and the liver. The third pair is represented by a single ganglion, which occupies the mesial line, and of which the volume is considerable. It is situated in the middle of the posterior transverse muscle.

The muscular system is much the same as in *Mytilus*.

Dr. Vanbeneden thinks that the organ of the byssus, which he designates, after Poli, by the name of 'languette,' has been erroneously taken for the foot. The true foot, he observes, consists of a muscular tunic more or less thick, which covers the abdomen of the animal, and serves it as an organ of progression; whilst the organ, which always accompanies the byssus, possesses no character in common with the foot except its mobility. Instead of covering the abdomen as a muscular tunic, it forms a part of the retractor muscle, from which it cannot be separated. At the base of this organ, with which, when the byssus is torn away, the animal seems to explore the bodies in its neighbourhood, is the sheath in which the byssus is lodged.

The mantle entirely envelops the animal, and forms three apertures, one of which serves for the passage of the byssus and the 'languette;' the second terminates the animal in the siphon; the third is placed on the back, and gives passage to the excrements. The aperture of the siphon is elongated many lines in respiration, and can be bent in different directions.

Place in the Animal Series.—Dr. Vanbeneden comes to the conclusion, from the anatomical and physiological structure of the animal, that its place is between *Mytilus* and *Anodon*.

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* Named from M. Dreissens of Mazeyk (province of Limburg).

Geographical Distribution.—The author above quoted states that this form is found throughout Europe, and that America possesses individuals which approach it. (*Mytilus recurvus*, Rafinesque, &c.)

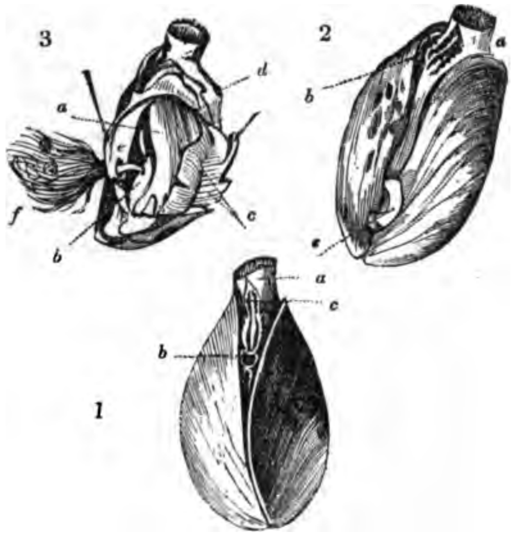
Dr. Vanbeneden records two recent species, *Dreissena polymorpha* and *Dreissena Africana*.

Example, *Dreissena polymorpha*. This appears to be the *Mitylus Wolgæ*, Chemn.; *M. Chemnitzii*, Fér.; *M. Hagenii*, De Baer; *M. lineatus*, Waardenburg, and *M. Arca*, Kickx.

Localities.—Inhabiting seas, lakes, rivers, and marshes; all these conditions seem favourable to it. Dr. Vanbeneden gives the following localities:—the Caspian Sea, the Black Sea, and the Baltic, the Danube, the Wolga, and the Rhine, where they are found in considerable quantities; the marshes of Syrmia (the Palatinate), the *Canal Guillaume* (Belgium), the lakes of Harlem (Holland), the Lea (our river Lea, we suppose, is meant), the *Doks* (the Commercial Docks, London, probably), and the neighbourhood of Edinburgh (Union Canal); so that this form extends nearly over the whole surface of Europe from lat. 43° N. to 56°; Turkey, Austria, Russia, Germany, Belgium, Holland, and England. (Vanbeneden.)

Mr. J. D. C. Sowerby appears to have been the first who noticed their introduction into the Commercial Docks, in the Thames, to which place he is of opinion that they had been probably brought in timber.

Habits, &c.—The species are found at the bottom of the water in beds, like the marine mytili, agglomerated in bunches by means of their byssus. They attach themselves to stones, to piles, to other shells (*Unio* and *Anodon*), and all the bodies which are in their neighbourhood. Dr. Vanbeneden remarks, in continuation, that they probably often adhere to the keels of boats, and that it is perhaps by such means that they are dispersed over such a considerable extent.

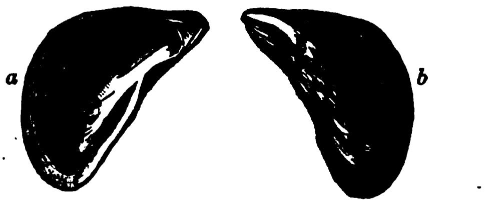


Dreissena polymorpha.

1, Animal of 'nat. size,' showing the siphon exserted, and the aperture which corresponds with the anus open; view of the back. *a*, The siphon; *b*, the posterior row of papillæ; *c*, anal aperture.

2, View of the ventral side. *a*, The siphon; *b*, the anterior row of papillæ; *e*, the languette.

3, Animal in the left valve. *a*, The abdomen; *b*, the languette in situ; *c*, the branchiæ; *d*, the aperture which gives issue to the excrements; *e*, aperture of the byssus; *f*, the byssus. (Vanbeneden.)



Shell of Dreissena polymorpha.

a, View of inside of valve, showing the septum at the umbo; *b*, the outside of valve.

M. Deshayes (last edition of Lamarck), after alluding to the memoir of Dr. Vanbeneden, which the reader will find in the second series of the *Annales des Sciences Naturelles*, vol. iii. (1835), allows that the animal does not entirely resemble the marine mytili, which have the mantle open nearly throughout its circumference, and only have the lobes united posteriorly in a single point, so as to form over against the anus a small canal for the issue of the excrements. The principal difference, he remarks, consists in the *Mytilus polymorphus* having two posterior apertures instead of one; the second aperture, larger than the other, prolonging itself into a short siphon destined to conduct the water over the branchiæ. With regard to the other parts, he observes that they do not differ from the other mytili except by gradations similar to those which are found in the marine species. Thus the retractor of the foot is here less divided, and leaves only a single narrow and isolated impression on the valves. M. Deshayes states that he knows an analogous disposition in the marine species. The form of the foot, the position of the byssus, the form of the mouth and of the labial palps, and the interior disposition of those organs, resemble the same parts in the mytili. Some slight differences may perhaps be found in the distribution of the nerves; but M. Deshayes inquires whether it is clearly made out that this distribution does not vary as much in the marine muscles. He then adverts to the small transverse septum in each valve, the external surface of which gives attachment to the anterior adductor muscle of the valves, and he allows that if this character was only to be found in this species, coexisting with two posterior apertures in the mantle, a small generic group might be founded on this type; but he proceeds to state that many marine species, *Mytilus bilocularis*, for example, offer the same character, which loses its importance when we find it established by degrees, commencing in some species so as to be scarcely perceptible, increasing in others, and showing itself in its greatest development in the species last quoted. Unfortunately, he adds, the animal of *Mytilus bilocularis* is not known; so that we are unable to appreciate the value of the character which it offers in common with the genus *Dreissena* of Dr. Vanbeneden.

Modiola. (Lamarck.)

M. Rang makes Modiola the third group of the genus *Mytilus*. M. Deshayes, in his inquiry whether this genus ought to be preserved, observes that the *Mytili* and *Modiolæ* much resemble each other, as all admit, but they offer some difference, the importance of which he proceeds to test. Of the animals he says nothing, their analogy being so perfect, and all their characters, internal as well as external, being so similar that it is impossible to distinguish them. The habit which certain species have of living in the stones which they pierce has not changed their organization; and of the justice of this remark those interested in the subject may, he states, assure themselves by a comparison of the animals themselves, which are abundantly spread abroad in all seas. It is a received principle among all zoologists, he continues, that animals having the same organization ought to make a part of the same genus; but as there are persons who attach considerable importance to certain characters in the shells, it is right to reduce it to its just value. The *Modiolæ* differ from the *Mytili* in not having pointed and terminal umbones. On assembling a great number of living and fossil species of both genera, some will be observed whose umbones, nearly terminal, are overpassed by a small very short border; others in which this border is a little more extended; and so one passes by insensible degrees from the *Mytili* to the *Modiolæ* without the possibility of determining the point where one genus ends and the other begins. If the same comparison is continued between the *Modiolæ* and the *Lithodomi* the same passage may be observed, and then, concludes M. Deshayes, the observer will be convinced, as we are, of the inutility of these genera.

Mr. G. B. Sowerby, in whose *Genera*, No. xxvi., will be found very instructive figures showing the variety of form to which the *Modiolæ*, treated by him as a distinct genus, are subject, admits that the most important character which serves to distinguish *Modiola* from *Mytilus* consists in the smaller side of the former advancing before the umbones, and giving the shell a rounded termination anteriorly. In every other respect he admits that it resembles *Mytilus*, to which it was united in most of the older books, in connection with other genera that are exceedingly distinct. 'The *Modiolæ*, like the *Mytili*,' says Mr. Sowerby, in continuation, 'and many other genera, affix themselves to submarine productions by means of a bundle of rather coarse fibres, commonly called a byssus, each fibre of which is fastened to the rock by its expanded external termination, and applied by the foot of the animal. The recent species of *Modiola* are not very numerous; we have however several species on the coasts of Britain, of which the most remarkable are the *M. discrepans* and *discors*. These two, together with some others that resemble them in form, differ much from the common *Modiolæ*, and might perhaps with propriety be considered as a distinct genus.' The same author states his belief that *Modiolæ discrepans* and *discors* are, on our coasts, always found embedded in the common *Ascidia*, and appear to be destitute of a byssus; while the much larger specimens that are brought from the West Indies are found completely enveloped in a fine silky byssus closely matted together, and forming large bundles. Some cognate species however, that have been brought from the Northern Ocean, appear, he adds, to have been affixed by a few filaments only.

Mr. Garner remarks (*loc. cit.*) that when a foot is present there are three *ganglia*, or pairs of *ganglia;* when absent, but two. Two are situated at the mouth, more or less removed from each other, but always connected by a supraœsophageal nerve; they are sometimes on a level with or before the mouth, sometimes behind it. They give off on each side filaments to the anterior muscle, tentacles, lips, and anterior part of the mantle. Each *ganglion* likewise gives off a twig going to the posterior *ganglia*, which are situated between the *branchiæ* on the posterior muscle. These are united into one, when the branchiæ are themselves united medianly, as in *Mactra, Mya, Solen*, &c., but are at a distance from each other when the branchiæ are remote: in this last case they are always connected by a transverse nerve, as in *Modiola, Avicula, Lithodomus, Arca*, &c.

M. Rang separates the group of *Mytili*, consisting of Lamarck's genus *Modiola*, into two subdivisions.

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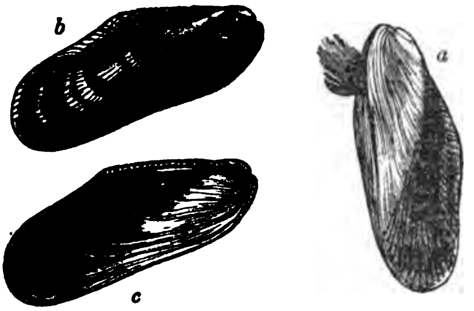
Shell sulcated longitudinally.

Example, *Modiola sulcata*. Shell bluish white; epidermis yellowish; hinge-margin dentilated.

Locality.—Indian Seas. Lamarck.



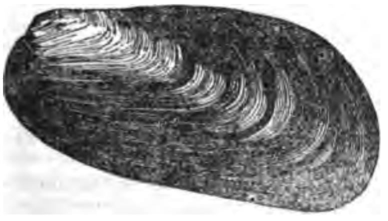
Modiola sulcata.
a, Shell closed, with byssus; *b*, outside view of valve; *c*, inside view of valve.

* *

Shell not sulcated longitudinally.

Example, *Modiola Silicula* (including, according to M. Deshayes, *Modiola cinnamomea*). Shell marone brown or whitish; epidermis deep marone brown.

Localities.—Lamarck gives the seas of the Isle of France as the habitat of *Modiola cinnamomea*, and the seas of New Holland as that of *Modiola Silicula*.



Modiola Silicula.

Lithodomus. (Cuv.)

Animal oblong, very much elongated, thick, having the mantle prolonged and fringed posteriorly; anal aperture mesial; mouth furnished with very small triangular appendages; foot linguiform, canaliculated, but little developed, and carrying a byssus at its base in the early stages of the animal's life.

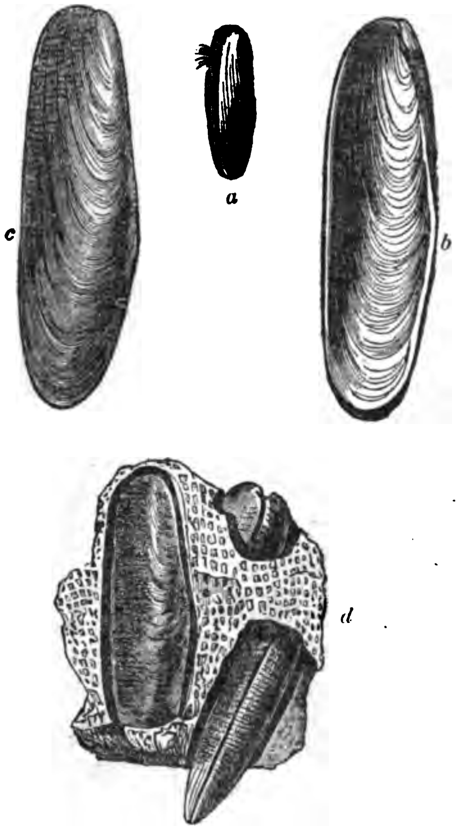
Shell delicate, covered with an epidermis, oblong, very much elongated, subcylindrical, rounded anteriorly, not gaping; umbo subanterior, very distinct; hinge toothless; ligament linear, for the most part internal, inserted in a narrow and elongated furrow; anterior muscular impression of considerable size.

Example, *Lithodomus Dactylus* (*Modiola lithophaga*, Lam.; *Mytilus lithophagus*, Linn.).

We have seen the opinion of M. Deshayes, as to the separation of this genus. M. Rang, on the other hand, thinks that this form has been separated from the *Mytili*, by M. Cuvier, with more reason than Lamarck had for the separation of the *Modiolæ* from that genus. The singular habits of the *Lithodomi* and the form of their shell justify perhaps, he thinks, this generic distinction, which moreover has generally been adopted since. In the early stages of life the *Lithodomi* suspend themselves to rocks and madrepores, by means of their byssus; but they soon pierce those bodies, in order to introduce themselves, and thus form cavities which they can never leave, in consequence of their increasing volume as they advance in age. The byssus then becomes useless, and is no longer manifested. These shells, says M. Rang, in continuation, are very common in the Mediterranean and at the Antilles, where they are found in stones and masses of madrepore, and sometimes, but much more rarely, in some thick shells.

This species is highly nutritious and well-flavoured. Imprisoned as the animal is in the stone or madrepore, frequently with a very small opening communicating with the sea, it must obtain a plentiful supply of food, probably by means of the currents produced by the animal; for the shells are always full and the animal plump. A stew of these *Lithodomi* is described by those who have partaken of it as excellent.

With regard to the power of piercing rocks, stones, wood, &c., possessed by Lamellibranchiate animals, Mr. Garner, in the paper above quoted, observes that such piercing cannot in every case take place by the mechanical action of the valves, and he instances those of *Lithodomus* as not at all adapted for such an action. He also denies the possibility of the perforation being caused by a solvent fluid secreted by the animal. 'The fact appears to be,' says Mr. Garner, 'that the phenomenon is caused by the vibratile action of the parts exciting constant currents of water against the substances, aided by its impetus when drawn in down the



Lithodomus Dactylus.
a, Young, with byssus; *b*, full-grown, inside of valve; *c*, ditto, outside of valve; *d*, three specimens in a mass of madrepore.

elongated body of the animal, and in some cases perhaps by the rasping of the valves.'

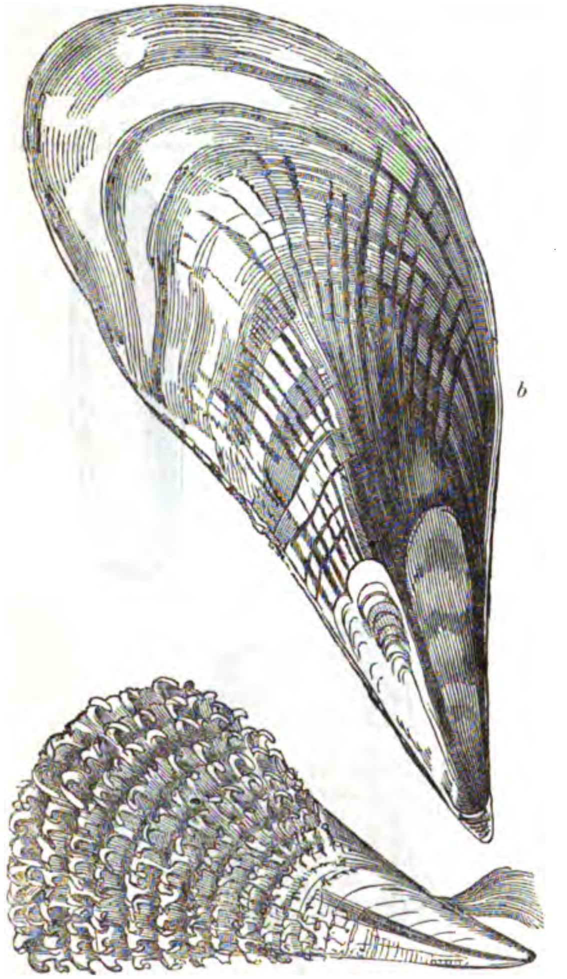
Pinna. (Linnæus.)

Animal elongated, rather thick, subtriangular; lobes of the mantle united on the dorsal border, separated throughout the rest of their extent, ordinarily ciliated on the edges; foot slender, conic, vermiform, carrying at its base a silky byssus; mouth between two lips foliaceous within, very much elongated, and terminated by two pairs of short palps; the two palps of one side soldered nearly throughout their length; two adductor muscles; the anus terminating behind the posterior one. (Deshayes.)

Shell fibrous, horny, rather delicate, fragile, compressed, regular, equivalve, longitudinal, triangular, pointed anteriorly, rounded or truncated posteriorly; anterior umbo but little distinct; hinge linear, striate, toothless; ligament marginal, a great portion of it internal, very narrow and compact, occupying more than the anterior half of the dorsal border of the shell, in a narrow and elongated gutter; anterior muscular impression very small and entirely in the angle, posterior muscular impression very large. (Rang.)

Poli has given beautiful figures of the animal, which he calls *Chimæra*, and most elaborate details of its anatomy; and to his great work we refer the reader. There are no projecting siphons, and the conic tongue-like foot is employed by the animal to fix itself by the byssus, which is not scanty and coarse, like that of the *Mytili*, but long, fine, lustrous, and abundant; so that, though it takes no dye, it is employed in manufacture in Italy. [BYSSUS; CONCHIFERA, vol. vii., p. 432.] The Pinnæ approximate more especially to the *Mytili*, but the shell of the former, with its straight umbones and its gaping opposite extremity, strongly distinguishes them. There is a tendency in their shell to divide itself into laminæ, and thus it approaches that of the *Malleacea*.

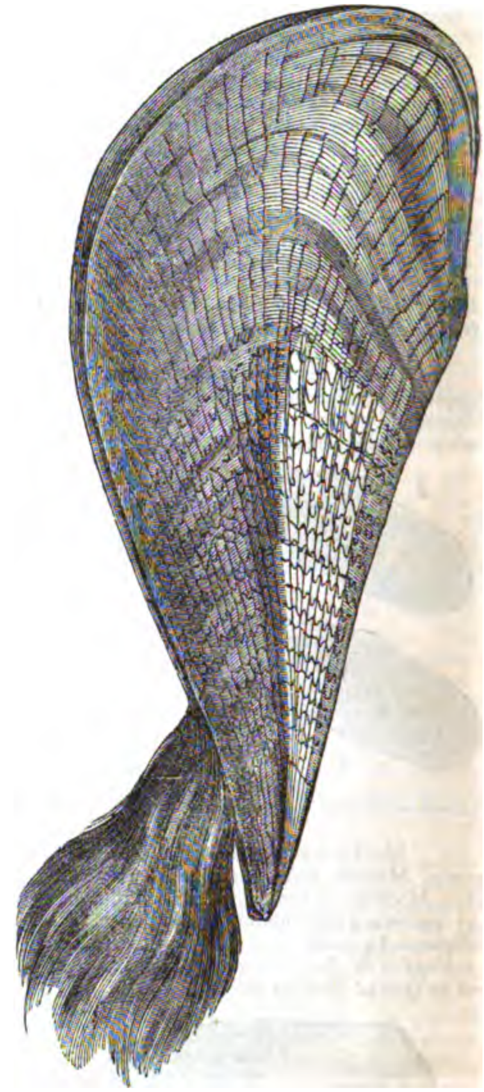
Example, *Pinna Flabellum*.



Pinna Flabellum.

a, Young, with spines, and the byssus, nat. size; *b*, full-grown, inside view of valve, one-fifth nat. size.

Habits, Geographical Distribution, &c.—The species are generally found in deep water, but they have been taken at depths ranging from the surface to 17 fathoms; most frequently on sandy bottoms, where they were moored by their byssus, and at no great distance from the shore. It is said that the animal sometimes fixes itself by the aid of its byssus, and sometimes removes itself by the aid of its foot. Small crustaceans, both brachyurous and macrurous, are sometimes found in their shells. Species occur nearly in all seas. Most of them are muricated when young with vaulted or subtubular spines; but as they increase in age, these are worn down, and at last almost entirely disappear. We have had individuals of the great Mediterranean *Pinna* before us, gradually increasing from a very small size to nearly two feet in length. When specimens taken at wide intervals were compared, the difference was so great that they might easily have passed as distinct species, as indeed they have been described by some authors. We have seen many pearls from this *Pinna* not ill formed and of an amber colour, but none of any considerable size.



Pinna Flabellum, full-grown, valves closed, outside view, with byssus, one-fifth nat. size.

FOSSIL MYTILIDÆ.

Mytilus.

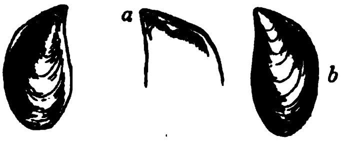
Mr. G. B. Sowerby (*Genera*) states that the fossil species with which he is acquainted are not numerous; they occur however, he observes, in some of the beds below the chalk, as well as in most of those above it, but particularly in the crag.

M. Deshayes, in his Tables (1833), makes the number of fossil species (tertiary) fifteen. *M. Chemnitzii* and *M. edulis* he states to be both living and fossil (tertiary). In the last edition of Lamarck (1836), he remarks that Brocchi mentions a fossil shell to which the latter gives the name of *Mytilus edulis*: but M. Deshayes does not believe that this fossil is the analogue of *Mytilus edulis*, Linn., but of an other edible species very common in the Mediterranean. Of fossil species he admits nine only in that work. Dr. Mantell notices a species in the cliff between Brighton and Rottingdean (diluvium); and another, *M. lanceolatus*, in the Shanklin sand. Professor Phillips notes a *Mytilus cuneatus* from the inferior oolite, in his list of organic remains of the Yorkshire coast. Dr. Fitton, in his 'Systematic and Stratigraphical List of Fossils' (*Strata* below the chalk), enumerates the following species: *M. edentulus, inæquivalvis, lanceolatus, Lyellii, prælongus, tridens*, and an undetermined species.

Dreissina.

Fossil in the modern calcaire of Aratapak and Transylvania, in Moravia, and the environs of Vienna. (Vanbeneden.)

Here we may perhaps place *Mytilus Brardi*. The septum comes very near to that of *Dreissina*.



Mytilus Brardi.

a, Hinge and septum enlarged; *b*, outside of valve; *c*, inside.

Modiola.

Mr. G. B. Sowerby states that the fossil species are not many. He observes that such as he knows seem to belong principally to some beds of the oolite series, and that there are others in the principal formations both above and below the chalk. M. Deshayes, in his Tables, makes the number of fossil species (tertiary) twenty-one; and *Mod. barbata discrepans* and *lithophaga* (Lithodomus), both living and fossil (tertiary). In the last edition of Lamarck the number given is twenty. The shell from Plaisance, considered by Lamarck to be a variety of *Modiola subcarinata*, is not, in the opinion of M. Deshayes, a variety of that species, but very probably the analogue of *Modiola barbata;* and he says that another (*Mod. lithophagites*) is not a *Modiola*, but a *Gervillia*. Dr. Mantell notes *Mod. elegans* in the arenaceous limestone or sandstone of Bognor, and *Modiolæ æqualis* and *bipartita* in the Shanklin sand. Professor Phillips enumerates the following species among the organic remains of the Yorkshire coast:—*Modiolæ, scalprum* (marlstone), *plicata* (inferior oolite), *bipartita* (calc. grit), *cuneata?* (Oxford clay, Kelloways rock and cornbrash), *imbricata* (Bath oolite), *Hillana* (lias), *ungulata* (coralline, Bath and inferior oolite), *pulchra* (Kelloways rock), *aspera?* (inferior oolite), *inclusa* (coralline oolite). Mr. Lonsdale (*Oolitic District of Bath*) records *Modiolæ Hillana* (lias), *gibbosa* (inferior oolite), *Hillana?* and *plicata* (fullers' earth), *imbricata* (cornbrash), *bipartita* (Kelloways rock). Dr. Fitton (*loc. cit.*) gives the following list: *Modiolæ æqualis, alæformis, aspera, bella, bipartita, depressa, imbricata, lineata, parallela, reversa*, two new unnamed species, one (casts), and a doubtful species. These are principally from the lower green-sand. One (*bella*) occurs in the gault as well as in the green-sand, and *bipartita* also in the Oxford oolite. The new and doubtful species appear to have been found in the Purbeck and Portland stone, lower green-sand, and Oxford oolite. Mr. Murchison (*Silurian System*) notes *Mod. semisulcata* (lower Ludlow rock) and *M. antiqua* (Wenlock shale).

Lithodomus.

M. Deshayes (*Tables*) does not mention this genus in his Tables, and appears to place it under *Modiola*, a position which it occupies in Lamarck's work. M. Deshayes records *Modiola lithophaga* (var.)—*Lithodomus lithophagus*—as fossil at Paris. Mr. Lonsdale (*loc. cit.*) notices a *Lithodomus* in the inferior oolite, and another in the coral rag. Dr. Fitton (*loc. cit.*) records a new species and another species, both nameless, in the Portland stone.

Pinna.

Mr. G. B. Sowerby (*Genera*) states that he is acquainted with several fossil species, which occur in the secondary and tertiary beds of marine origin; one, in particular, he observes, is beautifully preserved in the indurated sandy bed of London clay at Bognor; and another, he adds, is not unfrequently met with in the calcaire grossier at Grignon. M. Deshayes gives the three as the number of fossil species (tertiary), and records *P. nobilis* as both living and fossil (tertiary). In the last edition of Lamarck, he notices the fibrous structure of the shell in this genus [SHELL], and says that in the tertiary beds the fibrous part decomposes into calcareous filaments, which detach themselves from the nacreous part, the preservation of which is more perfect. When this last part is a little gone (degradé), the point or junction of the two parts of which the valves are formed is perceptible; and it is, he adds, to a similar disposition observed in an individual of the *Pinna nobilis*, or *squamosa* of Italy, that the creation of Lamarck's species, *Pinna quadrivalvis*, is due. *Pinna margaritacea* (Paris, Grignon, &c.), *P. ampla* (oolite in England, France, and Germany), and *P. Saussurei* (coral rag of St. Mihiel, Mont Salève, Normandy), are the other fossil species enumerated. Dr. Mantell notices *Pinna affinis* from the arenaceous limestone or sandstone of Bognor, and another nameless species, for which he cites Martin (*Geol. Mem. West Suss.*), from the Shanklin sand. Professor Phillips (*loc. cit.*) gives us *P. gracilis* (Speeton clay), *P. mitis* (Oxford clay and Kelloways rock), *P. lanceolata* (coralline oolite and calc. grit.), *P. cuneata* (cornbrash and Bath oolite), and *P. Folium* (lias). Mr. Lonsdale (*loc. cit.*) gives a species, nameless, from the inferior oolite, and another nameless, with a note of interrogation, from the Kelloways rock. Dr. Fitton (*loc. cit.*) enumerates *Pinna? crassa*, n. s., from the lower green-sand; *P. tetragona*, from the lower green-sand, Kent, Sussex, and Isle of Wight, and at Blackdown; and a cast and a species, new? from the lower green-sand (Sussex and Isle of Wight).

MY'TILUS EDU'LIS, the edible muscle, a molluscous animal or shell-fish, common along the coast of Britain, is generally considered a safe and wholesome article of food, but it occasionally gives rise to troublesome and even fatal affections in those who partake of it. No anatomical investigation into the condition of such specimens as prove injurious, nor chemical analysis of their composition, has revealed the cause of the disorder; but as such casualties result mostly in summer, it is probable that some natural change is taking place in the animal, which renders it at that season unfit for food. It would therefore be prudent to use it only in the winter months. The idea that it is owing to the fish having absorbed copper is quite unfounded. The application of heat in cooking does not destroy the noxious property, as it does that of many vegetable poisons, for those which are dressed are as hurtful as those eaten raw. Neither does decay seem to be the source of the deleterious principle, since bad effects follow the use of those which are quite fresh; nor does decay decompose the poison, though most animal poisons are destroyed by putrefaction, for two fatal cases have ensued from the eating of decaying muscles. (See cases by Dr. Burrows, in *London Medical Repository*, iii., p. 445.) The consequences have been imputed to idiosyncrasy in those who eat the muscles; but this is obviously inadequate to explain the circumstances, since in most of the instances every person (amounting in one case to thirty individuals) who tasted them suffered; and even cats and dogs, as well as human beings, died from eating them. The morbid symptoms vary, and in some of the cases are connected with inflammation of the stomach and intestines, and require venesection for their relief; but more commonly 'the local effects have been trifling, and the prominent symptoms have been almost entirely indirect, and chiefly nervous. Two affections of this kind have been noticed: one is an eruptive disease, resembling nettle-rash, and accompanied with violent asthma; the other a comatose or paralytic disorder, of a very peculiar description. The symptoms have usually commenced between one and two hours after eating, and rapidly attained their greatest intensity. The first symptoms were like those of violent catarrh, swelling and itching of the eyelids, and generally nettle-rash followed; and the eruption afterwards gave place to symptoms of the most urgent asthma. The swelling is not always confined to the eyelids, but has usually extended over the whole face. In several cases the eruption was preceded by asthma, lividity of the face, insensibility, and convulsive movements of the extremities; in others, nausea and vomiting, followed by heat and constriction of the mouth and throat; difficulty of swallowing and speaking freely; numbness about the mouth, gradually extending to the arms, with great debility of the limbs.' The abdomen is often affected with pain, increased on pressure; the functions of the kidneys disturbed, but generally increased; the bowels sometimes obstinately constipated. Epileptic symptoms, or delirium, convulsions, and coma have appeared in the greater number of fatal cases, rather than inflammatory action.

Emetics, such as sulphate of zinc, which acts quickly, have been of service; but æther seems the most effectual means of relieving the difficulty of breathing and the other nervous symptoms. Purgatives were found of no avail in some of the fatal cases accompanied by constipation; yet in general sulphate of magnesia (Epsom salts) in a large quantity of fluid, acidulated with dilute sulphuric acid, taken in small and frequent doses, is very efficacious in removing the eruption of nettle-rash. (Combe, in *Edin. Med. and Surg. Journal*, vol. xxix., and Christison *On Poisons.*) [MYTILIDÆ, p. 46.]

MYXI'NE, a remarkable fish belonging to the order *Cyclostomi*, family *Petromyzidæ*, and genus *Gastrobranchus* according to Bloch. It is the *Mixine glutinosa* of Linnæus, who, from its worm-like form, placed it in the class Vermes.

The Myxine is usually about a foot in length, of a slender and nearly cylindrical form, compressed towards the tail: the dorsal fin is very narrow and continued round the end of the tail to the vent; on the head is a single spiracle which communicates with the interior; the head is rounded and destitute of eyes; eight cirri, or feelers, have their origin on the lips; the mouth is large; on each side of the tongue there are two rows of strong pectinated teeth; the palate is furnished with a single hooked tooth: the branchial openings are two in number, and situated on the abdomen a little beyond one-fourth of the entire length.

This remarkable fish frequents the northern seas, and occurs also on our own coast. It is found in the bodies of other fishes, especially the cod and haddock, and sometimes five or six specimens are found in one fish. Pennant says 'it enters the mouths of other fish when on the hooks attached to the lines which remain a tide under water, and totally devours the whole except the skin and bones.' It is sometimes called the Hag, and also Borer, because it is said by some that the myxine pierces a small aperture in the skin, and thus makes its way into the body of the cod or other fishes which it attacks.

MYZOME'LA. [MELIPHAGIDÆ, vol. xv., p. 82.]

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⁂ In the Table of Public Buildings at Munich, page 485, the architects' names to the following ones should be corrected as here given:—
St. Bonifacius . . . Ziebland. Post Office . . . Klenze. Georgionum . . . Gartner.

N.

N is one of the liquid or trembling series of letters. It is formed with the tongue at the point where the teeth and palate meet, and the sound passes chiefly through the nasal passage. For the characters by which this letter is represented, see Alphabet.

The letter *n* is subject to the following changes:—

1. It is interchangeable with *nd*. Thus the Latin roots *men*, *fini*, *gen* (genus), appear in Saxon English as *mind*, *bind* or *bound*, *kind* or *kin*. The converse change is common in the provincial dialect of Somersetshire, where the English words *wind*, *hind* (behind), *find*, *round*, *and*, are pronounced *wine*, *hine*, *vine*, *roon*, *an;* while on the contrary, *manner* is changed to *mander*. [D.]

2. Before *f*, *n* was silent in Latin. Hence the town *Confluentes*, at the junction of the Moselle and Rhine, is now called *Coblenz*. So the German *fünf* is in English *five*.

3. N final often becomes a more complete nasal, and is equivalent to *ng*. Thus the German infinitive in *en* appears to be the parent not only of the participle in *end*, but of the substantive in *ung*, with which are connected the English participle and substantive of the same form in *ing*. The Somersetshire dialect prefers the *n* without *g*, as *stanin*, *sparklin*, *starvin*, for *standing*, *sparkling*, *starving*. The Sanscrit alphabet has a particular character for this sound.

4. *Ni* or *ne* before a vowel often forms but one syllable with that vowel, the *i* or *e* being pronounced like the initial *y*. This sound is represented in Italian and French by *gn*, as *Signor*, *Seigneur;* in Spanish by *ñ*, as *Señor;* and in Portuguese by *nh*, as *Senhor* · all derived from the Latin *senior*, elder.

5. *N* is interchangeable with *l*. Hence the double form of *luncheon* and *nunchion;* but see L.

6. *N* with *m*, particularly at the end of words. [M.]

7. *On* and *o* are frequently interchanged. Hence the disappearance of the final *n* in the Latin nominatives *ratio*, *ordo*, *Laco*. The Portuguese also often discard an *n* so placed. On the other hand the Greek neuter nominative takes an *n* to which it is not entitled, as *αγαθον*. It is probably from a confusion between the two sounds that the question has arisen, whether the letter *ain* of the Hebrew alphabet is an *o* or an *n*.

8. *R* final with *rn*. Hence the double forms of the Latin verbs *cer* and *cern*, separate; *ster* and *stern*, strew; *sper* and *spern*, kick, despise. Again *star* (and the Latin must once have had *stera* in order to form from it the diminutive *stella*, as from *puera* comes *puella*) is in German *stern*. *Spur* in English is *sporn* in German, and of the same origin perhaps is the name of the *Spurn Head*, at the mouth of the Humber, as well as the Latin *spern-ere*. The Latin *bur* (seen in *com-bur-o*) is the same word as the English *burn;* and even the Latin *curr-ere*, to run, has in Gothic the form *urn-an*, just as the south-western dialect of England has *hirn*, and the ordinary English, by a slipping of the *r* [R], *run*. In the same south-western dialect *beforne*, *avaurn*, *orn*, *norn*, *ourn*, are the forms employed for *before*, *afore*, *or* or either (Germ. *oder*) *nor* or neither, *our*.

9. *N* with *s*. This change will not be readily admitted without consideration, as the sounds appear so different. The change however is very parallel to the admitted change of *l* and *d;* and indeed as the two latter letters are formed at the same part of the mouth, so are *n* and *s*. The close connection of the two letters will be most forcibly demonstrated by examples of suffixes in which the change occurs. Thus the English language has a double form of the plural suffix in *en* and *es*, as in *oxen* and *asses*. The Greek verb has the same variety; first, in *τυπτομεν* and *τυπτομες;* secondly, in *τυπτετες*, which must have been the older form of *τυπτετε*, and the so-called dual *τυπτετον*. The Latin again has the *s* suffix in *scribimus scribitis*, but the *n* in *scribunt*. Again the Latin comparative has for its oldest suffix *ios*, as in *melios*, whence both *melior* and *melius;* or a better example occurs in *ple-ios* and *pleos*, whence the latter forms *plous* and *plūs*. On the other hand the Greek suffix is *ion*, as *πλε-ιων* and *πλεον*, from the same root as the Latin *plus*, and with the same meaning. The old genitive plural suffix in Latin appears to have been *sum*, as *servosum*, whence *servorum*. The suffix for a female in Greek is either *na* or *sa*, with perhaps an *i* prefixed, as *βασιλιννα*, *μελαινα*, *λεαινα*, or *βασιλισσα*, *τυπτουσα* and in English we have *ess*, while the Germans have *inn*. Lastly, such verbs as *σβεν-νυμι* have *σβεν* for the radical part, which often takes the form *σβες*, as *α-σβεσ-τος;* and the same change appears in *σωφρον*, Nom. *σωφρων* and *σωφροσυνη*. If the change be admitted, we see the cause of the anomaly in the Latin *pon-o*, *posu-i*, *pos-itum*.

10. *N* before *s* silent, but lengthening the preceding vowel. This fact is well exemplified throughout the grammar of the Greek language. The Latin had the same peculiarity. Hence *consul* was sometimes written *cosol*, and when abbreviated was always represented by the three first of the sounded letters, viz. *cos*. So *censor*, *infans*, *viciens*, *vicensumus*, are often found in the form *cesor*, *infas*, *vicies*, *vicesimus*. We see too why the Greeks wrote the Latin words *κηνσωρ*, Κωνσταντινος, with a long vowel in the first syllable. Lastly, while the Germans write *gans*, *wünschen*, the English have *goose*, *wish*.

11. *N* silent at times before *t* and *th*. The English word *mutton* is derived from the French *mouton* and the Italian *montone;* and our word *tooth* in the older Gothic dialects was *teenth*, thus corresponding as nearly as it ought to do with the Greek *οδοντ*, and Latin *dent*.

12. *N* before *v* silent. Thus the Latin *convention*, assembly became *covention* (as it occurs in one of the oldest inscriptions), before it was reduced to *contion*, the assembly of the people, a word which modern editors, in spite of all the best MSS. and of etymology, persist in writing with a *c* for the fourth letter. Similarly from *conventu* came the French *couvent;* and though the English generally say *convent*, yet the name *Covent Garden* is a proof that the *n* was not always pronounced even here.

An initial *n* is sometimes prefixed to, and sometimes taken from words by error. Thus *nadder*, a snake, has now lost its *n* through a confusion of the phrase *a nadder* with *an adder*. On the other hand, the phrase *for then once*, i.e. *for this once*, in which the article has its old accusative form *then*, is now written *for the nonce*. Is it in this way that we should account for the prefixed *n* in the diminutives *Ned*, *Nol*, *Nan*, *Nelly*, for *Edmund* or *Edward*, *Oliver*, *Anne*, *Ellen*, as if the original phrases *mine Ed*, *mine Anne*, had been confounded with *my Ned*, *my Nan?* At any rate, *mine*, *thine*, *an*, were severally the original forms of *my*, *thy*, *a*, and used even before consonants; nay, in Somersetshire they have changed *aunt* to *nânt*, *uncle* to *nuncle*, *awl* to *nawl*. Very similar is the prevailing error of calling the Greek negative particle *alpha privative* instead of *an privative;* the latter of which corresponds so accurately with the Latin *in* and the English *un*, to say nothing of the Greek *ανευ*, and the German *ohne*. In fact, *n* at the end of words is often pronounced very faintly.

The Somersetshire dialect has been referred to because its peculiarities have been recorded with great care in Mr. Jennings's 'Observations.'

NABATHÆI. [Arabia, p. 215.]

NABIS, tyrant of Sparta, attained the supreme power after the death of the tyrant Machanidas, who was killed about 206 B.C. He proved a cruel despot, and put to death a number of citizens. He had an ingenious engine of torture, described by Polybius (xiii.), which was called Nabis's wife, and which he applied to those who would not deliver up their money to him. He allied himself with Philip II. of Macedon, and took possession of Argos and other parts of the Peloponnesus. After the defeat of Philip, and the peace which followed between him and Rome, the consul Flamininus marched against Nabis, defeated him, but afterwards granted him peace, taking his son as hostage to Rome. After the departure of the Romans, Nabis having begun to annoy his neighbours afresh, the Achæans sent against him their general Philopœmen, who defeated him and drove him back into Sparta, where Nabis was soon after treacherously killed by his own Ætolian auxiliaries, B.C. 192. (Livy, xxv. 35.) He appears to have been a very able commander in war.

NABLOUS. [Syria.]

NABOB, or NABAB, a corruption of the Hindustani Nuwwab, which was the title of the governor of a province under the Mogul empire, such as the Nuwwab of Arcot, of Oude, &c. (Gilchrist, *Vocabulary.*) Several of these became gradually independent during the decline of the empire, and are now either allies or dependents of the Anglo-Indian government. The word Nabob is sometimes used in Europe to mean a wealthy man who has made his fortune in India.

NABONASSAR, ÆRA OF. [PERIODS OF REVOLUTION.]

NABOPOLASSAR. [BABYLON.]

NACHITOCHES. [LOUISIANA.]

NACRE. [SHELL.]

NACRITE, a mineral usually occurring in mica slate, taking the place of the mica; so that the rock becomes a mixture of quartz and nacrite. It is also found crystallized in granite. It occurs in four-sided prisms. Hardness 2·75. Colour silvery, or light greenish white. Lustre pearly, silky, splendent. Translucent. Specific gravity from 2·788 to 2·793. It occurs in Wicklow, Ireland, and in North America.

A specimen from Brunswick, Maine, analyzed by Dr. Thomson, gave—

Silica	64·440
Alumina	28·844
Protoxide of Iron	4·428
Water	1·
	98·712

The crystals from Wicklow contained less oxide of iron, but a considerable portion of lime and of protoxide of manganese.

NADIR. [ZENITH.]

NÂDIR SHAH was born on the 11th of November, 1688, at the small village of Abuver, near Killaat, about 30 miles north-east of Mushed in the province of Khorassan. He was originally called *Nâdir Kouli*, that is, 'a slave of the Wonderful,' or 'of God.' When he entered the service of Tâmâsp, king of Persia, he assumed the name of *Tâmâsp Kouli Khân*, that is, 'Khan, slave of Tâmâsp;' but on his accession to the throne he resumed his original name of *Nâdir.*

The father of Nâdir belonged to the tribe of Afsshâr, which was one of the seven Turkish tribes which had attached themselves to the kings of Persia. He was a person of no note or rank, and earned his livelihood by means of making coats and caps of sheep-skins. Nâdir, after his elevation to the throne, used frequently to allude to his low birth. When the royal house of Delhi required that his son, who was about to marry a princess of that family, should give an account of his male ancestors for seven generations, Nâdir exclaimed, 'Tell them that he is the son of Nâdir Shah, the son of the sword, the grandson of the sword, and so on till they have a descent of seventy instead of seven generations.'

Nâdir was distinguished in early years by his boldness and intrepidity. At the age of seventeen he was taken prisoner by the Usbegs, who made annual incursions into Khorassan; but he effected his escape after a captivity of four years. On his return to Khorassan, he entered the service of a petty chief of his native country; but he became soon afterwards the leader of a formidable band of robbers. From this employment he rose, by a transition by no means uncommon in the East, to a high rank in the service of the governor of Khorassan; but having displeased his master, he was degraded and severely punished. After this he resumed his occupation as a robber; and in consequence of the unsettled state of the country, he acquired in a short time no small degree of power. In order to understand clearly the circumstances which facilitated the rise of Nâdir, it is necessary to make a few remarks on the internal state of Persia at that time.

In the early part of the eighteenth century, Persia was attacked and eventually conquered by the Affghans. In 1722 Shah Hussein, the Suffavean monarch of Persia, abdicated the crown to Mahmud, the Affghan conqueror. Mahmud was succeeded in 1725 by Ashrâff; who reigned at Ispahan and had the supreme power, though Tâmâsp, the son of Hussein, maintained a precarious independence in a distant part of the empire. Though the power of the Suffavean monarchs had been entirely overthrown by the Affghans, yet the latter had not been able to establish their own authority in the distant provinces of the kingdom; and the consequence was, that Khorassan and other remote provinces were left without any regular government. Nâdir was thus enabled to prosecute his schemes without interruption; and having at length raised a body of 5000 men, he joined Tâmâsp in 1727, and declared his intention of expelling the Affghans from his native country. The oppressive rule of the Affghans and the renown of Nâdir quickly brought great numbers to his standard; and having been invested with the supreme command by Tâmâsp, which he acquired by putting to death Futteh Ali, who had previously commanded the forces of the king, he marched against the Affghans and took Mushed in the same year. He followed up his first success with several brilliant victories; Ispahan fell into his power; Ashrâff was taken and put to death; and by the close of the year 1729 few if any Affghans were left in Persia.

Such sudden and unexpected success rendered Nâdir exceedingly popular; and he appears from this time to have resolved upon seizing the royal power as soon as circumstances would allow him to do so. In 1730 he received from Tâmâsp a grant of the four finest provinces of the kingdom, Khorassan, Mazanderan, Seistan, and Kerman; and was requested at the same time to assume the title of sultan. This honour however he declined; but at the same time he ordered money to be struck in his own name, which in the East is regarded as a virtual assumption of the sovereignty of the country.

In 1731 Nâdir was engaged in a war with the Turks, whom he defeated on the plains of Hamadan; but having been obliged to march to Khorassan to quell a rebellion, Tâmâsp seized the opportunity of assuming the command of the army, and marched himself against the Turks. Being defeated in battle, he concluded a treaty with the Turks, by which he ceded to them several provinces of the Persian empire. As soon as Nâdir heard of this treaty, he took advantage of the discontents which it excited, to carry into execution the plans he had long meditated for seizing the royal power. He published a proclamation, in which he bitterly inveighed against the peace, and announced his intention of prosecuting the war. Having thus secured the good will of the people, he invited Tâmâsp to his camp; and on his arrival, he caused him to be seized and carried away to Khorassan. Instead however of proclaiming himself king, he considered it more prudent for the present to place on the throne the son of Tâmâsp, who was an infant eight months old.

Having completed these arrangements, Nâdir continued the war against the Turks, and after experiencing some reverses, he obliged them to sue for peace, which was granted in 1735. The infant sovereign of Persia having died about the same time, Nâdir summoned a grand council, consisting of almost every person of rank and consideration in the kingdom, to meet in the plains of Chowal Mogâm, which extend from the neighbourhood of Ardebil to the mouth of the Cyrus, in order to take into consideration the state of the kingdom. Upwards of 100,000 persons are said to have attended this assembly, in which the sovereignty was offered to Nâdir, who accepted it with apparent reluctance, on the 26th of February, 1736, on condition that the Sheah sect, which had hitherto been supported by the great majority of the Persians, should be entirely abolished, and the sect of the Sunees established in its place. He also stipulated that the Imaum Jaaffer should be placed at the head of the national religion; and that as there were four orthodox sects among the Sunees, the Persians should be considered as a fifth, under the name of the sect of Jaaffer It is difficult to determine the reasons which induced Nâdir to make this violent change in the religion of the country; but it appears most probable that he wished to destroy the Sheah sect, since it had always warmly supported the dynasty of the Suffavean princes. All the religious property of this sect, which was very considerable, was confiscated by Nâdir, and this impolitic attack upon the established religion tended to produce discontents at the very commencement of his reign. Nâdir himself appears to have possessed little or no religion; and the Korân as well as the Gospels, which were translated into Persian by his order, were frequently the subjects of his merriment and sarcasm.

Soon after his accession to the throne, Nâdir made vigorous preparations for the extinction of the Affghans as a separate power; and as this object could not be accomplished without the reduction of the city and province of Candahar, which were then in the possession of the brothers of Mohammed, the late Affghan monarch of Persia, he commenced the war by an invasion of this province. The city of Candahar fell into his power in 1738, and many of the Affghans fled into the northern provinces of Hindustan, where they were hospitably received. Nâdir required of the emperor of Delhi that none of the Affghan fugitives should find shelter in his dominions, but as no attention was paid to his demands, he marched into Hindustan in the following year, and after defeating the Mogul troops, entered Delhi on the 8th of March, where he seized the immense treasures which had been amassed in the course of nearly two centuries by the Mogul monarchs. Soon after his arrival, a report having been spread through the city that Nâdir was dead, the inhabitants made a general attack upon his soldiers. Nâdir in vain endeavoured to undeceive the populace; his moderation only inflamed the fury of those whom, according to Hindu historians, it was his desire to save; and at length, unable to restrain the people, he gave orders for a general massacre. These commands were too well obeyed; and from sunrise till noon the inhabitants were butchered by his soldiery without any distinction of sex and age. At the intercession of Mohammed, the emperor of Delhi, Nâdir at length commanded the massacre to be stopped; and it is recorded as a proof of the high state of discipline of his troops, that his commands were immediately obeyed. The number of those who perished in this massacre is variously stated by different writers. Fraser says that 120,000 persons were killed; but a Hindu historian reduces the number to only 8000. (Scott's *Translation of the History of the Dekkan*, vol. ii., p. 207.)

Nâdir did not attempt to make any permanent conquests in Hindustan. He returned to Persia in the following year, and directed his attention towards the reduction of the nations on the north of Persia. He crossed the Oxus in order to punish the sovereign of Bokharah, who had, during his absence in Hindustan, made inroads into Khorassan. This monarch having submitted to his power, Nâdir next marched against the king of Khaurizm, whose dominions extended westward of Bokharah along both banks of the Oxus as far as the Caspian. The king of Khaurizm, refusing to submit to Nâdir, was defeated in battle, taken prisoner, and put to death, 1740.

By these conquests Nâdir had completely secured the peace of Persia. He had delivered his native country from the tyranny of the Affghans, and had extended its dominions to the Indus on the east, the Oxus on the north, and almost to the plains of Bagdad on the west. The Turks, who frequently endeavoured during his reign to extend their dominions, were always repulsed with loss; and the Russians were glad to enter into alliance with this all-powerful conqueror. Hitherto Nâdir had ruled with moderation and justice; but the latter part of his reign was disgraced by acts of the foulest tyranny and oppression. His conduct during this period has been described, even by a partial historian (Mirza Mahadi), as exceeding in cruelty and barbarity all that has been recorded in history of the most bloody tyrants. In 1743 his eldest son, Reza Kouli, who had distinguished himself by his bravery in many actions, was deprived of sight by order of his father. The possession of absolute power appears to have called forth in the mind of Nâdir, as it has often done in the minds of other absolute monarchs, some of the worst passions of human nature—avarice, jealousy, and cruelty. During the early part of his reign Nâdir was distinguished by the greatest liberality; and after he had obtained the immense wealth of the imperial house of Delhi, he at first remitted three years' taxes. But the possession of such enormous wealth appears to have excited in him the desire of accumulating more; and the taxes were increased to meet the insatiable demands of the royal treasury. It has been already stated that the proscription of the Sheah sect had tended to render him unpopular. Nâdir, aware of this, ceased to trust any of the native Persians, who belonged almost entirely to the Sheah sect, and placed his chief dependence on the Turks and Affghans in his army, who were Sunees. So great was his suspicion of his own subjects, that he is said to have formed the design of putting to death every Persian in the army. Some of the principal officers of his court, having learnt that their names were included in the proposed massacre, resolved to save themselves by the assassination of the tyrant, and, having entered his tent during the night, put him to death, on the 19th or 20th of June, 1747. Nâdir was succeeded by his nephew Ali.

'The character of Nâdir,' observes Sir John Malcolm, 'is perhaps exhibited in its truest colours in those impressions which the memory of his actions has left upon the minds of his countrymen. They speak of him as a deliverer and a destroyer; but while they expatiate with pride upon his deeds of glory, they dwell with more pity than horror upon the cruel enormities which disgraced the latter years of his reign; and neither his crimes nor the attempt he made to abolish their religion have subdued their gratitude and veneration for the hero, who revived in the breasts of his degraded countrymen a sense of their former fame, and restored Persia to her independence as a nation.' (*History of Persia*, vol. ii., p. 103.)

The life of Nâdir Shah was written in Persian by his secretary, Mirza Mohammed Mahadi Khan, who attended him in all his expeditions, and has been translated into French by Sir W. Jones. Fraser also published from Persian MSS., which he obtained in India, 'The History of Nâdir Shah, formerly called Thamas Kuli Khan, the present Emperor of Persia,' Lond., 1742. Many interesting particulars relating to Nâdir are given by Hanway, in his 'Historical Account of the British Trade over the Caspian Sea,' Lond., 1753-4, which have considerable value, since Hanway had personal knowledge of many of the facts which he has recorded. A detailed life of Nâdir is also given by Malcolm in his second volume of the 'History of Persia.'

NÆSA. [ISOPODA, vol. xiii., p. 53.]

NÆVIUS CNEIUS, a native of Campania, and one of the earliest Roman poets, was older than Ennius, and the contemporary of Livius Andronicus. He served in the first Punic war, and afterwards wrote an epic poem on the same, 'De Bello Punico,' and another called 'Ilias Cypria.' He also wrote several dramas in imitation of the Greek, and other comedies on national or Roman subjects, such as 'Macchus exul,' 'Vindemiatores,' &c. Of all these, the titles and a few scattered lines are all that have come down to us. ('Fragmenta Poetarum Latinorum, quorum Opera non extant,' by Stephanus, 1564, and also Maittaire, 'Corpus Poetarum.')

Cicero, 'De Oratore,' ii. 69, 70, and iii. 12, praises him for his unaffected simplicity and native humour. It appears that he had a genius for the satirical, which proved unlucky to him; for, having exposed in his plays some of the leading men at Rome, among others some of the Metelli family, he was imprisoned and banished as an alien. He is said to have retired to Utica in Africa, where he died about B.C. 204, according to the chronicle of Eusebius. Aulus Gellius (iii. 3) says, that being imprisoned at Rome, he composed two comedies in his prison, through which he was restored to liberty.

NÆVUS (*Nævus maternus*, *Mother Spot* or *Mole*) is a congenital mark or morbid growth on a part of the skin. Nævi are of various kinds; some are merely yellowish or brown discolorations of the skin without any evident alteration in its structure; but the greater number are composed of an excessively vascular tissue, or a dense network of arteries and veins forming a reddish or livid substance, more or less elevated above the surface of the surrounding skin. A third kind are like extensive warty excrescences, and many of them are covered with thick-set coarse hair.

The nævi of the first kind rarely require treatment. Those of the second are more important from their tendency to increase, or to ulcerate and slough, or to produce severe hæmorrhage by the rupture of some of their vessels. Many plans have been suggested for their removal. If they be not seated on an exposed part, or if they do not show a tendency to increase, they had better be left without treatment. In other cases, the simplest and sometimes a sufficient means is the continued application of cold with moderately firm pressure; but a more certain method is to produce such an inflammation in them as may obliterate their vessels and reduce them to the common substance of scars. In small superficial nævi this may be effected by vaccinating them so as to produce a number of pustules on their surface; and in larger ones, by cauterising a part of their surface with fused potash, or nitric acid, or nitrate of silver, or by injecting some stimulant (as dilute nitric acid) into their tissue, or by making small incisions into them, or by passing hare-lip pins and sutures [Hare-Lip] through parts of their substance, or by placing setons in them. The circumstances of each case must decide the choice between these several means, and the mode in which that which is selected may be best applied. Should complete removal be deemed necessary, nævi may be either cut out, or made to slough by tying them round the base. For the third kind of warty nævi, excision is at once the simplest and the most secure means.

It is a popular belief that nævi and some other malformations in infants are consequent on an impression made on the mind of the mother during pregnancy, and that the mark always bears some resemblance to the object by which the impression was excited. It cannot be denied, that among the many cases of nævi, some singular coincidences of the kind have occurred, and that in some of these the malformation might be deemed to have some connection with the object of the mother's fear or anxiety; but till it be determined that the number of these coincidences is greater than would occur according to the common laws of chances (which is as yet far from being proved), the hypothesis of a connection between the state of the mother's mind and the local conformation of the child, which is totally opposed to all physiological probability, cannot be admitted.

NAGASAKI. [Japan.]

NAGORE. [Marwar.]

NAGPORE. [Berar.]

NAGPORE, a large town in the dominions of the Rajah of Berar, or Nagpore, situated in 21° 9′ N. lat. and 79° 10′ E. long. It stands on a plain 1100 feet above the level of the sea. The town, which is of very irregular form, is about 7 miles in circumference, the buildings being placed in a very straggling manner, as is often seen in India. The greater part of the dwellings are small thatched cottages. Some of the richer inhabitants have large brick-built houses with flat roofs, but the number of these is small, and is continually decreasing through the declining condition of the town. According to an enumeration made in 1825, Nagpore contained at that time,

Houses built of brick	1,301
Tiled houses	11,120
Thatched cottages or huts . . .	14,680
Matted huts of the lowest description .	48
Total	27,149

The population at the same time amounted to 115,228.

The palace of the rajah is a large, heavy, and very plain building of brick, and is surrounded by the lowest kind of houses or hovels: it has never been completely finished.

The trade of Nagpore, which was at no time very considerable, has declined since the fall of Appah Sahib, and the removal of the seat of government.

At the enumeration in 1825, it appeared that there were about 3500 domestic slaves, chiefly females, who had been purchased when children from their parents. The condition of slavery in this region does not bear much analogy to the state of degradation which is elsewhere implied in the name, since the severest punishment that can be inflicted for any crime committed by a slave is expulsion from the family of the master, and consequent manumission. On the other hand it would appear that the condition of free labourers is one of great hardship, so that life has little value in their eyes. Suicide is of very common occurrence, being resorted to upon the slightest occasions of domestic quarrel, or of real or supposed injury: the more usual modes employed for self-destruction are poison, drowning in wells, and hanging.

Nagpore is distant 733 miles from Calcutta, 577 miles from Bombay, 673 from Madras, 486 from Poonah, and 631 from Delhi, travelling distances. (*Report of Committee of House of Commons* in 1832; Rennell's *Memoir of a Map of Hindustan.*)

NAHUM (נַחוּם, Ναοὺμ), one of the twelve minor Hebrew prophets, was called the Elkoshite (הָאֶלְקֹשִׁי, *Nahum*, i. 1), probably from the place of his birth, Elkosh, a village in Galilee (Hieronymus, *Prooem in Nahum;* Eusebius, *Onomasticon*, art. 'Ελκεσει'). He prophesied in the kingdom of Judah, whither we may suppose he had gone after the overthrow of Israel. His age can only be conjectured from certain indications contained in his prophecy, from which it appears that both the kingdoms of Israel and Judah had been subject to severe attacks from the Assyrians (chap. i.), and that the captivity of Israel had already taken place (chap. ii. 2). He is thought to allude to the destruction of Sennacherib's army (i. 11-14), as having occurred recently (ii. 1). He also prophesies the speedy restoration of Judah to prosperity (i. 15; ii. 7), which happened in the reign of Josiah. These circumstances would place his prophecy towards the close of Hezekiah's reign, about 705 B.C.

Some suppose that the destruction of Thebes and the captivity of the Egyptians and Ethiopians, spoken of in Nahum (ii. 8-10), are the same events to which Isaiah refers (chap. xx.); but this is uncertain.

His prophecy is a complete poem, the subject of which is 'the burden of Nineveh' (i. 1), that is, the destruction of Nineveh and the Assyrian empire, as the punishment of its wickedness and oppression. The prophecy commences with a sublime description of the power of Jehovah in punishing his enemies and protecting his people, and proceeds to foretell the impending destruction of Nineveh (chaps. i. ii.), which is described in the most vivid poetry in chap. iii. The event which he prophesies took place in the year 625 B.C., in the reign of Chyniladanus, king of Assyria, when Nineveh was destroyed and the Assyrian empire overthrown by Cyaxares I. and Nabopolassar.

'None of the minor prophets seem to equal Nahum in boldness, ardour, and sublimity. His prophecy too forms a regular and perfect poem; the exordium is not merely magnificent, it is truly majestic; the preparation for the destruction of Nineveh, and the description of its downfall and desolation, are expressed in the most vivid colours, and are bold and luminous in the highest degree.' (Bp. Lowth, *Prælect.*, xxi.) Some expressions and images, which are peculiar to him, occur in i. 10; ii. 4-9; iii. 17.

The canonical authority of Nahum's prophecy is undisputed.

(Rosenmüller, *Scholia in Vet. Test.;* Winer's *Biblisches Realwörterbuch;* the *Introductions* of Eichhorn, Bertholdt, Jahn, De Wette, and Horne.)

NAIA, Laurenti's name for a genus of highly venomous serpents, *Uræus* and *Aspis* of Wagler.

Cuvier places the form next to the Vipers (*Vipera* of Daudin), and immediately preceding *Elaps* (Schn., part). Mr. Gray makes *Naiina* the second subfamily of his *Viperidæ*, *Viperina* being the first. *Naiina*, which is characterised by Mr. Gray as having the 'head broad behind, with plates,' is immediately succeeded by *Elaphina*, and thus the genus *Naia*, in his arrangement, stands between *Pelius* (Merrem) and *Sepidon* of the same author. (*On the Genera of Reptiles*, in *Annals of Phil.*, 1825.)

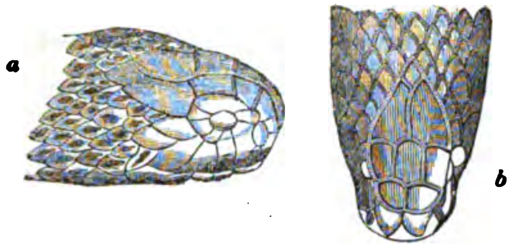
Mr. Swainson, in his 'Classification of Reptiles' (*Natural History of Fishes, Amphibians, and Reptiles*, vol. ii.), places the genus *Naia* among the *Crotalidæ*, his second family of *Ophides*, or serpents, and arranges it between *Cerastes* and *Platurus*. He gives the following as the subgenera:—*Naia*, *Sepidon*, and *Elaps*, and thus characterises the subgenus *Naia*:—Neck capable of being dilated; head narrow; dorsal scales linear; tail conical; subcaudal plates arranged in two rows.

Geographical Distribution.—This form appears to be confined to the Old World.

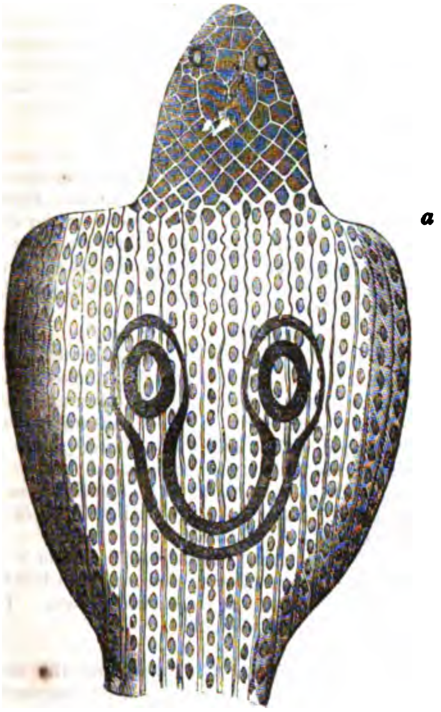
The Asiatic species, *Coluber Naja* of Linnæus, *Coluber cæcus* of Gmelin? *Vipera Naja* of Daudin, *Naja tripudians* of Merrem, *Naja lutescens* of Laurenti, *Cobra de Capello* (adder with a hood) of the Asiatic Portuguese, *Serpent à lunettes* of the French, *Spectacle-snake* of the English, *Nag* and *Chinta nagoo* of the natives, may be considered as the type of the genus.

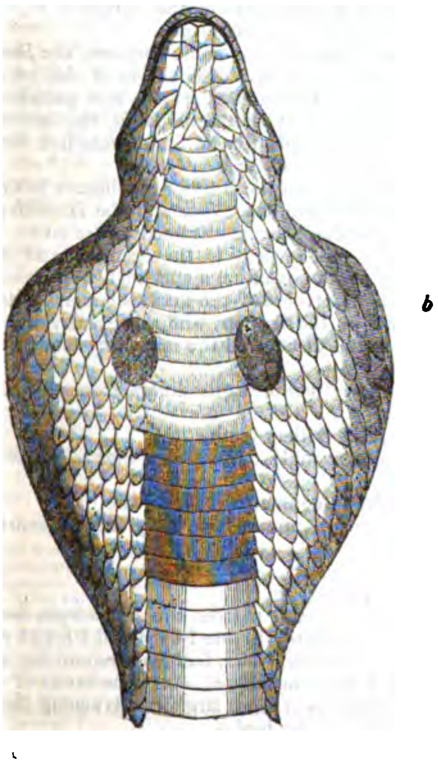
Generic Character.—Head, with nine plates behind, broad; neck very expansile, covering the head like a hood; tail round. (Gray.)

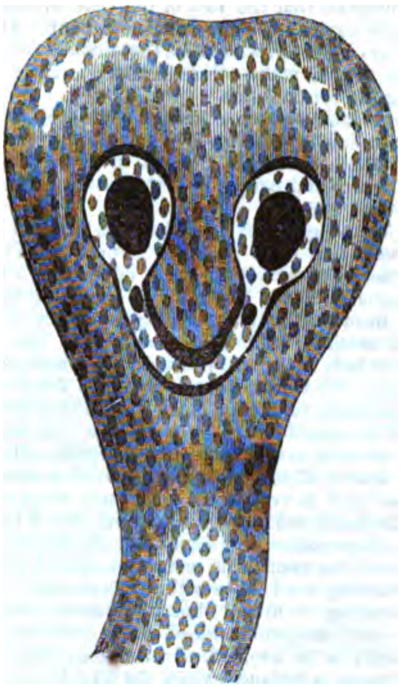
The expansion of the neck and upper part of the body is effected by the anterior ribs, which the animal has the power of raising and bringing forward so as to dilate that portion into a disk more or less large. When this disk is thus dilated in the *Naia tripudians*, it presents on the back part of it no bad representation of a pair of spectacles, or rather barnacles, reversed, for there is no trace of the lateral pieces by which spectacles are attached to the head of the wearer. The animal is brown above, and bluish-white beneath. The following cuts will convey some idea of the form of this snake, with the hood or disk expanded.



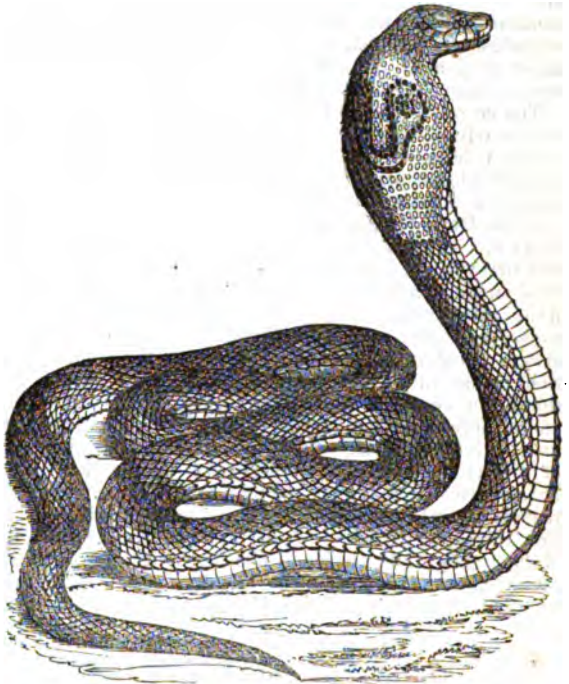
Head of Naia.
a, side view; *b*, seen from above.







a, view of the upper side of the disk or hood expanded, with the head on the same line with the body; *b*, view of the under side of the same; *c*, the disk or hood seen from behind, when the anterior portion of the excited serpent is in an erect posture.



Naia tripudians (reduced) in an erect and excited state.

Colonel Briggs informs us that this active and deadly serpent is sometimes worshiped in temples in India, where it is pampered with milk and sugar by the priests, and he notices it as a surprising instance of the effect of kind treatment in subduing the most irritable spirits. 'The Hindus,' says the Colonel, in continuation, 'have a notion that the sagacity and the long-cherished malice of this worm are equal to that of man. I have seen them come out from their holes in the temples, when a pipe has been played to them, and feed out of the hand as tamely as any domestic animal; and it is when in this state of docility, so opposite to their shy but impetuous nature, the common people believe that the Deity has condescended to adopt that form. It seems probable that this hooded snake was the dragon of the heathen worship; and the shape of its head and its activity when in a state of excitement probably gave rise to the fable of its being winged.'

It is pretended that the root of the *Ophiorrhiza mungos* is a specific against the bite of this serpent. The priests and jugglers however, who make them dance to astonish or amuse the people, make all sure, there is little doubt, by extracting the poison-fangs.

This formidable species, or at least some species of hooded snake, according to the records of travellers, grows to a considerable length. Captain Percival gives the following account of its size and habits, in his 'Account of the Island of Ceylon,' 4to., 1805:—

'The Cobra Capello, or hooded snake, is found here from six to fifteen feet long. Its bite is mortal. The natives find the herb pointed out by the ichneumon a remedy, if timely applied. When enraged and preparing to attack, it raises its head and body to the height of three or four feet in a spiral manner, while at the same time the remaining part of the body is coiled up to accelerate and give force to the spring. At this instant it distends from its head a membrane in the form of a hood, from which it receives its name. This membrane lies along the forehead and the sides of the neck, and is almost imperceptible till the animal gets into a state of irritation and is about to attack his foe. When the hood is erected it completely alters the appearance of the head, and discloses a curious streak in the shape of a pair of spectacles, and sometimes of a horse-shoe. The extension of this membrane seems intended by Providence to give warning to all those within this animal's reach that he is preparing to attack them. Without this signal he would be very dangerous indeed, as his motions afterwards are too rapid to be avoided. I have more than once been an eye-witness to instances where the fatal bite of this snake was escaped from merely by the object of his vengeance timely observing his preparations. One remarkable characteristic of these dangerous serpents is their fondness for music. Even when newly caught they seem to listen with pleasure to the notes, and even to writhe themselves into attitudes. The Indian jugglers improve greatly on this instinct, and, after taming them by degrees, instruct them even to keep time to their flageolet.'

The largest *Cobra de Capello* seen by Dr. Davy in Ceylon was nearly six feet long; and he adds that the general length is between two and four feet. The colour varied: those of a light colour were called high-caste snakes by the natives, and those of a dark colour low-caste. 'The natives,' says Dr. Davy, 'in general rather venerate this snake than dread it. They conceive that it belongs to another world,* and that when it appears in this it is merely as a visitor; they imagine that it possesses great power, that it is somewhat akin to the gods, and greatly superior to man. In consequence they superstitiously refrain from killing it, and always avoid it, if possible. Even when they find one in their house, they will not kill it, but, putting it into a bag, throw it into water. They believe that this snake has a good and generous disposition, and that it will do no harm to man, unless provoked.' Dr. Davy gives a pleasing picture of the irritations and soothings with which the snake-charmers excite and allay the temper of this serpent. He records several instances of the operation of the poison, the first arising from a serpent found in a bag floating down the Kalang-ganga. It was about five feet long, and about six inches in circumference in the broadest part. This snake bit a hen, fixing its fangs in the skin covering the lower part of the left pectoral muscle, and keeping its hold about two or three seconds, when Dr. Davy succeeded in shaking it off. The hen, which at first seemed to be little affected, died eight hours after she was bitten.

The reader will find other experiments recorded by the author; but the bite which was followed by the most speedy death was inflicted by another Cobra de Capello upon a young cock. 'The snake fastened on the thigh, and inflicted rather a severe wound, from which some blood flowed. The cock became instantly lame, and in less than a minute was unable to stand. In about five minutes his respiration became hurried and rather laborious; some alvine dejections took place. In about ten minutes he appeared to be in a comatose state, and for about five minutes he continued in this state, his respiration gradually becoming more feeble and laboured. In seventeen minutes, when his breathing was hardly perceptible, he was seized with a convulsive fit, which in the course of the next minute returned four or five times, each less violent than the former, and the last proved fatal.' (*An Account of the Interior of Ceylon, &c.*, by John Davy, M.D., F.R.S., 4to., London, 1821.)

We owe to Dr. Cantor, who has added so much to our knowledge of the natural history of Asiatic serpents, the introduction of a new genus of hooded snakes, *Hamadryas*, which will probably find its proper place in the series as a subgenus of *Naia*. The doctor himself gives it a position between that genus and *Bungarus* (Daudin), which two forms, in his opinion, it will be found to connect together

Hamadryas. (Cantor.)

Generic Character.—*Head* broad, subovate, deplanate, with a short obtuse rostrum, covered above with fifteen *scuta*. *Cheeks* tumid. *Eyes* large, prominent, pupil round. *Nostrils* widely opened within the confine of two *scuta*. *Gape* very ample, subundulated. *Poison-fangs* anterior, behind which are the maxillary teeth. *Neck* dilatable. *Body* thick, smooth, imbricated with smooth scales disposed in oblique rows. *Tail* short, covered with *scuta* and *scutella*, its apex acute. (Cantor.)

Example, *Hamadryas ophiophagus*. (Cantor.)

Description.—Above olive-green, girt with black sagittal striæ, abdomen glaucous, marbled with black. The Hindustanee name is *Sunkr-Choar*.

Locality.—Bengal.

Habits, &c.—Dr. Cantor thus describes the habits, the effect of the poison, and the history of this serpent.

'The *Hamadryas*, like the *Bungarus*, *Hydrus*, and *Hydrophis*, has a few maxillary teeth behind the poison-fangs, and thus, like the latter, connects the venomous serpents with isolated poison-fangs to the harmless, which possess a complete row of maxillary teeth.

'Of the terrestrial venomous serpents, the *Bungarus* is chiefly characterised by a distribution of the teeth similar to that of the *Hamadryas*, which, also partaking of the chief characteristic of the genus *Naja*, viz. that of forming a hood or disc, constitutes an immediate link between the genera *Bungarus* and *Naja*.

'In consequence of the strong resemblance in the general appearance between the *Naja* and the *Hamadryas*, when first my attention became attracted to the latter, I thought I could refer this serpent to that genus; and it was not until I was able to examine a specimen whose poison-fangs were untouched (those of the first specimens I saw having been drawn by the natives, who are greatly afraid of this serpent), that I discovered the maxillary teeth behind the poison-fangs.

'*Hamadryas ophiophagus* differs from the *Naja tripudians*:

'1. By its maxillary teeth.

'2. By the strongly developed spines on the *os occipitalis inferius*.

'3. By the integuments covering the head.

'4. By the integuments covering the abdominal surface of the tail.

'5. By its colour.

'6. By its size.

'According to the natives, the *Hamadryas* feeds chiefly upon other serpents: in one I dissected I found remains of a good-sized *Monitor*, which fact may account for its arboreal habits, as I have in Bengal, along the banks of the rivers, observed numbers of those large lizards among the branches of trees watching for birds.

'The power of abstaining from food, generally speaking, so characteristic of the serpents, is but in a comparatively small degree possessed by this species; the most protracted starvation amounts to a period of about one month; while the *Vipera elegans*, the *Naja tripudians*, and the *Bungarus annularis*, have, without inconvenience, been confined in cages without any food for more than ten months. Two specimens of the *Hamadryas* in my possession were regularly fed by giving them a serpent, no matter whether venomous or not, every fortnight. As soon as this food is brought near, the serpent begins to hiss loudly, and, expanding the hood, rises two or three feet; and retaining this attitude, as if to take a sure aim, watching the movements of the prey, darts upon it in the same manner as the *Naja tripudians* does. When the victim is killed by poison, and by degrees swallowed, the act is followed by a lethargic state, lasting for about twelve hours. Such of the other Indian venomous serpents, the habits of which I have had opportunity to study from life, show themselves much inclined to avoid other serpents, however ready they are to attack men or animals when provoked or driven by hunger; and I am not aware of any other of those serpents being recorded as preying upon its own kind. A short time ago however, during my sojourn at the Cape of Good Hope, I received from high authority the following fact, which throws a light upon the habits of the *Naja* of Southern Africa, one of which, when being captured, threw up the body of a *Vipera arietans* (*Vip. brachyurus*, Cuvier), which bore marks of having been submitted to the process of digestion.

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* Dr. Davy, in his chapter on the Singalese System of the Universe, has the following passage:—'The Naga-bhawené, that lies under Asoora-bhawené, is also 10,000 leagues in circumference. It is a hollow sphere, without mountains or hills, lakes or rivers, and entirely destitute of vegetation, with the exception of a single tree, called Parasattoo, that answers for all others, bearing not only an immense variety of flowers and fruits, but everything else that is desirable. The Naga-bhawené is the abode of a numerous race of snakes, similar in kind to the hooded snake, and of great size, beauty, and power, capable of passing from one part of the world to another, and shining like gods; so that, though they have no light but that which emanates from their own bodies, they enjoy perpetual day infinitely brighter than ours. In their former lives on earth they were persons of remarkable purity and goodness, almost deserving of becoming gods; but their high virtues were sullied by some vice, particularly that of malice, to which they owe their present forms. Though snakes, they are Bhoodists, and are in possession of a relic and worship in temples. They reside in well-furnished houses, and eat and drink, and enjoy society. By merely wishing, they immediately have any article of food they want; and whatever it may be, it always appears in the form of a frog. They are under a regal government, and are distributed into castes, like the Singalese. Their king, Mahakilla-naga-rajaya, is in every respect superior to the rest; it was with his assistance that the gods and Asooras churned the milky sea; he wound himself round a rock, and they, pulling at his two extremities, set the mass in motion and accomplished their work. Were these snakes disposed, they could destroy the whole of the inhabitants of the earth by a single blast of their poisonous breath; but they are naturally mild and benevolent, and do harm only when provoked. In consequence, they are rather venerated than dreaded; and it is on this account that the common hooded snake is so much respected.'

'The *Hamadryas*, like the greater number of Indian serpents, evinces a great partiality to water; with the exception of the tree-serpents (*Leptophina*, Bell), they all not only drink, but also moisten the tongue, which, as this organ is not situated immediately in the cavity of the mouth, become in the serpents two different acts.[*] Specimens of this serpent in my possession changed the skin every third or fourth month, a process which takes place in all the Indian serpents several times during the year. The *Hamadryas* is very fierce, and is always ready not only to attack, but to pursue, when opposed: while the *Cophias*, the *Vipera*, the *Naja*, and the *Bungarus*, merely defend themselves; which done, they always retreat, provided no further provocation is offered. The natives of India assert that individuals are found upwards of twelve feet in length, a statement probably not exaggerated, as I have myself seen specimens from eight to ten feet in length, and from six to eight inches in circumference. I have often heard it asserted that "Cobras" (which name is naturally enough given to every hooded serpent) have been met with of an enormous size, but I strongly doubt their belonging to the genus *Naja*: among a considerable number which have come under my observation, I never saw any exceeding five to six feet in length, while the common size is about four feet. Some time before I discovered the *Hamadryas*, I was favoured by J. W. Grant, Esq., of the Hon. Company's Civil Service, with an interesting description of a gigantic hooded serpent he had observed in the upper provinces, and which, he remarked, was not a *Naja*. By inspection this gentleman denied the *Hamadryas* to be identical with the above-mentioned.

'The natives describe another hooded serpent, which is said to attain a much larger size than the *Hamadryas*, and which, to conclude from the vernacular name, "*Mony Choar*," is perhaps another nearly allied species.[†]

'The fresh poison of the *Hamadryas* is a pellucid tasteless fluid, in consistence like a thin solution of gum arabic in water; it reddens slightly litmus paper,[‡] which is also the case with the fresh poison of the *Cophias viridis*, *Vipera elegans*, *Naja tripudians*, *Bungarus annularis*, and *Bung. cœruleus*: when kept for some time it acts much stronger upon litmus; but after being kept it loses considerably, if not entirely, its deleterious effects.

'From a series of experiments upon living animals, the effects of this poison come nearest to those produced by that of the *Naja tripudians*, although it appears to act less quickly. The shortest period within which this poison proved fatal to a fowl was fourteen minutes, whilst a dog expired in two hours eighteen minutes after being bitten. It should however be observed that the experiments were made during the cold season of the year.'

A specimen of the present genus (*Hamadryas*), in the Collection of the Society, was upon the table, having been presented to the Museum by Sir Stamford Raffles, but without any facts respecting its history, or the locality in which he had procured it. (*Zool. Proc.*, 1838.)

For an example of the African species see ASP. It is worthy of observation with reference to the contest in the presence of Pharaoh between Moses and Aaron and the magicians of Egypt (*Exodus*, vii. 9-12), that it is stated, on good authority, that the modern Egyptian jugglers possess the power of throwing the Asp (*Naia Haje*) into a state of catalepsy, and rendering it stiff and immoveable, in other words, changing it into a rod, by pressing the nape with the fingers.

NAI'ADES, or NAYADES, Lamarck's name for a family of fresh-water conchifers (*Naiadæ*), comprising the genera *Unio*, *Hyria*, *Anodonta*, and *Iridina*. The third of these genera has been of late years more correctly named Anodon. Dr. Leach and Mr. Bowdich first made this alteration, and they have been followed by most English zoologists. The genus *Unio* was first established by Bruguière.

The position which the genera constituting this family occupied in the systems of the leading zoologists will be seen by a reference to the article MALACOLOGY. Other genera were added by authors, to which it will not, at present, be necessary to advert. Mr. Swainson, in the first series of his interesting 'Zoological Illustrations,' some time ago observed, that having paid some attention to the fluviatile bivalves, and possessing a most extensive collection of specimens, he was clearly of opinion that no permanent characters will be found sufficient to retain either the genera *Dipsas*, Leach, *Hyria*, Lamarck, or *Alasmodonta*, Say, 'much less,' continues Mr. Swainson, 'that of *Damaris*, Leach, and another, whose name I forget, made by Dr. Turton[*] from the same shell as Leach's *Damaris*, viz. *Mya Margaritifera* of Linnæus. In fact, the line of demarcation between *Unio* and *Anodon* appears to rest on the first possessing cardinal teeth, and the latter having none.' In the second series of his 'Zoological Illustrations' Mr. Swainson gives the following synopsis of the genera—*Unio*, *Hyria*, *Iridina*, *Anodon*, *Alasmodon*.

The North American rivers abound with this family; and Mr. Lea of Philadelphia has contributed most largely to our knowledge of the habits of these animals, and has made great additions to the species. The result of his labours, as regards classification, we shall presently show.

Reproduction, Habits, Organization, &c.—Mr. Lea, in his 'Preliminary Remarks,' notices Lamarck's statement that the animal of *Anodon*, which is essentially the same with that of *Unio*, is hermaphrodite, and seems viviparous; for the eggs pass into the oviduct placed along the superior branchiæ, where the young are found with their shells complete. Mr. Lea then tells us that he dissected a specimen of *Anodonta undulata* nearly three inches long, and found the oviducts charged with about 600,000 (as nearly as he could calculate) young shells perfectly formed, both valves being distinctly visible with the microscope. In his second volume bearing the title of 'Observations on the Genus Unio,' &c., the same author informs us that, believing that the oviducts would present the means of discrimination in some species, he having found them to be so very different in *Unio irroratus*, his attention had been particularly addressed to these organs in the few and small species of his vicinity. Whilst engaged in this investigation, Dr. Kirtland, of Poland, Ohio, informed Mr. Lea of his ability to distinguish the female and male shells of the same species, without having recourse to the included animal; and, shortly afterwards, Dr. Kirtland's paper on the subject appeared in the 'American Journal of Science and Arts,' vol. xxvi. Mr. Lea's attention now became more addressed to sexual characters, and he states that a very short series of examination satisfied him fully as to the establishment of the difference of sexes. The female, sustaining her very large burthen, naturally requires, he observes, more space within the valves; hence an enlargement of the posterior portion of the shell is generally found, differing in its form in various species. The following figures, representing the oviducts of the species whose names are printed under the cuts, are given by Mr. Lea.

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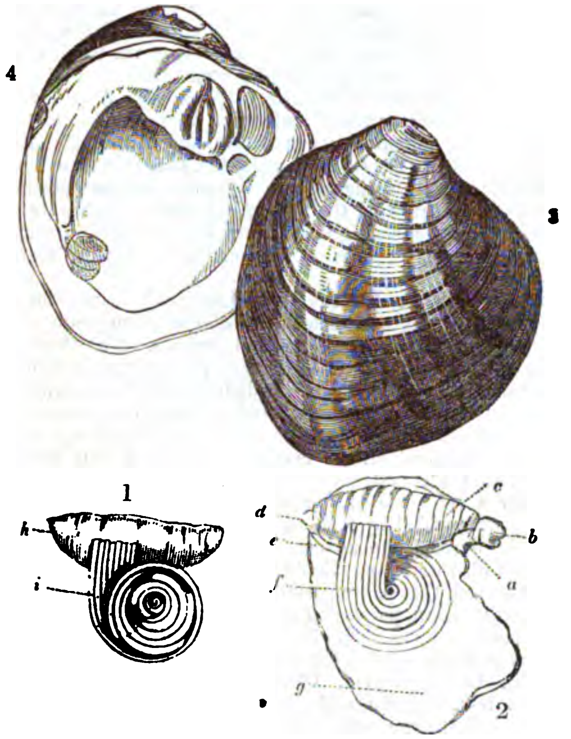
[*] M. Schlegel is of opinion that serpents never drink. (*Essai sur la Physiogn. des Serpens, Partie Générale.*) As mentioned above, I have had opportunities of ascertaining that the greater number of Indian serpents are very fond of water, a fact which I am aware has also been observed in the African serpents by the eminent naturalist Dr. A. Smith, whose valuable discoveries, which he is at present engaged in publishing, will bring to light many facts, of which we are at present in almost total ignorance, concerning the habits of animals, particularly those of the Reptiles.

[†] The Cobra Capello described by Captain Percival (ante, p. 62) may have been one of these gigantic hooded serpents.

[‡] 'M. Schlegel asserts (loc. cit., p. 34) the venom is "ni alcalin ni acide." The only way in which I can account for this mistake from a man who ranks among the first Erpetologists, is by supposing that M. Schlegel himself never had an opportunity of testing the poison of a living serpent; for besides the five above-mentioned genera of Indian venomous serpents, I found the fresh poison of different species of marine serpents (*Hydrus*) to possess the property of turning litmus paper red. The same fact with the *Crotalus* is noticed by Dr. Harlan, who says, "The poison of the living *Crotalus*, tested in numerous instances with litmus paper, &c., invariably displayed acid properties." (Vide Harlan, *Medical and Physical Researches*, p. 501, sq.)'

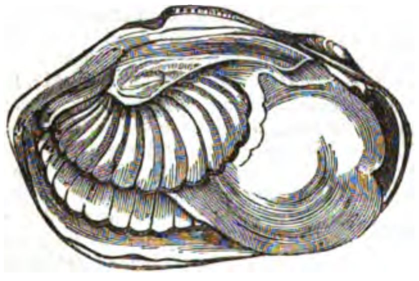
[*] Mysca?



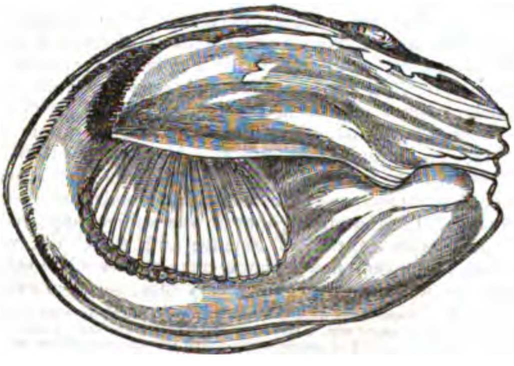
Unio Irroratus.

1, soft parts showing interior of oviduct; 2, showing exterior of oviduct, the mantle being removed; *a*, mouth; *b*, great anterior muscle; *c*, right superior branchia; *d*, great posterior muscle; *e*, inferior right branchia; *f*, right oviduct; *g*, foot; *h*, superior left branchia; *i*, interior view of oviduct; 3, 4, shell.

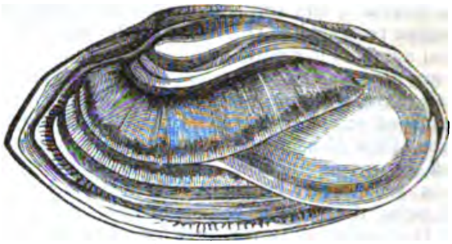
Appearances exhibited by female Naiades according to Mr. Lea, one of the valves removed and the oviducts exposed.



Unio Ochraceus.

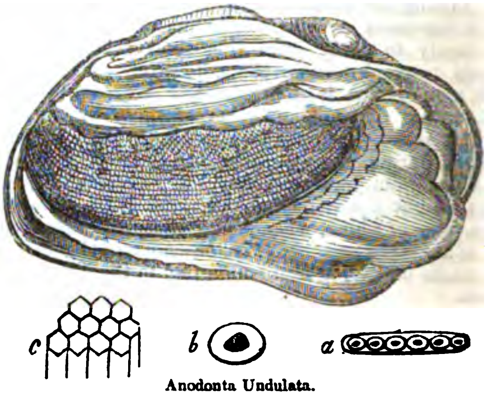


Unio Cariosus.



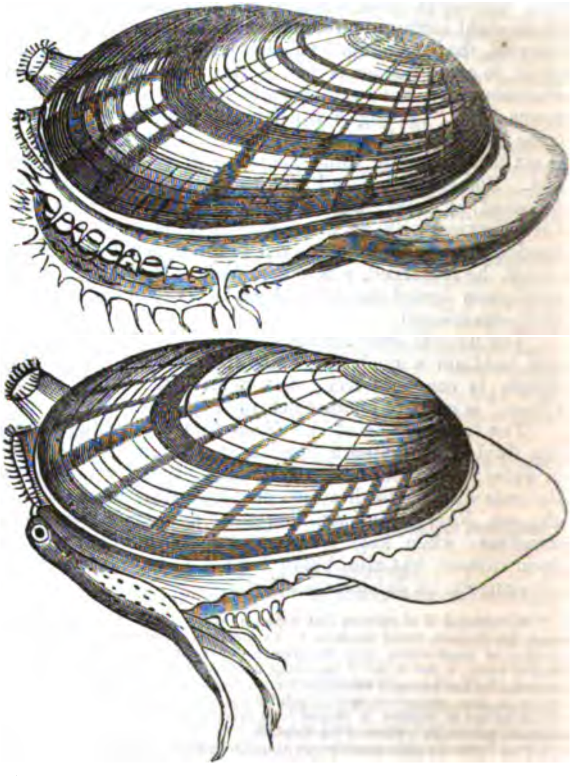
Anodonta Fluviatilis.

In plate xx. (Mr. Garner's paper on the 'Lamellibranchiate Conchifera') will be found a figure of the animal from the ovarium of an *Anodonta*, as seen in the field of the microscope ($\frac{1}{8}$-inch focus); and in pl. xviii. the disposition of the heart, pericardium, excretory organs, &c., of *Anodonta anatina* is shown.



Anodonta Undulata.
Apparently nearly ready to spawn.

Mr. Lea remarks that the mass of the lobes in this species differs from that of *A. fluviatilis*, in presenting a darker appearance and a very curious arrangement of the oviducts. The ova are placed in a kind of sac lying across the lobe, and presenting one end to the stomach and the other to the mantle of the animal. They lie so close together, as to take the form on the exterior, like the cells of a honeycomb This, Mr. Lea says, is of course produced by pressure Some of these sacs, when carefully removed, were found to contain as many as twelve ova, each with a perfect living shell in it, having a brownish epidermis: *a* in the cut repre



Two females of *Unio radiatus* as they were seen with the parts protruded as they lay at the bottom of a basin of water Mr. Lea states that these females put on two quite different forms as regards the inferior portion of the mantle, as exhibited above.

sents a sac with its ova, *b* represents the ovum with its perfect young shell included, *c* represents the honeycomb appearance and is eight times magnified.

Mr. Lea (vol. i.) states that it seems to be a matter of doubt on what these animals subsist. He says that he has strong reasons for believing that they feed on animalcules which are ever found to exist in water, and which they might separate from the constant stream which they pass from the posterior part of the shell, and which must be taken in at another part. This operation he witnessed frequently in a vessel in which he kept the *Naiadæ* for some months. If the water was not changed for twenty-four hours, he uniformly found the animals quiet, but within a few minutes after it was changed they as uniformly commenced the passage of this constant stream. He adds that he cannot suppose this operation to be for the sole purpose of breathing, as there is no intermission in the stream of water, and the quantity thrown out is too great for this purpose only. He believes it to be the result of the action of the separation of the animalcules from the water.

In the Museum of the Royal College of Surgeons in London (*Physiological series*) are the following preparations. No. 1002, The soft parts of a fresh-water muscle (*Anodon cygneus*) injected and prepared to show the four branchiæ, which unite below the foot. The convolutions of intestine at the base of the foot and the passage of the rectum through the heart are also shown. No. 1003, The soft parts of a fresh-water muscle, with both mantle-lobes and heart dissected away, so as clearly to display the branchiæ and labial processes. The orifice of the branchial vessels and water-tubes are well displayed at the base of the branchiæ. The first series of vessels, which run transversely across the branchiæ, give off lateral ramulets at right angles, and form a most delicate vascular net-work to receive the influence of the respiratory currents. No. 1004, A transverse section of the branchiæ of a fresh-water muscle, injected, dried, and preserved in oil of turpentine: a beautiful display of the vascularity and delicate structure of the respiratory organ. No. 66, A transverse section of the connecting ligament of the valves of a fresh-water muscle, showing that its structure is fibrous, the fibres being perpendicular to the plane of the shell, and converging towards the centre, so that when the shell is closed these fibres are in a state of compression, and consequently have a constant tendency to antagonize the adductor muscle, open the shell, and retain it in that state, independent of any muscular action. No. 67, A longitudinal section of the same ligament, made by dividing the valves from one another.

The brilliant and variously coloured nacre with which many of the species are lined and the extreme thickness of some of the shells are very remarkable. That pearls should be found in them will not surprise those whose attention has been drawn to their internal surface. Pennant remarks that *Mya Margaritifera* of Linnæus (*Unio elongatus*) is noted for producing quantities of pearls, and formerly there were regular fisheries in many of our rivers to obtain them. As many as sixteen have been taken from one shell. The Esk and the Conway were famous in this way. The latter river, in the days of Camden, was noted for them. Sir Richard Wynn of Gwydir, chamberlain to Catherine, queen to Charles II., is said to have presented her majesty with a Conway pearl which is to this day honoured with a place in the regal crown. Pennant, who states this, adds, that the shells are called by the Welsh, *Crigen Diluw*, or Deluge Shells, as if left there by the deluge. The river Irt in Cumberland also produced them; and Sir John Hawkins, the circumnavigator, had a patent for fishing that river. Britain indeed had early acquired a reputation for its pearls; for, according to Suetonius, they were Cæsar's inducement for undertaking his British expedition. (*Jul. Cæsar*, c. 47.) This however does not seem very probable. Pliny (ix. 35) indeed speaks of the pearls of our island as small and ill coloured, and refers to the breast-plate which Cæsar himself had brought home and dedicated to Venus Genetrix in her temple, adding that he wished it to be understood that the offering was formed of British pearls.

Ireland has produced pearls of considerable size and some value, especially in the rivers of Tyrone and Donegal. One weighed 36 carats, and was valued at 40*l.*, but it was foul, and so lost much of its worth. Other single pearls were sold for 4*l.* 10*s.*, and for as much as 10*l.* The last was sold a second time to Lady Glenlealy, who put it into a necklace, and refused 80*l.* for it from the duchess of Ormond. Pennant, who quotes from the abridgement of the 'Phil. Trans.,' speaks of the last century as the time when these large Irish pearls were procured. We have seen some lately of considerable size, fair shape, and pretty good colour.

Mr. Lea, in his final arrangement, admits only two genera, *Margarita* and *Platiris*. The first of these has been preoccupied by Leach to designate a genus of marine conchifers. [MARGARITA.] We shall however retain the name in this article, in order to present to the reader the leading features of Mr. Lea's arrangement and the forms of the shells.

MARGARITA. (Lea.)

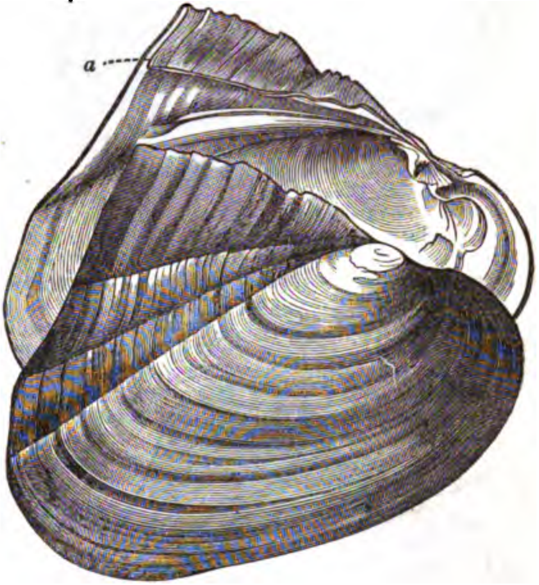
1. Subgenus. Unio.

Having a cardinal and lateral tooth.

*

Symphynote.

Example, *Unio alatus*.



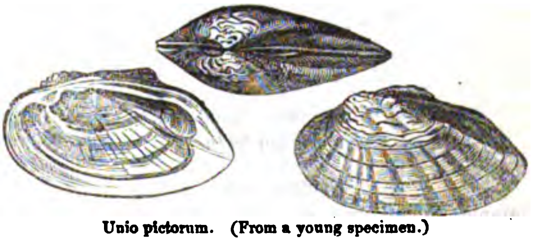
Unio alatus.

a, part of the wing of the valve broken off, showing the symphynote character. reduced.

* *

Non-Symphynote.

Example, *Unio Pictorum*, common in our English rivers; shell and animal figured in the article CONCHIFERA, vol. vii., p. 433.



Unio pictorum. (From a young specimen.)

In Mr. Garner's memoir on the anatomy of the Lamellibranchiate Conchifera (pl. xx.) the ova of *Unio Pictorum* from the ovaries and branchiæ are represented (18th of an inch focus). Also the valve of a young *Unio*, showing that its nucleus is of the same shape as the valves of the animals found in the branchiæ.

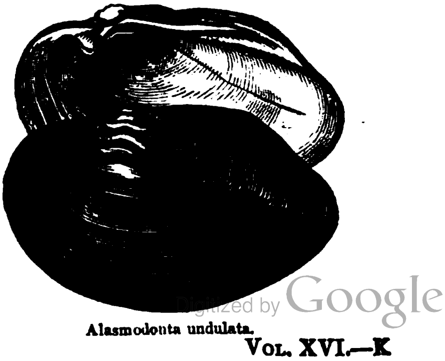
2. Subgenus. Margaritana.

Having one tooth (cardinal).

* *

Non-Symphynote.

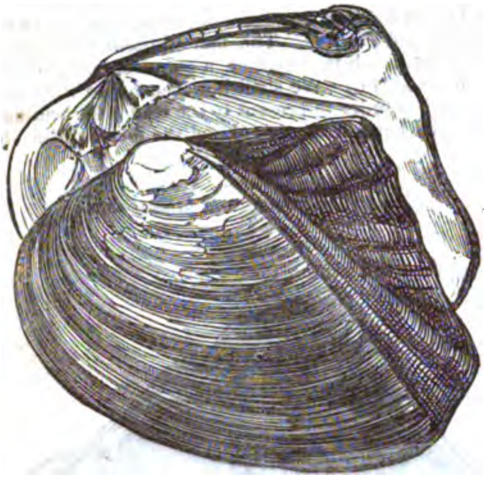
Example, *Alasmodonta undulata.* (Say.)



Alasmodonta undulata.

Symphynote.

Example, *Alasmodonta complanata*. (Barnes.)



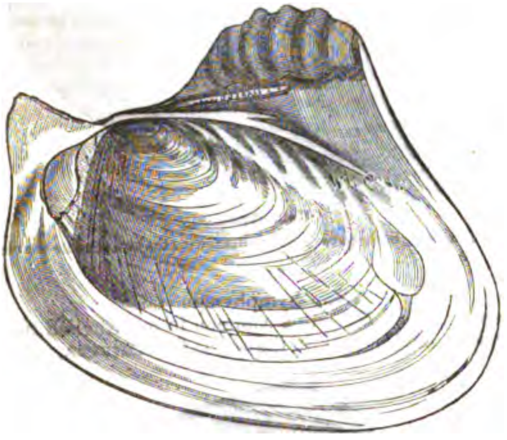
Alasmodonta complanata.

3. Subgenus. Dipsas.

Having a linear tooth under the dorsal margin.

Symphynote only.

Example, *Dipsas plicatus*. (Leach.)



Dipsas plicatus.

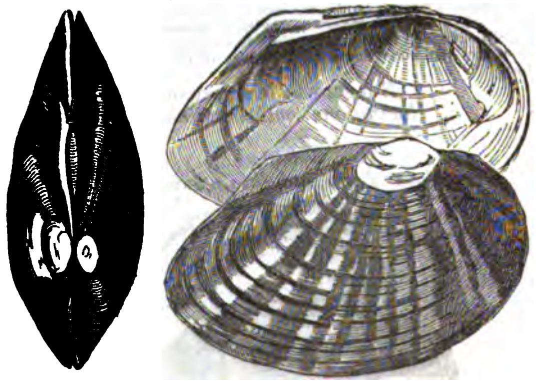
4. Subgenus. Anodonta.

Having no teeth.

*

Symphynote.

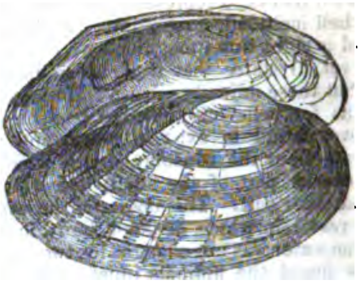
Example, *Symphynota magnifica*. (Lea.)



Symphynota magnifica.

Non-Symphynote.

Example, *Anodonta fluviatilis* (**Mytilus** fluviatilis of Solander, Dillwyn, &c; Anodonta catarracta of Say).



Anodon fluviatilis.

PLATIRIS. (Lea.)

1. Subgenus. Iridina.

Having a crenulate dorsal margin.

Non-Symphynote.

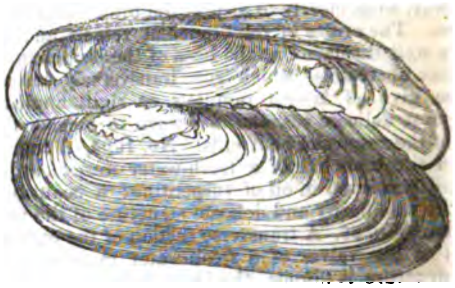
Example, *Iridina exotica*. [See CONCHACEA, vol. vii. p. 426.]

2. Subgenus. Spatha.

Having the dorsal margin non-crenulate.

Non-Symphynote.

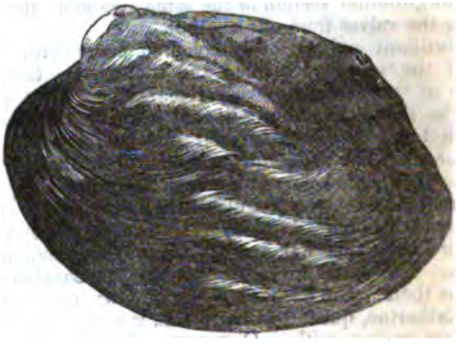
Example, *Iridina Nilotica*. (Sowerby.)



Iridina Nilotica.

Plicate Shells.

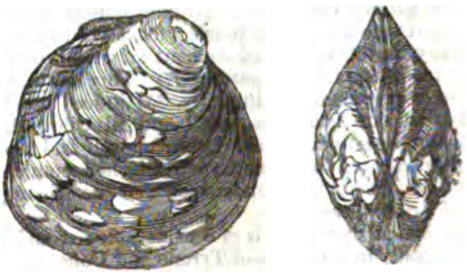
Example, *Unio plicatus*. (Lesueur.)



Unio plicatus.

Nodulous Shells.

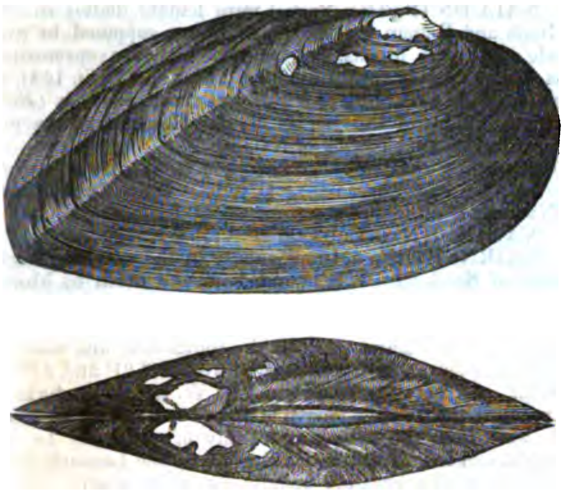
Example, *Unio pustulosus*. (Lea.)



Unio pustulosus.

Smooth Shells.

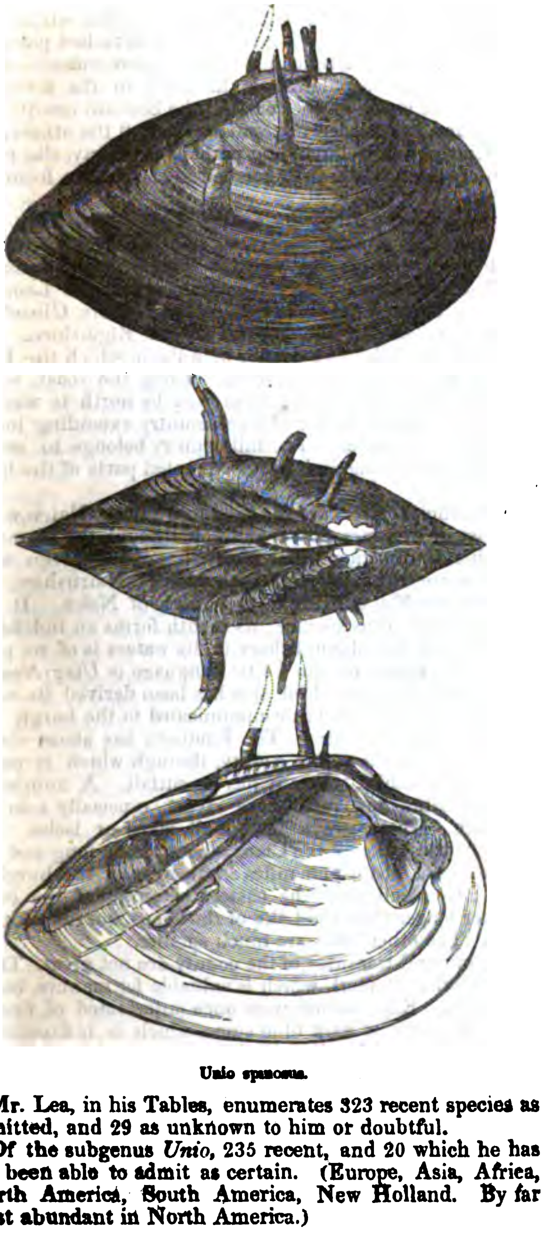
Example, *Unio complanatus* (Unio purpureus, Say).



Unio purpureus.

Spinous Shells.

Example, *Unio spinosus* (Lea). N.B. Bartram appears to have been the first who discovered this species. He, apparently, found it in the Mississippi. See his 'Travels,' p. 431.



Unio spinosus.

Mr. Lea, in his Tables, enumerates 323 recent species as admitted, and 29 as unknown to him or doubtful.

Of the subgenus *Unio*, 235 recent, and 20 which he has not been able to admit as certain. (Europe, Asia, Africa, North America, South America, New Holland. By far most abundant in North America.)

Margaritana, 20 admitted, 2 unknown. (Europe, North America, South America, and perhaps Africa.)

Dipsas, 2 recent. (Asia.)

Anodonta, 58 admitted; 7 unknown to Lea. (Europe, Asia, Africa, North America, South America, New Holland.)

Iridina, 2 recent. (Africa.)

Spatha, 6 recent. (Africa, South America.)

M. Deshayes (last edition of Lamarck), after reviewing the state of the question, comes to the conclusion that all the various genera cannot form and ought not to form more than one genus, constituting singly the family of the *Naiadæ*. He refers to Mr. Lea's work favourably, but charges him with an omission which would have been almost unpardonable in an author who had undertaken a monograph of this extensive family. It is but common justice to Mr. Lea to insert his conclusive answer to this charge: 'I will be excused,' says Mr. Lea, 'in taking this opportunity to correct an erroneous impression on the mind of M. Deshayes. He says that I was not able to examine the collection of the museum of Paris. "Malgré cette imperfection qu'il ne pouvait empêcher, le travail de M. Lea se recommende à l'attention des naturalistes par des observations judicieuses, des descriptions exactes," &c. It would be strange indeed if, after spending so many years in the study of this family that I should neglect, while in Paris, to see the collections from which Lamarck made so many descriptions. I was frequently at the museum, and, on one particular occasion, by appointment of MM. Blainville and Férussac, arranged, in the presence of these and other gentlemen, all the species of the *Naïades* that were in the museum, and named them; and also presented to the museum about 15 species which were new to that great national institution. I also did the same thing for Baron Férussac, having designated every specimen in his cabinet belonging to this family.'

Fossil Naiadæ.

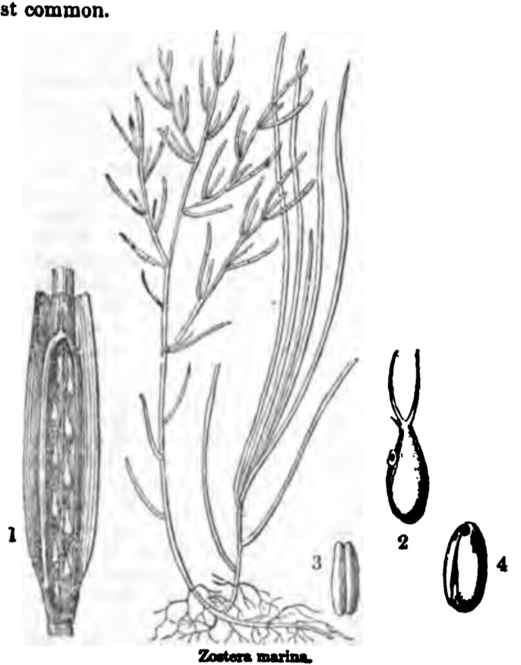
Speaking of *Anodon*, Mr. G. B. Sowerby (*Genera*) says that he does not know of any fossil species, unless we are justified in considering the bivalve from the coal-measures figured in Sowerby's 'British Mineralogy,' tab. 386, under the name of *Mytilus crassus*, as an *Anodon*.. This Mr. G. B. Sowerby states he is unable, after examining the specimens, to demonstrate, though he finds strong reason for believing that it may prove so. When treating, in the same work, of the genus *Unio*, the author states that there are many fossil shells, particularly in the coal-measures, which are referred to this genus; and, he thinks, correctly so, though he has never been able to consult the characters of the hinge; but, judging from the cast of the inside, which is very common, he finds no difference between it and casts that he made from the inside of recent *Uniones*. He does not however feel authorised to pronounce the shell published in *Min. Con.*, t. 153 (*Unio crassissimus*), to be an *Unio;* for its hinge, he observes, is far from being characteristic, and it has not the compound muscular impression of that genus. He thinks that it agrees more nearly with some of the Lamarckian *Cypricardiæ;* at the same time he confesses his doubts about the probability of that genus being ultimately adopted. His attention appears to have been next drawn to *Unio Listeri*, *U. hybridus*, *concinnus* and others figured in *Min. Con.*, and placed in the oolitic series by Conybeare and Phillips; and, in confirmation of some of the observations recorded in their 'Outlines,' he remarks that these, together with *Unio crassiusculus* (*Min. Con.*, t. 185), all want some of the principal distinguishing marks of the *Unio*, and, judging even from their hinges, he remarks that we should certainly hesitate to place them with *Unio*. He adds that he has never seen any perfect specimen of the shell published as *Unio*, from the freshwater formation; but if he may be allowed to decide from such fragments as he had examined, and from its geological position, he should hardly feel a doubt upon the subject. Notwithstanding however what he has above advanced, he concludes by observing that he must still consider the existence either of *Unio* or *Anodon* in any bed below the chalk, except the coal-measures, as exceedingly problematical. M. Deshayes (*Tables*) makes the number of fossil species of *Unio* (tertiary), 2; of *Anodon*, 1; of *Hyria*, none; and of *Iridina*, none. In the last edition of Lamarck he records 2 of *Unio*—*U. concinnus* (Sow.), from the inferior oolite near Banbury, in Oxfordshire, and *Unio hybridus* (Sow.) from the Nottinghamshire beds; both from *Min. Con.* Dr. Mantell records a *Unio* (*Brit. Min.*, t. 500) from the plastic clay (Castle Hill, near Newhaven), and *Uniones porrectus*, *compressus*, *antiquus*, *aduncus*, and *cordiformis*, from the Tilgate beds (middle division). Also *Unio antiquus* from the Ashburnham beds (lower division of the Hastings deposits). Professor Phillips (Yorkshire) enumerates *Uniones Listeri*, *concinnus*, and *crassiusculus*, from the lias; *peregrinus* from the cornbrash; and *abductus* from the inferior oolite and marlstone. Mr. Lonsdale (oolitic district of Bath) records *Unio concinnus* from the alluvium (Weston) and from the inferior oolite (Widcombe Hill); and an unnamed *Unio?* from the Kelloways rock (Christian Malford). Dr. Fitton, in his table (*Strata below the Chalk*) notes *Uniones aduncus*, *antiquus*, *compressus*, *cordiformis*, *Gualterii*, *Mantellii*, *Martini*, *porrectus*, *subtruncatus*, a species not distinct, a large new species, and some other species probably new, from the Weald clay, Hastings sand, and Purbeck beds. Mr. Lea gives 21 as the number of fossil *Uniones*, and one (doubtful) of *Anodon*.

⁂ The last-named author, in his arrangement founded on the form of the hinge, has deemed it better not to adopt D'Orbigny's genus *Mycetopoda* [MYCETOPODA] established on the natural character of the animal. In its perforating habit it resembles, according to Mr. Lea, his *Unio oriens*, which buries itself about 12 inches below the surface of the sand in which it lives.

The genera *Diplodon*, *Triplodon*, &c. of Spix can hardly be allowed to stand.

NAI'ADES, otherwise called *Naiadeæ* and *Fluviales*, are aquatic plants forming a small natural order of Endogens, remarkable for the unusual simplicity of their organization. As they live constantly below water, they require no epidermis, and therefore the leaves consist of nothing more than the mesophlœum, or central stratum of parenchyma. Their sexes are usually separate, and sometimes on different plants. Their floral envelopes are either deficient or in the form of a membranous tunic or cup, or consist of scales, to the face of which anthers or carpels adhere. The latter are either solitary or in pairs or fours, one-seeded, one-celled, with the ovule generally pendulous from the central suture. Their fruit is usually indehiscent and nut-like, but sometimes it is 2-valved or irregularly ruptured. The embryo has no albumen, and consists of a very large radicle, usually folded up, and containing a slender plumule lying in the cavity so formed.

These plants are inconspicuous objects, inhabiting both fresh and salt water in all parts of the world. In this country, the genera Potamogeton, a common inhabitant of rivers and ponds, elevating its little brown spikes of flowers above water during the time of fertilization; Zannichellia, a thread-shaped plant, with minute axillary flowers, constantly submersed; and Zostera, or sea-wrack, with long, narrow, riband-like leaves, inhabiting æstuaries of the sea, are the most common.



Zostera marina.

1, a spathe containing male and female flowers; 2, a female, 3, an anther; 4, an embryo.

NAIA'DS (Ναιάδες, Νηίδες) were female deities in the Greek and Roman mythology, who were supposed to preside over rivers, brooks, and springs. They are represented as young and beautiful nymphs (Hom., *Od.*, xiii. 103), of whom Ægle, according to Virgil, was the most lovely (*Ecl.*, vi. 21). Many of the heroes of the Homeric poems are described as the offspring of Naiads.

According to Pausanias (viii. 4, § 2), the Naiads were called, by the Arcadians, Dryades and Epimeliadæ. [NYMPHS.]

NAIRN. [NAIRNSHIRE.]

NAIRNSHIRE, a small county in the northern highlands of Scotland. It is bounded on the north by Moray Frith, on the east by Elginshire, on the south-east by a detached portion of Inverness-shire, on the south by a detached portion of Elginshire, and on the south-west and west by Inverness-shire. It is situated between 57° 21′ and 57° 39′ N. lat., and between 3° 40′ and 4° 5′ W. long. Its form is irregular; the greatest length is, from north by east to south by west, from the eastern extremity of the coast to the neighbourhood of Cairn Glaschurn and the Leonach hills, 20 miles; the greatest breadth, at right angles to the length, is, from the neighbourhood of Culloden Muir to the neighbourhood of Loch-an-Tulloch in Elginshire, sixteen miles. The area of the county is given by Dr. Playfair (*Description of Scotland*) and by Mr. MacCulloch (*Statistical Account of the Brit. Empire*) at 198 square miles; the population, by the census of 1831, was 9354. Two detached portions belong to the county, the district of Ferintosh or Fairntosh, near Dingwall in Ross-shire, and Dunmaglass in Inverness-shire. These detached parts are not, we believe, comprehended in the measurements given above; but the population is included in the foregoing number. It is one of the least of the Scottish counties in extent, and is exceeded in population by all the others, except Kinross and Selkirk, and perhaps Cromarty, the population of which is not distinguished in the Return from that of Ross.

The southern part of the county is hilly; the hills form two irregular groups, separated by the river Findhorn, which flows through the county. The principal summits are Ben Bui, Cairn Our, Craigerachan, and the Leonach, all on the border towards Inverness-shire; Cairn Glaschurn and Cairn Dui, on the border toward Elginshire. The valley between the two groups of hills in which the Findhorn flows is called Strathdern. Along the coast, which extends about eight miles from east by north to west by south, is a narrow border of level country extending inland from one to six miles. The hill country belongs to one of the least interesting and least frequented parts of the highlands.

The principal rivers are the Findhorn and the Nairn, which both rise in Inverness-shire, and flow through the county in a north-east direction. The Nairn has about eleven miles of its course within or upon the border of Nairnshire, and falls into the Moray Frith at the burgh of Nairn. It is a stream of little consequence; its mouth forms an indifferent harbour, and the salmon-fishery in its waters is of no great value. Its name in the Celtic language is *Uisg Nearne*, 'the water of alders;' from this has been derived its usual designation, which it has communicated to the burgh, and through it to the shire. The Findhorn has about eleven miles of its course in this county, through which it passes to enter Elginshire, where it has its outfall. A number of small streams flow into these rivers, especially into the Findhorn. There are a few small lakes or lochs. The largest is the Lake of the Clans, about a mile long and half a mile broad, about four miles south-west of the burgh of Nairn; Cranloch, near the eastern extremity of the coast, is rather longer than the Lake of the Clans, but not quite so broad. The other lakes are much smaller.

The mineral treasures of the county are not great. There is abundance of marl, which is valuable for manure, but is little used. Expectations were once entertained of finding coal. A quarry of dark blue stone, which is inflammable, is worked; it neither loses bulk nor is pulverised by fire. There is freestone in Nairn parish, and a few men are employed in the quarries. Peat is dug.

The soil is diversified. In the eastern part of the level tract along the coast it is generally a rich loam on a sandy or gravelly bottom: in the western part it is either a stiff rich clay or a sharp gravelly mould. In the mountainous district it is chiefly a sandy loam, full of gravel and small stones

The climate in this part is cold and stormy, and the crops are later than along the coast, where the temperature is more favourable. Yet the crops are rarely if ever cut off by frost, nor are they materially retarded by the autumnal rains.

The agriculture of Nairnshire is in a very backward state. About twenty or thirty years since the farms were small and the tenantry poor. Most of them held their farms without leases. These poorer tenants followed the routine of agricultural practice, which had been long established; but the richer tenants and the proprietors were more willing to break through the shackles of custom and to introduce improvements. The proportion of arable land was small, especially in the Highland district, and almost the whole county was unenclosed. Manure, formed of dung mixed with turf or sand, was accumulated by means of sheep, which on the small farms (on nearly all of which a small flock was kept) were housed every night; and also by means of some black cattle and horses. This manure was spread over a portion, perhaps a fourth, of the farm, which portion, after three ploughings, was sown with bear or big, and this crop was succeeded by two or three successive crops of oats. A small plot was allowed for potatoes, and occasionally a patch for growing flax for domestic use. When, as frequently happened, the land became too much overrun with weeds to afford an adequate return, it was left waste for one or two years, and the horses and cows were turned in to feed upon it; after which it was again brought into cultivation, as above described. The tenantry were allowed pasturage for their cattle, either in the open down along shore or in the unenclosed moors near the foot of the mountains. The more opulent farmers had introduced fallows into their practice, and cultivated the artificial grasses and other green crops. The poor farmers made their own carts and agricultural implements, which were consequently of very inferior construction.

There are in the county about 8000 acres of natural wood and 4000 acres of plantations. The woodlands are chiefly on the banks of the rivers and their tributary streams.

The population of the county in 1831 was thus classified: 2074 inhabited houses; 2246 families; of which 742 families were chiefly employed in agriculture; 487 families in trade, manufactures, and handicrafts; and 1017 families in other occupations: the population consisted of 4307 males and 5047 females; total, 9354.

There are no manufactures carried on in the county except that of woollen cloth, which in 1831 employed about 50 men, who converted yarn into cloth for family use. The coast fishery gave employment to 127 men in the parish of Nairn; and 532 men were engaged in retail trade or in handicrafts, chiefly carpenters, masons, shoemakers, tailors, and smiths.

The county has no other subdivisions than parishes, of which it contains three entire, and portions of seven others, the remaining parts of which are in Inverness, Elgin, Ross, or Cromartyshire, and most of them in the first.

There is only one town in the shire, the royal burgh of Nairn, situated on the west side of the river Nairn, near its mouth. It appears to have been founded by William the Lion (who reigned from 1165 to 1214), and was originally called Invernaren. The town was afterwards granted by Robert Bruce (who reigned from 1306 to 1329) to the earl of Ross, Lord of the Isles, under whose descendants it probably continued till A.D. 1475. The site of the more antient town was at some distance from that of the present town: this change has resulted from the gradual advance of the sea upon the land, and the shifting of the bed of the river. The ruins of the antient castle which defended the town have been long covered by the sea; but thirty years ago some of the older inhabitants remembered to have seen them at spring-tides. The present town consists of one principal street parallel to the river, and of a number of smaller streets or lanes branching from it at right angles. Some new streets of greater regularity have been laid out on the north side of the town, near the shore; but little progress, if any, has been made in building them. The kirk lies back from the main street near the river; the town-hall, a part of which is used as the burgh and county prison, is in the main street; it was rebuilt about twenty years since. There are two dissenting places of worship. There is a bridge over the Nairn.

Considerable expense was incurred, some time since, in forming a harbour; but the great floods of 1829 almost ruined it, so that it is now only accessible to vessels of very small tonnage. The trade of the town, which never extended beyond the supply of a small district round, has been much injured by the ruin of the harbour. Nairn is a place of some resort as a bathing-place, and several villas have been erected in the neighbourhood. Some coal and lime are imported, and a number of boats are engaged in the herring fishery. The burgh and parish, which comprehends an extensive rural district, contained, by the census of 1821, 679 inhabited houses and 3228 inhabitants; by that of 1831, 721 inhabited houses and 3266 inhabitants: 38 of the houses were assessed at 10*l.* a year value or upwards, and more than 60 were estimated to be worth 10*l.* a year or more. There is a weekly market: and six stated fairs are held in the year.

The burgh of Nairn belongs to the Inverness district of burghs, which comprehends Inverness, Fortrose, Forres, and Nairn, and returns one member. The number of councillors, as determined by act 3 & 4 Will. IV., c. 76, is 9; the number of registered voters is above 60. The yearly revenue of the corporation is upwards of 140*l.*; the expenditure about 10*l.* more. The whole of the trades make but one corporation. The jurisdiction of the burgh magistrates has dwindled to the cognizance of petty thefts and assaults.

Several Roman coins have been discovered at Nairn. (Carlisle, *Top. Dict. of Scotland.*)

Auldearn, a parish, the kirk of which is about two miles south-east of Nairn, is a burgh of barony. The parish had, in 1831, 330 inhabited houses and 1613 inhabitants.

Nairnshire is united under one sheriff with Elginshire · the sheriff, as in the other counties of Scotland, is a paid legal functionary or judge, with extensive jurisdiction in civil cases and more restricted jurisdiction in criminal cases. (MacCulloch's *Statistical Account of the British Empire.*)

There is little crime in the county, and that little is decreasing, from greater decision in enforcing the laws against smuggling, and from the growth of self-respect, the result of the increased civilization of the people. Petty assaults and other breaches of the peace, almost all arising from drunkenness, are the most common offences. Drunkenness is however diminishing; but the condition of the people is much depressed. Most of the adults are able to read, and the men can generally write. (*Second Report of Inspectors of Prisons.*)

There is much suffering among the people from poverty. in the parish of Nairn alone, in 1836, 200 persons were on the poor-roll. The condition of the able-bodied labourer has however improved. There is a savings' bank near Nairn. Potatoes and herrings form a considerable portion of the food of the poorer classes.

The three parishes which are wholly within the county, and two of those which are partly within it, are in the presbytery of Nairn; the remainder of those which are partly in the county are severally in the presbyteries of Inverness, Forres, and Dingwall. The presbytery of Dingwall is in the synod of Ross; the other presbyteries are in the synod of Moray.

For parliamentary purposes the county is united with that of Elgin: the two return one member. Before the Reform Act, Nairnshire returned a member alternately with Cromartyshire.

This county was formerly included in the district of Moray. It contains some antiquities, of which the most interesting is Calder or Cawdor Castle, the antient seat of the thanes of Cawdor. In this building tradition has fixed the scene of the murder of Duncan by Macbeth, and the very bed in which he was murdered is professedly shown; but the tower, which alone remains of the old castle, and to which is attached a more modern building, is obviously of later date than the transaction connected with it. In the parish of Nairn are the vestiges of an antient fortress, called *Caistle Fionlah*, i.e. Finlay's Castle; and at no great distance are the remains of the castle of Rait, the seat of the Cummins. Below this castle there is a place called *Knock-na-Gillan* or *Knoch-na-Gillaw*, i.e. 'the hill where the young men were killed.' It takes its name from the slaughter, by the Cummins, of eighteen of the clan MacIntosh with whom they had a feud.

In the year 1645 the low country, the people of which favoured the Covenanters, was ravaged by Montrose, who destroyed the fishermen's boats and nets. The Covenanters, under General Hurry or Urry, attacked him at Auldearn near Nairn, but were beaten with the loss of 2000 men. Montrose burnt the towns of Elgin and Nairn.

In the Rebellion of 1745-46 the royal army in pursuit of the Pretender's forces crossed the county. The battle of Culloden was fought just beyond the boundary, in the county of Inverness.

(Playfair's *Description of Scotland; Beauties of Scotland;* MacCulloch's *Statistical Account of the British Empire; Municipal and Boundary Commissioners' Reports* and other Parliamentary Papers; Carlisle's *Top. Dict. of Scotland.*)

NAKED SEEDS. This name was applied by Linnæus to a small form of fruit which does not directly bear a style at the apex, and which has the appearance of a seed, as in the Sage, the Dead-nettle, the Borage, &c.: such fruits are now called *spermidia* by many writers. Naked seeds strictly so named are seeds which are fertilised by immediate contact with pollen, and which have no pericarpial covering: they are at present known only in the great class of Gymnosperms, that is to say, in Coniferæ, Cycadaceæ, and Loranthaceæ. It however sometimes happens that seeds burst through their pericarp, after the influence of the pollen has been communicated to them, and long before their maturation, as in Leontice thalictroides. In such cases they are, strictly speaking, naked, but not in the sense in which the term is usually applied.

NAKHICHEVAN. [GEORGIA.]

NAKHIMOV, AKIM NIKOLAEVITCH, a Russian poet, was born at Kharkov, of wealthy parents, in 1782, and educated at the university of Moscow. According to the usual custom of that period, he entered the military service at an early age, but did not long continue in it; for, on the new university being opened at Kharkov, he enrolled himself among the students, and applied himself to literature with such zeal and diligence as to excite general astonishment. Having taken his degree, he retired to his own estate to indulge in that fulness of literary enjoyment which his fortune permitted him, and in that domestic society which he shortly after secured to himself by his union with a very amiable young lady. Thus eminently favoured in every respect, the tranquil felicity of his life met with no other interruption than that of a premature death, for he was suddenly carried off by a fever, July 17-29, 1814, in the 32nd year of his age, leaving behind him two infant children, to whom he had looked as pledges of the increasing happiness in store for him.

Though of amiable disposition and possessed of a fund of good sense and philosophy, Nakhimov had many singularities, and was at times morbidly shy even among his most intimate acquaintance. Another trait in his character was his singular diffidence of his own literary talents, notwithstanding that his favourite subjects, and those in which he best succeeded, were of a satirical cast. This turn for caustic observation displays itself also in his 'Fables,' which are remarkable for their epigrammatic point. Besides his satires in verse, he wrote many pieces in prose that partake more or less of the same spirit, more particularly that entitled 'The Speaking Monkeys,' which was composed in derision of the attempted conquest of Russia by Napoleon, and which may challenge comparison with Voltaire's 'Micromegas.' A short memoir of him, with a critical notice of his chief productions, was published at St. Petersburg in 1818, by Dr. Maslovitch.

NAME. [NOUN.]

NAMEN. [NAMUR.]

NAMES, PROPER, are words by which single objects are denoted, as countries, rivers, towns, men, &c.

But when we speak of proper names, we mean, more usually, the names of men; and on this subject, to which little attention has hitherto been paid, and especially such proper names as appear among ourselves, it is our intention to offer a few observations.

In the primitive state of society, as soon as men were so far advanced as to find the convenience of having a verbal denotation of the individuals who composed a tribe, the rule would undoubtedly be, 'one man, one word:' we see this to be the case in the uncivilized tribes; and as man is presented to us in very early historic periods, we still see the same system prevailing. In the Hebrew genealogies, which ascend much higher than any which possess the slightest claim to our respect in any other nation, we find a single word, as *Terah, Abraham, Reuben, Aaron, David, Solomon,* the only designation of the persons whom those words call up before us; and if in any instance there is any deviation from the rule, it is for some special reason, and we see it to be an exception to what was the usual practice.

In the other nations, the fathers of European civilization, it was the same, Egypt, Syria, Persia, and Greece; one person, one word: and so in the earliest periods to which we can ascend in the history of the Latin nation, we have rarely more than one word to denote one individual, or if there is a second word employed, it bespeaks an origin in something which is apart from the simple, colloquial, and usual designation of him.

In the Celtic and German nations it appears to have been the same; *Arminius, Ariovistus,* and the like: and in Britain, *Caractacus.* The Saxons were a nation in whom this, the primitive system, was still prevalent, not only when they first established a colony in Britain, but during the whole period when the descendants of Hengist held the supreme authority in this island. Persons do, to be sure, present themselves in the pages of historians with such additions as *Harefoot, Ironside,* but it may be reasonably doubted whether these terms can be properly regarded as *names,* and if it is admitted that they may be such, still these are only exceptions, the great mass of the Saxon population, of whatever rank, having but one single word by which the individual was denoted, such as *Edwin, Alfred, Gurth, Ulf, Tosti, Harold,* and the like.

As nations advanced in refinement, the names of the individuals comprising them became more complex. Amongst the Romans, for instance, we have *Publius Cornelius Scipio Africanus, Caius Julius Cæsar, Publius Ovidius Naso;* and names of this class formed the rule, at least in families which were free. The slaves probably remained with the single word only.

We have not room to enter into an examination of the principle on which this new form of personal denomination was constructed. A uniform principle, like that very valuable one on which our own personal nomenclature is at present constructed, perhaps did not exist, so that our present system is rather to be regarded as the invention of modern nations, than as borrowed by them from any of the nations of more antient civilization.

The principle of the modern system of personal nomenclature in our own nation is this: to have one name for the individual, joined to a second name, which is common to some particular stirps in the great English family to which he belongs. We call the two the *name* and the *surname.* We think in these days much more of the latter than of the former. But in the more solemn acts of our lives, we find the proper consequence given to that which is indeed the name; in baptism, in elementary Christian instruction, at marriage, when the name is the thing in question, it is that which is properly the name, and not the surname, which is pronounced; *John, Richard, Anne.* We may find in books, even down to the close of the seventeenth century, that catalogues and indexes are sometimes so constructed, that the names, and not the surnames, are ranged in alphabetical order. Philips's 'Theatrum Poetarum' presents a late instance.

The value of this principle lies here: that it is a simple and easy mode of showing, to some extent, to what family an individual belongs; it promotes family union; but its chief advantage lies in the facilities which it affords for conducting inquiries into the condition of the ancestors of persons who may feel any curiosity on the subject, which, without the indications afforded by identity of surname, could be attended with very little success, when it was attempted to ascend beyond the recollections of persons still living.

This mode of designation, we believe, prevails in most other countries of modern Europe. In England it is almost the universal plan. The royal house of England forms an exception, an unchangeable surname having never been adopted by them. In this respect the house of Brunswick is like the houses of Saxe, Nassau, Bourbon, Orleans, and a few others, springing from the persons who were of prime note in that state of society when the rule was, 'one person, one word,' and being afterwards too conspicuous by rank and station to need any such ordinary mode of distinction as that which the adoption of an invariable addition to the name would have given them. This was once not peculiar to the royal house of England in this island (the Stuarts, it may be observed, and perhaps the Tudors, but not the Plantagenets, were a temporary exception, being families of inferior rank, who were raised by circumstances to the possession of the regal dignity), for the earls, in the first two or three centuries, seem also to have disdained a practice which assimilated them too nearly to the classes next below them. Thus the persons distinguished in Domesday Book as *Comites*, are *Comes Hugo*, *Comes Rogerus;* and never, we believe, with names of addition which descended to their posterity. But all these great houses have become long ago extinct.

There is also an exception to the modern rule, of another kind. There are still some remote and rudely-cultivated districts, in which the inhabitants are better known by some *by-name*, as of the house in which they live, or as the son of some person well-known, than by any unvarying addition to their name properly so called. This is said still (or at least very lately) to be the case in some parts of Yorkshire and Lancashire, and is certainly the case in parts of Wales, but it is probable that the extension of education will bring all parts of this island into subjugation to a plan which has such obvious convenience.

If it is inquired when the system on which we now proceed was first adopted, the fact which has just been stated, that even now the system is not universally prevalent, will show, what is indeed the fact, that, like many other things, it has made its way by degrees. There is not, we believe, a single instance before the Conquest of persons in genealogical succession bearing the same surname; and it is also quite certain that in the mass of the population of England after the Conquest, the descendants of the Saxon population, there can rarely, if ever, be shown an instance of successive individuals of the same family being distinguished by the same surname in the two centuries immediately succeeding the Conquest. We have indeed but imperfect means of pursuing the inquiry for those two centuries. The names of the people of those centuries lie buried in unprinted records and chartularies. But if there are exceptions, and Saxon families in these centuries to be traced using an invariable as well as a variable name, it is in that remarkable class, who still exist in no very small number, who have one of the old Saxon appellatives in the place of the surname, such as *Thorold*, *Swaine*, *Aldred*, *Thoroughgood* (Turgot), *Godwin*, and the like.

But we find in Domesday Book that several of the Normans and other people from the Continent, who became settled in England at the Conquest, and soon after that event, are distinguished by names of addition, which are not merely personal, but names which were borne by themselves and their posterity after them. Such are *Darcy*, *Arundel*, *Devereux*, *Balliol*, *Burun*, *Laci*, *Perci*, and others, people just below the rank of the comites, and who, gaining great possessions and great power, were afterwards very conspicuous in English history. These are the persons, we conceive, who first set the example of the practice which has since become all but universal among us.

The disposition which always more or less exists to imitate what is done by a superior, is probably the principle to which we are to refer the change in this point which we find to have taken place by the middle of the fourteenth century.

By that time the present system may be said to have been pretty generally established in all the well-settled portions of the island. The statute of additions of the 1st Henry V., by requiring that the name and description of the party should be exactly set forth in any writ or indenture, would do something to consolidate the system: and when it was required that in all parishes a register should be kept of baptisms, marriages, and burials, which was one of the acts of the Reformers, there was a new check presented to any attempts at relaxation in the practice.

But even at the beginning of the fifteenth century there was much that was unsettled in the personal nomenclature of England even in families to whom pertained portions of the soil. Thus in 1406 a person describes himself as *Willielmus filius Adæ Emmotson*, who in 1416 is *Willielmus Emmotson;* and more remarkably about the same time, a person who is described as *Johannes filius Willielmi filii Johannis de Hunshelf* appears soon after as *Johannes Wilson*. About the same time we had *Willielmus Johnson Wilkinson*, *Willielmus Adamson Magotson*, and *Thomas Henson Magot*, showing the present system then in its rudiments.

As the system at present existing made its way by degrees, and with much of casualty, so there seems to have been much also of accident in respect of the name of addition which marked the distinction of the stirpes. There are some of the surnames in common use among us for the adoption of which it is difficult now to assign any satisfactory reason. This is partly to be attributed to the corruption which many names have undergone, and partly to the strange additions which we find in the place of surnames in early documents of undoubted authenticity. One of these is *Adam that God made*, whose addition, if he lived at the period when his race first began to conform themselves to the system, would appear now in some form which would probably foil the sagacity of the most skilful inquirer. Sometimes there is a difficulty arising out of a wrong apprehension of the origin. Thus we have the names *Spring*, *Summer*, *Winter;* there is no *Autumn*. It is difficult to conceive how the names of the seasons should become the names of families; but in fact it is not so, *Spring* being a word denoting a small grove of trees, so that the name classes with *Wood*, *Holt*, and others concerning which there is no difficulty; while *Summer* and *Winter* are *Summoner* and *Vintner*, names derived from occupations.

But the great mass of our surnames may be easily explained. We cannot enter here at large into the subject; but it may be useful to those who are inclined to prosecute it, to say that nearly the whole of them may be referred to one of the five following classes:—

1. Foreign names brought in by settlers from other countries, including the Scotch and Irish names. These designate a very large section of the whole population; and there is a constant accession being made to them by the tide of population setting towards England. Very few of the names of this class introduced in the early periods remain: the great majority being of families who have become settled in England in the course of the last century and a half.

2. Names of locality.—These are divisible into two great portions: those which are derived from places of generic names only, such as *Hill*, *Dale*, *Cliff*, *Slack*, *Combe*, *Grove*, *Shaw*, *Frith*, and many others, mostly monosyllabic, which would originally appear as *John de la Hill*, &c.; and those which are derived from some specific place, as *Atherton*, *Burton*, *Denby*, and thousands of others, there being scarcely a town, village, or hamlet which has not given its name to some English family.

3. Names of occupation.—Of this class the number is very great. We have *Brewer*, *Barber*, *Smith*, *Mason*, in short every trade and every other occupation in which men engage. Lost trades or trades which have changed their names are preserved in the names of families whose ancestor was engaged in them at the time when his family fell into the system. Thus we have *Fletcher*, *Girdler*, *Furbisher*, *Stringfellow*, *Lister*, *Walker*, *Pargiter*, *Webster*, *Taverner*, and the like. We have also *Palliser*, *Lander*, *Foster*, *Palfreyman*, *Page*, *Woodruffe*, *Reeve*, *Hunter*, which were evidently at the beginning names of occupation. It is difficult to account for such names as *Bishop*, *Baron*, *Earl*, *Lord*, *Priest*, *King*.

4. A large portion of our personal nomenclature is made up of surnames which are formed upon those which we call Christian names. Nearly all these appeared originally in the form of *Filius*, &c., as John son of William. This mode of designation has taken various forms. Thus on this name of *William*, there are founded *Williams*, *Williamson*, *Wills*, *Wilson*, *Wilks*, *Wilkins*, *Wilkinson*, *Willis*, *Willison*, *Bill*, *Bilson*, *Willet*, *Willimot*, *Willmot*, *Till*, *Tilly*, *Tillot*, *Tilson*, *Tillotson*, *Willy*, each of which, if written by a scribe of the middle ages in Latin, would be expressed by the same phrase, *Filius Willielmi*. Other names have an equally numerous progeny. To this class may be referred *Ives* and *Iveson* which are *Filius Judei; Clarkson*, *Cookson*, *Wrightson*, which are names formed not indeed on the name, but the profession of the parents.

It would however be to extend this article to an inordinate length, even to touch upon the subordinate classes to the five great classes.

5. The fifth and last is that of names which indicate something peculiar in the personal appearance or mental qualities of the person to whom they are first given. Such are *Swift*, *Long*, *White*, *Black*, *Crump*, *Rouse*, *Wise*, *Good*, &c.

Of the proportions in which names of the five classes enter into the composition of English society, some idea may be formed by the following analysis of 896 names, found in what was called the 'Fashionable' class of the inhabitants of Bath. Throwing out 162 as of uncertain origin, there remained 734 surnames, which give the following results:—

1. Foreign names, 142.
2. Names of locality Generic, 57; specific, 249. Total, 306.
3. Names of occupation, 79.
4. Patronymical, 172, of which 43 were Saxon names.
5. Descriptive, 35.

The results would be somewhat different in a population of a different kind. There are six families who have names of occupation in the English peerage. The number of the individuals bearing the names varies greatly in the five classes. The ratio of the number of persons bearing the name to the name itself is the lowest in the first and second classes.

The nations who contributed the 142 foreign names were these:—

Scots,	44	German,	9	Italian,	2	Poles,	1
French,	39	Dutch,	6	Portuguese,	2		
Irish,	32	Welsh,	5	Cornish,	2		

Thus much for the *surname.*

The *names* of the antient Saxon population of England were nearly all descriptive of some quality of mind or body. Thus *Edward* is truth-keeper; *Winfred*, win-peace; *Alfred*, all-peace; *Edmund*, truth-mouth; *Ailwin*, of all beloved; *Ulf*, wolf. But a great change took place soon after the Conquest. We see in the names of the Normans who became settled in England many which continued for ages favourite names of the English nation; *Roger*, *Ralph*, *Hugh*, *Humphrey*, *Geffrey*, *Gilbert*. To them also we owe the introduction amongst us of names of religion. If these names existed at all in England before the Conquest, they were exceedingly rare. In the catalogues of Saxon bishops, not one occurs. Even amongst the first race of Normans they did not abound. We find *Adam*, *John*, *Stephen*, *David*, *Peter*, *Matthew*, and perhaps a few others. But in the century and a half after that event, names of this class began to prevail in a great degree. It was a period of extraordinary Christian devotion: the exertions in founding monasteries, building churches, and maintaining the war against the infidels show it. In this state of the public mind the new system of taking names of religion spread and strengthened. The names of religion were almost wholly from the Old and New Testament, a few only being taken from the names of persons who have been eminent in later times for their Christian virtues.

Since then little change has taken place. A few names once common have lost their popularity; a few others have been introduced. There have been periods when names somewhat fantastic have had a popularity; such as the names of the virtues, as *Patience*, *Truth*, *Prudence*, *Faith*, by which women have been named; *Thankful*, *Faithful*, *Sabbath*, and others more extraordinary, have been given to men. Some went for a time into another extreme, and we had *Hannibal*, *Scipio*, *Cæsar*, and *Hercules*.

We have however not been sufficiently attentive to the importance of keeping up a stock of what we call Christian names. Our population has increased to a very great extent, while our surnames have rather diminished than the contrary. We should therefore, if we wish that names should be what they are intended to be, *Notamina*, increase the number of those names out of which we have the power ourselves of selection. As it is, with a population of 20 or 30 millions, we have but 53 names of men which can be used without some appearance of singularity. Of these 12 are in more frequent use than the rest:—

John William Henry George James Robert
Thomas Francis Charles Edward Richard Samuel

Of these, 4 are names of religion; 4 are names introduced at the Conquest; 3 names introduced at a later period from the nomenclature of other countries; 1 is pure Saxon. Of the 41 names of secondary frequency, 28 are names of religion; so that of the 53 names of men in ordinary use, 32 are names of religion, or considerably more than one-half, and they are all taken from the Scriptures.

Again, looking at the 53 names in respect of the languages from which they are derived, it appears that

25 are of Hebrew origin,
19 from the various dialects of Western Europe,
5 from the Greek, and
4 from the Latin.

There are a multitude of names, once in use in England, which might easily be revived, and it would be a matter of some public convenience to do so. Few persons have not found inconvenience in some form or other from the want of sufficient distinctness in the name he bears. Thus a little time ago there were two antiquarian Chalmers'; two Parkes upon the bench; two Whitakers, both clergymen, and both writers on Lancashire topography: some time ago there were two Dr. John Thomas's, both chaplains to the king, and both bishops; and two Dr. Grays, both divines, both writers in their own profession, both connected with historic literature and poetry, and both engaged in controversies with Warburton. This occasions confusion. To change a surname is a difficult and expensive process; the cheapest and simplest remedy is to give a name at baptism which will be marked and remembered, as *Basil Hall*. Of neglected names there are, *Austin*, *Allan*, *Aubrey*, *Arnold*, *Baldwin*, *Blase*, *Barnard*, *Fabian*, *Ferdinand*, *Josceline*, *Miles*, *Sylvester*, *Theobald*, *Theodore*, and a host of others. But it might be worth the consideration of government, whether some facilities should not be afforded for increasing our very scanty stock of surnames by the revival of many which are now extinct and lost in persons who descend from those who bore them.

NAMUR, the French name for NAMEN, a province of the kingdom of Belgium, bounded on the north by Brabant, on the north-east and east by Liège, on the south-east by Luxemburg, on the south by France (department of Ardennes), and on the east by Hainault. Its greatest length from north to south is 55 English miles, and its greatest breadth 42 miles; its area is 366,181 hectares, equal to 904,467 English acres, or 1413 square miles, and is thus employed

In cultivation . .	181,306	hectares.
Marshes and waste land	48,343	„
Woods and forests .	125,541	„
Sites of buildings .	1,277	„
Roads and streets .	7,523	„
Rivers and streams .	1,658	„
Undescribed . . .	533	„
	366,181	hectares.

The province is watered by the Maas, the Sambre, the Lesse, and several small streams, by which it is traversed in all directions. The Maas enters Namur from France, near the town of Givet, and runs north-north-east about 9 miles to Dinant, when it flows to the north-north-west for 17 miles to the city of Namur, and turning to the east-north-east, enters the province of Liège at the distance of six miles from Namur. The Sambre enters the province from Hainault about 10 miles east of Namur, at which city it falls into the Maas. The Lesse enters Namur from Luxemburg at Palizeul, and flowing first to the north, and then to the north-east, falls into the Maas a short distance south of Dinant.

The soil of the province is generally fertile, consisting for the most part of an unctuous marl, but without any great depth. Of the three *arrondissemens* or districts into which the province is divided, viz. Namur, Dinant, and Philippeville, that of Namur is the most productive, the other two being more stoney. The principal agricultural products are wheat, rye, oats, barley, hemp, flax, and chicory. The grain harvests do not more than suffice for the consumption of the province. There are few natural meadows in the district of Namur, but in the other parts of the province the meadows are the most profitable of the lands. Artificial grasses are also much cultivated, especially trefoil in the district of Namur. Wood grows abundantly in the province. The trees are principally oak (the bark of which forms an article of export), beech, ash, hornbeam, birch, and hazel. With the exception of the oak trees, which are used for building purposes, the wood which is cut is converted into charcoal for the use of smelting furnaces. A great many plantations have been made of late years, especially in places where, through a want of depth in the soil, its cultivation cannot be profitably conducted. The breeding of draught horses forms an important branch of rural occupation; they are at once strong and active, and the farmers are careful to preserve the breed unmixed. Great numbers of swine are bred, and are mostly sold to itinerant dealers. Near to Dinant some are killed and salted for exportation. The farmers occasionally suffer from the visits of wolves, and there are great numbers of foxes, rats, weazles, and polecats.

The mineral productions of the province are iron, lead, coal, marble, and potters' clay. The quantity of iron made in the course of a year is stated to be 30,250 tons, nearly the whole of which is smelted with wood charcoal, requiring annually the produce of 6000 to 7000 hectares (16,000 acres). The number of people employed in the iron-works is 913, in addition to miners, wood-cutters, charcoal-burners, waggoners, &c., amounting to 13,700 persons. The lead-mines which are near the city of Namur have been open since 1619, but their working has been discontinued at various times. These mines are worked by a company, who employ in them about 200 men. No return of the produce has been given. The coal-field of this province has already been sufficiently described. [BELGIUM.] The marble quarried in Namur is found in various parts of the province, and gives employment in sawing and polishing it to a great number of persons. It is of various colours, red, grey, blue, and black; the greatest part of what is raised is exported to France. The potters' clay found in the province is used chiefly at Namur and Ardenne.

In addition to the branches of industry already mentioned, Namur contains the only copper-works in Belgium. The raw material is procured chiefly from Sweden, and the principal market for the manufactured goods is found in France.

The province of Namur contains only five towns, Namur, Ardenne, Dinant, Fosse, and Philippeville. With the exception of the capital, they are all inconsiderable places. Ardenne is situated on the right bank of the Maas, near to the border of Liège, in 50° 30′ N. lat. and 5° 4′ E. long. Its population in 1837 was 4314. Various kinds of earthenware are made in the town, and there is a paper-mill in which 140 workmen are employed. Dinant is likewise situated on the Maas, in 50° 17′ N. lat. and 4° 54′ E. long. Its population in 1837 was 5033. They are engaged in manufacturing woollen cloths, paper, and hats, and in cutting and polishing marble. Fosse, a small town with 2722 inhabitants, is situated in 50° 22′ N. lat. and 4° 42′ E. long., about 9 miles south-west of Namur. The coal-mines and marble-quarries in the vicinity give employment to many of the inhabitants. Philippeville, in 50° 12′ N. lat. and 4° 32′ E. long., although the capital of an arrondissement, has only 1127 inhabitants. It is built on an eminence and fortified: the walls form an irregular pentagon. The town is composed of ten wide well-paved streets.

The population of the province, on January 1, 1838, was 229,665. The movement of the population during 1837 was as follows:—

	Males.	Females.	Total.
Born—in towns . . .	567	622	1189
„ in the country . .	3211	3046	6257
	3778	3688	7466
Died—in towns . .	514	491	1005
„ in the country .	2002	1902	3904
	2516	2393	4909
Marriages . . .			1673

The number of houses in the province was then 43,096, and of separate families 46,995. With the exception of about 400, the whole population profess the Roman Catholic religion.

NAMUR (in Flemish, *Namen*), the capital of the province of that name, is situated in 50° 28′ N. lat. and 4° 48′ E. long., at the confluence of the Sambre and the Maas. It is considered to be the strongest fortress in Belgium. It is entered by eleven gates; the streets are wide and clean; the houses are mostly built of a bluish stone and are slated. There are several squares; two bridges, one over the Maas, the other over the Sambre; and six churches, one of which is the cathedral dedicated to St. Aubin. This is a fine building of modern architecture; the front is ornamented with twenty Corinthian columns, sustaining a cornice which bears several statues of white marble. On either side of the great altar are fine statues in Carrara marble, representing St. Peter and St. Paul. This building was begun in 1750, and finished in 1767.

The situation of Namur, at the confluence of two navigable rivers, is favourable to commerce. The two chief branches of industry are the manufacture of cutlery and tanning. Great numbers of workmen are employed in the neighbouring collieries, marble-quarries, and mines of iron and lead. There are four cattle-fairs held in the year, in February, May, July, and November. The great fair begins the 2nd of July, and lasts fifteen days.

The castle of Namur is said to have been built at the end of the sixth century, and for more than four centuries thereafter the city was of very insignificant dimensions. Early in the eleventh century, under the reigns of Albert I. and II., it was much enlarged, and by the beginning of the fifteenth century Namur had attained its present dimensions.

This fortress has sustained several sieges, the most celebrated of which was successfully undertaken by Louis XIV., assisted by the renowned Vauban, in 1692. The French maintained themselves for three years in the fortress, to the defences of which they made several additions. On the 3rd July, 1695, the town was invested by the English under William III. The garrison, under the Marshal de Boufflers, consisted of 14,000 men, but the attack was so fierce, that the marshal capitulated on the 4th of August. Namur was unsuccessfully attacked by the count of Nassau in 1704; it was ceded to Austria, in 1713, and put under the care of Holland in 1715. In 1746 it was taken by France, but was restored to Austria, under the treaty of Aix-la-Chapelle, in 1748. The fortifications were demolished by Joseph II. in 1784, but were afterwards restored. It was taken by the French in 1792, retaken by the Austrians in the following year, and falling again into the hands of France in 1794, was constituted the capital of the department of the Sambre and Meuse, and so continued until 1814, when the Netherlands threw off the yoke of France. Namur was the scene of an obstinate battle in 1815, between the French and Prussians.

The population of the city, on January 1, 1838, was 20,480.

NANCY, or NANCI, an important town of France, capital of the department of Meurthe, situated on the left bank of the Meurthe, 172 miles east of Paris in a direct line, or 206 miles by the road through Epernay, Châlons-sur-Marne, and Bar-le-Duc; in 48° 41′ N. lat. and 6° 12′ E. long.

Nancy is not known to have existed before the twelfth century. In the middle ages it was the capital of Lorraine, and was several times taken and retaken, especially in the struggle in which René II., duke of Lorraine, had to engage with Charles le Temeraire, duke of Bourgogne [BOURGOGNE], for the possession of his duchy. It was under the walls of this town (Jan., 1477) that Charles experienced his last fatal defeat, in which he fell. In the reign of Louis XIII. (A.D. 1633) it was taken by that prince from Charles III. or IV., the then reigning duke of Lorraine. The fortifications were demolished on the restoration of the town to the dukes of Lorraine.

The town is situated in a fertile and pleasant plain at the foot of wooded and vine-covered hills. It consists of two parts, the old town on the north and the new town on the south. The old town retains some portions of the old fortifications: the streets are narrow and crooked. The new town, commenced in the beginning of the seventeenth century, has wide and straight streets, lined with good houses: the stateliness of its public buildings, and the extent and beauty of its squares and public walks, render Nancy one of the handsomest, though it is one of the dullest, of the great towns of France. La Place Royale is the finest of the squares: one side is formed by the town-hall (one of the handsomest in France), containing a gallery of pictures; two other sides are occupied by the office of the prefect, the custom-house, the theatre, and some private houses. In the angles of the square are four fountains, and in front of the town-hall a triumphal arch, erected by Stanislas Leckzinsky, duke of Lorraine, to Louis XV. Two streets run in a direct line from this square to two of the town-gates, built like triumphal arches. The cathedral is not remarkable, except for a portal with a triple row of columns, and for the high altar. The little church of Bon Secours, in the suburb of St. Pierre, is adorned by the monuments of Stanislas Leckzinsky and his wife. This church was erected by Stanislas to replace one built by René II., on the spot where Charles of Bourgogne fell. There are fine barracks both for cavalry and infantry, an Exchange, and other public buildings. In the old town is the antient Gothic castle, the former residence of the dukes of Lorraine; and adjacent to it is a small church of Gothic architecture, the burial-place of the ducal family. The tomb of René II. and some others are in the church itself; others are in a round chapel attached to the choir. This chapel was restored in 1822, at the joint expense of the French and Austrian governments it is lighted by some stained-glass windows in the cupola by which it is surmounted, and contains seven marble tombs erected to the memory of the dukes of Lorraine or members of their family, a marble altar on which is a sculpture of Christ in his grave-clothes, and other ornaments. The remains of several of the princes of Lorraine lie in the vault beneath.

The population of Nancy, in 1826, was 29,122 for the commune; in 1831 it was 29,001 for the town, and 29,783 for the whole commune; in 1836 it was 31,445 for the commune. The inhabitants manufacture hosiery, hats, and gloves; and embroider muslin. This latter branch of industry employs many hands; the embroidery is sent to Paris and to the colonies. They spin cotton yarn by the agency of steam; and make coarse woollen cloth, calico, muslin, and other cotton goods. Some chemical preparations are manufactured; also vermicelli, liqueurs, paper-hangings, and earthenware. There are several establishments in the town or neighbourhood for spinning woollen-yarn and weaving muslin and calico; besides tan-mills, tanyards, dye-houses, breweries, and oil-presses. There is near the town a large bed of stone well adapted for lithographic printing. Trade is carried on in the various manufactured articles; and in grain, wine, brandy, wool, and iron. There are two yearly fairs, one of twenty days.

Nancy is the seat of a bishop, whose diocese comprehends the department of Meurthe, and who is a suffragan of the archbishop of Besançon; of a Cour Royale, whose jurisdiction comprehends the departments of Meurthe, Meuse, and Vosges; of a subordinate justice court and a commercial tribunal; and of several fiscal or administrative government offices. There are several hospitals and charitable institutions, and a house of correction.

There is a public library of 23,000 volumes; and there are libraries attached to the bishopric, the Cour Royale, and the high school. There are a rich museum, a cabinet of natural history, and a botanic garden; an académie universitaire, a high school, and a seminary for the priesthood; a school of design, and a secondary school of medicine; a central agricultural society, a royal society of sciences and arts, an elementary Protestant school, a Bible society, and a society formed by the wealthier Jews of the department for the instruction of the poor children of their nation in the useful arts.

Nancy was the native town of Marshal Bassompierre, of Claude Lorraine the painter, of Calmet the Benedictine, and other eminent men.

The arrondissement of Nancy has an area of 551 square miles, and contains 187 communes; the population, in 1831, was 127,944; in 1836 it was 129,841.

NANGASAKI. [JAPAN.]

NANI'NA, Mr. Gray's name for a genus consisting of the phanorbicular species of *Helix*, with large umbilici, included in the subgenus *Helicella* of De Férussac. The animal was first discovered and figured by General Hardwicke in 1797. Mr. Gray characterizes the genus, and enumerates the species in the 'Zoological Proceedings for 1834.'

NANING is the name of a country which up to 1832 was possessed by a Malay chief, who was tributary to the British province of Malacca. In the year 1832 Naning was annexed to that province, the chief having risen in rebellion against the East Indian government. It lies at the back of the other territories, and separates them from the small kingdoms of Rumbowe and Johole. It extends north and south about 40 miles, with an average breadth of 10 miles, which gives an area of 400 square miles, or nearly the extent of the county of Bedford. The surface is undulating, interspersed with high knolls thickly clothed with jungle; the hollows or flats between the undulations, where the water lodges in the rainy season, average seventy or eighty yards in width, and either form a swamp or paddy ground. The soil on the high grounds is red and generally gravelly; on the flats it is soft and whitish. Water is plentiful, and may easily be got two or three feet below the surface, on the slopes of the rising grounds. The chief products are rice, timber, and fruits; pepper and gamboge are cultivated. Among the fruits are mangosteens, pine-apples, jack-trees, and many other kinds. There are forty-five species of trees in the jungle, of which the fruit is edible. A small portion of gold is found, and tin in considerable quantities. According to a census taken in 1829, the population amounted to 3458, probably males, as it is added that 1800 were capable of bearing arms. They are Malays, profess the Mohammedan faith, and live in villages, of which the largest, called Sabany, contains 148 houses. (Moor's *Notices of the Indian Archipelago*, Singapore, 1837.)

NANKEEN, a description of cotton cloths, usually of a yellow colour, imported from China, and taking their name from the city of Nankin, in which great quantities of them are made. The peculiar colour of these cloths is natural to the cotton-wool of which they are made, and not the effect of any dye. White cloths of similar texture are imported from China, and these, to distinguish them from the yellow cloths, are called white nankeens. Nankeen cloths were formerly very much used in England for gentlemen's summer clothing, but better fabrics of home manufacture being now procurable at lower prices, these have taken the place of the Chinese goods. Within the last ten years the annual importation of nankeen cloths into the United Kingdom, from China, has exceeded 900,000 pieces; but the quantity brought in 1838 was under 60,000 pieces, and the greater part of these was re-exported.

NANKIN, a town in China, on the south bank of the river Yantse-kiang, near 32° N. lat. and 117° E. long., and about 120 miles from the mouth of the river. It is said that at some remote period sea-vessels were able to ascend the river to the town, but the very low and swampy shore which extends in these parts along the Hoang-Hay (Yellow Sea) renders this statement improbable. This town was the capital of the empire to the end of the thirteenth century, and at that time the largest town on the globe. To give an idea of its then extent, the Chinese historical records say, that if two horsemen were to go out in the morning at the same gate, and were to gallop round by opposite ways, they would not meet before night. This is certainly an exaggeration. The Jesuits, when surveying the town for the purpose of making a plan of it, found that the circuit of the exterior walls was 37 *lies*, or nearly 20 miles; and this agrees pretty well with the description given by Ellis, who estimates the distance between the gate near the river and the Porcelain Tower at about six miles, and says that an area of not less than thirty miles was diversified with groves, houses, cultivation, and hills, and enclosed within the exterior wall, which forms an irregular polygon. But the whole of this area is not covered with houses built in regular streets; only about one-fourth of it at present is covered by the town, which occupies that part which is farthest from the river, and is about six miles from its banks.

The town began to decrease when Kublai-khan removed the Imperial residence to Pekin, and still more rapidly when the six great tribunals, which for some time were kept at Pekin and Nankin, were attached to the court at Pekin. When this took place the name of the town Nankin (the southern court) was changed into that of Kianning-foo, as it is now always called in public documents, though the people continue to call it Nankin.

The present town consists of four principal streets, running parallel to one another, and intersected at right angles by smaller ones. Through one of the larger streets a narrow channel flows, which is crossed at intervals by bridges of a single arch. The streets are not spacious, but have the appearance of unusual cleanliness. The part within the walls, which is now only occupied by gardens and bamboo-groves, is still crossed by paved roads, a fact which seems to indicate that the whole area was once built upon.

None of the buildings of Nankin are distinguished by their architecture, except some of the gates, and the famous Porcelain Tower, which is attached to one of the pagodas or temples. This building is octagonal, and of a considerable height in proportion to its base, the height being more than 200 feet, while each side of the base measures only 40 feet It consists of nine stories, all of equal height, except the ground-floor, which is somewhat higher than the rest. Each story consists of one saloon, with painted ceilings; inside along the walls statues are placed. Nearly the whole of the interior is gilded. The material of the wall seems to be a highly polished stone; but probably it is composed of bricks made of a fine clay, susceptible of impressions, as the figures show which appear on them. On the outer side of the wall they are white, and, according to Ellis, are merely the white bricks frequently used in China. At the termination of every story, a roof built in the Chinese fashion projects some feet on the outside, and under it is a passage round the tower. At the projecting corners of these roofs small bells are fastened, which sound with the slightest breeze. On the summit of the tower is an ornament in the form of the cone of a fir-tree: it is said to be of gold, but probably is only gilt; it rests immediately upon a pinnacle, with several rings round it. This tower is said to have been nineteen years in building, and to have cost 400,000 taels.

The population of Nankin, which is said to have been once four millions, is now probably reduced to 300,000. It still has a great number of manufactures, especially silk and crapes, and carries on a very considerable commerce, being situated in the most populous part of the empire. Through the ports of Soo-cheou-foo and Shang-hae it receives great quantities of corn and other articles. They are brought by water to Nankin, as there are several canals which connect the town with the river, which is five or six miles from it in a straight line. According to the statements of the Jesuits this city is also famous as the seat of arts and sciences, and furnishes more doctors and great mandarins than many more populous cities together. It has also the greatest number of libraries, and the numerous booksellers' shops are well stocked with the best publications. The paper made here is considered the best in the empire.

(Du Halde's *History of China*; Ellis's *Journal of the late Embassy to China*.)

NANNI, GIOVANNI, called Giovanni di Udine, was born at Udine, in 1490. He studied first in the school of Giorgione, and afterwards passed to that of Raphael, under whose direction he executed the greater part of the stuccoes and grotesque ornaments in the loggie and other apartments of the Vatican. He is considered as the most eminent in this branch of the art. His bowers, plants, and foliage, his aviaries, with birds of every description, are so true to nature as almost to deceive the eye by the closeness of the imitation. After the sack of Rome he visited other parts of Italy, and many of his works are at Florence, Genoa, and Udine. He died in 1464, at the age of 70. Vasari frequently calls him 'Ricamatori.'

NANO'DES. [PSITTACIDÆ.]

NANTES, a town in France, capital of the department of Loire Inférieure, situated on the north bank of the Loire, in 47° 13′ N. lat. and 1° 34′ W. long.; 208 miles from Paris in a direct line west-south-west, or 231 miles by the road through Versailles, Chartres, Le Mans, and Angers.

Nantes is a very antient town: it is mentioned by Ptolemy as the capital of the Namnetes, a Celtic people, under the name of Condevicnum, a name which was superseded about the time of the downfal of the Roman empire by that of Namnetes, whence the modern Nantes. In the ninth and tenth centuries it was six times pillaged and burnt by the Northmen, and continued desolate for thirty years. In A.D. 1598 Henri IV., who had come into Bretagne to appease the troubles excited by the duke of Mercœur [BRETAGNE], issued from this town an edict granting various privileges to his Protestant subjects. This edict, commonly known as the edict of Nantes, was revoked by Louis XIV. In the Vendean war, the town was attacked by a body of insurgents computed to amount to 80,000: the inhabitants, with some troops of the line in the town, succeeded in repelling them. Nantes was afterwards the scene of the cruelties of Carrier, the most ferocious of the agents employed at that time by the revolutionary government. Madame La Roche Jacquelin estimates the number of those who were drowned or shot or died in prison at 25,000.

The old town of Nantes was almost entirely comprehended in the angle formed by the north bank of the Loire and the east bank of its tributary the Erdre: a small part of the old town near the junction of the rivers extended across the Erdre to the opposite bank, on which the suburb of Le Marchys is situated. The suburbs of St. Clement and Richebourg are east of the town in the angle of the rivers, the latter extending along the bank of the Loire. The suburb of Les Ponts (the bridges) comprehends the islands of the Loire opposite the town, across which islands a chain of bridges and causeways communicates with the suburb of St. Jacques, on the south side of the river. The quay of La Fosse extends along the north bank of the Loire, west of the town: it is planted with trees for a considerable part of the length, and is lined with handsome houses with balconies, which may be considered as forming another suburb. The ramparts of Nantes have been almost entirely removed: the two promenades of St. André and St. Pierre, which form one line extending from the Erdre to the Loire, are on or near the site of one portion; and the boulevard, a public walk, west of the Erdre, is on or near the site of another portion. The antient castle of the dukes of Bretagne, a stately and massive building, is at the south-eastern point of the old town, on the Loire. By the destruction of the fortifications, Nantes and its suburbs have become one town: the space between the quay of La Fosse and the suburb Le Marchys has been filled with streets and squares, forming Le Quartier Neuf, or New Quarter; and various other improvements have been effected and are still going on.

The streets are generally well laid out and paved; and the houses well built, chiefly of stone, and roofed with slate. There are about twenty places or squares, which are regularly laid out: the Place Royale and the Place Graslin are adorned with handsome houses of uniform design. Part of the old town however yet retains the narrow, dark, and dirty streets, and the old black-looking houses, faced in some instances with a sombre covering of slates, which were formerly characteristic of the whole place. The street La Poissonnerie (Fish-street) is the most remarkable of these relics of the olden time: the upper parts of the houses project so as nearly to meet across the street.

The principal public buildings are the cathedral and the episcopal palace; the prefect's office (formerly the Chambre des Comptes), the Hôtel de Ville, the Bourse or Exchange, the theatre, the mint, the prison of Bouffay, the hospitals of Le Sanitat and the Hôtel Dieu, the Salorges (now used as a depôt for merchandise of all sorts), the corn-market, &c.

The cathedral is just within the line of the antient ramparts on the east side of the town: it has never been finished; the nave only was erected: the west front has three doorways, and is adorned with sculptures in high relief, which were much defaced during the Revolution; it is of the fifteenth century. It has two towers, which have never been finished; they rise little above the level of the roof: one of them is crowned with a lantern or turret built for the purpose of keeping watch on the movements of the Vendean insurgents. The interior of the nave is fine; it is not of great extent, but is very lofty: the transepts and choir were never built to correspond with the nave; but the heavy, low, and dark choir of a much more antient building of the sixth century was adjusted to the nave in the seventeenth century: the communication is by a modern portico. The cathedral contains the tomb of François II., last duke of Bretagne. The episcopal palace, which adjoins the cathedral, has the appearance of a common parsonage-house. The prefect's office has two good fronts, the principal towards the cathedral, the other towards the river; each front is adorned with an Ionic portico of four columns. The corn-market is a large, modern, and tolerably handsome building: above it is the public library of 30,000 volumes. The exchange is adorned with Ionic columns, with the statues of four of the most eminent seamen whom France has produced, viz., Duquesne, Jean Bart, Duquay-Trouin, and Cassard; and with a number of allegorical statues. The hospital of Le Sanitat is partly a receptacle for decayed townsmen, who here obtain lodging and board at a very low rate, and partly a lunatic asylum. There are no fountains in Nantes; but the town is adorned by several public walks; there is a departmental column 70 feet high, and in the Place Louis XVI. is a column surmounted by a statue of that king. There are a number of bridges, some of them over the fosse of the antient ramparts, now forming a ravine or deep valley in the town; others across the Erdre or the arms of the Loire. There are several low islands in this latter river opposite Nantes; that of Feydeau is nearest to the town, of which indeed it forms part; the others are the Ile Gloriette and the Ile de la Biesse, divided by the arms of the river into three parts. Communication is maintained between the opposite banks of the river by bridges from one island to another.

The population of Nantes, in 1826, was 71,739 for the commune; in 1831 it was 77,992 for the town, or 87,191 for the commune; in 1836 it was 75,895 for the commune. It derives its importance and prosperity from its situation on the Loire, which forms its port. The tide flows up to Nantes, but its rise in ordinary tides is only about 5 feet; and in winter it is imperceptible, being then counteracted by the force of the stream. Vessels of 200 tons come up to Nantes at spring-tides; at other times only vessels of 100 tons or less can get up. Larger vessels either remain at Paimbœuf, 25 miles lower down, or at least discharge part of their cargo there. The quays at Nantes extend along the river side from the eastern extremity of the suburb Richebourg to the western or lower extremity of the quarter of La Fosse.

There are quays all round the Ile Feydeau and in one part of the Ile Gloriette, and along the bank of the Erdre, which expands into a fine sheet of water, resembling a lake, with its banks adorned with country-houses: it is navigable to Nort, 12 or 13 miles above Nantes. The merchants of Nantes enjoy a high reputation for the punctual fulfilment of their commercial engagements: they were formerly extensively engaged in the slave-trade; and during the last general war a hundred privateers were fitted out here. The manufactures are considerable, and include coarse woollen cloth and flannel, calico, handkerchiefs, fustian, bed-ticking, and other cotton or linen fabrics. There are copper-founderies, and iron-works for making chain-cables, casting cannon, and furnishing other articles for the equipment of vessels; ship-building yards (at which corvettes and other small ships of war are built) and ropewalks; breweries, brandy-distilleries, vinegar-yards, refining-houses for colonial and beet-root sugar, a glass-house for bottles, tan-yards, currying establishments, &c. Pottery, tobacco-pipes, chemical products, brushes, corks, and fishing-nets are also made. There is a victualling establishment for the navy, from which Brest, Lorient, and Rochefort are supplied. Provisions are very cheap. The trade of the port is not limited to any particular part of the world: the principal articles of export and import are grain, flour, ship-biscuit, butter, dried pulse, hides, morocco leather, timber, agricultural implements, Spanish and Portuguese wine, liqueurs, colonial produce, and French manufactures. Vessels are fitted out for the Newfoundland cod-fishery, and the fishery of the sardine, or pilchard, is actively carried on. The navigation of the river facilitates communication with the interior of France, and the dangerous navigation of one part of the coast is superseded by the canal from Nantes to Brest. The salt from the salt-pans of the coast about Noirmoutier and Le Croisic is in great part conveyed into the interior by Nantes. There are two weekly markets and twelve yearly fairs.

Nantes is the seat of a bishopric, the foundation of which some carry back to the third century: the diocese comprehends the department of Loire Inférieure: the bishop is a suffragan of the archbishop of Tours. It is also the seat of a Lutheran consistory. There are nine churches, six nunneries, and four hospitals. There are a subordinate court of justice and a commercial tribunal, a custom-house, a mint, and a variety of other fiscal or administrative government offices. There are a high school, two seminaries for the priesthood, a school of design, a free school for navigation, a secondary medical school, and one or two courses of lectures. Besides the public library of 30,000 volumes, there are a library at the episcopal palace, museums of paintings, natural history, and physical science, a botanic garden, an observatory, public baths, and a theatre. There are various societies for literary and charitable purposes.

The arrondissement of Nantes has an area of 685 square miles, and comprehends sixty-six communes: the population, in 1831, was 205,627; in 1836 it was 205,892.

NANTUA. [Ain.]

NANTUCKET BAY. [Massachusetts.]

NANTWICH, or NAMPTWICH, a market-town in the hundred of Nantwich, in Cheshire, on the river Weaver, 192 miles from London on the road through Lichfield and Stafford to Chester. The first part of the name is said to be derived from *nant*, a British word signifying a brook or valley; the second part is an Anglo-Saxon corruption of the Roman *vicus*; and though locally assumed to be the appropriate designation of a salt-work, is in reality a general designation of a group of habitations, whether in town or country. The termination wick or wich, for it is written both ways, and is sometimes separate from the other part of the name, is found in the names of places (*e.g.* Green-wich, Wool-wich, Nor-wich, Ips-wich, War-wick, Aln-wick, &c.) which have no peculiar connection with the manufacture of salt.

Nantwich is mentioned in 'Domesday' by the simple designation Wich, and the salt-works are there mentioned. It was then enclosed by the river Weaver on one side, and on the other by a ditch. In 1069 Nantwich was the scene of an unsuccessful attempt by the Cheshiremen to resist the advance of the Normans under Hugh Lupus, earl of Chester. It was afterwards made the head of a Norman lordship, and the lords had a castle here, of which there are no remains. In 1438 and 1583 the town suffered considerably from fire. The damage on the last occasion was estimated at 30,000*l.* In the civil war of Charles I. the town was occupied by the Parliamentarians, from whom it was taken by Lord Grandison just before the battle of Edge Hill. Sir William Brereton, the parliamentary general, afterwards re-occupied it, and made it his head-quarters during the war. It was besieged (January, 1643-44) by a body of the king's troops, partly Irish, under Lord Byron; but though defended only by works hastily raised round the town, was gallantly held by the townsmen and others under Sir George Booth until the siege was raised, and the enemy entirely defeated by Sir Thomas Fairfax and Sir William Brereton.

The town is in a low flat situation, on the right or east bank of the Weaver. It is irregularly laid out, and consists of three principal streets, which unite near the church, and some others. The streets are indifferently paved, and the houses are commonly old, built of timber and plaster, with large bay windows and projecting upper stories. The church is a cross church, with a mixture of various styles of architecture. The west door is early English; the rest of the church decorated English or perpendicular, with some portions of a transition character between them. The nave has flying buttresses within, and is marked by some other peculiarities. The north transept has a fine decorated window; and the south transept and the choir or chancel, some fine perpendicular windows. The tower, which rises from the intersection of the nave and transepts, is an octagon of perpendicular date, with small crocketted pinnacles. It is small in proportion to the other parts of the church. The whole is of red-sandstone of friable texture. In the churchyard is an antient timber building, formerly the town-hall, but now used as a free-school. There is a market-house and town-hall, built in the last century, and a stone bridge over the Weaver. The dissenters have several meeting-houses, and there are several ranges of alms-houses.

The parish has an area of more than 3490 acres, with a population, in 1831, of 5357: it comprehends the whole townships of Alvaston, Leighton, Nantwich, Woolstanwood, and part of that of Willaston. Nantwich township comprehends 780 acres, with a population of 4886, scarcely any part of it agricultural. The prosperity of the town was formerly owing to its brine-springs and salt-works, which were of great celebrity and antiquity. Only one spring is now worked. The chief manufactures are of shoes, gloves, and cotton goods. The Chester, the Ellesmere, the Liverpool and Birmingham Junction canals, and the Middlewich branch canal, unite in the neighbourhood of the town; and the Grand Junction Railway passes at no great distance. The market is on Saturday, and there are three yearly fairs. The cheese made in the neighbourhood is highly esteemed. Petty-sessions for the hundred are held here; general quarter-sessions were formerly held here, but were removed to Knutsford in 1760. The town was once governed by a guild, but this was suppressed by Edward VI. The living is a rectory, in the diocese and archdeaconry of Chester, of the clear yearly value of 269*l.*, with a glebe-house.

There were in the township, in 1833, a day-school, with 65 boys, partly supported by endowment; another day-school, with 58 boys and 8 girls, partly supported by endowment and partly by payments from the children; fourteen other day-schools, with 431 children; and four Sunday-schools, with 836 children. The other townships contain only one day-school, with 20 children.

Major-general Harrison, one of the Regicides, who was put to death on the restoration of Charles II., was a native of Nantwich. Milton's widow was born in the neighbourhood, and died here at an advanced age in 1726.

(Ormerod's *Cheshire*; *Beauties of England and Wales*; *Parliamentary Papers*.)

NAPHTHA. [Hydrogen—*Carburets*.]

NAPHTHALAMIDE. This compound is formed by heating naphthalate of ammonia in a retort; ammonia and water are disengaged, and naphthalamide sublimes, without leaving any residue. This substance is colourless, inodorous, and insipid. It fuses when heated, and on cooling becomes a fibrous mass. When strongly heated it boils, emitting vapour, which condenses in crystalline plates. It is nearly insoluble in cold water, and but slightly soluble in hot; the solution deposits acicular crystals as it cools.

Chlorine does not act upon naphthalamide; heated concentrated sulphuric acid dissolves it, but when cooled and diluted, crystals of naphthalamide are deposited. Dilute acids do not act upon it; when boiled in a strong solution of potash, ammonia is disengaged; sulphuric acid separates the naphthalamide from the alkali.

According to M. Laurent this substance consists o.

Hydrogen . . .	3·10
Carbon . . .	64·65
Oxygen . . .	23·35
Azote . . .	8·90
	100·

NAPHTHALASE, a compound discovered by M. Laurent in 1835. It is prepared by mixing nitronaphthalase with about ten times its weight of lime, slightly moistened in a retort filled to the neck; when heat is applied, a brown oil is formed, containing much napththalin, some ammonia and undecomposed naphthalase, and in the neck of the retort a thick oil is condensed, which on cooling becomes solid; this is separated by cutting off the neck of the retort, and when washed with æther, the foreign matter is dissolved and the naphthalase remains.

Its properties are, that it is pulverulent, of a yellow colour, insoluble in water and alcohol, and nearly so in æther. At 482° it begins to sublime but does not melt; at a higher temperature it fuses and boils; the vapour is of a yellow colour, and it condenses either in yellow scales or needles. A small quantity dissolved in cold sulphuric acid imparts to it a fine deep violet-blue colour, and water precipitates it unaltered.

According to Laurent, it consists of

Hydrogen . . .	4·8
Carbon	87·
Oxygen	8·2
	100·

M. Laurent considers it as nitronaphthalase minus an equivalent of hyponitrous acid.

NAPHTHALIC ACID, a compound obtained by a very tedious and complicated process from naphthalin by Laurent. Its properties are, that it is white, brilliant, and in long feathery crystals, which are four-sided prisms; it considerably resembles benzoic acid. It melts at 221°, and on cooling concretes into a fibrous mass, and when more strongly heated, it volatilizes without decomposition in a pungent white vapour, which is readily combustible.

This acid is devoid of smell, has little taste, is unaltered by exposure to the air, reddens moist litmus paper, is only slightly soluble in cold water, but dissolves to a considerable extent in hot water; alcohol and æther dissolve it readily. Chlorine has no action upon it, but hydrochloric, nitric, and sulphuric acid dissolve it while hot without decomposition.

According to M. Laurent, it consists of nearly

Two equivalents of Hydrogen .	2	or	2·13
Ten equivalents of Carbon .	60		63·83
Four equivalents of Oxygen .	32		34·04
Equivalent	94		100·

The crystals contain one equivalent of water. Its saline compounds are called naphthalates, but they are not important.

NAPHTHALIN. [Hydrogen—*Carburets.*]

NAPIER, JOHN, baron of Merchiston, was born at Merchiston Castle, near Edinburgh, in the year 1550, at which time his father was but sixteen years old. His lineage is traced from John de Napier, who, in 1296, swore allegiance to Edward I. of England: and among his more immediate ancestors are mentioned William Napier, governor of the castle of Edinburgh, and Alexander Napier, vice-admiral of Scotland. His father, Sir Archibald Napier, was master of the mint of Scotland. Napier was never raised to the peerage, as might be inferred from the writings of some authors, Briggs among others. (*Letter to Archbishop Usher*, vol. v., p. 422.) His name has been variously written. Besides the Latinized forms Neper and Neperus, we meet with Naper, Napier, and Nepair. The last is the orthography adopted in the title-page of Wright's translation of the logarithmic canon, which work was revised by Napier himself the year before his death. The name at the head of this article appears to have been the family name, and is certainly that by which he is now generally known.

Napier's matriculation into the university of St. Andrew took place in the year 1562-3, as appears from the books of the university. (See the 'Pursuit of Knowledge,' in the *Library of Entertaining Knowledge*, and the subsequently published Life of Napier, by Mark Napier, 4to., Lond., 1834.) That it took place early also appears from the following passage in the preface to his 'Plain Discovery of the Revelation of Saint John,' published at Edinburgh in 1593, 4to. Speaking of the university, he says, 'In my tender years and bairn age at schools, having on the one part contracted a loving familiaritie with a certain gentleman, a papist, and on the other part being attentive to the sermons of that worthy man of God, maister Christopher Goodman, teaching upon the Apocalyps, I was moved in admiration against the blindness of papists, that could not most evidentlie see their seven-hilled citie of Rome pointed out there so lively by St. John as the mother of all spiritual whoredom: that not only bursted I oute in continuall reasoning against my said familiar, but also from thenceforth I determined with myself, by the assistance of God's spirit, to employ my study and diligence to search out the remanent mysteries of that holy booke, as to this houre, praised be the Lord, I have bin doing at all such times as convenientlie I might have occasion.' One object of the 'Plain Discovery' was to show that the doctrines of the pope were antichristian, which so accorded with the views of the French Huguenots, that a translation of the work, stated in the title-page to have been revised by Napier, appeared at Rochelle in 1603, and the same year the council of Gap formerly declared the pope to be Antichrist. In the same work he fancies he has determined the dates at which the completion of the prophecies will take place, and he assigns the destruction of the world to the year 1786.

From the time of his entering the university to the publication of the above work, scarcely any thing is known concerning him. His biographers, David Stewart, earl of Buchan, and Walter Minto, about the close of the last century made inquiries among the descendants of Napier for letters or other documents which might throw light on his history during this long interval. Their exertions in this respect seem to have been attended with little success. MacKenzie, in his 'Lives and Characters of the most eminent Writers of the Scottish Nation,' fol., published at Edinburgh in 1708-22, informs us, but without mentioning any authority, that Napier passed some years in France, the Netherlands, and Italy, and that while absent he applied himself to the study of the mathematics. This is confirmed by his biographer, Mark Napier, who supposes him to have left Scotland as early as the year 1566, and adds that his college residence had been too short to entitle him even to the degree of B.A. In 1571 he had returned to Scotland. In 1593 he was chosen by the General Assembly one of the commissioners appointed to assemble at Edinburgh to counteract the attempts of the Roman Catholics to put aside Protestantism, then recently established. We are left to conjecture at what time prior to the year 1594 the mind of Napier first became occupied with the discovery of a method which should supersede the long and laborious arithmetical operations which the solution of the most simple trigonometrical problems then exacted. That he was thus occupied in the year 1594 is probable from a letter written by Kepler to Crugerus, dated 1624, wherein, speaking of Napier's logarithmic tables, which had then been published ten years, he says, 'Nihil autem supra Naperianam rationem esse puto: etsi quidem, Scotus quidam, literis ad Tychonem anno 1594 scriptis, jam spem fecit canonis illius mirifici.' (Kepl., *Epist.*, Lips., 1718, fol., p. 460.) The Scotchman here alluded to was Dr. Craig, of whom a circumstance is related by Wood, in his 'Athenæ Oxonienses,' under the article 'Briggs,' upon the authority of Oughtred and Wingate, and cited by several authors with reference to Napier's invention. The substance is this:—Craig, coming out of Denmark, called on Napier at Merchiston and informed him, among other things, of a rumoured discovery by Longomontanus, 'as 'tis said,' whereby the tedious operations of multiplication and division in astronomical calculations were avoided; and intimated that this was effected by means of proportional numbers, of which information Napier availed himself so skilfully, that upon Craig repeating his visit a few weeks after, he showed him a draught of what he called canon mirabilis logarithmorum. The correctness of this story, as regards Longomontanus, is disproved by the fact that Longomontanus attributes the invention to Napier. (*Astronomica Danica*, p. 7, &c., quoted by Dr. Hutton.) There appears however to be no doubt that Craig did write to Tycho Brahe at the time stated, acquainting him with the progress which Napier had then already made.

Besides Longomontanus, several authors have been mentioned, and their works referred to, with a view to detract from the merit of Napier by bringing him in debtor to some of his contemporaries. All these attempts appear to proceed more or less on the supposition that the principle of logarithms was in Napier's time a novelty. The fame of Napier however does not rest on the discovery of that property of numbers upon which all the advantages of logarithms depend. Long before his time it was known that if the terms of an arithmetical and geometrical series were placed in juxta position, the multiplication, division, involution, and evolution of the latter would answer to and might actually be effected by a corresponding addition, subtraction, multiplication, and division of the former. To a certain extent this property was employed by Archimedes, in his 'Arenarius,' or treatise on the number of the sands. Stifel also, in his 'Arithmetica Integra,' Nürnberg, 1544, p. 35, exhibits its principal uses, and evinces so clear a conception of the nature of logarithms, only not under that name, that had he been furnished with a table of such numbers, he would doubtless have been able to make use of them. He might even have constructed a table, but the natural numbers would not have been consecutive, and the omissions would have been by far more numerous than the insertions, and this would have happened simply because he, in common with all other mathematicians previous to Napier, possessed no means of determining the logarithm corresponding to *any* proposed number, but merely those corresponding to particular numbers. Until such means were supplied, no table of any practical utility could have been constructed. Napier discovered the means, but had he not been of a peculiarly ardent disposition, he would have shrunk from the labour which their application required, and his discovery would perhaps have remained a mere sterile truth. It happened to him, as it has happened to most original discoverers, that the view which he took of the problem was not the most natural, and consequently not the most simple. The problem itself was purely arithmetical; Napier arrived at its solution through geometrical considerations. But notwithstanding this circumstance and the disadvantages he must have laboured under, arising from the imperfect methods of analysis then in use, and the almost total absence of notation, his processes even now are to a certain extent the most eligible, and are analogous to those employed in the construction of the great 'Tables du Cadastre.' 'Modern formulæ,' says Delambre, 'have furnished processes more sure and exact, but not more convenient.' (*Astronomie Moderne.*) Concerning Napier's principles we have not further to speak; the reader will find them explained in the article Logarithms.

With regard to the importance of the invention, and the claim of its author on the gratitude of his successors, we may cite the words of Laplace. (*Exposition du Système du Monde.*) 'By reducing to a few days the labour of many months, it doubles, as it were, the life of an astronomer, besides freeing him from the errors and disgust inseparable from long calculations. As an invention it is particularly gratifying to the human mind, emanating as it does exclusively from within itself. In the arts man avails himself of the materials and forces of nature; in this instance the work is wholly his.'

His tables were published in 1614, by the title of 'Mirifici Logarithmorum Canonis Descriptio,' Edinb., 4to. As their principal object was to facilitate trigonometrical computations, they contained only the logarithms of the natural sines corresponding to each minute of the quadrant and to a radius = 10^7. The principle of their construction Napier at first withheld, 'waiting the judgment and censure of mathematicians before exposing the remainder to the malignity of the envious.' This explanation was given in a posthumous work, edited by his son, and published in 1619, Edinb., 4to. It is entitled 'Mirifici Logarithmorum Canonis Constructio: una cum annotationibus aliquot Doctissimi D. Henrici Briggii.' The two works were reprinted at Lyon in 1620.

From the date of the publication of the logarithmic canon until the death of Napier, which took place the following year, there is little recorded of him which demands particular notice, except his connection with Briggs, already noticed. [Briggs.] His 'Rabdologiæ, seu Numerationis per Virgulas, libri duo,' Edinb., 1617, 12mo., was the last of his literary productions. [Napier's Bones.]

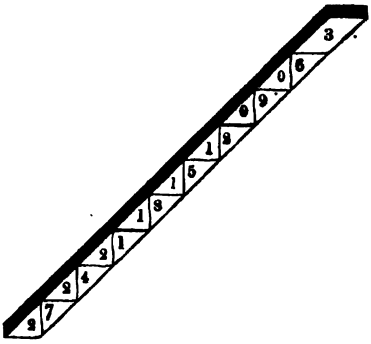
Napier died at Merchiston on the 3rd or 4th of April, 1617 (not 1618), old style, and was interred in the cathedral church of St. Giles at Edinburgh. On the eastern side of the cathedral is a stone tablet with a Latin inscription, indicating the spot of his interment. He was twice married. By his first wife, the daughter of Sir James Stirling of Kier, or Keir, he had one child, Archibald, who became privy-counsellor to James VI., and was raised by Charles I. to the peerage in 1627, by the title of Lord Napier. By his second wife, the daughter of Sir James Chisholm of Crombie, he had five sons and five daughters. To his third son Robert, to whom he had taught the mathematics, he confided the care of publishing his posthumous works.

Of Napier's improvements in trigonometry it is sufficient to refer to the elegant theorems known as Napier's 'Analogies' [Trigonometry], and to his theorem of the 'five circular parts,' which furnishes a ready solution of all the cases of right angled spherical triangles.

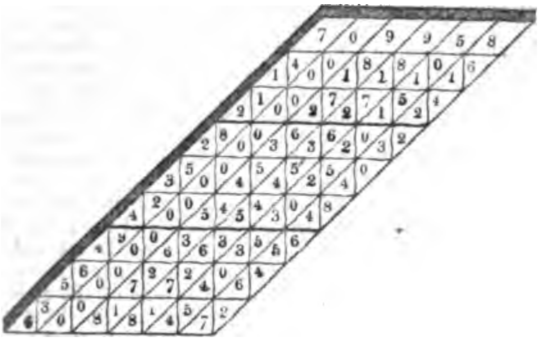
The only work of Napier not already mentioned is a letter to Anthony Bacon, entitled 'Secret inventions profitable and necessary in these days for the defence of the island, and withstanding strangers, enemies to God's truth and religion' (the original is in the archbishop's library, Lambeth; two copies are in the British Museum; it is also printed in Tilloch's 'Philosophical Magazine,' vol. xviii.). Watt, in his 'Bibliotheca Britannica,' adds 'Arithmetica Logarithmica,' Lond., 1624, fol.; but this is a mistake, Briggs being the author of that work.

(*Life, Writings, and Inventions of John Napier*, by David Stewart, earl of Buchan, and Walter Minto, LL.D., Perth, 1787, 4to.; Hutton's *Tracts*, &c.)

NAPIER'S BONES, or RODS, a contrivance of Napier to facilitate the performance of multiplication and division, explained by him in his 'Rabdologia,' published in 1617. The invention would have been perhaps more employed, but for his discovery of logarithms: and even yet it might be used with advantage by young arithmeticians in verification of their work. We shall therefore describe it, with a very slight modification, which somewhat facilitates its use.



The preceding cut represents one of the rods belonging to the number 3. It is a parallelogram with an angle of 45°, containing nine equilateral parallelograms, with one vertical diagonal in each. In these are distributed, in a manner which will be visible at a glance, the multiples of the number which stands at the head, up to nine times. A sufficient number of rods must be provided for each of the headings 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, so that by placing the proper rods side by side, any number may be seen at the head, as in the following diagram, which represents rods in juxtaposition ready for the multiplication of 709958



709958
32978
5679664
4969706
6389622
1419916
2129874
23412994924

If we wish to multiply by 32978 we look at the eighth column of multiples, in which we see the following disposition of figures (which however it is not necessary to write down afresh)

602204
507746

These may be added on the rods, and the result 5679664 written down in its proper place. The same is done with the other digits, and the results are added in the usual manner.

The only difference between the preceding description and Napier's rods is, that in the latter the rods are upright, and the additions that are made from the rods are therefore made diagonally. The compartments should be made large enough to allow of the figures which are to be added standing directly under one another.

Napier's *bones*, as they were called, have been much more often described in historical works than in those intended for use. Sir Walter Scott must have had an indistinct remembrance of them, without however knowing what the phrase meant, when he made Davie Ramsay, in the 'Fortunes of Nigel,' swear by 'the bones of the immortal Napier.'

NAPLES, KINGDOM OF, REGNO DI NAPOLI, is the name commonly given to the Continental part of the united kingdom of the two Sicilies, which, in the administrative language of the country, is styled 'Sicilia Citeriore' (hither Sicily), or 'Dominj di quà dal Faro' (territories on this side of the Straits of Messina). This fine region occupies the southern half of the Italian peninsula, being bounded on the north-west by the Papal State, and on every other side by the sea. The frontier line between the kingdom of Naples and the Papal State begins on the coast of the Mediterranean, at the tower 'Dei Confini,' which is a mile or two south-east of Terracina, where the mountains recede from the sea, and at the opening of the basin of the lake of Fondi. The boundary-line then follows an offset of the ridge of the Lepini mountains as far as the valley of the river Sacco, an affluent of the Liris, which opens a natural road into the kingdom. Crossing that valley, the line proceeds first in a northern and afterwards in a north-north-western direction, along several ramifications of the Apennines, which divide the waters of the Liris from those of the Anio; then ascending the loftier group which, to the west, bounds the basin of the lake Fucino, it descends by following the downward course of the river Salto into the valley of the Velino, crosses that river a little to the east of Rieti, which belongs to the Papal State, and then again ascends, crossing the backbone or central ridge of the Apennines between the sources of the Nera and those of the Tronto. Descending along the eastern slope of the central ridge, the line follows an offset which skirts the right bank of the Tronto, and afterwards, below Ascoli, the river itself forms the boundary down to the Adriatic. The whole of this tortuous boundary-line is about 150 English miles, but the direct distance, from its extreme point on the Mediterranean to the corresponding point on the Adriatic coast, is not quite 120 miles. Four roads, which are ultimately reduced to two, lead into the kingdom, one by Terracina to Fondi, along the coast of the Mediterranean; the second from Rome, by Palestrina and the valley of the Sacco, into the valley of the Liris, and from thence into the valley of the Volturno, where it joins the former; the third, by Rieti, Civita Ducale, and Antrodoco, to Aquila and the valley of the Pescara; and the fourth by Ascoli to Teramo, and along the coast of the Adriatic to the banks of the Pescara likewise. It is a remarkable fact that the boundaries of the kingdom of Naples, since the foundation of the Sicilian monarchy by the Normans, about eight centuries ago, have not varied throughout all the political vicissitudes of the country.

The greatest length of the kingdom of Naples, from the Tronto to Capo Spartivento at the southern extremity of Calabria, is about 400 miles, in a curved line running through the centre of the peninsula. Its breadth from sea to sea varies greatly. In its northern part, from the mouth of the Garigliano to that of the Pescara, it is about 85 miles wide: farther south, from Cape Misenum near Naples, to the mouth of the Fortore, on the Adriatic coast, it is 100 miles; and from Naples to Vietri, on the promontory of Mount Gargano, it is 125 miles. From Naples to Manfredonia it is about 100 miles. South of Naples the gulf of Salerno on one side, and that of Manfredonia on the other, reduce the breadth of the peninsula to 83 miles; but farther south it again widens from the point of Licosa near Pæstum, to Mola di Bari, on the Adriatic, a distance of 130 miles, which is the utmost breadth which the kingdom of Naples attains, but in which we do not include the length of the Iapygian peninsula, which projects in an oblique direction to the line of breadth measured across the main body of the peninsula of Italy. The length of the Iapygian projection is nearly 90 miles, with a mean breadth of 30 miles: the description of this district is given under OTRANTO, TERRA DI.

The breadth of the kingdom again becomes contracted between the deep gulf of Taranto on one side and that of Policastro on the other, it being about 65 miles from the mouth of the Bradano to that of the Trecchina. [BASILICATA.] It becomes still narrower as we advance southwards into Calabria: it is 45 miles between the gulf of Lao and that of Taranto, and 35 from the mouth of the Cratis to Cape Cetraro, after which it widens again to near 60 miles for a length of about 50 miles. South of the Lacinium promontory, now Capo delle Colonne, the land becomes contracted into a narrow isthmus about 14 miles across, between the gulfs of Squillace and Sant Eufemia, beyond which it spreads again to a breadth of 25 to 35 miles throughout the length of the province of Calabria Ultra. [CALABRIA.]

The area of the kingdom of Naples is estimated at about 31,600 square miles, or about 2700 square miles more than the area of Ireland. The population consisted in 1815 of 5,059,000 inhabitants; in 1825 it had increased to 5,456,664; in 1832 it was 5,809,000; and in 1837 it ascended to 6,021,284. (Petroni, *Censimento dei Reali Dominj di quà dal Faro*, 1826; Serristori, *Saggio Statistico dell' Italia*, 1833; *Bollettino Statistico di Milano* for January, 1839.) Of this population more than two-thirds, or about four millions, live by agriculture, about half a million by manufactures and other mechanical labour, another half million by trade, including sailors and fishermen; the priests, monks, and nuns amount to about 40,000; lawyers 8000; medical men 9000; persons employed under government 30,000; the military amount to 40,000; household servants to 50,000. The illegitimate children are to those born in wedlock as 1 to 22; but in the capital they are as 2 to 13.

The main features of the physical geography of the kingdom are—1, the Apennines, which run through the centre of the country, forming in several parts large masses and high table-lands, which, with their numerous offsets, occupy, especially in the southern part, the whole breadth of the peninsula [APENNINES]; 2, two extensive plains, Apulia and Campania, the former to the east and the other to the west of the Apennines; 3, numerous valleys between the offsets of the Apennines, of which those on the side of the Adriatic are mostly transverse, while on the side of the Mediterranean the valleys of the Volturno, and its affluents the Calore, Sabbato, and Tamaro, and the valley of the Tanagro, an affluent of the Sele, and some others, are longitudinal, running between ridges parallel to the central chain; 4, a strip of low land along the coast between the base of the mountains and the sea, varying in width from ten miles to one mile, and in some places even less, especially in Eastern Calabria, and some parts of Abruzzo, where the mountains advance close upon the sea. This low region is hot and naturally fertile, but unwholesome in many parts and exposed to inundations from the mountain-torrents.

The principal basins or water-systems are—1, that of the Liris, or Garigliano, which is about 60 miles long, not reckoning the windings of the river, from its source at Mount Camicciola, in the Abruzzo, to its æstuary near the site of antient Minturnæ. The breadth of the basin in the upper course of the river is much contracted between the central Apennines to the east and the Sabine mountains to the west, which latter divide it from the basin of the Anio, but after passing Sora it spreads to about 20 miles in breadth, including the courses of the Fibreno, Melfa, Rapido, Frigido, and other affluents. It also drains part of the Papal province of Campagna through the channel of the river Sacco. The Garigliano is a deep river, always full of water, and is navigable for boats in the lower part of its course. West of the basin of the Garigliano, and separated from it by the mountains of Itri, is the small basin of Fondi, containing a low plain of about 50 square miles in extent and drained by the small river Vetere. 2. The basin of the Volturno is the largest and most important in the kingdom. The Volturno drains the greater part of the province of Terra di Lavoro, and its affluent the Calore is the drain of Principato Ultra, making in all an area of nearly 3000 square miles. The Volturno has a tortuous course of nearly 100 miles, and the Calore runs for about 60 miles before its junction with the Volturno. 3. The fertile plain east of Mount Vesuvius and between it and the Apennines forms a small basin, which is drained by the river Sarno. 4. The basin of the Sele and its affluent the Tanagró includes the greater part of the province of Principato Citra and a part of that of Basilicata which lies west of the central ridge. The Sele has a course of about 60 miles altogether, and the Tanagro a course of about 35 above its junction. South of the basin of the Sele, the peninsula becomes narrow, the Apennines come close upon the sea, and the course of the rivers towards both coasts is very short. In fact Calabria has numerous mountain-torrents, each of which drains its narrow valley. An exception however is found in 5. The basin of the Crati in Calabria Citra. The Crati has its source south of Cosenza, in the high lands of La Sila, a vast group projecting east of the main ridge of the Apennines and extending towards the coast of the gulfs of Taranto and Squillace. The Crati flows in a north direction between the main ridge to the west and the mountains of La Sila to the east, draining the fine valley of Cosenza; turning eastwards after passing the town of Tarsia, it enters the gulf of Taranto. Its whole course is about 60 miles, and it is the largest river of Calabria. 6. The basin of Basilicata, with its four parallel rivers, the Agri, Sinno, Bradano, and Basiento, is fully described in the article **Basilicata**. East of Basilicata, the narrow Iapygian peninsula, which is intersected in its length by a low barren ridge, has no water-courses of any importance; and this is also the case with the province of Terra di Bari. 7. The Ofanto, one of the principal rivers of the kingdom, rises in the Apennines of Conza within the boundaries of Principato Ultra; it drains the part of that province which lies east of the Apennines, and also the northern part of Basilicata, as well as a part of Capitanata and Terra di Bari, and after a course of above 70 miles enters the Adriatic. It receives no affluents of any importance. 8. The great plain of Apulia is drained by the Carapella, Cervaro, and Candelaro, the courses of which are nearly parallel, and run from the central Apennines to the sea. The Candelaro has several affluents, and drains a considerable tract of country between the group of Mount Gargano and the Apennines of Lucera and San Severo. 9. The Abruzzi contain numerous and rapid streams which run direct to the sea along deep valleys between lofty parallel ridges; but there are no extensive basins, with the exception of that of the river Pescara, which has a course of above 80 miles, and receives on one side the waters of the central chain of the Apennines, including Mount Velino, which runs north of Lake Fucino, and on the other those of the lofty mass of Monte Corno, which projects eastwards towards the Adriatic coast and has snow on its summit almost the whole year. The Pescara above the middle of its course passes through a narrow defile near the town of Popoli and turns eastwards towards the Adriatic, receiving from the south the waters of another great outlying group of Apennines, called Mount Majella, in the province of Chieti. 10. The basin of Lake Fucino, or Celano, in the centre of the peninsula, is surrounded by mountains on every side. The lake, which is 16 miles long and nine miles broad, receives the waters of about 400 square miles, mostly of high lands covered with snow for a great part of the year, and yet it has no visible outlet. But there are subterraneous drains from the bottom of the lake, which is much higher than the neighbouring valleys of the Liris on one side and the upper Pescara on the other. On the side of the Liris the intervening ridge about Capistrello is much depressed, and there the 'emissary' or tunnel was made in the time of the emperor Claudius, which is now in course of repair. The Liris runs in a deep narrow valley about three miles from the lake. [**Celano.**]

The kingdom of Naples has a coast-line of about 1500 miles in length, two-fifths of which lie on the west or Mediterranean sea, and the rest on the Ionian and Adriatic seas. The Ionian sea, according to the Italian denomination, extends from the Straits of Messina to Cape Leuca, at the extremity of the Iapygian peninsula. Unfortunately this very extensive line of coast has few harbours. The deficiency of tides in the Mediterranean renders the æstuaries of rivers useless for the purpose of navigation; and this is a great and lasting disadvantage to the countries round that sea, which alone would determine their maritime inferiority to the countries bordering upon the ocean. The Garigliano, Volturno, Sele, Crati, Ofanto, Pescara, and other rivers of the kingdom of Naples, if they were tide rivers, would afford good natural harbours for large vessels, whilst, as it is, the bars at their entrance are impassable except for very small craft. The only harbours on the Mediterranean coasts are those of Gaëta and Naples, and even these are not safe at all times, and do not admit of large vessels. But the Gulf of Baiæ, in the Bay of Naples, affords a safe anchorage for the largest men of war. The natural port of Misenum, although not used now, is still capable of receiving large merchant vessels. South of Naples, as far as the Straits of Messina, there is no harbour. The artificial port of Salerno is filled up with sand, which has been the fate of most harbours on the coast of the kingdom, wherever a mole has been constructed. To prevent this evil, it has been proposed to raise, instead of continuous moles, piers made of arches, as the antients did at Puteoli, which, by leaving free ingress and egress to the waters, would prevent the constant accumulation of the sand. (De Fazio, *Nuove Osservazioni sopra i Pregj Architettonici dei Porti degli Antichi*, 1832.) On the eastern coast are the ports of Taranto and Brindisi; Gallipoli has merely a roadstead; the ports of Trani and Barletta are filled up, but Manfredonia has a very good road. A new harbour has been begun at Bari. On all the coast of Abruzzo there is no harbour; the mouth of the Pescara and the mole of Ortona afford shelter only for small craft. A new harbour is in course of construction at Ortona. The coast of the Abruzzo is generally shallow, except at the point of Tormoli, where there is deep water, and the position is favourable to the construction of a harbour which has been projected. (Afan di Rivera, *Considerazioni sù i mezzi di restituire il valore proprio ai doni che la natura ha largamente conceduto al Regno delle due Sicilie*, 2 vols., 1833.)

The productions of the soil throughout the kingdom are various. The staple products are corn, wine, oil, wool, and silk. The plains of Apulia produce vast quantities of corn for exportation. A quantity of wool is exported from the same province, where about two millions and a half of sheep are fed. [**Capitanata.**] Oil is likewise exported from the eastern provinces and from Calabria, to the amount of about nineteen millions of Italian livres, or about 750,000*l* sterling. Gallipoli is the great oil mart. Silk is made in Calabria, in Abruzzo Citra, Terra di Lavoro, and Principato. Cotton is produced in the provinces of Bari, Principato, near Castellamare, and other places. Wine is made all over the kingdom, and in great abundance and variety, but most of it is consumed in the country and within the year; and although some of the wine, especially that of Calabria, is as full bodied and generous as any Portuguese and Spanish wine, yet little of it is kept or sent to the northern parts of Europe. Naples however exports wine to Rome, Genoa, and other parts of Italy. Some brandy is made and exported to America. Some of the wines made in the neighbourhood of Naples, at Piedimonte, Procida, Capri, Gragnano, and at the foot of Mount Vesuvius (the latter is known by the name of 'Lachryma Christi'), are very fine and well flavoured. The country produces most kinds of fruit, such as figs, chesnuts, almonds, oranges, lemons, pomegranates, melons, peaches, and apricots. The Indian fig comes to maturity in Sicily, but not in the continental part of the kingdom. Tobacco is cultivated chiefly near Lecce, saffron in Abruzzo, and the sugar-cane in Calabria. Flax, hemp, and rice are also raised in considerable quantity in the low grounds. Indian corn is also much cultivated. Cheese is made chiefly in Abruzzo and Apulia. In some favoured spots, such as in the neighbourhood of Naples, at the foot of Mount Vesuvius, near Monteleone and Reggio in Calabria, the fertility of the soil seems inexhaustible.

There is a rich iron-mine near Stilo in the farthest Calabria, which is worked for the government. Coal is found also in Calabria near Briatico (Vivenzio, *Relazione dei Terremoti di Calabria*, Naples, 1788; Savaresi, *Viaggio in Calabria*, 1801-2; Tenore, *Essai sur la Géographie physique et botanique du Royaume de Naples*, 1827.)

The forests with which the Apennines were once clothed have in great part disappeared through the waste, improvidence, and neglect of the people and the various governments which have succeeded each other in the country. This is a very serious evil, for not only fuel and timber have become scarce, but the destruction of the forests has caused the springs to be dried up and occasioned summer droughts in the subjacent lands, whilst the winter rains have washed away the vegetable earth from the mountain sides and exposed the bare rock, and the torrents carrying down alluvial matter into the valleys and plains have damaged whole tracts of country, choked up the beds of rivers, and occasioned the formation of pestilential marshes. Afan di Rivera, already quoted, has shown at great length the calamitous effects of the destruction of the Apennine forests. By a law concerning the forests, promulgated on the 21st August, 1826, an attempt has been made to arrest the progress of the evil.

The strip of maritime low land which skirts the sea-coast is in many places marshy and covered with underwood. Herds of black cattle, buffaloes, and pigs live in that unwholesome region. Something has been done of late years towards draining the marshes, especially between the mouth of the Volturno and Cuma, and on the opposite coast of Apulia. [Brindisi; Capitanata.]

At the beginning of the present century there was no carriage-road through the kingdom, with the exception of the high road from Rome to Naples. Since that time roads have been made from Naples to Reggio at the extremity of Calabria, to Bari, Manfredonia, and Taranto in Apulia, to Chieti, Teramo, and Aquila in Abruzzo, to Potenza in Basilicata, to Campobasso in the province of Sannio, and other roads are in course of being constructed. A handsome suspension-bridge has been thrown across the Garigliano, which, although on the high road from Rome to Naples, had been crossed for centuries before only by a miserable ferry.

The kingdom is divided for administrative purposes into 13 provinces. We subjoin the population of each, as it was by the last authentic returns which we have seen, of 1837, which, compared with those of Petroni for 1825, show that the population has been gradually increasing at the average rate of about 1 per cent. annually: Provincia di Napoli, 720,796 inhabitants; Terra di Lavoro, head town Caserta, 664,138 inhabitants; Principato Citra, head town Salerno, 539,227; Principato Ultra, head town Avellino, 379,999; Sannio, formerly called Contado di Molise, head town Campobasso, 339,862; Abruzzo Citra, head town Chieti, 284,482; Abruzzo Ultra Primo, head town Teramo, 204,092; Abruzzo Ultra Secondo, head town Aquila, 299,543; Capitanata, head town Foggia, 273,489; Terra di Bari, head town Bari, 441,964; Terra d'Otranto, head town Lecce, 384,510; Basilicata, head town Potenza, 457,522; Calabria Citra, head town Cosenza, 434,622; Calabria Ultra Prima, head town Reggio, 283,886; Calabria Ultra Seconda, head town Catanzaro, 325,122. In common discourse, these divisions are often called by the name of the head town, such as 'Provincia di Salerno,' 'Provincia di Lecce,' 'Provincia di Teramo,' &c. The provinces are divided into districts, and the districts into communes. Each province is administered by an 'intendente,' or king's lieutenant, appointed by the king, and changed every three years. In every province there is a 'Consiglio provinciale, or a council of notables, proposed by the communal councils, and appointed by the king, which assembles once a year, and examines the provincial accounts and proposes local improvements. Keppel Craven, the latest authority on the subject, who has visited at leisure every province of the kingdom speaks favourably of the character, qualifications, and genera. behaviour of the intendenti. The same praise however ought not perhaps to be extended to the subaltern or district and police authorities. Every commune has a sindaco, who corresponds to the maire of the French communes. A communal council, called 'Decurionato,' chosen by ballot from among the notables or proprietors, fixes the local rates, administers the revenue, and appoints the municipal officers, subject however to the sanction of the intendente. One of these officers is called 'conciliatore,' and acts as umpire between parties at variance, for the purpose of preventing them from going to law upon trifling grounds. (Serristori; Colletta, *Storia del Reame di Napoli*; Orloff, *Mémoires sur le Royaume de Naples*.)

The judicial department consists of four 'Gran Corti Civili,' which sit at Naples, Aquila, Trani, and Catanzaro; a criminal court, and a civil court in every head town of a province; and a judge of instruction in every district, and a justice of peace, 'giudice di circondario,' in every 'giudicatura inferiore,' of which there are 525 in the whole kingdom. A supreme court of cassation, 'Corte Suprema di Giustizia,' sits at Naples. Trials are public in the kingdom of Naples, as in France. The French civil code, with some modifications, has been retained, as well as the French commercial code.

For the purposes of public instruction, there is an elementary school in every commune; grammar schools, 'scuole secondarie,' in most towns; a royal college in every head town of a province; five lycea at Naples, Salerno, Aquila, Bari, Catanzaro; and, lastly, the university of Naples. There is a very good institution at Naples for the education of young ladies, founded by Caroline, Murat's wife, and since patronised and increased by Queen Isabella, the wife of Francis I.; but the education of females in general is much neglected.

The ecclesiastical establishment consists of 20 archbishops and 65 bishops, 72 clerical seminaries, and 3767 rectors of parishes. The number of priests, monks, and nuns has been stated above. Serristori, in 1833, reckons the monks at 11,000, and the nuns at 9000; but Petroni, in 1826, reckoned the former only at 8455, and the nuns at 8185. It is possible that the monks may have increased since the former date. The ecclesiastical jurisdiction and discipline were defined by a concordat agreed upon between Cardinal Consalvi on the part of the pope Pius VII. and the Cavaliere de' Medici for king Ferdinand I., in March, 1818. The Roman Catholic is the exclusive religion of the country; a Protestant chapel has been of late years tolerated in the capital, for the accommodation of foreigners. Several communes in Calabria, Apulia, and Abruzzi follow the Greek ritual, but they belong to the Latin communion, and acknowledge the pope as their spiritual head.

The history of the kingdom and the present constitution of the monarchy are given under Sicilies, Two, Kingdom of the.

The inhabitants of the countries composing the kingdom of Naples are derived from various and mixed races. The descendants of the antient Samnites, Peligni, Marsi, Frentani, Lucanians, and other people of old Italian origin; the Etruscan Campanians, the wild Bruttii, the Greek population of the coasts—of Magna Græcia, of Cuma and Neapolis—after having been fearfully thinned during their contest with Rome, the war of Pyrrhus, the second Punic war, the social war, and the civil war of Marius and Sulla, became mixed with numerous Roman and Latin colonies. The antient Oscan and Samnite languages were gradually lost, but the Greek still remained a spoken language over a great part of the maritime districts. At the fall of the empire, the country was overrun rather than occupied by the northern tribes, but afterwards returned to the allegiance of the Byzantine emperors, when it received a fresh admixture of Greek blood and Greek language and Greek usages. In the sixth century the Longobards took possession of Beneventum, and founded there a powerful duchy which survived the fall of their power in North Italy. In the eleventh century the Normans came, who conquered both the Longobards and the Greeks, and founded the monarchy of the two Sicilies upon the base of feudal institutions. Then came in succession the Suabians, the French or Provençals, the Aragonese, and the Spaniards. All these nations have left traces of their residence. A dash of Greek character is still observable in the temper, customs, and dialect of several parts of the country. Some families trace their descent from the Normans and the Angevins or Provençals. Lastly, Spanish family names, Spanish habits, and Spanish words often occur, especially in the capital. Considerable shades of variety are observable among the inhabitants of different parts of the kingdom [ABRUZZO; CALABRIA]; whilst the capital, from the constant influx of provincials, contains specimens of them all. But notwithstanding these varieties, the long habits of amalgamation produced by a central administration and a large capital during eight centuries have created a lasting feeling of common nationality, which is perhaps stronger in the kingdom of Naples than in any other Italian state. Neapolitan, not Italian, is the national appellation. Generally speaking, the Neapolitan is quick, shrewd, humorous, fond of music and dancing, rather inclined to bombast and hyperbole, fiery but changeable, inclined to pleasure and ease, hospitable, susceptible of generous feelings, and also of a high social polish.

Notwithstanding the common prejudice to the contrary, the Neapolitan is by no means deficient in personal courage. During the last wars, Neapolitan troops fought well as auxiliaries in the ranks of the French, Austrian, and English armies; the people also fought desperately in defence of their capital in 1799; and the long and obstinate war in Calabria, from 1806 to 1810, was only put down by extermination. If the regular troops have not shown the same spirit in defence of the kingdom, this has proceeded from various peculiar circumstances which are fairly explained by Colletta in his 'History' already quoted, and likewise by the author of a work lately published at Florence, 'Fasti e Vicende dei Popoli Italiani, dal 1801 al 1815.' See also the *Antologia Militare*, of which the sixth volume has been lately published at Naples.

NAPLES, PROVINCE OF (Provincia di Napoli), is the name of the metropolitan province of the kingdom of the two Sicilies, which includes the capital [NAPLES, CITY OF] and the territory round the bay from Cape Misenum and Cuma on the west to Castellamare and Sorrento on the south-east. The islands of Ischia and Procida belong also to the province of Naples. The province is divided into four districts: 1, Naples; 2, Pozzuoli, which includes the whole western division and the islands; 3, Castellamare, which comprises the territory at the base of Mount Vesuvius, and the coast opposite Naples as far as Sorrento; 4, Casoria, which comprehends a tract of the Campanian plain stretching north of the range of hills behind the city of Naples. This tract extends as far as a line which, beginning on the sea-coast half way between the lakes of Licola and Patria, runs in an eastern direction to Caivano, not including the town of Aversa, which belongs to the province of Terra di Lavoro: it then runs south-east skirting the north base of Mount Vesuvius, and not including the towns of Acerra, Nola, and Nocera: it next follows the ridge of hills which runs through the peninsula of Sorrento at the back of Castellamare, including the towns of Castellamare, Vico, and Sorrento. The summit of the ridge divides the province of Naples from that of Principato Citra, or province of Salerno. The whole of this territory formed until lately part of the larger division of Terra di Lavoro, from which it is not geographically separated; but owing to the great population of the capital and surrounding territory, it has been found convenient for administrative purposes to constitute it into a distinct province. The province of Naples, exclusive of the capital, contained, according to the returns of 1837, 374,494 inhabitants.

The principal towns of the province of Naples, exclusive of the capital, are: 1, Pozzuoli, the antient Puteoli, situated on the east side of the gulf of the same name, and opposite to Baiæ, originally a colony of Cuma, called Dicæarchia, founded in the sixth century B.C., and now a bishop's see and a poor-looking town, with 10,000 inhabitants. [POZZUOLI.] The whole surrounding country is of a volcanic character. The hill called Solfatara, which is the crater of a volcano not yet extinct, rises to the east above the town. 2, Afragola, a large village or town of 13,000 inhabitants, north-east of Naples in the Campanian plain, has some hat manufactories. 3, Fratta Maggiore, near the antient Atella, is famous for its strawberry beds, which supply the markets of Naples. 4, Somma, at the north base of Mount Vesuvius, has 7000 inhabitants. 5, Sant' Anastasia, near Somma, has 6000 inhabitants. The whole neighbourhood produces the luscious wine known by the name of 'Lachryma Christi.' 6, Portici and Resina, two adjoining towns built on the south-west slope of Vesuvius, on the site of Herculaneum, contain together about 14,000 inhabitants. Visitors who ascend Mount Vesuvius pass through Resina. Portici has a royal palace; its museum of antiquities obtained from Herculaneum and Pompeii has been lately removed to the Museo Borbonico at Naples. East of Resina is another pretty royal villa called La Favorita, in a lovely situation near the sea-shore. 7, Torre del Greco, about two miles south-east of Portici, at the foot of Vesuvius, a town of 13,000 inhabitants, has been repeatedly destroyed by the lava and earthquakes, but rebuilt over and over again. The inhabitants are mostly addicted to a seafaring life. 8, Torre dell' Annunziata, about four miles south-east of Torre del Greco, and near the site of Pompeii, has 9000 inhabitants, a manufactory of muskets for the royal service, and a large gunpowder magazine. It is also known for its great manufactory of maccaroni, which is the best in Naples, and known by the name of 'Maccaroni della Costa.' North of Torre dell' Annunziata is the large village of Bosco tré Case, and further north, on the east slope of Vesuvius, is the town of Ottajano, with 15,000 inhabitants. 9, Castellamare, at the south-east extremity of the Bay of Naples, near the site of Stabiæ, is in a delightful situation on the sea-coast, at the foot of the lofty mountain St. Angelo, the Mons Lactarius of the antients, nearly 5000 feet high: it has docks for the royal navy, several sources of mineral water in the neighbourhood, a royal villa called 'Quisisana' and park, and about 10,000 inhabitants. Castellamare is much frequented by the Neapolitans during the summer heats. In the neighbouring district of Gragnano a wine is made which is among the best in the neighbourhood of Naples. 10, Vico (Vicus Æquanus), a small town perched upon the cliffs above the coast, about 4 miles south-west of Castellamare, was the birth-place of the metaphysician and historian Gianbattista di Vico. 11, Sorrento is in a delightful valley surrounded by hills, which is a complete grove of orange and mulberry trees, and contains several villages and numerous country-houses. The town of Sorrento has 5000 inhabitants, is a bishop's see, and the birth-place of Tasso. The plain of Sorrento is much frequented by the wealthy Neapolitans during summer. There are boats which cross daily from Naples to Sorrento, and return loaded with oranges and other fruit. Silk is also produced here.

The country round Naples is the most populous neighbourhood belonging to any capital in Europe, excepting perhaps that of Paris. For particular descriptions of it see AGNANO; AVERNO; BAIÆ; CUMA; HERCULANEUM; ISCHIA; POMPEII; POZZUOLI; VESUVIUS.

NAPLES (*Napoli*, in Italian), the capital of the kingdom of the Two Sicilies, and the fourth in population among the European cities, is situated in 40° 50′ N. lat. and 14° 13′ E. long., on the northern coast of the fine bay of the same name, and partly at the foot and partly on the slope of a range of hills which runs obliquely to the shore. On the south-east is Mount Vesuvius, from which it is divided by a fertile plain watered by the small river Sebéto, and opposite to it, across the bay, are the mountains of Castellamare, Vico, and Sorrento, with the island of Capri due south, at the entrance of the bay, on the side of Sicily.

Seen from the sea Naples appears in the form of two crescents, of very unequal depth, one on the east, and the other on the west, divided by the point of Castel dell' Uovo and the hill of Pizzofalcone, which is behind it. The eastern crescent, which includes the great bulk of the city, faces the south-east, and is bounded by the hill of Capodimonte to the north, and Sant' Elmo or Ermo to the west, crowned by the castle of that name, which commands the town. Between these two hills is a considerable depression, on which the suburbs of La Sanitá and L'Infrascata are built. The slope of the hill of Capodimonte is likewise covered with houses, forming the suburbs called Miracoli and Le Vergini. To the eastward the town is open to the plain of Campania. From the barrier of Capo di Chino, at the entrance from Rome, a succession of fine streets run through the body of the town to the sea, the principal of which, called Toledo, about a mile in length, runs due south, and divides the old city, which is east of it, from the new districts. The street of Toledo terminates in the *place* before the royal palace. The old city forms a closely built square of about a mile on each side: part of its walls, towers, and ditches still remain, and several of the gates are standing, namely, Porta Nolana, on the road to Nola, Porta Capuana, on the road to Apulia, and Porta S. Gennaro, and Porta S. Maria di Constantinopoli, towards the north. This part of the town, which is in a plain, has narrow streets and lofty massive houses, many of them six or seven stories high; it is very thickly inhabited, and contains more than one half of the whole population of the capital. West of Toledo numerous streets run up the hill of Sant' Elmo, which is covered with houses for two-thirds of its height. South of the hill of Sant' Elmo, and between it and the point of Pizzofalcone, is another depression, which affords a carriage communication between Toledo and the western crescent, or new part of the town, which is called by the general name of Chiaja, 'the quay.' This part, which is much contracted between the hills and the sea, extends in length about a mile and a half between the hill of Pizzofalcone to the east and that of Posilipo to the west. A fine road runs all this length, parallel to the sea-shore, and between the public gardens on one side and a row of fine houses on the other; it then turns along the base of Mount Posilipo, and gradually ascending it, leads to the other side of it towards Pozzuoli. There is another and straighter road to Pozzuoli by the tunnel called Grotta di Posilipo, which is cut through the mountain for about three-quarters of a mile.

Naples is an open city like London, but it has a sort of barriers or custom-house posts at the principal avenues leading into the town, for the purpose of collecting the 'gabella,' or duty upon provisions, corresponding to the 'octroi' of the French and other continental towns. The extreme length of Naples, measured along the sea-coast, but without following its sinuosities, is about three miles and a half from the Ponte della Maddalena, on the road to Calabria, to the grotto of Posilipo: the greatest depth, from the suburb of La Sanità, at the foot of Capodimonte, to the shore of Santa Lucia, is about two miles; but in other directions it is much less.

Few buildings at Naples are in a good architectural style; they are either overloaded with ornaments or disproportionate in their parts. The most remarkable are—

1. The royal palace, 'La Reggia,' a large mass of buildings, constructed at two different times, first by the viceroy Pedro de Toledo, which part goes by the name of Palazzo Vecchio; and the second, after the design of the architect Fontana, under the Spanish viceroy Count De Lemos, in the seventeenth century. This new palace has a front of nearly 400 feet in length, with three orders of pillars, one above the other, Doric, Ionic, and Corinthian. The great court has two rows of arcades, one above the other, supported by granite columns; the grand staircase is ample and commodious. The apartments are adorned with valuable paintings of the old Italian masters. The great gallery contains the portraits of all the Spanish viceroys who presided over Naples for more than two centuries. At the back of the palace, along the first floor, facing the sea, is a handsome terrace paved with marble and shaded with trees, from which there is a delightful view of the bay. On the ground-floor are the royal printing-press and the royal china manufactory. Facing the palace is a semicircular colonnade, with a pantheon-shaped church in the centre, raised by the late king Ferdinand I.

Adjoining the palace, and between it and the sea, are the arsenal, the cannon-foundry, and basin, or wet-dock, for the king's barges or yachts. On the eastern side the palace adjoins the theatre of San Carlo, which is one of the remarkable structures of Naples. It was rebuilt after the fire of 1815, and is one of the largest theatres in Europe; it has six tiers of boxes, each box capable of containing from ten to twelve persons. Farther on the old palace adjoins the Castel Nuovo, a massive and extensive castle, with towers and a ditch around, begun in the thirteenth century, by Charles of Anjou, and successively increased. Fronting the castle is the finest square in Naples, called Largo del Castello. East of Castel Nuovo is the mole, with the lighthouse at the end of it. The harbour, which it is intended to shelter, is small, and not always safe.

The mole affords a promenade, which is much frequented by the citizens, and on which Punch, and a story-teller, who recites the romantic deeds of Rinaldo, are generally stationed in the afternoon.

2. The palace, museum, and library, called 'degli Studj,' are in the northern part of the town, at the foot of the hill of Capodimonte. The museum, styled 'Museo Borbonico,' is one of the richest in Europe. Among the numerous masterpieces of antient sculpture which it contains, the Hercules Farnese, the Venus Callipyge, the Apollo Citharoedus, the Bacchus, and the statue of an orator called Aristides [ARISTIDES], deserve especial mention. The museum is also rich in antient bronzes; the Mercury, the Satyrs, a horse's head, &c. are much admired. The collection of antient instruments, utensils, female ornaments, and other household articles found at Herculaneum and Pompeii, is unique. It contains also a vast number of articles of glass, mostly Egyptian. The collection of Campanian, Greek, and Sicilian vases, as well as the numismatic cabinet, is also very rich. That of antient paintings is very remarkable, although most of them are evidently the work of second-rate artists. There are also some fine antient mosaics. The tables found at Heraclea, in Magna Græcia, are valuable as specimens of Greek palæography. A good description of the museum, with plates, has been recently published by the government, 'Il Reale Museo Borbonico,' 16 vols. 4to.

The Gallery of Modern Paintings contains many good works of the Neapolitan, Flemish, Venetian, and Bolognese schools. The collection of papyri found at Herculaneum has hitherto disclosed few works of any importance. [HERCULANEUM.] The Royal Library contains 150,000 printed volumes, and about 3000 MSS. A catalogue of it was published in 1830, in 2 vols. fol. Besides this library, which is open to the public, there are two or three other public libraries at Naples, such as that of S. Angelo à Nido, and that of the convent of S. Filippo Neri.

3. The churches of Naples amount to about two hundred; but in general they are remarkable for their monuments, paintings, and other accessories, rather than for their architecture. The cathedral, begun by Masuccio, a Neapolitan architect and sculptor of the thirteenth century, has been since repeatedly altered, ornamented, and spoiled. The interior is rich in antient columns of valuable marbles; it also contains a splendid mausoleum of Charles I. of Anjou, the conqueror of Naples. The adjoining chapel of San Gennaro is rich in paintings: the ceremony of the liquefaction of the blood of St. Januarius continues to be performed there annually. Valéry, in his 'Voyages Historiques et Littéraires en Italie,' has described it as he saw it in September, 1826. The front of the church of S. Paolo, built on the site of a temple of Castor and Pollux, contains some fluted columns of marble, the remains of the antient structure.

The church of San Lorenzo, founded by Charles of Anjou, on the site of the town-house, where the municipal council of the city formerly used to assemble, contains several royal tombs and some good paintings. The church of S. Filippo Neri is built in better taste than most of the churches of Naples; it is rich in paintings, and contains the tomb of Vico, an original Neapolitan thinker and writer in the early part of the eighteenth century. The church sacristy and convent of S. Domenico constitute a real museum of the middle ages, on account of the numerous monuments of kings, literary men, and other distinguished personages of the times of the Anjous and Aragonese; and for the cell, lecture-room, and chair of Thomas Aquinas, who resided, wrote, and taught in this convent. The interior of Santa Chiara is elegant and rich: it contains the monuments of Robert of Anjou, the friend of Petrarch; of his son, the duke of Calabria; of Joanna I.; and of Raimondo Capanno, a Moorish slave, who became great seneschal of the kingdom, and acted a part in the murder of Joanna's husband, Andreas of Hungary. The neighbouring church of Gesú Nuovo, the façade of which has been compared to that of a prison, has in the interior the appearance of a splendid ball-room. It now belongs to the Jesuits, who were re-established at Naples in 1816. The church of Monte Oliveto is rich in sculptures by Giovanni di Nola, Donatello, Benedetto da Majano, and other celebrated artists. The vast adjoining convent, which once afforded an asylum to Tasso, has been suppressed, and is now occupied by several offices of the municipal administration. San Giacomo dei Spagnoli contains the magnificent tomb of Don Pedro de Toledo, one of the best Spanish viceroys of Naples. The small neglected church of S. Giovanni à Carbonara is remarkable for the monuments of King Ladislaus and his sister Joanna II.; and in the chapel behind the altar, that of her favourite, Ser Gianni Caracciolo, who was murdered at last through a court intrigue. The walls of this chapel are painted with frescoes, now much impaired and defaced, which have reference to the history of Joanna and Caracciolo. The convent of San Giovanni had once a library rich in MSS., founded by Parrhasius and Cardinal Seripandi; but about a century since, the emperor Charles VI. having sent some learned Germans to examine the MSS. and make extracts from them, the monks felt so wearied by their obligatory attendance on the foreign scholars, that they preferred making an offer of the MSS. in question to the emperor, in order to avoid being exposed to any further trouble about them. (Valéry.) The church Del Carmine, with its lofty steeple, is chiefly noticed for its neighbourhood to the great market, the scene of Masaniello's insurrection, and also of the desperate defence of the populace against the French in 1799; and likewise for the modest tomb of the unfortunate Corradino and his cousin Frederic of Austria, who were beheaded near this spot by order of Charles of Anjou. The church of L'Annunziata, by the architect Vanvitelli, is one of the best churches of Naples: adjoining to it is a foundling hospital and a Magdalen. The church of San Martino, near the castle of Sant' Elmo, from which there is a most magnificent view of Naples and the bay, is richly painted by Lanfranco, Spagnoletto, and D'Arpino: the adjoining convent is now occupied by invalids from the army, of whom many are blind. The church of Santa Maria del Parto, founded by Sannazaro, in a delightful spot, near the shore of Mergellina, has a fine mausoleum of the poet. San Gennaro dei Poveri is remarkable for its vast catacombs, which extend under the hill of Capodimonte.

4. The royal palace of Capodimonte is a heavy structure, but is remarkable for its fine situation, the excellent road leading to it, constructed by the French, its extensive park and hunting grounds, and the adjoining observatory. On the slope of the hill is the Chinese College, for the education of young Chinese, who, after taking holy orders, return to their country as missionaries. The number of Chinese students seldom exceeds six. An account of this remarkable institution is given in 'Italy and the Italians in the Nineteenth Century,' by A. Vieusseux, which work contains also many particulars concerning the peculiar sights of Naples and the manners and habits of the people.

On another part of the hill of Capodimonte is the botanical garden, formed in 1818, and placed under the direction of the Neapolitan professor of botany, M. Tenore. Not far from thence, in a secluded valley at the foot of the hill, are the remains of an aqueduct constructed by Augustus, which is called Ponti Rossi, 'red bridges or arches,' from the colour of the stone.

Naples has many charitable institutions, such as the great hospital Degli Incurabili, the foundling hospital already mentioned, the school of the deaf and dumb, the asylum for the blind, under the direction of the distinguished oculist Quadri; the Reclusorio, or general workhouse for able-bodied poor, with a school annexed to it, and which contains about 3000 poor; San Gennaro dei Poveri, for the poor who are unable to work, San Francesco di Sales, and several other minor hospitals and houses of refuge. Valéry seems to think that the administration of the workhouse might be susceptible of much improvement, especially with regard to moral discipline. Mendicity is forbidden by law; but the law is often evaded. There are no poors'-rates at Naples.

The university is well provided with professors. It has a good library and a cabinet of natural history annexed to it. Some account of the state of education in the Neapolitan kingdom is given in Nos. 5 and 16 of the 'Quarterly Journal of Education.' Among the special schools are a medical college, a veterinary college, two military schools, a college of pilots, and the 'Conservatorio,' or school of music, which has produced many illustrious composers, has some good professors, and a rich musical library, containing among others the autographs of Paisiello's works. Besides San Carlo, Naples has half a dozen minor theatres, Il Fondo, i Fiorentini, Teatro Nuovo, La Fenice, San Carlino, &c. In the last two, plays, or rather farces, are performed in the Neapolitan dialect, which is full of humour and naïve expression.

The Neapolitan or Apulian dialect is very old; it was spoken at the court of Frederic II. and his son Manfred, and their contemporary, the chronicler Matteo Spinello, wrote in it the annals of those two princes. The popular songs or ballads, of which every now and then new ones are produced by obscure poets and sung about the streets, generally run upon love matters, which furnish the principal incidents in the existence of the people of this country. Some of these songs are full of pathos. The following are specimens :—

'Albero piccirillo te chiantaje;
Io t' adacquaje col li miei sudore;
Venne lo viento, e ne rompé no ramo;
La fronna verde ha cagnato colore;
Lo frutto doce è diventato amaro;
Addò è ghiuto lo bello sapore?
Viene, morte, arremedia a chiste guaje,
Giacché nennillo mio ha cagnato amore.'

('I planted a small tree, and watered it with the sweat of my brow; but the wind came and broke a branch of it, the green leaf became withered, and the fruit, once sweet, grew bitter: Oh, where is its sweet flavour gone? Come, O death, and put an end to my distress, since my love has left me for another.')

We extract the next, which is conceived in a wilder spirit, from Valéry, who heard it about the streets of Naples in 1826-27:—

'Che bella cosa è de morire acciso
Nnanze a la porta de la nnammorata,
L'anema se ne saglie in paradiso
E lo cuorpo lo chiagne la scasata.'

('A desirable fate, to be stabbed to death at the door of one's love! The soul then ascends to paradise, while the forlorn beauty bathes the bleeding body with her tears.')

For a further account of the Neapolitan dialect, see Italy—*Italian Language and Literature*, and the references in that article.

The population of Naples, which in 1835 amounted to about 350,000, was reduced by the cholera in the two following years to 336,300, according to the returns of the end of 1837, exclusive of the garrison and non-resident foreigners. (*Bollettino Statistico di Milano*, January, 1839.) Of this population, about 1700 are priests, 700 monks, and 800 nuns; 9400 are employed under the government, and 18,000 are pensioners, 3000 lawyers, 26,000 are men-servants, 3400 coachmen, 8000 sailors, boatmen, and fishermen, 3500 porters, 5200 shop-boys, 3700 gardeners and greengrocers, 2500 tailors, 2400 shoemakers, 800 cobblers, 1450 barbers and hairdressers, 1500 cooks, 500 printers, 59 booksellers, 58 bookbinders, 146 physicians, 105 surgeons, and 186 apothecaries, 900 sellers of wine, 303 coffee-house-keepers, 350 tavern and eating-house keepers, 310 innkeepers, 800 fruiterers, 800 goldsmiths, 1000 smiths, 2400 carpenters, 1600 builders and masons, &c. Naples has manufactures of hats, straw-hats, gloves, leather, earthenware, coral, and jewellery. There are about 700 hackney-coaches, 600 cabriolets, 1600 boats, and about 500 vessels, belonging to the town of Naples. There are 809 inns and lodging-houses. The town is divided into twelve 'quartieri,' or districts, of which five and the most populous are in the old or eastern part of the town, namely, Mercato, Pendino, Porto, S. Lorenzo, and Vicaria; one in the middle, S. Ferdinando, in the neighbourhood of the royal palace; two at the west end, Chiaja and S. Giuseppe; one, S. Carlo all' Arena, at the north end towards the road to Rome; and three, Stella, Avvocata, and Monte Calvario, include the upper part of the town, which is built on the hills of Capodimonte and S. Elmo. Every district has a commissary of police, whose office is open at all hours of the day. There are sixty-six military posts in the whole town, four castles, S. Elmo, Castel Nuovo, Castel dell' Uovo, and Castello del Carmine, besides extensive barracks both for infantry and cavalry. The town has six prisons, one of which is for debtors. The vast and massive structure called 'La Vicaria,' at the east end of Naples near Porta Capuana, which was once a castle and the residence of the Norman kings, now contains various courts of justice, and also the archives of the kingdom, an immense collection of documents, divided into four sections, historical, financial, judicial, and communal. The acts, edicts, &c. of the sovereigns of the Anjou dynasty alone fill 300 thick folio volumes. The 'Constitutiones' of Frederic II., the oldest code of the kingdom, written by his chancellor Pietro delle Vigne, are also there.

The Lazzaroni, so often mentioned by travellers, and so confusedly described, included the lowest orders of the inhabitants or populace, the porters, the hawkers of fish, vegetables, and other eatables, the boatmen, journeymen out of place, and numerous vagrants, and other low and loose characters. Many of these classes in former times had no regular domicile, and lived chiefly in the open air, or were huddled together at night under some porch or vestibule, in narrow alleys, in their boats, and wherever they could find shelter. To these were added indiscriminately the numerous class of fishermen, an industrious race, whose habits have always been more domestic and orderly than those of the common lazzaroni. All these people were vaguely reckoned, with probably some exaggeration, at 40,000 individuals, a muscular, brawny, and erect set of men, but totally uneducated and little civilised, very abstemious and frugal in their habits, mostly barefooted, living from day to day on their casual earnings, their dress consisting merely of a shirt and a pair of loose trowsers; very good-tempered in quiet times, but apt to run riot on the first political excitement or tumult. The name lazzaro is said to have been derived from the numerous lepers who once abounded on the coasts of the Mediterranean, and who invoked as their patron the Lazarus who is mentioned in the Gospel. A charitable order, or fraternity, which was instituted in the middle ages for their relief, assumed the name of 'Order of St. Lazarus.' The lepers were obliged to wear a peculiar dress, consisting of white shirt and trowsers and hood. After the leprosy became extinct, the same garb continued to be worn by the lower orders for the sake of cheapness and convenience in the warm climate of Naples, and the name lazzari was retained and applied to that class. This is the etymology given by Galiani and others, in the 'Vocabolario del Dialetto Napolitano,' published at Naples in 1789. But the author adds that already in his time the number of the lazzari had much decreased, owing to the progress of civilisation, and that 'many among the people who had the appearance of lazzari during the week-days, looked very different when dressed in their Sunday clothes.' As a peculiar class, the lazzari may be said to be now extinct: the lower orders live like those of other cities; they are all duly registered in their respective parishes, they have all a domicile of some sort, and the police regulations, enforced for the last thirty years, have produced a material alteration in their habits, though the every-day clothing of many of them continues to be the same as before.

The nobility at Naples are very numerous, but, excepting their titles, they enjoy no privilege or influence above the rest of their countrymen. The alterations made in the law of inheritance, by which all the children succeed in equal or nearly equal portions, as in France, have broken down the fortunes of most families, which were already encumbered by debts, the consequence of want of order, of indolence, and expensive habits of living. The most important and interesting class at Naples at present consists of the higher ranks of the middle orders, including lawyers, physicians, professors, and men of other liberal professions, some native merchants, the higher officers under government, and the better sort of the clergy. Among these are found considerable information, much civility united to frankness, great sociability, and respect for decency and morality. Those who wish to know more particularly the present state of Neapolitan society and the changes which it has undergone during the last half century, may consult Colletta, *Storia del Reame di Napoli*, a work of great moral penetration, extensive observation, and written with remarkable impartiality.

The palaces of the nobility are spacious and massive, but few of them are in a good architectural style. The most remarkable are the palazzo Gravina or Orsini, the palace Maddaloni, that of Sansevero, remarkable for its chapel, adorned with some good statues, that of Della Rocca, those of Francavilla, Stigliano, Berio, &c. The building which has been raised between the streets Toledo and S. Giacomo, for the offices of the financial department and for the bank of the Two Sicilies, is one of the finest structures in Naples.

Naples is not so well supplied with water as Rome, and has not such handsome fountains; those of Fontana Medina and Monte Oliveto are the best. Several aqueducts from the neighbouring mountains supply the water, besides which most houses have cisterns. There is a sulphureous spring of water on the shore of Santa Lucia, which is much drunk by the inhabitants in the spring.

The neighbourhood of Naples abounds in delightful walks. The public gardens, or 'Villa Reale,' extending along the shore of Chiaja for nearly a mile, enjoy the advantages of the sea-breeze, and of a view unrivalled in the world. The new road over the hill of Posilipo is a beautiful drive. The hills of Capodimonte and Scutillo, and the suburbs of Infrascata and Arenella, at the back of Sant' Elmo, abound with pleasant walks and a variety of scenery. These, as well as the other neighbouring hills of Vomero, Posilipo, &c., are covered with country-houses and gardens of all sizes. But the hills are mostly destitute of trees, and appear barren and parched, especially in summer.

Naples is an archbishop's see, and is divided into fifty parishes, including the neighbouring villages.

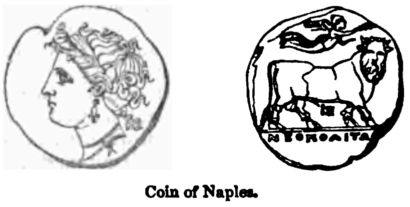
The town is abundantly supplied with provisions of every kind; fish and shell-fish are plentiful, as well as vegetables and fruits. Snow, of which a great quantity is used, especially in summer, for cooling the drink and for ices, is brought from the mountain of Castellamare, where it is kept in large reservoirs.

The great street of Toledo is thronged with people and carriages at all times of the day, and until very late at night, or rather until two or three o'clock in the morning, when fashionable people retire to rest. It is decidedly the noisiest street in Europe, as the people are in the habit of vociferating at the top of their voice; and others must do the same in order to be heard. The motley groups which are seen mixing pell-mell in the street, the crowded balconies above, the numerous venders of provisions, the acquaiuoli, or sellers of ice-water, at the corners of the bye-streets, the life out of doors, which is a general habit in this country, all render the streets of Naples, and especially that of Toledo, most curious to a foreigner.

Naples, or Neapolis, that is, 'New City,' was a Greek colony from Cumæ; the date of its origin is not known. The story of its first foundation, under the name of Parthenope, is a mythic tradition. Livy (b. viii. 22) says that there were once two towns near each other, Palæopolis and Neapolis, the inhabitants of both being from Cumæ, but Palæopolis had, long before Livy's time, merged into the new town, or Neapolis.

Neapolis, after its first foundation by the Cumæans, received colonists from Chalcis, Pithecusa, and Athens; and subsequently admitted some Campanians also among the body of citizens. (Strabo, p. 246. *Casaub.*) It became allied to the Samnites, but after their subjugation by Rome it maintained its independence as a republic, and during the second Punic war sent ambassadors to Rome to propose an alliance against Hannibal, and with it a rich present in golden vases, which the people took from their temples to defray the expenses of the war. (Livy, xxii. 32.) It continued afterwards an ally to Rome and became a municipium. After the fall of the empire Neapolis was taken by the Goths, retaken by Belisarius, and lastly destroyed by Totila, A.D. 543. It was afterwards rebuilt, and annexed to the Longobard duchy of Beneventum; but after the decline of the Longobard power, when the Byzantine emperors asserted a kind of supremacy over southern Italy, Naples had its dukes, who were chosen by the inhabitants. In the ninth century the dukes of Beneventum obliged it to pay tribute. When the duchy of Beneventum was split into three principalities, Benevento, Capua, and Salerno, Landulf, count of Capua, in order to maintain its independence of the other two, called in the Saracens, who devastated the shores of Campania. The Norman adventurers lent their assistance to the prince of Salerno against these piratical hordes, and afterwards by degrees established their own power in Apulia and Sicily. Naples was one of the last towns which submitted to the Normans; it acknowledged king Roger I., of Sicily, as its sovereign, about A.D. 1137. The subsequent history of Naples, both political and literary, is given under the head of SICILIES, TWO, KINGDOM OF THE.

The following are the principal works concerning the town of Naples, besides those which have been mentioned in this article:—Celano, *Notizie del bello, dell' antico, e del curioso della Città di Napoli*, 4 vols. 8vo., 1792; Romanelli, *Napoli antica e moderna*, 3 vols. 8vo., 1815; Vargas, *Ragguagli storici dell' Origine di Napoli*, 4to., 1754; and also *Dissertazioni istorico-legali sull' Antichità, Sito, ed Ampiezza della Liburia Ducale, o siasi dell' Agro e Territorio di Napoli*, 4to., 1756, by the same; Giraffi, *Le Rivoluzioni di Napoli*, 8vo., 1647; Chioccarelli, *Antistitum Neapolitanæ Ecclesiæ Catalogus ab Apostolorum temporibus ad annum* 1643, fol.; Stefano (Pietro di), *Descrizione dei Luoghi Sacri di Napoli*, 4to, 1560; Caracciolo (Eugenio), *Napoli Sacra*, 4to., 1623; Laseina (Pietro), *Dell' antico Ginnasio Napolitano*, 4to., 1641, 1688; Origlia, *Istoria dello Studio di Napoli*, 2 vols. 4to. 1754; Signorelli, *Storia della Reale Accademia delle Scienze e Belle Lettere à Napoli*, 1787; Attumonelli, *Delle Acque Minerali di Napoli*, 8vo., 1808; Ricci, *Analisi chimica dell' Acqua Ferrata e Sulfurea di Napoli*, 8vo., 1821; Vetrano, *Sebethi Vindiciæ, sive Dissertatio de Sebethi antiquitate nomine, &c.*, 8vo. 1767.



Coin of Naples.
British Museum. Actual Size. Silver.

NAPOLEON. [Bonaparte.]

NAPOLEON, CODE. [Codes, Les Cinq.]

NA'POLI DI MALVASI'A, or MONEMBASIA, a town built on an island on the east coast of Laconia, and connected with the mainland by a bridge about 540 feet in length. Its situation gave rise to its name Monembasia (single entrance). About four miles north of the bridge, along the coast of the mainland, are some ruins which Leake considers to be those of Epidaurus Limera, while Monembasia is the Minoa of Pausanias, which was a small place in his time. As Epidaurus fell into decay, the town on the island grew into importance, and it then probably assumed the name of Neapolis, or new town, in addition to that of Monembasia. It was a place of some consequence under the Byzantine emperors, and Andronicus Comnenus in the twelfth century founded here a monastery, which still exists, and the church of which is one of the largest in Greece. The Franks when they conquered a great part of the empire in the thirteenth century corrupted the name of Monembasia into that of Malvasia. The country in the neighbouring district formerly produced a luscious wine, to which the Venetians gave the name of Malvasia from the town at which it was shipped, and the name has been since applied as a generic appellation to wine of the same quality made in other parts of the Mediterranean, as at Lipari, in Sardinia, Spain, &c. This is the kind of wine called in English *malmsey*.

The island of Monembasia is hilly, about half a mile in length, and one third of a mile in breadth. The castle is on the summit of the hill, and the town, which is built below it, extends to the sea on the south side of the island. The streets are narrow and steep; the place contains about 300 houses, besides 50 more in the castle. The ramparts and several other buildings were constructed by the Venetians, who took possession of the place in the thirteenth century and kept it till 1540, when it was given up to the Turks by a treaty. On this occasion most of the inhabitants left it along with the Venetian garrison and found an asylum in the other Venetian possessions. It now forms part of the new kingdom of Greece.

The bishop of Monembasia, a metropolitan of high rank in the Greek church, has seven suffragan bishops under him, including those of the neighbouring district of Maina. (Coronelli; Leake.)

NA'POLI DI ROMANI'A, NAU'PLIA, ANAPLI', a town of the Morea, built on a rocky promontory at the north-east extremity of the Argolic Gulf. The harbour between this promontory and the north coast is large and tolerably safe, but has become too shallow to admit large ships. A small fortified island lies at the entrance of the harbour. The town stands on the north-east slope of the hill facing the mainland, and is fortified; the hill has a tabular summit, which is unoccupied with houses, and from which abrupt cliffs descend to the open sea at the back of the promontory. A steep and rocky mountain rises above it to the south-east called Palamedi, a very antient appellation derived from Palamedes, the son of Nauplias, the reputed son of Neptune and founder of the town. On this cliff is the castle, which is very strong owing to its almost inaccessible situation.

Nauplia was once the port and arsenal of Argos, but in the time of Pausanias it was deserted. It revived under the Byzantine emperors, was occupied by the Venetians in the thirteenth century, and became their chief settlement in the Morea, until it was taken from them by Sultan Solyman in 1537. The fortifications are of Venetian construction, but the ramparts towards the east are partly composed of the antient walls of the town, which are of a similar construction with and probably of the same date as those of the Acropolis of Argos. Other and later remains of Hellenic construction are seen on the brow of the tabular summit above the town.

Nauplia, after the Greek insurrection, remained for several years the head town of Greece, until it was superseded by Athens. Its population, which had risen to about 12,000 inhabitants, has recently declined. The streets are irregular and dirty, and the air is not wholesome. A few of the houses and the barracks are of a superior description to the rest of the buildings. The bishop, of the Eastern communion, is styled bishop of Argos and Anapli. There is also a Latin church. An aqueduct of good water from the rocky ridge near Tiryns supplies the town. (Spon; Coronelli: Leake; Gell.) From the old Greek name of Nauplia the Franks made by corruption that of Napoli, to which they added 'Di Romania' to distinguish it from the Italian Napoli.

NARBONNE, a city in France, in the department of Aude, near the coast of the Mediterranean, in 43° 11 N. lat. and 3° 0′ E. long., 530 miles from Paris by Orléans, Châteauroux, Limoges, Cahors, Montauban, and Toulouse.

Narbonne (the Roman Narbo, or Narbo Martius) is one of the oldest cities of France. A Roman colony was planted here about B.C. 116, and it had been one of the chief towns of the Volcæ Arecomici, a Celtic people, long before that time. Cæsar sent additional colonists to Narbonne, the veterans of the tenth legion. Cicero (*Pro Fonteio*, c. i.) speaks of Narbo as 'a watch-tower and bulwark of Rome.' Mela (ii. 7) speaks of Narbo as being in his time the chief town of that province of Gaul, in which it was situated, and to which it gave the title of Gallia Narbonensis. Strabo (p. 101. *Casaub.*), describes it as the emporium of all Gaul; and, at a later period, Sidonius Apollinaris and Ausonius have borne testimony to the number of its structures or the extent of its wealth. The course of the Atax, or Aude, through the adjacent lake of Rubresus, or Rubrensis (étang de Sigean), was facilitated by an artificial channel 100 feet wide and 30 feet deep; and the navigation of the river, though of small extent, promoted the commerce of the town. The history of Narbonne under the Romans has been minutely given by Expilly, in his 'Dictionnaire des Gaules,' &c.

In A.D. 413, Ataulphus, king of the Visigoths, surprised Narbonne, where he shortly after celebrated his marriage with Placidia, sister of Honorius. He was however soon obliged to abandon the city; but in A.D. 462 the Visigoths obtained possession again by treachery, and retained it. After the taking of Toulouse by Clovis and the Franks, Narbonne became the Visigothic capital: it was repeatedly taken by Franks and Burgundians, and early in the eighth century fell into the hands of the Saracens [Moors, p. 385], from whom it was taken (A.D. 759) by Pepin le Bref, and annexed to the Frankish monarchy. Narbonne was subsequently pillaged by the Northmen. In the ninth and tenth centuries it was the capital of the marquisate of Gothia, or Septimania, which was afterwards merged in the county of Toulouse. Under the marquises of Septimania, Narbonne was governed by vidames, or viscounts, who were at first removable, but afterwards became hereditary, and were feudatories of the counts of Toulouse and (for a portion of the town) of the archbishops of Narbonne. Aymeri III., viscount of Narbonne, was engaged in the crusade against the Albigenses: the Inquisition was established at Narbonne in his time, but not without occasioning considerable disturbances. The inhabitants were at this time extensively engaged in commerce, and had alliances and treaties with Marseille, Nice, Genoa, Pisa, and other trading towns on the Mediterranean. In 1348 the plague carried off 30,000 of the inhabitants of Narbonne, a loss which attests the greatness of the population. In 1355 Aymeri IX., viscount of Narbonne, defended the place successfully against the attacks of the Black Prince, but was taken prisoner next year at the battle of Maupertuis, or Poitiers. In 1407 Guillaume, or William II., viscount of Narbonne, contested the possession of Sardinia (whither he had been invited by the natives) with the kings of Sicily; he was ultimately however obliged to yield. He was one of the supporters of the Dauphin, afterwards Charles VII.; and took part in the murder of Jean, duke of Bourgogne, at Montereau (A.D. 1419). He fell (A.D. 1424) in the battle of Verneuil against the English. The viscounty afterwards passed by sale to the counts of Foix. The last viscount was Gaston de Foix, nephew of Louis XII., king of France, who fell in the battle of Ravenna A.D. 1512). He had before his death exchanged his viscounty, which was annexed to the crown, for the duchy of Nemours. In the religious wars of the sixteenth century, Narbonne embraced the party of the League; but in 1596 the inhabitants submitted to Henri IV.

There do not appear to be at Narbonne any edifices of Roman erection; but a number of fragments of Roman architecture are incorporated in the walls of the town, which were erected in the reign of François I.; and a number of inscriptions exist in excellent preservation. A few years ago, many thousand silver coins of the Roman emperors were found at Narbonne.

The town is situated upon the Canal Robine de Narbonne, by which a portion of the waters of the Aude flow into the Mediterranean. It is a fortress, but not of the first class, surrounded by an old wall, with several bastions and towers. The Canal Robine divides it into two parts, respectively distinguished as Le Bourg and La Ville, between which there is communication by three bridges. Along the bank of the canal is a public walk planted with trees. There are a cathedral and two other churches. The cathedral is a Gothic building, with a fine nave. It contains the mouldering tomb of Philippe III., le Hardi, king of France. The archbishop's palace is an antient building, having much the appearance of a fortress, and is defended by square towers. There are barracks, an arsenal, a military hospital, two other hospitals, and a prison. The population, in 1826, was 10,097 for the commune; in 1831 it was 9281 for the town, or 10,246 for the whole commune; in 1836 it was 10,792 for the commune, showing a steady but not rapid increase. The country about Narbonne is fertile in corn, but the neighbouring marshes render the place unhealthy. The inhabitants make brandy and other distilled spirits, verdigris, bricks, tiles, pottery, and paper, and are engaged in throwing silk, dyeing, and tanning. They carry on trade in corn, red and white wine, brandy, oil, salt, soda, wax, and excellent honey, which is collected in the arrondissement. There are two yearly fairs. There are marble quarries and salterns near the town. There are several fiscal government offices, an Exchange, a subordinate court of justice, and a commercial court; a society of agriculture, a society of emulation, a school of hydrography, and a seminary for the priesthood; a museum, a theatre, and public baths. The village of La Nouvelle, at the mouth of the Canal Robine, is the port of Narbonne. The learned Benedictine Montfaucon was a native of Narbonne.

The archbishopric of Narbonne is very antient: the foundation of the see has been carried by some as far back as the first century of the Christian æra. It is now united to the archbishopric of Toulouse.

The arrondissement of Narbonne has an area of 581 square miles, and comprehends seventy communes. It is divided into six cantons or divisions, each under a justice of the peace. The population, in 1831, was 54,101; in 1836 it was 56,965.

NARBOROUGH, SIR JOHN, an English naval commander of some distinction, was descended from an old family in Norfolk, and received his first commission, as lieutenant of the Portland, in the year 1664. In the ensuing Dutch war, his bravery and good services soon became so conspicuous that, within two years, after the long and desperate action, in June, 1666, between the English fleet, under Prince Rupert, and Monk, duke of Albemarle, and the Dutch under De Ruyter and Van Tromp, he was promoted to the command of the Assurance, a fourth rate. After the conclusion of peace, he was selected to conduct a voyage of discovery to the South Seas, for which destination he sailed 1669, in the Sweepstakes, of 36 guns, attended by the Bachelor pink. In the following year, he passed the Strait of Magalhaens; and, after being impeded, in the ports of the Pacific, by the jealousy of the Spanish authorities, with the usual obstacles to either intercourse or research, from which he extricated himself with remarkable prudence, he returned home in 1671. Captain Philip Parker King, in speaking of the early navigators who explored the Strait of Magalhaens, observes that 'among the numerous plans of it that are extant, those of Sir John Narborough and Cordova are the most correct.'

On the breaking out of the second Dutch war, in 1672, he was taken by the lord-high-admiral, the duke of York, into his own ship, the Prince, as second captain; and in the obstinately contested battle of Solebay with the Dutch fleet under De Ruyter, in which the first captain of the Prince, Sir John Cox, was killed, and the vessel so disabled that the Duke of York was compelled to shift his flag into the St. Michael, Narborough's energy and ability in refitting the ship for action in a few hours, as well as his courage during the fight, were deemed sufficiently meritorious to be made the subject of special commendation in the account of the action published by authority of government. After being, next, successfully employed in convoys and other duties, he was raised, in 1673, to the rank of rear-admiral, and received the honour of knighthood. In 1674 he was appointed commander-in-chief of a fleet sent to the Mediterranean, for the purpose of overawing the Tripolines and other piratical states, and obtaining redress for their depredations upon the national commerce; and he acquitted himself with so much spirit, address, and success in this duty, that he compelled the Bey of Tripoli to release all his British captives, to pay 80,000 dollars in reparation for injuries to the British trade, and to grant to British subjects more honourable and valuable privileges than any other nation had before possessed or claimed. Having achieved these objects, Sir John Narborough returned to England with his squadron in 1677: but the skill and gallantry with which he had fulfilled his instructions caused him, almost immediately, to be despatched again to the Mediterranean, in command of another fleet, with a similar commission to chastise the piracies of the Algerines. In this expedition he acted with his accustomed vigour; burnt or sunk many Algerine vessels of war; cannonaded the city of Algiers itself with good effect, though without being able to bring the pirates to terms; and concluded his operations by capturing and carrying into Cadiz a whole squadron of five Algerine frigates, which the Dey had equipped to obtain satisfaction for his previous losses. This exploit, after which he returned home in 1679, was Sir John Narborough's last important service at sea; but in the following year he was made a commissioner of the navy, and continued to hold that office both during the remainder of the reign of Charles II., and throughout the whole of that of his patron James II., until his death, which occurred towards the close of 1688. (Charnock, *Biographia Navalis;* Captain P. P. King, in the *London Geographical Journal*, vol. i.; and Sir John Narborough's *Journal*.)

NARCEIA, an alkali procured from opium by Pelletier in 1832. To prepare this substance opium is to be digested in repeated portions of cold water until the soluble part is dissolved. The mixed solutions are to be evaporated to the consistence of an extract, and when this is treated with boiling water, a brilliant crystalline substance is left, which is the narcotina of the opium; this is to be separated. The clear liquid is then to be heated to ebullition, and ammonia added slightly in excess to precipitate the morphia; expel the excess of ammonia by heat; the liquor being then evaporated to one half, more morphia is separated, and barytes water mixed with it throws down meconate of barytes; carbonate of ammonia then added precipitates the excess of barytes, and heat expels the superabundant ammoniacal salt. The liquor being again filtered, evaporated to the consistence of a thick syrup, and set aside in a cool place for some days, yields a pulpy mass which contains crystals; this is to be drained, dried by strong pressure, and digested in boiling alcohol; the solution obtained, when the spirit is distilled, yields a crystalline substance, which, when repeatedly dissolved and crystallized, is narceia in a state of purity.

The properties of narceia are, that it crystallizes in colourless acicular four-sided prisms, is inodorous, has a slightly bitter taste, dissolves in 375 times its weight of cold and 230 times its weight of boiling water; alcohol dissolves it, but æther does not. At about 198° it melts, and on cooling it concretes into a white translucent mass, exhibiting appearances of crystallization. At 230° it becomes yellow, and at a higher temperature it is decomposed.

Dilute acids combine with narceia, but they continue to redden vegetable blues; when hydrochloric acid diluted with one-third of its weight of water is put into contact with narceia, it becomes of a fine blue colour; but the addition of more water renders it colourless; it may be precipitated from the blue solution by an alkali with its properties unchanged. The stronger and concentrated acids decompose narceia; the persalts of iron are not rendered blue by this alkali. According to Pelletier's analysis, narceia consists of—

Hydrogen . .	6·52	or nearly	20 equivalents.
Carbon . . .	54·73	„	32 equivalents.
Oxygen . . .	34·42	„	16 equivalents.
Azote . . .	4·33	„	1 equivalent.
	100·		

NARCISSUS is a genus of Endogens belonging to the natural order Amaryllidaceæ, among which it is known by its flowers growing upon a scape, and having a cup at their mouth; the stamens which are opposite the sepals being longer than the others. It consists of bulbous plants principally inhabiting the warmer parts of Europe, only one species, *N. pseudo-narcissus*, or the Common Daffodil, being found plentifully so far north as Great Britain, with two others, *N. biflorus* and *poeticus*, in an apparently wild state, and a very few advancing into Africa.

The species are numerous, and from their hardiness or gay colours, or sweet smell, have long been favourite objects of cultivation, especially the Daffodils, Jonquils, and Tazettas. A very full account of them will be found in the 'Amaryllidaceæ' of the Honourable and Reverend William Herbert, p. 292 (8vo., London, 1837), who however divides the genus into six others, after the example of Salisbury and Haworth; but as those genera are not likely to be adopted by botanists, with the exception perhaps of the genus Corbularia, no account need be given of them. With regard to Corbularia, to which the name of Hoop-petticoat Narcissus is given, and of which five supposed species are enumerated, the peculiar form of the flower and the delicate stamens of that plant may perhaps entitle it to be regarded as a peculiar genus: the species are pretty, all yellow flowered, with the single exception of *C. cantabrica*, a little plant with white flowers found on the mountains of Biscay and the Pyrenees, but now lost in our gardens.

NARCOTICS (from the Greek adjective *ναρκωτικός*, which is from *ναρκή*, a stiffening, stupor, or insensibility), a class of medicines which may be defined—agents which, in moderate doses, cause a temporary increase of the action of the nervous and also of the vascular system, followed more or less speedily by a marked diminution of this action, terminating generally in sleep. When the dose is large, the excitement is scarcely perceptible; while the diminished power of the nervous system is so manifest, that an appearance of coma or apoplexy is induced. All the agents included in this class are capable of producing a state termed narcosis, or narcotism, which, if not quickly removed by a natural subsiding of their influence, or by artificial means, may terminate in death. Many of them are therefore as familiarly known as poisons as therapeutic agents. It is the consideration of them however in this latter quality which is to be entered on in this place. Their power of inducing sleep has procured for them the name of hypnotics, or soporifics; and the property which many of them possess of alleviating pain, by blunting the sensibility, has obtained for them the appellation of anodynes [ANODYNES], or, from one of the best known among them, simply of opiates.

The most important consideration respecting them is the circumstance of their depressing action being always preceded by a stimulant. This peculiarity renders their employment difficult in some cases and improper in others. 'Narcotics must be distinguished from stimulants on the one hand, and from sedatives on the other; and the distinction is the more necessary, because in nature the narcotic principle is generally combined with one or other of these: hence the contradictory and unsatisfactory reports of the value of different narcotic remedies, and the difficulty experienced in their application by those who do not know the reason why opium suits one case, hyoscyamus another.' (Billing's *First Principles of Medicine*, 3rd edit.) The progress of chemistry, by isolating the various active principles existing in the same natural compound, has lessened the difficulty attendant on their administration; still, as no one can be said to act in a manner precisely similar to another, a correct knowledge of each is desirable in order to ensure the selection of that which is best suited to the case. Diversified as they are in their nature and modes of action, there is this common property, that they all make a direct impression on the extremities of the nerves (to whatever part of the body, with few exceptions, they are applied); but their full and ultimate effects do not take place till they are absorbed, and mingled with the circulating fluid.

A slight glance at their action on the different systems of the body will furnish a useful guide in their administration. A full dose of a narcotic introduced into the stomach will, if that organ be empty, destroy the desire for food, while, if it contain food, the digestive process is suspended or rendered slower. Their frequent or continued use is therefore very injurious to that function, on which all the others depend, viz. nutrition; as is displayed in the persons of opium-eaters of the East. Further, should any considerable irritation or subacute inflammatory condition of the mucous coat of the stomach exist, they cause an aggravation of the febrile symptoms, and either in common or cancerous ulceration of that organ they cause great uneasiness. Though their primary effect on the vascular system be stimulating, and many of them send thereby a large quantity of blood to the brain (probably the source of their soporific property), their secondary effect is depressing; and in this the respiratory organs participate. This is at once a source of utility and of danger, for by moderating the action of the heart and lungs, the respiration is rendered slower, an advantage in most inflammatory complaints; but when pushed too far, the blood is not sufficiently aërated, and partaking too much of the nature of venous blood, it does not prove a sufficient stimulus to the brain and other organs.

Their action upon the secreting system is not very uniform, nor are all writers agreed as to its nature. Opium generally checks most of the secretions, except that of the skin, and causes heat, thirst, and constipation. Hyoscyamus rarely causes any of these states, but on the contrary is rather laxative, and aconite greatly increases the secretion of the bile and also of the skin. Many natural compounds have an acrid principle combined with the narcotic, and hence are termed *narcotico-acrids*, such as aconite, squil, colchicum, hellebore, &c.; these generally augment the mucous and other secretions, though they produce narcotism in excessive doses.

Lastly, some of them possess greater influence over one set of nerves than the other, and expend their energy on the nerves of motion, or of sensation, according to their nature.

No set of medicines have their action more modified by a variety of circumstances—such as the quantity given, or the frequency of repetition, also the force of habit, climate, or season, but above all by idiosyncrasy. Age also has an important share in determining the amount of action. Children do not in general bear them well, and therefore though they are very subject to convulsive and spasmodic diseases, other means should be employed, especially the removal of the source of irritation, when practicable. The various nostrums recommended for children generally contain some narcotic, and prove a fertile cause of the mortality of early life. [ANTISPASMODICS.] The administration of narcotics requires more knowledge and judgment than that of any other class of remedies, and should only be had recourse to under competent advice.

In case of over-dose or accidental poisoning, the following observations may be useful. The stomach being rendered insensible to the irritation of emetics, these are generally useless, and much valuable time is lost by administering them. Where better means cannot be had, sulphate of zinc (white vitriol) dissolved in water, or a table-spoonful of flour of mustard diffused through a pint of warm water, may be given, accompanied with pressure on the pit of the stomach, and at the same time tickling the throat with a feather. Neither ipecacuan nor tartar emetic should be used; the latter is particularly unfit. [BELLADONNA.] The stomach-pump is the surest means of emptying the stomach, and should be used as soon as possible. If the brain appear much oppressed, the countenance flushed, and the pulse full, *moderate* blood-letting will be serviceable, especially if artificial respiration be subsequently employed. When the water brought up by the stomach-pump is clear and devoid of any smell of the poison, which will prove that all the hurtful material has been evacuated, *then*, and *not till then*, vinegar may be given to the patient, who should also be kept moving about, and not suffered, if possible, to sink into a state of slumber. Coffee is a very useful beverage, and still more a drink made by boiling twelve ounces of vinegar, and pouring it immediately on three ounces of roasted and ground coffee, or by boiling the coffee in the vinegar, straining it, then adding half an ounce of sugar, and giving it in small quantities to the patient every quarter or half hour. This can be prepared while the stomach-pump is being used, and is one of the most efficacious means of counteracting the narcotic principle. Vinegar given while any of the poisonous substance is in the stomach only increases its deleterious property. [ANTIDOTES.] See Pereira's *Materia Medica* for the mode of action of the different narcotic substances, i., p. 66, and Christison *On Poisons*.

NARCOTI'NA, one of the peculiar and alkaline principles of opium which was discovered by Derosne about 1804; its true nature and alkaline properties were however first ascertained by Robiquet in 1817. Various processes have been proposed for obtaining narcotina; the easiest method is stated to be that of digesting opium in water, filtering the solution, evaporating it to the consistence of an extract, and digesting this in æther, which dissolves the narcotina and some other substances. The æther being distilled off, the residual matter, which has a brown colour and is acid, is to be dissolved in hot water or boiling alcohol; the solution, after decolorizing with animal charcoal, is to be treated with ammonia, which precipitates the narcotina, and if it be not white, it is to be dissolved in hydrochloric acid, again treated with animal charcoal, precipitated by ammonia, washed, and dried; thus obtained, it is in the state of light white flocks, but when dissolved in boiling alcohol or æther it is deposited from them, on cooling, in pearly acicular crystals.

The properties of narcotina are, that it is insoluble in cold and very sparingly soluble in hot water; æther and the fixed oils readily dissolve it; its taste is not bitter; it does not restore the blue colour of reddened litmus, but as it combines readily with dilute acids, and forms salts which are made to crystallize, though with difficulty, it is classed with the alkalis; the hydrochlorate crystallizes in radiating groups; the sulphate does not crystallize, and the acetate is decomposed by heat: these salts have a taste which is more strongly bitter than those of morphia.

Narcotina has been repeatedly analyzed; the results do not exactly agree, but its composition is not far removed from—

Hydrogen . . .	5·32	or 20 equivalents
Carbon . . .	65·27	or 40 equivalents
Oxygen . . .	25·63	or 12 equivalents
Azote	3·78	or 1 equivalent
	100·	

NARCOTINE. [Papaver.]

NARDI, JA'COPO, born at Florence in 1476, served first in the troops of the republic, and afterwards in a civil capacity. He was sent in 1527 as ambassador to Venice. He died at a very advanced age, after the fall of the republic. He wrote 'Storia della Città di Firenze dell' anno 1494 al 1531,' published at Lyon in France, 4to., 1582: another edition was published at Florence in 1584. Some passages which were expunged in both editions, but especially in that of Florence, on account of the political feelings of the author, are found in the MSS. in the libraries of Strozzi of Florence and Nani of Venice. Nardi was warmly attached to the republican constitution of his country, of which he witnessed and described the overthrow, whilst his contemporary Nerli, who composed a general history of Florence including the same period ('Commentarii dei Fatti Civili occorsi in Firenze dall' anno 1215 all' anno 1537,' fol., Augsburg, 1728), wrote in a manner favourable to the Medici, and accepted office under the grand-duke Cosmo I. The history of Nardi forms a sequel to that of Machiavelli, which ends with the death of Lorenzo the Magnificent in 1492, and the two together form a complete history of the Florentine republic from its rise till the overthrow of its independence.

Nardi wrote also 'Vita di Antonio Giacomini,' 4to., 1597. Giacomini was one of the most distinguished captains of the Florentine republic. He was also the author of an Italian translation of Livy, and a comedy, 'L'Amicizia,' one of the earliest comedies in Italian verse.

NARDUS. [Spikenard.]

NARES, JAMES, Mus. Doc., was born at Stanwell in Middlesex, in 1715, and received his musical education first as a chorister in the King's Chapel, under Bernard Gates, and afterwards under the celebrated Dr. Pepusch. At an early age he was chosen organist of the cathedral of York, and in 1756 was appointed organist and composer to George II., on the decease of Dr. Greene; and about the same time the degree of Doctor in Music was conferred on him by the University of Cambridge. In 1757 he succeeded Mr. Gates as master of the children of the Chapels-Royal, which office he held till 1780, when declining health induced him to resign it to his friend Dr. Ayrton, who had been his pupil. He died in 1783, 'regretted,' says his eldest son, the late Archdeacon Nares, 'not only by the family he left, but in a proportionate degree by all related to or connected with him.' Among these were, his younger brother, Sir George Nares, one of the judges of the Court of Common Pleas, and his nephew, the Rev. Edward Nares, D.D., author of the 'Life and Administration of Cecil, lord Burleigh;' also of Sermons and other works.

Dr. Nares published several musical works, the most important of which are: 'Twenty Anthems in Score, composed for the use of the Chapels-Royal,' and now constantly heard in every cathedral in England and Ireland; 'A Collection of Catches, Canons, and Glees,' dedicated to the Earl of Mornington, including the prize-glee, 'To all Lovers of Harmony,' and 'Fear no more the Heat of the Sun;' 'A Treatise on Singing,' with a set of English duets; and 'The Royal Pastoral, a Dramatic Ode.' After his death a second set of anthems, six in number, together with his popular Service, were, as he had directed, published by his son; and though these anthems have not obtained the same celebrity as those in the former set, they are not inferior in merit, and ought to be brought into notice by the influential persons in our choirs.

Of Dr. Nares it is most justly remarked in the *Harmonicon*, that 'his numerous productions for the church are rich in beautiful air as well as in harmony, not elaborate, but of the purest kind; and his judgment in setting our Liturgy has been equalled by few, exceeded by none; for his natural good sense and cultivated understanding led him not only to avoid the errors too apparent in the works of many ecclesiastical composers who preceded him, but also qualified him to become the guide of those who followed and had discernment and wisdom enough to profit by his examples.'

NARNI, a town of the Papal State, in the fine valley of the Nera, an affluent of the Tiber, and in the administrative province of Spoleto e Rieti, is situated on a hill which forms part of the mountains of Sabina, is a bishop's see, and has about 2500 inhabitants. (Calindri, *Saggio Statistico dello Stato Pontificio.*) It is an ill-built old-looking town; but it has several churches and convents, besides the cathedral, and in the neighbourhood are the remains of a very handsome bridge on the Nera, the antient Nar, said to have been built by Augustus. The antient Nequinum, a strong town of the Umbri, which stood on the present site of Narni, being taken by the Romans, 299 B.C., a Latin colony was sent there, which assumed the name of Narnia, from the neighbouring river. (Livy, x. 9, 10.) Narnia was one of the twelve Latin colonies which, after the battle of Cannæ, refused to give any further assistance to Rome. (Livy, xxix. 15.)

NARRAGANSET BAY. [Rhode Island.]

NARROWS, The. [New York.]

NARSES, the name of a eunuch who became one of the most successful generals of the emperor Justinian I., and rivalled Belisarius in his military triumphs. His origin and parentage are unknown. He was probably by birth an Asiatic, emasculated, and sold, according to the old barbarous custom of that part of the world, and employed in his youth in menial services in the imperial household of Constantinople. His natural abilities and insinuating manners attracted the attention of Justinian, who had certainly the tact of discerning merit in those about him. Justinian employed Narses about his person, and raised him successively to the office of 'cubicularius,' or 'groom of the bedchamber,' and afterwards to that of keeper of the emperor's privy purse. Narses seems to have known and practised the arts of a courtier, but at the same time he was also capable of better things. He was sent on several missions, and at last, in A.D. 538, he was appointed to the command of a body of troops which were sent to Italy to act under Belisarius. [Belisarius.] The two generals acted in concert at first, and obliged the Goths to raise the siege of Ariminum; but they soon quarrelled, and Narses, who was supported by a party at the court of Justinian, chose to act for himself: the consequence was, that Belisarius was cramped in his operations, and meanwhile the Goths and Burgundians took and ravaged Milan. (Procopius, *De Bello Gothico*, xi. 21.) In the year 539 Justinian recalled Narses, who resumed his places at the imperial palace. Several years after, Belisarius having been recalled from Italy, the state of that country fell again into utter confusion; the Goths under Totila overran the whole country; and Germanus, a nephew of the emperor, being sent with an army to prevent the total loss of Italy, fell ill in Dalmatia and died. In the year 552, Justinian determined to make a last effort: he appointed Narses commander-in-chief of the Italian expedition, and supplied him plentifully with money, with which he collected a number of auxiliaries, Heruli, Longobardi, Gepidæ, and others, whom he united with the army of Germanus, and assembled them all near Salona. Not having sufficient vessels to embark his troops, he marched along the shores of the Adriatic, through Dalmatia, Istria, and Venetia, and thus arrived at Ravenna, from whence, after some days' rest, he moved on across the Apennines, and met Totila, who was advancing from Rome, at a place called Tagina, or Tadinæ, where a desperate battle took place, in which the Goths were completely defeated and Totila was killed. Narses advanced to Rome, which he took, whilst the Goths, having retired to Pavia, elected for their king Teias, who moved with a fresh army to encounter Narses. The two armies met on the banks of the river Sarno, near Nocera in Campania: Teias was killed in the fight, and the remaining Goths entered into a convention with Narses, by which they laid down their arms and withdrew to North Italy, where they dispersed in various parts of the country. Not long after however part of them joined a host of Franks and Alemanni who had crossed the Alps, under two brothers, called Lother and Bucelin, and the whole made an irruption into South Italy whilst Narses was besieging Lucca. The barbarian host advanced as far as Calabria, plundering and committing all sorts of excesses; but on returning northwards loaded with booty, they were met by Narses on the banks of the Volturno, and totally destroyed. The Gothic kingdom in Italy was now at an end, and the whole country acknowledged the authority of Justinian, who appointed Narses exarch of Italy, A.D. 553. Narses fixed his residence at Ravenna, as the most convenient place for a prompt communication with Constantinople. During his fifteen years' administration, he did much to re-establish order throughout Italy; he checked the licentiousness of his troops, dismissed the most turbulent of his barbarian auxiliaries, appointed governors, with the title of dukes, to the different provinces, and repressed faction and religious schism. He has been accused of only one vice, avarice: he is charged with accumulating a large treasure during his residence in Italy. After the death of Justinian, A.D. 565, the enemies of Narses obtained his recal from the emperor Justinus II., who sent Longinus to supersede him as exarch of Ravenna. It is said that Sophia, the wife of Justinus, added to the letters of recall an insulting message to the purport that he ought to leave to men the command over other men, and return to the use of the distaff among the women of the palace; to which Narses is said to have retorted, that he would spin her a thread that she should not be able to unravel. He is accused of having entered into a correspondence with Alboin, king of the Longobards, inviting him to invade Italy. This however rests upon dubious report. Narses, after giving up his command, withdrew to Naples, but soon after, upon the urgent application of the Roman people, forwarded through their bishop, he removed to Rome, where he died at a very advanced age, A.D. 568. About the same time Alboin was crossing the Noric Alps to invade Italy. (Agathias; Paulus Diaconus; Gibbon.)

NARUSZEWICZ, ADAM STANISLAUS, a voluminous Polish writer, was born October 20th, 1733, and at the age of fifteen entered a seminary of the Jesuits, where his abilities and application so greatly recommended him to his instructors, that he was sent to the college of Jesuits at Lyon, and on quitting it was enabled, by the liberality of his patron, prince Czartorysky, to travel through Italy, France, and Germany. Having employed the opportunity thus afforded him in acquiring information and perfecting himself in various branches of study, on his return to his native country he was appointed professor of poetry at the university of Wilna. Within a short time afterwards he was promoted to a similar professorship in the College of Nobles at Warsaw. The reputation his talents now procured for him also the notice of the king Stanislaus Augustus, who, besides other repeated marks of his favour, conferred upon him the bishopric of Smolensk after the suppression of the order of the Jesuits, and in 1790 that of Lukow. He died July 6th, 1796, in his 63rd year.

Besides his poems, which consist of fables, satires, pastorals, and several books of odes and other lyrical pieces, including several imitated from Anacreon and Horace, he wrote a 'History of Poland,' in six volumes, a translation of Tacitus, a description of Taurida or history of the Crim Tartars, a translation of all the odes of Horace, and Stanislaus Augustus' Journey to Kaniow in 1786, which contains an account of the origin of the Kosacks.

NARVA, the capital town of the circle of the same name in the government of St. Petersburg, is situated in 59° 24′ N. lat. and 28° 10′ E. long., on the west bank of the river Narowa, which comes from Lake Peipus and falls into the Gulf of Finland about ten miles below the town. It is surrounded with a rampart, and in the suburb of Ivangorod, on the other side of the river, there are the remains of a large fortress built by the czar Ivan Wassiliewitsch Narva is divided into the old and new town, which are separated by a rampart. The houses are well built of brick, and stuccoed white. There are 7 stone and 2 wooden Greek churches, and 2 stone Lutheran churches, an Exchange, and a good German school. The inhabitants, about 4500 in number, are for the most part of German descent, and Narva looks more like a German than a Russian town. It was a member of the Hanseatic League, and has still a very considerable export trade in balks, planks, flax, hemp, corn, and furs. The fishery in the Baltic is very productive, and the lampreys and smoked salmon of Narva are celebrated. About 100 merchantmen, chiefly in ballast (the imports being much less than the exports), arrive every year, and can come up to the town; but the barks which come down the Narowa from Lake Peipus are unloaded about a mile from the town, at the island of Kragholm, where there is a fall in the river about twelve feet perpendicular.

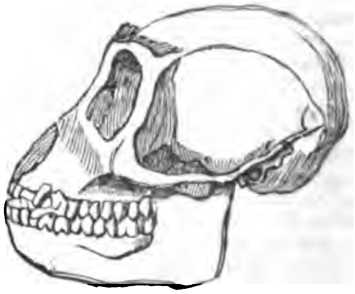
Narva was built in the year 1213 by King Waldemar, taken in 1553 by the grand-duke Ivan Wassiliewitsch, and re-taken by the Swedes in 1581. In 1590 and 1658 it was besieged by the Russians. On the 30th November, 1700, King Charles XII., with 8200 Swedes, totally defeated 80,000 Russians under Peter the Great and the duke of Croy, and stormed their intrenched camp near the town. In 1704 however Peter the Great took it by storm, and it has ever since remained in the possession of Russia.

NARWHAL. [WHALES.]

NASA'LIS, M. Geoffroy's name for a remarkable genus of Monkeys established on the 'Guenon à long nez' of Buffon, the *Proboscis Monkey* of Shaw, *Simia Nasica* of Schreber, *Nasalis larvatus* of Geoffroy, *The Kahau.*

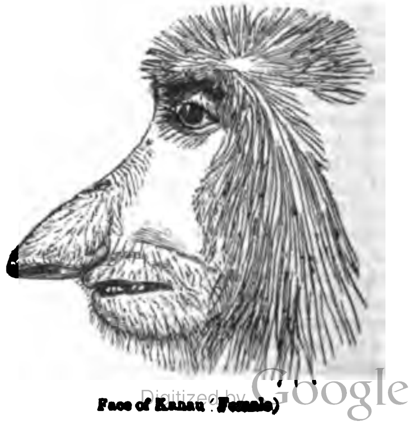
ORGANIZATION AND HISTORY.

The enormous development of the nose in the *Kahau* is not dependent on bone. The nasal bones are no more elevated than they are in the rest of the *Simiadæ*, as will be perceived from the following cut of the skull of a *Proboscis Monkey* in the museum of the Zoological Society of London.



Skull of Kahau.

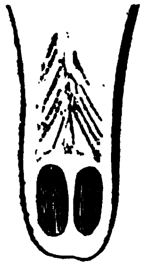
The figure given below was reduced from the drawing of a female, when newly taken from the cask of spirit in which the body was preserved: the specimen came from Borneo, and is now to be seen, but with the nose deteriorated by drying, in the museum of that Society. It is



Face of Kahau (Female)

said that the animal has the power of dilating this organ to an enormous size by inflation.

Audebert gives the following view of the nose, as seen from beneath.



Nose of Kahau, seen from beneath.

In July, 1837, Mr. Martin laid before the Zoological Society the following observations on this Monkey:—

'The genus *Nasalis*, of which the "*Guenon à long nez*" of Buffon (*Suppl.*, vii.) or Proboscis Monkey of Shaw, is the type, was founded by Geoffroy St. Hilaire in his 'Tableau des Quadrumanes,' published in the 'Annales du Muséum d'Histoire Naturelle' for 1812. In this outline of the *Simiadæ* the genera *Semnopithecus* and *Cercopithecus* are blended together under the latter title; but from this group are excluded two Monkeys, the *Douc*, constituting the type of the genus *Pygathrix* (*Lasiopyga*, Ill.) and the "*Guenon à long nez*." With respect to the genus *Pygathrix* or *Lasiopyga*, founded upon the alleged want of callosities, most naturalists, I believe (aware of the error committed both by Geoffroy and Illiger, in describing from an imperfect skin), have regarded it as merging into the genus *Semnopithecus*, at least provisionally, until the internal anatomy of its assumed representative be known.

'The characters of the genus *Nasalis*, formed for the reception of the "*Guenon à long nez*" (*Simia Nasica*, Schreb.; *Cercopithecus larvatus*, Wurmb), are laid down as follows:—

'"*Muzzle* short, forehead projecting, but little elevated; *facial angle* 50°; *nose* prominent, and extremely elongated; *ears* small and round; *body* stout; *cheek-pouches; anterior hands*, with four long fingers and a short thumb, ending where the index-finger begins; *posterior hands* very large, with fingers stout, especially the thumb; *callosities* large; *tail* longer than the body."

'At a subsequent period, however, in his 'Cours de l'Histoire Naturelle,' published in 1828, Geoffroy, adopting the genus *Semnopithecus*, established by Fred. Cuvier, places the "*Guenon à long nez*" within its limits, doubtfully, it is true, and with the acknowledgment that his genus *Nasalis* has not been generally adopted, but at the same time with a bias in its favour; for, observing that the manners of these Monkeys are those of the *Semnopitheci*, he adds, "Cependant, il ne nous parait encore démontré que le singe nasique soit une véritable semnopitheque, et il est fort possible que lorsque l'espèce sera moins imparfaitement connue, on soit obligé de rétablir le genre *Nasalis*, dans lequel on l'isolait autrefois, mais qui n'est pas été admis par la plupart des auteurs modernes."

'Setting aside the singular conformation of the nose, so remarkable in the *Simia Nasalis*, its external characters are not different from those of the *Semnopitheci* in general; and it is to be observed that in a second species, lately added by Mr. Vigors and Dr. Horsfield, under the title of *Nasalis recurvus*, the proportions of this part of the face are much diminished, and its form also modified. This species (which, though doubted by some as being distinct, is, we believe, truly so) takes an intermediate station between the *Simia Nasalis* and the ordinary *Semnopitheci* with flat noses, thereby showing that the transition in this particular character is not abrupt; even were it so, an isolated point of this nature does not form a philosophical basis upon which to ground a generic distinction.

'So far I have alluded to external characters only; it remains for me to give some account of the anatomical characters of this singular Monkey, of which, as far as I can learn, modern naturalists do not appear to be aware.

'It would seem that M. Otto,* who described the sacculated form of the stomach in one of the Monkeys of the genus *Semnopithecus*, is not the first observer of this peculiarity, for I find that Wurmb, in the 'Memoirs of the Society of Batavia,' notices this point in the anatomy of an individual of the *Simia Nasalis*. After giving some interesting details respecting the habits and manners of the species, he proceeds as follows:—"The brain resembles that of man; the lungs are of a snow-white colour; the heart is covered with fat, and this is the only part in which fat is found. The *stomach is extraordinarily large, and of an irregular form;* and *there is beneath the skin a sac which extends from the lower jaw to the clavicles.*" Audebert (with whose work, 'Histoire des Singes,' Geoffroy St. Hilaire was well acquainted) refers to this account of Wurmb; yet Geoffroy does not, as far as I can find, advert to these points, unless indeed his statement of the presence of *cheek-pouches* be founded on the observation of a sac extending from the lower jaw to the clavicles; and if so, he has made a singular mistake, for the sac in question is *laryngeal*, and the words as they stand cannot be supposed to mean anything else. I know of no Monkey whose cheek-pouches extend beneath the skin to the clavicles; but the laryngeal sacs in the *Orang* and *Gibbons*, and also in the *Semnopitheci* themselves, are remarkable for development. It is evident however, from the silence of M. Geoffroy St. Hilaire respecting the laryngeal *sacculus* in the Proboscis Monkey, that he was not aware of the real character of the structure to which Wurmb had alluded. With respect to the structure of the stomach, neither Wurmb nor M. Otto drew any general inferences from it; they described it as it presented itself in single species, and regarded it in an isolated point of view; it is, if I mistake not, to Mr. Owen that we owe its reception as an anatomical character extant throughout the *Semnopitheci*. (See his paper on the subject, in the *Proceedings for* 1833, and in the *Transactions of the Zoological Society*.)

'This is perhaps scarcely the place in which to introduce any speculations, but I cannot help observing that the same structure may be expected in the genus *Colobus*, which in form is a mere repetition of the genus *Semnopithecus*, except that the thumb of the fore-hands, which in the latter begins to assume a rudimentary character, is in the former reduced to its lowest stage of development. In both genera the teeth precisely agree, and present early that worn surface which is the consequence of a continued grinding *rodent-like* action upon the leaves and herbaceous matter which constitute the chief diet of the animals.

'The statement of Wurmb respecting the stomach and laryngeal apparatus of the Proboscis Monkey I have lately been enabled to confirm.

'Among the specimens in store brought within the last few months from the Gardens to the Museum occurred an example of the Proboscis Monkey, in brine, but in a state of decomposition which induced me to lose no time in making such an examination as its condition would admit, being indeed extremely anxious to ascertain the relationship of this curious Monkey to the other groups of Indian *Simiadæ*, groups to which I have been lately directing my attention.

'The specimen in question was a female, measuring, from the *vertex* to the *ischiatic callosities*, one foot nine inches.

'The body was meagre and slender, and the limbs long and slim; the contour of the animal being very unlike that displayed in the mounted specimen in the Museum of the Society, which gives the idea of great robustness.

'The abdominal cavity had at some former period been opened and the liver removed, in doing which the stomach had been cut, but not so much as to spoil it entirely. In every essential point this *viscus* is the same as in all the *Semnopitheci* hitherto examined: it consists of a large cardiac pouch, with a strong muscular band running as it were around it so as to divide it into two compartments, an upper and lower, slightly corrugated into *sacculi;* the *cardiac apex* of the upper pouch projects as a distinct *sacculus* of an oval form, and is not bifid. From this *upper pouch* runs a long and gradually narrowing *pyloric portion*, corrugated into *sacculi* by means of three muscular bands, of which one is continued from the band dividing the cardiac pouch into two compartments. The elongated *pyloric portion* sweeps around the *lower cardiac pouch*.

'The *œsophagus* enters the first compartment about four inches from its terminal apex, giving off a radiation of longitudinal muscular fibres over the central portion of the first compartment. The second or lower compartment is the largest and deepest, and is embraced by longitudinal muscular fibres from the œsophagus to the division-band, but, unlike the same compartment in the stomach of the *Semnopithecus Entellus*, it is very slightly sacculated; indeed it can scarcely be said to be so at all. The admeasurements are as follow:—

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* See his paper in the 'Nova Acta Academiæ Cæsareæ,' vol. xii.

	feet.	inches.
'1st compartment, round the greater curve .	1	6
2nd compartment, measured in the same manner	1	8½
From the entrance of the œsophagus, round the 2nd compartment, to the division-band	1	1
The same measurement, round the 1st compartment	0	8½
Length of *pyloric portion* . . .	2	1
Circumference at base . . .	0	9½
Circumference just above pyloric orifice .	0	5½
Length of small intestines . . .	18	0
Length of large intestines . . .	6	2

'The average diameter of the small intestines, lying flat, was ¾ of an inch; the ileum however was rather more, but not quite an inch.

'The *cœcum* is of a pyramidal figure, 5 inches in length, pointed, and somewhat sacculated by three slight muscular bands. Circumference at the base, 5½ inches.

'The large intestines are puckered into *sacculi* by two longitudinal bands; they commence large, becoming gradually smaller, the bands in the mean time gradually disappearing. Advancing towards the *rectum* the intestine again enlarges; and here, to the extent of 2½ feet from the anus, all trace of bands is lost.

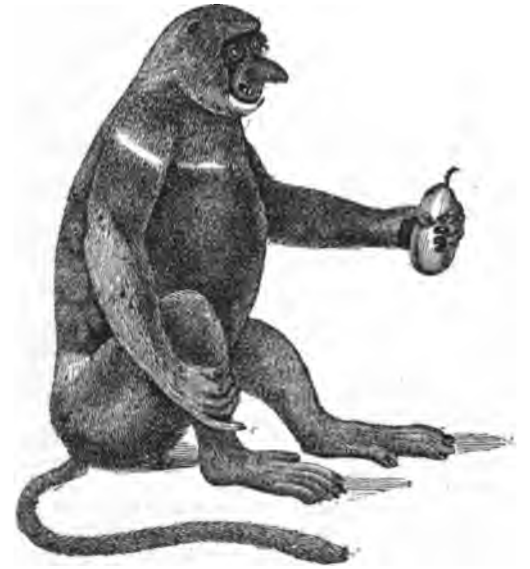
'The circumference of the large intestines, at their commencement, is 3½ inches.

'The lungs consisted of two lobes on each side, the fissure dividing the lobes on the right side being the most complete.

'The laryngeal sac was of enormous size, and single. It extended over the whole of the throat, and advanced below the clavicles, communicating by means of a single but large opening with the larynx. This opening is on the left side, between the *larynx* and the *os hyoides*, and is capable of being closed by means of a muscle arising from the anterior apex of the *os hyoides*, and running down the central aspect of the *trachea* to the *sternum*. The contraction of this muscle draws the *os hyoides* down, so as to press upon the edge of the thyroid cartilage.

'There were no cheek-pouches, nor any traces of them.

'The teeth were much worn, but the fifth tubercle of the last molar tooth of the lower jaw was very distinct.'—(*Zool. Proc.*, 1837.)



The Kahau. (Audebert.)

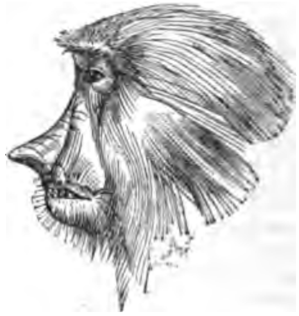
Description.—Reddish brown, except the light-coloured tail, lower part of the back, and some light-coloured markings on the arms. Height about three feet, when nearly erect. *Female* rather less, and destitute of the light markings on the back, &c. Nose and face darkish brown.

Geographical Distribution, Habits, &c.—This species is a native of Borneo. Their habits are gregarious, and they are said to collect in great troops upon the trees bordering the rivers at sunrise, darting from tree to tree with great activity, sometimes springing a distance of fifteen feet. Their name, *Kahau*, is supposed to be given to them from their continued cries, which are considered to resemble that word in their expression. Their disposition is said to be bad. M. Lesson notices the 'on dit' that the species is also a native of Cochin China; but he gives no authority for this locality.

Mr. Vigors and Dr. Horsfield, in their paper 'On the Mammalia in the Zoological Museum,' after noticing the species above described, mention another form, of which two specimens, almost equally distinguished by the extension of the nose, but having that member turned up instead of being recumbent, brought also from Borneo, are in the same collection. This is the form alluded to above by Mr. Martin, and is thus characterised by Mr. Vigors and Dr. Horsfield, under the name of *Nasalis recurvus*. It is to be remarked that they were also preserved in spirit, and consequently were not subject to the same contraction of the soft parts of the nose as might have occurred in dried skins:—

Description.—Head, neck, shoulders, and thighs rufous above; abdomen paler; middle of the back reddish grey; inside of arms and thighs, lower part of the back, and tail, grey; tail below, white. Size about one-third less than the Kahau.

Mr. Vigors and Dr. Horsfield observe that the general colour and markings of this animal correspond with those of the Kahau. The skin of the face however, they remark, is reddish in *N. recurvus*, where in the other species it is black. In *N. recurvus*, they add, the beard is very prominent; but in the Kahau the hairs on the chin scarcely assume the appearance of a beard.



Profile of N. recurvus.

Mr. Vigors and Dr. Horsfield state that it has been suggested that this may be the young of the Kahau; but they state that they cannot allow themselves to come to the conclusion that they are the same, with so great a disproportion of the facial angles, in the absence of some stronger grounds than mere conjecture. Its teeth, they remark, showed no signs of being otherwise than adult.

Mr. Swainson appears to agree with Mr. Vigors and Dr. Horsfield and Mr. Martin, in considering *N. recurvus* distinct; for he gives the number of species of *Nasalis* as two. (*Natural Hist. and Classification of Quadrupeds.*)

NASAMO'NES (Νασαμῶνες), a barbarous people in Libya, who dwelt on the coasts of the Greater Syrtis. According to Strabo they were bounded on the west by the Psylli, and extended westward as far as the Philænian Altars, which were at the southern extremity of the Greater Syrtis (xvii., p. 836, 838, Casaub.). Herodotus places them farther to the west, and states that they occupied the country of the Psylli (iv. 173). On the east they extended beyond the Syrtis, and were bounded by the Auschisæ, a small tribe, who dwelt to the west of the Cyrenaica (Herod., ii. 32; iv. 172). Inland they had dominion as far as the oasis of Augila, in the great desert of Barca, which is 180 miles south-east of Barca, and is at the present day one of the resting-places of the caravans which trade between Cairo and Fezzan. [AUGILA.] The Nasamones were accustomed to leave their cattle on the coast in the summer season, and go to Augila to gather dates (Herod., iv. 172).

Pliny (v. 5) also places the Nasamones on the Syrtis, and says that they were antiently called Mesammones by the Greeks, because they were situated between two quicksands (μέσος, ἄμμος); meaning perhaps the two Syrtes, which however is not the case.

The Nasamones are described by Herodotus (iv. 172, 190) as a numerous nomade people, who had a community of wives, were accustomed to swear by the tombs of the bravest and justest of their ancestors, and pledged their faith by drinking out of the hands of one another, or by licking dust out of one another's hands, if they had no water.

They are described by Lucan (*Phars.*, ix. 404) and Q. Curtius (iv. 7) as a barbarous tribe, who lived by the plunder of the vessels shipwrecked on their coast. Bruce, who was shipwrecked on this coast, found that the present inhabitants followed the same practice. (Rennell's *Geography of Herod.*, ii., p. 270.)

The Nasamones were driven into the interior of the country by the Romans in the time of Domitian. (Dionys. Perieg., ed Hudson, iv. 208; Eusebii *Chron.*, Ol. ccxvi.; Joseph., *Bell. Jud.*, ii. 16, § 4.) Ptolemy places them as far inland as Augila.

Herodotus gives (ii. 32) an interesting account of an exploring expedition, undertaken by five young men of this country, who crossed the great Libyan desert, and, after traversing extensive marshes, came to a large river flowing from west to east, with crocodiles in it, which many commentators have supposed to be the Niger. [NIGER.]

NASCENT STATE, a term proposed by Dr. Priestley to express the moment at which a gaseous body is liberated from previous combination and before it has assumed the gaseous form. The nascent state has a powerful effect in occasioning chemical combination, which could not occur without it. If, for example, azotic and hydrogen gases be mixed in any proportions whatever, and be subjected either to heat or electricity, which are so efficacious in causing many other gases to combine, no union takes place between them, and consequently no ammonia is formed. If however we decompose nitric acid and water by means of tin, the azote of one and the hydrogen of the other come into contact in their *nascent state*, and before they have even assumed the form of gases, and they combine to form ammonia. Other examples of similar action might be adduced, but no one more strikingly exemplifies the meaning of the term and the efficacy of the action which it is intended to describe.

NASEBY. [CHARLES I.]

NASH, THOMAS, was born in the year 1558, at Lowestofft, in Suffolk, and closed a calamitous life of authorship in his forty-third year. Dr. Beloe has given a list of his works, and Mr. D'Israeli an account of his privations and miseries. As a wit and a satirist, he seems to have been superior to all his contemporaries; but as a dramatic poet, much below most of them. He has left only one dramatic performance entirely of his own composition, 'Summer's Last Will and Testament,' which is not to be regarded so much in the light of a play as of a spectacle. It was exhibited before Queen Elizabeth at Nonsuch in the autumn of the year 1592, but not printed till eight years afterwards. Nash was concerned with Marlow in writing 'Dido, Queen of Carthage,' 1594, which was also acted before the queen by the children of her chapel.

He had a vigorous understanding, well stored with learning, and was capable of giving powerful descriptions of things and striking characters of persons, as will be found by his 'Supplication of Pierce Penniless to the Devil,' 1592: this latter work was followed up, though with less effect, by his 'Christ's Tears over Jerusalem,' 1593. 'Summer's Last Will and Testament' has been reprinted in the last edition of Dodsley's 'Old Plays.' It has no pretention to diversity of character in the persons, nor to interest in the plot, the only part that approaches to anything like individuality being that of Will Summers (or Sommers), the jester of Henry VIII.: the piece depends upon a sort of pun between the name of the jester and the division of the year which corresponds with that name.

(Collier's *Annals of the Stage.*)

NASH, JOHN, was born in 1752, and is said to have been of Welsh extraction, but few particulars are known of his early life, or when he first began to apply himself to architecture as a profession, previously to which he followed portrait, or rather miniature painting. Perhaps it was in an evil hour for architecture, that he devoted himself to it as practitioner; for though he thereby acquired a popular reputation for himself, as the author or promoter of the very extensive improvements in the metropolis, arising out of the formation of Regent Street and the Regent's Park, the taste there displayed most certainly has not contributed to raise our national character in regard to architecture, but has rather tended to bring into vogue a sketchy, showy, and meretricious style, wherein, though richness is affected, poverty and meanness are the prevailing qualities. Notwithstanding all their pretension and finery, the terraces in the Regent's Park have more the look of barracks than of palaces;—are mere stretched-out ranges of common-place houses, garnished with columns and pilasters, insipid enough in themselves, and rendering the poverty of all the rest absolutely offensive. It has been said that for the bad taste of many of the designs both in Regent Street and the Park, he is not answerable, they being the productions of the different architects, or rather builders, who erected them; yet besides that such excuse reduces Nash to little more than the surveyor employed on that occasion, it is no excuse whatever for the paltry taste of his own designs, which, so far from being decidedly superior to all the rest, exhibit some of the very worst specimens among them. Neither is he at all entitled to the originality claimed for him as having set a new fashion in street architecture, by combining several houses into one façade, since the same thing had been done about a century before by Wood of Bath. Whatever allowance however may be made for works of that class, we may fairly take Buckingham Palace as proof of his talent; and that costly structure is a decided and most deplorable architectural failure; hardly at all superior in style and quality to the average of the designs above referred to. Here and there are some bits of prettiness, but nowhere does it manifest the slightest approach to grandeur or to real architectural taste; neither is there any redeeming point in the general conception. In the Pavilion at Brighton he succeeded better, although it is but a poor and sketchy imitation of the style attempted; he seems never to have given any study to detail, but to have contented himself with the mere generalities of form. The United Service Club-house, the Haymarket Theatre, and the Terraces in St. James's Park, and indeed almost all his works, sufficiently attest this, nor is the variety displayed in them more than a very commonplace sort of fertility. The entrance to the Queen's Mews, another of his works, is remarkable only for its barbarous ugliness.

Mr. Nash died at his villa near East Cowes in the Isle of Wight, May 13, 1835, in his 83rd year, and is said to have left very little property, notwithstanding the vast sums of money he had derived from his profession.

NASIR-ED-DIN, MOHAMMED BEN HUSSEIN AL THUSSI, a Persian and an astronomer, who died A.D. 1276, aged about 70. Having met with some slight from Al Mustassem, the kalif, he left his country and went into Tartary. Here he obtained the friendship of Hulaku (commonly written Holagu), surnamed Ilkhan, the brother of the reigning prince. It is said that Hulaku, being on the point of leading an army against Constantinople, was deterred by Nasir-ed-din, and induced to prefer an invasion of Persia. D'Herbelot treats this as a fiction, so far as the astronomer is concerned; but whether this be so or not, Hulaku overran Persia, put Mustassem to death, and fixed his seat of government at Maragha, in Azerbijan, where he collected men of science, built an observatory, and placed Nasir-ed-din at the head of both. The instruments there used are described by Delambre, from an Arabic manuscript, in the 'Hist. de l'Astron. du Moyen Age,' page 199, &c. The tables made at this observatory are called the Ilchanic Tables, from the name of their author's patron. They enjoyed great reputation in the East, and are known in Europe from the 'Synopsis Tabul. Astron. Persicarum' of George Chrysococca, printed by Bouillaud in 1645, and the Commentary of a Persian, whose Latinised name is Shah Cholgius, printed by Greaves, in 1642. The Ilchanic Tables, according to Delambre, differ from those of Ptolemy only in the correction of some of the mean motions.

Nasir-ed-din also wrote a work on geography, which was printed by Greaves in 1652, and which we believe was long the authority for many Asiatic longitudes and latitudes; also a work on ethics, and several other writings.

NASSA. [ENTOMOSTOMATA, vol. ix., p. 455.]

NASSAU or POGGY ISLANDS, THE, form a part of a chain of islands which lie off the whole length of the west coast of Sumatra, at a distance of 60 or 80 miles. There are two islands which bear this name: they lie between 2° 30′ and 3° 16′ S. lat., and are separated from each other by a strait called Si-kakap, which is about two miles long and a quarter of a mile across. This strait forms an excellent harbour for ships of any size. It is surrounded by mountains, so that the water is literally as smooth as in a pond; and there are twenty-five fathoms of water close in-shore, and forty-five in the mid-channel. There are also some high rocks in the strait.

The surface of the islands is rough and irregular, consisting of high hills or mountains of sudden and steep ascents. The mountains are covered to their summits with trees, many of which supply excellent timber. The sago-tree grows in abundance, and affords the chief article of food to the inhabitants, who cultivate no rice. The cocoa-nut tree and the bamboo also abound. The fruits common in the islands of the Indian archipelago, such as mangosteens, plantains, &c., are numerous. The woods in their natural condition are impervious to man, and harbour various wild animals, as deer, hogs, and several kinds of monkeys. Fowl and pigs are raised, and fish are plentiful.

The inhabitants of these islands are few in number; they are divided into small tribes, each tribe occupying a little river, and living in one village. On the Northern Poggy there are seven villages, and on the southern five. The population amounted in 1792 to about 1400 individuals. In colour and stature they resemble the Malays, but they speak a language quite different from those used on the coast of Sumatra. There is some resemblance between them and the inhabitants of the islands of the Pacific in their practice of tattooing their body. They are still strangers to the use of coin of any kind. A sort of iron hatchet serves as a standard for the value of various commodities among them. They neither export nor import any article. Some Malays have settled among them for the purpose of building large boats, timber for which is found close at hand. (Crisp, in *Asiatic Researches*, vol. vi.)

NASSAU. [BAHAMAS.]

NASSAU, THE DUCHY OF, derives its name from the mountain castle of Nassau, the original seat of the Nassau family, of which only the ruins now remain, near the small town of Nassau. The extent of this duchy and its territories have undergone numberless changes in consequence of partitions, re-unions, cessions, and acquisitions. It is at present composed of 23 different territories, including all those which formerly belonged to the several branches of the family. It is comprised between 49° 55′ and 50° 50′ N. lat. and 7° 31′ 50″ and 8° 45′ E. long., and is bounded by the Prussian Rhenish provinces and by the different states of Hesse. The area is variously stated, 2226 square miles being the highest and 1743 the lowest estimate. According to the best maps, it seems to be 1900 square miles. The duchy is divided into three provinces, Wiesbaden, Weilburg, and Dillenburg, and subdivided into 28 bailliwicks. There are no large towns, Wiesbaden having only 9000 and Biberich 3000 inhabitants. The country is generally mountainous or hilly, and there is no part that can be called plain. The mountains follow the Rhine and the Lahn in their whole course through the duchy, and form delightful valleys, which are among the most romantic parts of Germany; the most picturesque is the Rheingau from Biberich to Lorchhausen, celebrated for its fine wines. This beautiful valley is protected by the Taunus from the north wind, and bounded on the south by the Rhine. There are two principal chains of mountains; on the north the wild and wooded Westerwald, and on the south-east the Taunus or the Höhe, the most elevated summit of which is the Feldberg, 2605 feet, and the Altkönig, 2400 feet above the level of the sea. The climate is on the whole temperate and healthy; it is mildest in the parts about the Main; on the highest summits of the Taunus and the Westerwald, it is rather bleak and cold. Of the rivers the chief is the Rhine, which bounds the duchy on the south and west, and at Lahnstein receives the Lahn, which is navigable 14 leagues from its junction with the Rhine at Weilburg. The Main forms the boundary to the south-east. There are several smaller rivers and mountain streams, such as the Embs, Aar, Sieg, Wiedbach, Weilbach, and Niester. There are no canals and no lakes. On the other hand the country has numerous Spas and mineral springs, which are among the most celebrated in Germany: of the former we may mention Ems, Wiesbaden, Langenschwalbach, and Schlangenbad, which are annually frequented by above 10,000 visitors; and of the latter Nieder-Selters, Fachingen, and Geilenau, from which about three millions of bottles are annually exported, of which 2¼ millions are Selters water. The natural productions are various and valuable. Though the farmers are very industrious, the corn raised is in general not sufficient for the consumption of the country. The fertile bailliwick of Höchst is indeed a granary to the city of Frankfort, and considerable quantities of the fine wheat and rye grown on the banks of the Aar and the Lahn are exported by means of the latter river; the wheat is of such superior quality that it fetches in Holland 25 or 30 florins per last more than that of the other countries on the Rhine and Main. Peas and beans, linseed, potatoes, flax, hemp, and tobacco are cultivated. Fruit is raised in great perfection, and large quantities are exported. But the boast of Nassau is its wine, of which that produced about Hochheim is well known by the name of *hock;* there are likewise the wines of Markebrunn, Asmannshausen, and Johannisberg; the last is the property of Prince Metternich, which the emperor Francis conferred on him in 1816 as a fief for his eminent services to the cause of Germany, the emperor retaining the feudal rights, and receiving the tithe on the wine. The prince derives from the estate an annual revenue of about 4000*l.* sterling. The breeding of cattle (especially horned cattle) is a chief source of wealth: there are about 200,000 horned cattle, 70,000 swine, 180,000 sheep, 10,000 horses, and 10,000 goats. The minerals are silver, lead, iron, copper, marble, freestone, limestone, basalt, slate, fullers' earth, and potters', pipe, and porcelain clay. There are also some salt-springs. The forests, which abound in game, supply vast quantities of timber and firewood. The smelting and manufacturing of metals are carried on to a considerable extent; there are also paper-mills, tanneries, distilleries, tobacco, vinegar, and potash works, and some woollen, leather, and linen manufactures, but on a small scale. The trade is almost wholly limited to the exportation of the produce of the country. With respect to religion, the inhabitants, who at the beginning of 1838 amounted to 379,272, are pretty equally divided betweeen the Roman Catholic and the Protestant churches. In the year 1817 the Lutherans and Calvinists agreed to unite in one body under the denomination of Evangelical Christians. There are nearly 6000 Jews. There is a gymnasium, a military school, a seminary for teachers, a deaf and dumb institution, an agricultural school, and 658 district schools. There is no university, but the young men study at Göttingen, where there is a professor who lectures on the laws of Nassau.

The duke was formerly an absolute sovereign, but in 1817 a representative constitution was introduced, with two chambers, which have larger powers than those of some other German states. The military force amounts to 4000 men. The revenue is 1,810,000 florins: but there are debts to the amount of twelve millions of florins. The duchy has been composed of so many different territories, and the exchanges and partitions, have been so numerous, that a regular history of the country is out of the question. Otho, brother of king Conrad I., in the tenth century, is considered as the founder of the Nassau family, which after the death of Henry II. was divided into two branches, of which his sons, Wabram and Otho, were the heads. The dukes of Nassau are descended from the elder, and the house of Orange-Nassau (king of the Netherlands) from the younger branch.

Nassau together with Brunswick has the thirteenth vote in the diet of the German Confederation; in full council Nassau has two votes of its own. Its contingent to the army of the Confederation is 3028 men.

NASSAU, HOUSE OF, an antient and illustrious German family, which, having distinguished itself throughout Europe, during the sixteenth and seventeenth centuries, in the cause of civil and religious liberty, has in our own times attained the regal title with the sovereignty of the Netherlands. The counts of Nassau on the Rhine had, in the middle ages, acquired sufficient power at one period to dispute the pre-eminence with the House of Austria, and to give a sovereign (Adolphus of Nassau, elected emperor A.D. 1292) and five ecclesiastical electors to the German empire. Early in the sixteenth century the family of Nassau obtained, through marriage and bequest, the French principality of Orange in Provence, from whence their most celebrated title has been derived: but the possession of several large domains and hereditary dignities in the Netherlands had meanwhile numbered the counts of Nassau among the vassals whom the House of Austria gained by the marriage of Maximilian with Mary of Burgundy; and William I. of Nassau, prince of Orange, the true founder of the glories of his race, was the subject of the emperor Charles V. Besides William I., the most remarkable personages of his house were his son Maurice, the ablest general of his age, and his great-grandson William III., stadtholder of the United Provinces and king of England; the lives of each of these three individuals will claim a separate notice.

I. **William I. of Orange** was born in the year 1533, at Dillenburg in Nassau. His father having embraced the reformed doctrines, he was at first educated in those principles; but the emperor Charles V., who early interested himself in his fate, removed him to his court, and had him brought up in the Roman Catholic faith. The emperor, who is said to have foreseen and predicted the great statesman in the boy, placed him about his person, allowed him alone to be present when he gave audience to foreign ambassadors, and soon honoured him with a confidence far above his years. William merited his favour by a discretion which had already obtained for him his famous surname of 'The Silent;' and the emperor did not blush publicly to avow, that to so young a man he had often been indebted for suggestions which had escaped his own sagacity. In the last solemn act of his public life, when he abdicated his throne to his son Philip II., Charles leant on the shoulder of William of Orange; and to him also, still only in his twenty-third year, the retiring monarch committed the honourable mission of delivering over his imperial crown to his brother Ferdinand.

The esteem of Charles seems to have been sufficient of itself to excite the jealousy and distrust of his son; and, from the commencement of Philip's reign, William became to that gloomy and suspicious despot an object of hatred and fear, which he repaid with deep though dissembled indignation. The state of religion in the Netherlands enabled him to convert those provinces into a theatre of action for projects which have been variously attributed to his patriotism or revenge, but which perhaps may with more probability be ascribed to the mixed motives that usually influence human conduct. While his benefactor Charles was on the throne, William had adhered to the Imperial creed; but after the abdication of that monarch we find him embracing Calvinism with the same facility with which he had in earlier years deserted the Lutheran for the Roman Catholic faith. This last transition was yet undecided or unknown when he was resident at the court of France as a hostage for the peace of Cateau-Cambresis; and the French king, Henry II., believing him to be as deep in the confidence of Philip II, as he had been in that of Charles V., incautiously spoke to him of the secret treaty which the crowns of France and Spain had recently concluded for the extirpation of the Protestants in the dominions of both.

This disclosure had a double consequence; for William hastened to communicate it to the leaders of the Protestant party in Brussels, and Philip II. discovered that he had given the information. The existence of this treaty and its detection served to increase the antipathy between William and his sovereign; but the dissimulation which belonged to their characters in common long prevented any open rupture, and for several years, while the Netherlands remained under the feeble administration of Margaret of Parma, the Prince of Orange, as a member of the Flemish council of state, and as stadtholder of Holland, Zealand, and Utrecht, covertly but indefatigably employed himself in undermining the tyrannical designs of Philip. The tortuous and often treacherous policy pursued by William during all this period can only be approved by that class of politicians in whose estimation the means are justified by the end. At length the approach of the energetic and sanguinary duke of Alva, to whom Philip had transferred the government of the Netherlands from the hands of Margaret of Parma, warned William that it was time to throw off the mask; and he avoided the tragical fate of his friends, the counts Egmont and Hoorne, by retiring from the Low Countries to his paternal domains of Nassau.

In the following year, 1568, the detestable tyranny and inhuman cruelties of Alva against the Protestants in the Netherlands, his own wrongs, and the appalling sufferings of a people whom he loved, roused William from his retreat, and thenceforward he stood forth the fearless and zealous champion of the great cause, which he is supposed to have embraced less from religious than from political motives. His efforts in arms were for the most part unsuccessful; for the raw and heterogeneous levies which he was enabled to make among the German and French Protestants for the succour of the unwarlike people of the Netherlands were no match for the veteran Spanish and Italian bands which Alva had led into the Low Countries. But every disadvantage under which William contended in the field with Alva and his skilful successors, Don John of Austria and Alessandro Farnese of Parma, was more than counterbalanced by his consummate abilities as a statesman, which enabled him finally to triumph, not only over his Spanish enemies, but over every rival in the councils of the revolted provinces. The archduke Mathias of Austria and the duke of Anjou, both of whom had been invited by the party opposed to William to assume the government of the insurgent states, found their authority less durable than his influence; and it was by his suggestions and under his auspices that the seven Protestant provinces of Holland, Zealand, Utrecht, Friesland, Groningen, Overyssel, and Guelderland, concluded, in 1576, the famous Union of Utrecht, which formed the lasting basis of the Dutch republic. [NETHERLANDS.]

Philip II. no sooner heard of this decisive measure than he showed his sense of its importance and his dread of its author by setting a price upon his head. So atrocious a temptation, combined with fanatical zeal, soon produced two attempts upon the life of William, from the first of which he escaped with a wound. The second was more successful, and he fell at Delft, in the year 1584, by a pistol-shot from the hand of one Balthazar Gerard, a Burgundian, who had been instigated or encouraged to the deed by Roman Catholic priests. William was four times married, and left, besides daughters, three sons, of whom Philip William, the eldest, having been seized in his youth by Alva, sent to Spain, and educated in that country in the Roman Catholic faith, was ultimately restored to the principality of Orange, and the two others, Maurice and Frederic Henry, successively attained the dignity of stadtholder of the United Provinces.

II. **Maurice of Nassau**, the second surviving son of William I., was born in 1567, and named after his maternal grandfather, the celebrated elector Maurice of Saxony, whose military genius he inherited. Although only seventeen years of age when his father was assassinated, the states of Holland and Zealand showed their gratitude to the memory of their deliverer by immediately electing young Maurice their governor or stadtholder; and though the count of Hohenloe was at first appointed his lieutenant to aid his inexperience, he soon proved himself capable of the unassisted conduct of military affairs. For a time indeed his further rise was impeded by his extreme youth, and by the desire of the States to gratify Queen Elizabeth of England through the elevation of her unworthy favourite, the earl of Leicester, to the supreme command of their forces. The proceedings of that nobleman however soon gave them just grounds of suspicion and disgust, and in 1587 they solemnly elected Maurice to fill, in his absence, the office of captain-general of the whole Seven United Provinces, a dignity which accordingly devolved altogether upon him, when the misconduct of Leicester had at length compelled the queen of England to relieve the Netherlands of his presence. At this epoch a great part of the territory of the Seven United Provinces was still in the hands of the Spaniards; but Maurice began vigorously though gradually to make head against them. In 1591 he displayed his skill and activity by the capture of Zutphen, Deventer, Nimeguen, and other important places; and his successes had now infused such confidence into the States and people, that he was received at the Hague with transports of public joy. In 1593 he took Gertruydenberg, after a memorable siege, and Groningen in the following campaign. The progress of the republican arms was marked during some years principally by the reduction of those and other fortified places; but in 1597 Maurice, with the aid of the English auxiliaries under Sir Francis Vere, completely defeated the Spaniards in his first ranged battle at Turnhout in Brabant; and three years later, in 1600, he obtained at Nieuport, with the same confederates, a second and more brilliant victory over the archduke Albert of Austria.

Thenceforth, until the recognition by Spain of the independence of the Seven United Provinces in the truce for twelve years, which was concluded in 1609, Maurice continued to extend the successes of the states, and to raise the glory of their arms. The undoubted talents of the great generals to whom he was opposed, and over whom he gained many advantages, signally enhanced his own reputation: for, after having baffled in his youth the enterprises of the renowned duke of Parma, Alessandro Farnese he found, in his later career, another worthy opponent, in the equally famous Italian, Spinola, who had succeeded to the command of the Spanish forces. Under such leaders, the operations of the hostile armies in the Netherlands riveted the attention of the world; and the camp of Maurice, as well as that of Parma and Spinola, being thronged with volunteers of distinction from every quarter of Europe, became the great school of military instruction.

The cessation of hostilities exhibited the qualities of Maurice in a less favourable light. He had laboured from selfish views to obstruct the conclusion of the truce with Spain, and was successfully opposed in these and other ambitious designs upon the liberties of the republic, by the pensionary Barneveldt, a man of real patriotism, eminent ability, and incorruptible integrity. But the religious disputes, which arose in the republic at this juncture between the Calvinists and Arminians, enabled Maurice to revenge himself upon the pensionary. Barneveldt being attached to the Arminian opinions, Maurice placed himself at the head of the opposite faction, the Calvinists, or Gomarists, as they were called after Gomar, the professor of theology at Leyden, who had been the antagonist of Arminius. As the Gomarists composed the great mass of the people, that party at length prevailed; the Arminian preachers were banished; and, in 1619, at the age of seventy-two years, the virtuous and venerable Barneveldt, who had for nearly half a century served the republic as successfully in the cabinet as Maurice had done in the field, was, by the machinations, and to the eternal dishonour of that prince, brought to the scaffold after being convicted on various false charges, of which the principal was, that he had 'troubled the state and religion.' [BARNEVELDT.]

The stadtholder, who by the decease of his elder brother had succeeded, in 1618, to the principality of Orange, gained little by his persecution of Barneveldt. After the death of the pensionary, the people awoke to a sense of their injustice and ingratitude to that patriot; and his oppressor Maurice suddenly became as hateful and suspected in their eyes, as he had hitherto been popular. His designs of acquiring the sovereignty of the states were perceived and frustrated; and whenever he appeared in public, groans and execrations pursued him as the murderer of Barneveldt.

The resumption of hostilities with Spain, at the expiration of the truce in 1621, turned the tide of public indignation; and Maurice again appeared in arms to measure himself against his old antagonist Spinola. The fortune of the contest however between these two great commanders was now so nicely balanced, that it would be difficult to assign the palm of victory to either. In 1622 Maurice compelled the wily Genoese to raise the siege of Bergen-op-Zoom, after having expended on it the lives of ten thousand of his veteran troops: but three years later, Spinola succeeded in reducing Breda, notwithstanding all the efforts of Maurice, and so much to his mortification, that the circumstance is believed to have produced or hastened his death, which occurred on the 23rd of April, 1625, and in the fifty-eighth year of his age. He left no legitimate offspring, and was succeeded, both in the principality of Orange and stadtholdership of the United Provinces, by his half-brother, Frederic Henry.

The character of Maurice of Nassau was favourably distinguished only by military genius. As a statesman he was without the sagacity and prudence of his father; as a man, in his treatment of Barneveldt and his family, he showed himself devoid of honour and humanity; and the violence and grossness of his nature were redeemed by no virtue of private life. But, as a general, he must ever be numbered among the greatest masters of his art, and may, in fact, be regarded as the founder of the military science of modern Europe. He was at least the earliest restorer among the moderns of the true principles of warfare, which he had deeply studied in the enduring lessons of classical antiquity, and as carefully applied to the exigencies of his own times. He was the first to methodise the practice of sieges, encampments, and marches; and he introduced numberless reforms in the armament, training, and formation of troops. He taught a cavalry of inferior physical weight to engage in close encounter, and to overthrow the ponderous masses of the old gens d'armerie; he first accustomed the infantry to a systematic management of their arms; and to his institutions must be referred that uniformity of exercise and regularity of movement which have become the simplest elements of martial discipline. To this may be added, that the celerity, as well as good order of his marches, the able arrangements by which he husbanded the lives and health of his troops, and the felicitous skill with which his camps were chosen and secured from assault, are the constant subjects of contemporary eulogy. He excelled particularly in the art of fortifying, besieging, and defending places; and, as the circumstances and localities of the contest in which he was engaged rendered such operations less perilous for the States than the hazard of decisive encounters in the field, his successes were gained more by a war of sieges, marches, and entrenched camps, than of great battles. But the victories of Turnhout and Nieuport were not the less the triumphs of his tactical system. Those actions were the first important defeats inflicted upon the Spanish bands, who had so long been the terror of Europe; and it was in the school of Nassau that the fundamental rules of military science were established, which, within less than half a century, finally prevailed over the slow and cumbrous array of the Imperial and Spanish service, in the plains of Lutzen and Rocroi.

III.—WILLIAM III. of NASSAU, Prince of Orange, stadtholder of the United Provinces, and ultimately king of England,—the great champion of the civil and religious liberties of Protestant Europe,—was born in the year 1650, and was the posthumous son of William II. of Orange, by Mary, daughter of Charles I., king of England. As William II. was the eldest son of the stadtholder Frederic Henry, who was the youngest son of William the Silent, by Louisa, daughter of the famous admiral Coligni, William III. was great-grandson of the founder of the Dutch republic, and was also lineally descended, in the female line, from the renowned leader of the Huguenots. Not only had a father's care been denied to the birth and infancy of William III., but his youth was destined to suffer for the errors of his parent. The stadtholder Frederic Henry, unlike his brother Maurice, had administered his office without attempting to violate the liberties of the republic, or giving umbrage to the jealousy of the States: but his son William II., even in the brief career which was cut short by death in his twenty-fourth year, contrived, by his violence and infringement of constitutional rights, to revive public suspicion of the designs of his house against the freedom of the commonwealth; and the party opposed to the Orange interest took advantage of the helplessness of his infant son to prevent his succeeding by election to the dignity of stadtholder, which had become, as it were, hereditary in the line of Nassau. The alliance of that family with the house of Stuart had also excited the jealousy of Cromwell, whose power was now in the ascendant; and, when peace was concluded between the two republics of England and the United Provinces, in 1654, the imperious demand of the protector, that all the states should solemnly engage to exclude the infant prince of Orange and his descendants prospectively from the stadtholdership, was only satisfied by a secret engagement to the same effect, to which Holland, as the leading province of the Union, disgracefully acceded.

The restoration of the Stuarts to the British throne, in a few years, tended however at once to raise the hopes of the adherents of the house of Orange, and to increase the disquietude of their opponents; and, in 1667, the republican or aristocratic party, headed by the two celebrated brothers, John and Cornelius de Witt, succeeded in inducing the States to pass the 'Perpetual Edict,' for ever abolishing the office of stadtholder. But the iniquitous aggression of the French king, Louis XIV., upon the republic in 1672, soon put an end to the operation of this edict. However pure might have been the intentions of the De Witts, their measures had left the republic defenceless. Confiding in the friendship of France, and distrusting the best officers of the army, as devoted to the House of Orange, they had, by reductions and neglect, so weakened the land forces of the republic, that resistance to the invaders seemed hopeless. The Orange party were loud in their clamours against the administration of their rivals; and the populace, who had always been favourable to the family of Nassau, were instigated to revolt. Their fury was directed against the De Witts, whom they murdered with horrid barbarity; and the young prince of Orange was tumultuously raised to the proscribed dignity of stadtholder.

William III. was only in the twenty-second year of his age when he was thus suddenly called to the government of a factious and distracted state, a lawless populace, and a dispirited and disorganized army. With such means was he required to arrest the progress of the victorious king of France at the head of a veteran army of 100,000 men, aided by the best generals of the age, and supported by the whole power both of his own crown and of that of England, which the baseness of Charles II. had rendered subservient to his ambition. But, happily for his country and the world, William at once displayed the same characteristics of a firmness and sagacity far beyond his youthful years, which seem to have been the heir-looms of his race, and equally to have distinguished him with his great ancestors William the Silent and Maurice. He indignantly repelled all the efforts of the combined kings of England and France to seduce him from the cause of the republic; and when Buckingham, the favourite of Charles II., asked him if he did not see that the destruction of the commonwealth was inevitable, he replied, 'There is one means by which I at least shall be sure not to witness the ruin of my country: I will die in the last ditch.' His magnanimous spirit he knew how to infuse also into his despairing countrymen, who cut the dikes of their lands, and resigned the fertile fields, which their ancestors had rescued from the sea, to the ravages of that element, rather than yield them to their invaders. The example of their young leader taught them to spurn the insolent demands of their enemies; and it appears among the miracles of history, that, in two short campaigns, the French armies, which had overrun the United Provinces, and penetrated almost to the gates of Amsterdam, were entirely driven out of the territory of the republic. In 1674, the young prince of Orange even dared every measure to bring the veteran Condé to a battle; and, though he suffered for his temerity at Seneffe, he so nobly conducted himself in that defeat as to extort from his illustrious opponent the generous avowal that 'he had acted in everything like an old captain, except in venturing his life too much like a young soldier.'

During the remainder of the war, which, after a separate peace between England and the States, was protracted with France for four years, and concluded by the peace of Nimeguen in 1678, William continued to give abundant proofs both of his political and military talents; and, shortly before the close of hostilities, he had effected a personal alliance, which largely influenced the fortunes of his subsequent life. This was his marriage with his cousin Mary, eldest daughter of James, duke of York, and heiress presumptive to the British crown. It is not easy to comprehend the readiness of Charles II. to adopt a measure so contrary to his usual policy and inclinations as this union of the princess with William, who, though his nephew, had thwarted his designs and offended his wishes by his maintenance of the republican cause. But dread of the growing discontents of his people, and a belief that the marriage would dispel the suspicions excited by his brother's religion, are supposed to have been motives sufficient to obtain his consent; and he invited or permitted his nephew to pay him the visit in England during which the alliance was concluded. To William the union presented obvious advantages: yet he honourably declined any proposals on the subject until he should be allowed to make the acquaintance and ascertain the inclinations of the princess; and this disinterestedness was not without its reward in the harmony which distinguished the course of his domestic life with his consort.

Neither the prince of Orange nor Charles II. and his brother probably foresaw all the consequences of this union to the politics of Europe. But no event of William's fortune contributed so essentially to the furtherance of that great design which had become the master passion of his mind—the reduction of the tyrannical power of Louis XIV. and the security of the liberties of the Protestant world. To these great objects, from the first hour in which he had been called to the defence of his country, his whole life was consistent; and in whatever degree motives of personal ambition, whether unconsciously to himself or otherwise, were mingled in his plans, he never appears to have suffered any consideration for an instant to interfere with his pursuit of the great cause to which he had devoted himself. Many circumstances contributed to place him at the head of the general league, provoked by the aggressive power of Louis XIV., in resistance to which his first glory had been won. The revocation of the Edict of Nantes, in 1685, by that monarch, and his persecution of his Protestant subjects, had justly alarmed and outraged all their European brethren of the same faith; the insolent pretensions of Louis had given mortal offence to the emperor and king of Spain, the apprehensions which experience had taught the United Provinces to entertain of the projects of the French king naturally rendered the court of their stadtholder the centre of negotiations against him; and various causes of hatred and fear enabled William to combine the States themselves and the Protestant princes of Germany, with the two Roman Catholic monarchs of the house of Austria and other powers, in the celebrated league which was concluded against Louis XIV. at Augsburg, in 1687. To the completeness of that great European confederacy nothing was wanting but the accession of England; and this was obtained, in the only manner which the alliance of her new king, James II., with France rendered practicable, by his insane attempt to overthrow the national faith.

Ever since his marriage, William had studiously abstained from taking part in the struggle of parties in England; and though, through his activity in thwarting the schemes of the French king, he had not been able to escape the displeasure of his uncle Charles II., he had lived on decent terms with his father-in-law, and since his accession had proffered him aid in suppressing the rebellion of the duke of Monmouth. But when he publicly refused to support the repeal of the Test Act, James began both to treat him as an enemy and to take injurious measures against the United Provinces; and, on the other hand, all the English Protestants turned their eyes to the prince of Orange for the protection of their liberties and faith. On the invitation of the principal persons both of the Whig and Tory parties, William was at length induced to undertake an expedition into England for the restoration of the national rights; and having arranged his preparations with consummate skill, he sailed from Holland with an army of about 14,000 men, composed partly of Dutch troops and partly of English regiments in the service of the States, and landed at Torbay, on the 5th of November, 1688.

This interference of William in the domestic politics of England has been variously viewed by opposite parties, as the most glorious, or the most questionable act of his life. But it cannot be denied that it was in perfect consonance with the whole tenor of his principles and his policy. The measures of James II. struck at the very existence of the Protestant faith; and their success might have been fatal also to the cause of civil freedom in Europe, to which William was equally attached. The birth of a male heir to the crown of England, by James's marriage with a princess of the Roman Catholic communion, may have quickened the zeal of William; and the double injury to his wife's title, consequent upon a prior right and a Roman Catholic succession, doubtless had its influence upon his mind. Yet there is no reason to discredit his sincere anxiety for the Protestant cause, which without these interested motives might assuredly have prompted his enterprise. The dethronement of a father-in-law has sometimes been imputed to him as a deed of unnatural guilt; and, if the affections of private life were usually permitted to have sway in the breasts of princes, it would not be easy to justify William in having made his wife an accomplice in the expulsion of her father. But he had himself personally little reason to love James, who had reluctantly received him as a son-in-law, and never cordially courted his friendship or gratitude; nor had there at any time been circumstances of private regard between them to outweigh considerations of public duty or personal interest.

The landing of William in Torbay was followed, after a few days of hesitation, by an almost total defection of James's English subjects from their allegiance; and with unparalleled ease and rapidity was that memorable and bloodless revolution effected which changed the royal line and firmly established the constitution of these realms. For once all parties and orders of men in the nation, except a very small minority of Roman Catholics, peaceably concurred in the necessity for a change of government; and when the betrayed and misguided king fled to France, the most opposite principles of passive obedience and popular rights were strained to the same practical conclusion, that James II. had either deserted or forfeited the throne. The all-important question, in what manner the vacant regal seat should be occupied, terminated the short-lived concord of factions. But William, whether moved in part by a mere selfish ambition, or wholly by a better conviction of the public exigencies of the crisis, at once cut short all schemes of the high monarchical party for restricting his functions to a regency, either on behalf of his wife or her infant brother. He declared that, except as king, he would not remain in the country. This decisive language hastened the proceedings of the convention parliament, which William had composed of the peers, the surviving members of the three last houses of commons, and the corporation of London; and in the famous Act of Settlement passed by that body, the crown, with constitutional limitations to its power, was conferred jointly upon the prince and princess of Orange, with remainder successively to the issue of the latter, to the princess Anne and her children, and to the heirs of William by any other wife.

Notwithstanding the ease with which William III. thus acquired the British crown, he was soon compelled to contend in arms for its preservation. In Scotland the cause of James was upheld by the gallant viscount Dundee, but perished with his fall in the brief moment of victory. In Ireland, the struggle maintained by James's Roman Catholic adherents was more obstinate; but William in person inflicted on them a memorable defeat at the passage of the Boyne in 1690; and the capitulation of Limerick in the following year completed the submission of Ireland. Meanwhile William had the satisfaction, the greatest probably which his new dignity gave him, of engaging England in the League of Augsburg. The war of that confederacy against Louis XIV., of which the principal conduct was intrusted to William, had indeed little success; for though possessed of considerable military talents, he wanted that good fortune which the antients numbered among the most indispensable attributes of a great general; and he sustained in the course of this struggle two severe defeats from the French under the duke of Luxemburg at Steenkirk and Neerwinden. By the peace of Ryswick, which terminated the war in 1697, little more was gained from the French monarch by the allies than the recognition of William III. as king of England.

The possession of that throne had meanwhile given him little happiness. Though almost all the nation had at first concurred in the Revolution of 1688, the tory and high church party were in general indisposed to the pretensions and person of the new king. The Whigs were still full of jealousy of the royal power; and the cold reserved temper and ungracious manner of William disgusted and alienated the minds of his subjects in general. His most favourite schemes were continually thwarted in parliament; his whole reign was harassed with intrigues of faction and plans of insurrection at home; and his life and throne were assailed from abroad with base plots of assassination by the adherents of James II., and with projects of invasion undertaken by Louis XIV. for the restoration of the dethroned king. To add to the distresses of William, he experienced in 1695 a severe domestic calamity in the loss of his queen-consort Mary, to whom he was deeply attached. Her decease, as she left no issue, terminated all claim of her husband to the crown in the eyes of that part of the nation who had been reconciled to his government by the semblance of hereditary right in her participation of the throne. His measures now experienced systematic opposition from all parties: from the Jacobites, as the partisans of the exiled monarch were termed, who of course regarded him as a usurper; from the Tories in general, to whom he was personally obnoxious; and from the Whigs and republicans, who desired in various degrees to lower or annul the royal power. The first use therefore which was made in parliament of the peace of Ryswick was to compel him to reduce the army to an insignificant remnant of guards and garrisons, and to send out of the kingdom the regiments of French Protestant refugees, as well as his own Dutch guards; and these and other mortifications had such an effect upon his mind as to extort from him a passionate expression of his regret that he had interfered in the affairs of a nation at once so ungrateful and so suspicious.

From the annoyances of his position in England, he sought relief by renewing with more ardour than ever his attention to the affairs of Europe, and by pursuing his favourite project for humbling the power of the French king, which the precarious health of Charles II., the childless monarch of Spain, and the pretensions of the house of Bourbon to the inheritance of his dominions, threatened to render more dangerous than ever. To avert these impending evils to the balance of power in Europe, William successively negotiated two treaties of partition for the Spanish monarchy, to both of which Louis XIV. was an artful and faithless subscriber; for when the Spanish king, in indignation that other powers should dismember and distribute his dominions, bequeathed them at his death, in 1700, to Philip duke of Anjou, second son of the dauphin, Louis XIV., in spite of every obligation of treaties, accepted the testament for his grandson.

William III., now in declining health, was sensibly affected by this defeat of all his labours: but he applied himself with his usual energy to form a new league against France; and the insulting conduct of Louis XIV. at this crisis, in giving the son of James II., on the death of that prince, the title of king of England, so exasperated the British nation, that they eagerly seconded William's wishes for a war. But, in the midst of eager preparations for the commencement of hostilities, William's life was suddenly brought to a close. His constitution, originally frail and sickly, had now been completely exhausted by a career of incessant and harassing anxieties. An accidental fall from his horse, by which he broke his collar-bone, gave a fatal shock to his worn-out frame; and he expired at Kensington palace, on the 8th of March, 1702, in the fifty-second year of his age.

With the death of William III. the male line of William the Silent became extinct; and the states-general were not sorry to leave the stadtholdership vacant, and tacitly abolished. But William had named for his personal heir his cousin John William Friso, prince of Nassau-Dietz (grandson of his aunt Albertina Agnes by William Frederic of Nassau-Dietz), from whom the present regal line of Orange is descended. The following has been the succession of the princes of this house:—

William (IV.) Henry Friso, son of John William Friso, born in 1711; married Anne, daughter of George II. of England; was raised by the Orange party to the stadtholdership in 1747, and died in 1751.

William (V.) Batavus, son of William IV., born in 1748, was declared stadtholder (under the guardianship of his mother) in 1751; was expelled by the French in 1795, renounced the dignity of stadtholder by treaty with France in 1802, and died in 1806.

William (VI.) Frederic, son of William V., born in 1772, was restored to the dignities of his family in 1813, was proclaimed king of the Netherlands under the auspices of the Congress of Vienna in 1815, and still survives; having two sons, the eldest of whom, William Frederic Charles, prince of Orange, has also male issue.

(The principal authorities consulted for the preceding sketch of the most illustrious members of the house of Nassau are—*La Généalogie des Illustres Comtes de Nassau*, Amst., 1624; *Commentaries of Sir Francis Vere*, Cambridge, 1657; Grotius, *Annales et Historiæ de rebus Belgicis*, Amst., 1658; Le Clerc, *Histoire des Provinces Unies*, Amst., 1723-28; Burnet's *History of his own Time;* Hume and Smollett's *History of England*, &c.; and *L'Art de Vérifier les Dates*, Paris, 1818-19.)

NASTU'RTIUM, an old word applied to some kind of pungent herb, such as cress. By the English of the present day it is given to the Tropæolum majus, an American annual with pungent fruit; by botanists, to the Watercress and plants allied to it; by the Romans it was applied to a plant resembling Mustard in its qualities.

NA'SUA. [URSIDÆ; VIVERRIDÆ.]

NATAL, THE COAST OF, extends along the eastern side of Africa from the boundary-line of the Cape Colony, which, since the last war with the Amakosas, is formed by the Kei river (32° 30′ S. lat.), to Dalagoa Bay (26° S. lat.), and constitutes the shores of Kafferland. Along the sea it is low, and in many parts swampy. Some of these swampy grounds extend far inland, especially towards Dalagoa Bay; but in general the country begins to rise within a few miles from the sea. The rise is rather rapid, for some miles farther inland the country is said to have an average elevation of 800 or 1000 feet above the sea level, and to present the appearance of a hilly plain, here and there covered with swamps, but mostly intersected by narrow deep valleys, through which the rivers run to the sea. The declivities of the hills are partly covered with forests and bushes, and partly bare and red owing to the iron-ore which they contain. The numerous rivers and mountain torrents after rains sometimes rise to an astonishing height, and their waters fill up the narrow valleys, through which they rush with terrific violence. As all the rivers abound in cataracts, and alternate depths and shallows, they are not navigable except for a few miles from the mouth. Nearly all of them have a huge sand-bank at their entrance, which prevents all access, and renders them useless as harbours even for small vessels. Most of the rivers have also a comparatively short course, as they rise in a high and continuous ridge of mountains, which runs parallel to the shores of the sea at the distance of about 80 miles. The elevated country mostly serves as pasture-ground, and is always covered with grass, as a want of rain is seldom experienced there, except towards the southern extremity, where the country frequently suffers from continual drought. During the summer months the grass is generally brown and dry, and towards the end of the dry season it is burnt by the natives, in order that the cattle may enjoy the new and tender herbage which comes after the first rains. On these elevated grounds there is generally a cool and refreshing breeze, but in the villages which are built in the deep valleys the heat in the dry season is extremely oppressive. The soil is rich, especially on the flats near the margin of the rivers, and along the hill-sides, where the natives cultivate pumpkins, melons, a species of millet, maize, sweet potatoes, and tobacco. The missionaries have introduced grapes, figs, oranges, lemons, apricots, peaches, nectarines, and some other fruits, as well as several kinds of vegetables, which in many places grow luxuriantly. The domestic animals are horned cattle, goats, and a few horses; some tribes possess also sheep. For further particulars see CAFFRARIA. (Stedman's *Southern Africa.*)

NATATO'RES, Illiger's name for the Swimming-birds, Swans, Ducks, Geese, &c.

NATCHEZ. [MISSISSIPPI, State.]

NA'TICA. [NERITIDÆ.]

NATIONAL ASSEMBLY. [MIRABEAU.]

NATIONAL DEBT. It will hardly be questioned that if we were to bring into account the wealth possessed by her citizens individually, England would be found, beyond all comparison, the richest country in Europe. The amount of her public debt, on the other hand, so infinitely beyond the public engagements of any other state, would seem to indicate that, considered apart from that individual wealth, England is poorer than the poorest among nations. It must not however be for one moment admitted that the public burthens of the country are ever to be considered in that light. The debt is owing by the aggregate of the people—*by the nation*—for whose benefit, real or supposed, it was legally contracted. It suits the general convenience, including that of the public creditor, that the nation, in its aggregate sense, should thus continue to exhibit signs of poverty in contrast with the evidences of enormous wealth; but if it were otherwise—if the public convenience, still more if the public safety, demanded such a course, the same authority which sanctioned the contracting of the debt could also oblige each individual in the country to contribute according to his fair proportion and his means towards its extinction. It would be difficult to imagine any circumstances that could render such a course expedient, and the position has been here advanced solely with the object of explaining, in a familiar way, the nature of the debt, and the manner in which the obligation to bear the burthen and contribute towards upholding the national faith presses upon every individual in the community. There is in truth no one, however high or however low his station in the country, excepting only those whose whole subsistence is drawn from eleemosynary sources, who can be said not to bear a part towards this upholding of the public faith. Every one therefore is interested in forming a correct idea concerning a matter which exercises an influence upon every act and circumstance that affects his social position and progress. This being the case, one cannot help feeling surprised at the crude and fallacious ideas that are generally entertained on the subject. It is by no means uncommon to find, among even educated persons, the impression that the national debt is a fund, a deposit of treasure, a sign of national riches; anything in short opposed to that which it really is, namely, a drawback upon the national wealth, a mortgage of the national industry for the payment of a perpetual annuity in return for capital advanced to meet the national exigencies, and which has been expended or consumed for national objects. It has been said, that as this debt, or by far the largest part of it, is owing among ourselves, it cannot have any prejudicial action upon the national interest, since that which a body owes to its own members cannot be held in the light of a debt, and may be considered as though it had no existence. It certainly says more for the national resources that its public expenditure, including its debt, has been furnished by its own citizens rather than borrowed from strangers, and that our future industry is therefore not mortgaged to strangers, but that the portion of its fruits which must be set apart for the public creditors will remain at home to afford a fresh stimulus to that industry in time to come. It will nevertheless easily be made apparent how the successive absorption of private capital for public purposes must prove injurious to a country, if we consider what must have been the condition of England, if, instead of thus absorbing a part only, the whole of the disposable wealth of her individual citizens had been so expended. It might still have been said, that as what was taken from all in the form of taxes was returned to a part in the form of dividends, the money did not leave the country; and that although of course it must affect the condition of individuals, it would not affect the condition of the aggregate. But, it must be asked, where, in the case supposed, would have been the capital that must set in motion the springs of industry and enable the payment of taxes? It is indeed evident that in such case the country must have long ago become bankrupt, and have been unable to hold any rank among independent nations.

It is not intended further to pursue the inquiry as to what might have been the result to the nation of any circumstances different from those actually existing, but rather to explain what those actual circumstances are, and to suggest rather than to follow out to their ultimate effects their bearing upon the public prosperity. It seemed necessary however to mention and to combat some of the fallacies by which the question of our public debt is beset, and to show wherein it agrees and on what points it differs in its nature from the debt of an individual. That difference in fact consists in the compound character of the creditors, who as members of the nation are legally and morally bound to contribute towards the maintenance of the public faith, while they have each a personal interest in its preservation. In its practical operation, there is this further distinction to be drawn between the debts of the nation and those of individuals, that the state has at all times the right to pay off its creditors at par, while the latter have no right to demand repayment of the principal money they have advanced, but must content themselves with receiving half-yearly the amount of their annuity.

Before proceeding to give an historical sketch of the progress of the national debt, it may be as well to mention one other fallacy which has been often broached of late years by a small and happily an uninfluential party in the country, namely, that the general prosperity of the state would be advanced by the abolition (unsatisfied) of the public debt; and as in all matters of public policy the prosperity of a great majority should be considered before that of a part, a sound policy requires that faith should no longer be kept with the public creditor. The proposition is here put in plainer terms perhaps than its advocates would use, but this is the substance of their argument.

It has been shown that the money in respect of which the claims of the public creditors have arisen is spent, and that those creditors being part of ourselves, living and expending their incomes among us, the evil effects of the debt are limited to the loss of the capital which otherwise would have formed part of the national wealth, giving additional rewards to industry, and adding in various ways to the sum of our material enjoyments. But the capital thus lost has all been advanced in times of necessity, in full faith that the conditions promised would be performed by the borrowers under all possible circumstances; and it would indeed be a day of disgrace that should sanction the securing of any advantage, however great, through the dishonest breach of those conditions. But would any such advantage as has been supposed follow from so dishonest a step? Those who contend that the great majority of the nation would be benefited by the unsatisfied extinction of the national debt, and would urge its extinction on this ground, as being precisely the same ground on which many enactments are made, ought to show that the loss occasioned by such extinction will be confined to the immediate losers, to the comparatively small number of public creditors. But it is easy to show that the loss would not be confined to the immediate losers; and this being the case, it is impossible to prove that such extinction will really benefit a great majority. It might happen that it would in its results benefit only a small minority of the actual generation, or even nobody at all; and the allegation of this possible result in a sufficient answer to the assumption made by the advocates of unsatisfied extinction, that the loss incurred would be confined to the immediate losers, and that there would be a real gain to the great majority of the nation. Such an unsatisfied extinction would in effect be a dissolution of innumerable contracts, on the faithful performance of which depends the happiness of many thousands who are not public creditors. It is hardly necessary to remark that the nation would not afterwards find it easy to borrow money from individuals on any reasonable terms for any purpose, however generally useful, or any public necessity, however urgent.

The contracting of the National Debt cannot be said to have been begun before the Revolution of 1688. The kings of England had indeed been accustomed from a remote date to borrow money upon emergencies, but on such occasions the revenues of the crown were pawned for the amount, which was seldom beyond what could by that means be repaid in a few years. The earliest instance of this borrowing which we have on record was in the reign of Richard I., when money was wanted to defray the expense of his crusade to the Holy Land. Even for some few years after the accession of William and Mary the borrowings of the government were for short periods only. The first transaction of this kind of a permanent character arose out of the chartering of the Bank of England in 1693, when its capital of 1,200,000*l.* was lent to the public at 8 per cent. interest. A power of repayment was reserved on this occasion by the crown, but no corresponding right of demanding payment existed on the part of the bank.

So cautious was the parliament in those days of burthening future generations for the exigencies of the present moment, that when the annual income was inadequate to meet the charges of the foreign wars in which the country was engaged, and it became necessary to borrow the deficiency, annuities were granted, not in perpetuity, but for lives and terms of years, the produce of certain duties being mortgaged for their discharge.

This cautious proceeding could not be long continued. The expensiveness of the wars in which the nation was engaged at the end of the seventeenth century made it necessary to incur debts beyond the means of their prompt redemption, and at the peace of Ryswick, in 1697, the debt amounted to 21½ millions. During the next ten years, although the country was again involved in a continental war, its amount was reduced to little more than 16 millions, and the greatest efforts were made to raise money without imposing any lasting burthen on the people. These efforts indeed soon found their limit, and at the accession of George I. in 1714, the debt had accumulated to the amount of 54 millions, an amount which excited great uneasiness and caused the House of Commons to declare itself under the necessity of making efforts for its reduction. In 1717 the debt amounted to 48½ millions, and the annual charge in respect of the same to 3,117,296*l.* A great part of this debt consisted of annuities granted for 99 years, the money obtained for which had varied from 15 to 16 years' purchase.

In the year 1720 the South-Sea Act was passed, authorising the company to take in, by subscription or purchase, the redeemable and unredeemable debts of the nation, the object being to reduce all the debts under one head of account at one uniform rate of interest. In the accomplishment of this scheme the projectors only partially succeeded, while the disgraceful frauds by which the proceedings of the company at that time were marked, led to a parliamentary investigation which caused the disgrace of some of the ministers, the chancellor of the exchequer being expelled the House, and committed to the Tower for his share in the plot. It is not the least remarkable circumstance attending this scheme that it was attempted at the same time with the equally famous Mississippi scheme, which, with a similar object, was projected in France by John Law, under the sanction of the Regent Duke of Orleans. [LAW, JOHN.]

In 1736 the public debt of England amounted to about 50 millions, but the annual charge had been reduced below two millions. At the peace of Aix-la-Chapelle, in 1748, the national debt exceeded 78 millions, but in the following year the public obtained some relief from the burthen through the lowering of the rate of interest. Little else was done in the way of alleviation at this time, and at the breaking-out of the Seven Years' War, in 1756, the debt still amounted to 75 millions. A public writer of some repute, Mr. S. Hannay, says, at that date, 'It has been a generally received notion among political arithmeticians, that we may increase our debt to 100,000,000*l.*, but they acknowledge that it must then cease by the debtor becoming bankrupt.' Those who in more recent times have witnessed the addition year after year to the debt of sums equal to more than the difference between its then amount and its declared limit, may smile at this prediction, and learn to put little faith in opinions which are not based upon previous experience.

When the Seven Years' War was ended by the peace of Paris, the debt reached 139 millions and the annual charge was 4,600,000*l.* During the twelve following years, a period of profound peace, only 10,400,000*l.* of the debt was discharged. The war of the American Independence raised the debt from 129 to 268 millions, and the annual charge in respect of the same to 9,512,232*l.* So little was done in the way of liquidation during the following ten years, that at the beginning of the war of the French Revolution the debt still amounted to 260,000,000*l.*, and its annual charge to 9,437,862*l.* The outlay occasioned by the prosecution of that war was great beyond all precedent. Between 1793 and the peace of Amiens the addition made to the capital of the debt amounted to 360 millions and the annual burthen was increased from 9,437,862*l.* to 19,945,624*l.* Between the recommencement of the war in 1803 and its termination after the battle of Waterloo in 1815, there were added 420 millions to the capital of the debt, which then amounted, including the unfunded debt, to 885 millions, and the annual charge upon the public exceeded 32 millions of money. This enormous, this frightful rate of progression, appears to have excited far less alarm than was expressed at the comparatively trifling additions made at the beginning of the funding system, a consequence which probably must be in great part attributed to the establishment of the sinking fund, and to the hope which it held out of cancelling at no very distant period each amount of debt successively increased.

A plan for the gradual extinction of the national debt by the establishment of a sinking fund was proposed and partially applied in 1716 by Sir R. Walpole. The scheme for that purpose proposed under the same name by Mr. Pitt in 1786 had a greater show of reality about it. By this scheme the sum of one million was annually set apart from the income of the country towards the extinction of its debt. Other sums were rendered accessory to the plan, and it was supposed that at the expiration of 28 years the annual income of the sinking fund would amount to four millions, a part of which might then be applied towards relieving the burthen of the public. So far the project bore the stamp of reasonableness and prudence: had the fund of one million annually assigned to commissioners been an actual surplus of income over expenditure, its operation must speedily have been highly advantageous to the country. The fallacy consisted in this, that the sums devoted to it were borrowed for the purpose. The only real advantage secured by this means arose from the unfounded confidence which it imparted to the public, under which they willingly bore a higher rate of taxation than might have been tolerable but for the expectation of future relief through its means. Now that the absurdity is acknowledged of borrowing in order to pay off debt, which absurdity would in the case of an individual always have been apparent, it is difficult to account for the blindness with which the whole nation clung to this so-called fund as the certain means of extinguishing the debt which in effect it contributed to augment through the less advantageous terms upon which the money was borrowed than those upon which an equivalent amount of debt was afterwards redeemed. The difference between the average rates at which money was borrowed and at which purchases were made by the Commissioners who managed the sinking fund between 1793 and 1814 was such, that through the operations of the fund, upon which such confident hope of relief was placed, the country owed upwards of 11 millions more at the end of the war than it would have owed but for those operations. At the period just mentioned the annual income of the sinking fund amounted to 13,400,000*l.*, arising from dividends on stock purchased by the commissioners with funds borrowed at a higher rate of interest for the purpose. It was impossible however during a time of peace to raise by means of taxes so large an amount, in addition to the actual current expenditure of the country and the interest upon the unredeemed portion of the debt. During the war, when the deficiency of income was covered by yearly loans, the fallacy was not quite so apparent as it now soon became, for a few years after the peace the deficiency in the public income was borrowed from the sinking fund commissioners by parliament, a course which served to render the absurdity only the more apparent, and in 1824 the plan of keeping up a large nominal sinking fund in the absence of actual surplus income was abandoned.

The amount of the National Debt unredeemed on the 5th of January, 1816, was stated to be as follows in the fourth Report of the select committee of the House of Commons on public income and expenditure:—

3 per cent. stock . .	£580,916,019
3½ " . .	10,740,013
4 " . .	75,725,504
5 " . .	148,930,403
Perpetual annuities	816,311,939
Terminable annuities, 1,894,612*l.*, equal to an estimated capital of	30,080,347
Unfunded debt . .	38,794,038
Total of unredeemed debt .	£885,186,324

The annual charge upon which was:—

Interest upon perpetual annuities . .	£28,278,919
Terminable annuities	1,894,612
Interest on unfunded debt . . .	1,998,937
Charge for management paid Bank of England	284,673
Total annual charge	£32,457,141

The experience of the last twenty-five years has proved that the only important relief from the pressure of debt to be obtained, even during a profound and long-continued peace, will probably be derived from the lowering of the rate of interest. The price of 5 per cent. stock at the beginning of 1822 was advanced to 6 or 8 per cent. above par, and advantage was taken of this circumstance to induce the holders to exchange each 100*l.* of 5 per cent. annuities for 105*l.* of 4 per cent. annuities. On this occasion 140,250,828*l.* of 5 per cent. stock was cancelled, and 147,263,328*l.* of 4 per cent. stock was created, the annual charge being by this means reduced by the sum of 1,122,000*l.* In 1824 a further saving of 381,034*l.* per annum was effected by reducing to 3½ per cent. the interest payable on 76,206,882*l.* of 4 per cent. stock; and in 1830 a further abatement of one-half per cent. was effected on the 4 per cent. stock created in 1822, whereby the sum of 700,000*l.* per annum was saved to the public.

Some little progress has been made since 1816 in the reduction of debt by the employment for that purpose of actual surplus revenue. An addition has on the other hand been made to the public burthens by means of the grant of 20,000,000*l.* voted by parliament for compensation to the owners of slaves in the British colonies who were emancipated by the act of 1833. The unredeemed funded and unfunded debt which existed on the 5th January, 1839, and the annual charge thereon, was as follows:—

3 per cent. annuities . .	£508,360,605
3½ " . .	249,922,566
4 " . .	1,615,385
5 " . .	1,449,134
Perpetual annuities	761,347,690
Terminable annuities, 4,292,173*l.*, equal to an estimated capital of	68,145,907
Unfunded debt . .	24,026,050
Total of unredeemed debt .	£853,519,647

The annual charge upon which was:—

Interest on perpetual annuities . .	£24,135,180
Terminable annuities . . .	4,292,173
Interest on unfunded debt . .	720,928
Charge for management . . .	158,150
Total annual charge	£29,306,431

The diminution of the annual burthen in the course of twenty-three years, from 1816 to 1839, has thus been 3,150,710*l.*, at which rate the total extinction of the debt would not be effected until the year 2053. The slow progress made in this direction stands in striking contrast to the rapidity with which the load was accumulated, the entire diminution effected during twenty-three years of peace being scarcely equal to the additions made during some of the individual years of the war.

It will be seen, on comparing the above statements for 1815 and 1839, that the terminable annuities have increased from 1,894,612*l.* to 4,292,173*l.* By the act 48 Geo. III. and several subsequent acts, the commissioners for the reduction of the National Debt were empowered to grant annuities, either for lives or for certain terms of years, the payment for such annuities being made in equivalent portions of permanent annuities, which were therefore to be given up and cancelled. By this course, which it will be seen has been acted upon to some extent since the peace, some future relief will be obtained at the expense of a present sacrifice. This plan, provided it be not carried so far as to interfere with the onward progress of the country, through an overload of taxation, appears to be dictated by sound prudence. A part of the terminable annuities (nearly one-half their present amount) will expire in 1860, and after that time portions will rapidly fall in; so that without looking to any redemption of debt from surplus income, or to any further reductions in the rate of interest, the next twenty-three years will be productive of nearly as much relief as has been obtained since 1816.

If this course of proceeding is justly characterised as prudent, what must be said of the scheme of a directly opposite tendency which was brought forward and partially carried into effect by the government in 1822? When the measure for commuting the half-pay and pensions usually denominated the 'dead weight' was adopted in that year, the annual charge to which those obligations amounted was about five millions. From year to year the public would have been relieved from a part of this burthen through the falling in of lives, until, according to the most accurate computation, the whole would have ceased in forty-five years. The measure above alluded to was an attempt to commute these diminishing payments into an unvarying annuity of forty-five years certain; and the calculation which was made assumed that by the sale of such a fixed annuity of 2,800,000*l.*, funds might be procured enough to meet the diminishing demands of the claimants. Only a part of this annuity was sold. The Bank of England purchased an annuity, payable half-yearly until 1867, for 585,740*l.*, and paid for the same between 1823 and 1828, in nearly equal quarterly instalments, the sum of 13,089,419*l.* For the sake of obtaining a partial relief during those six years, to the amount of 9½ millions, we have thus had fixed upon the country for thirty-nine subsequent years an annual payment of 585,740*l.* It is not possible to allow that both these courses, so directly opposed to each other, could have been wise. Without inquiring further into the matter, it may be said that the plan of taking a larger burthen upon ourselves, that we may relieve those who come after us, has at least the recommendation of being the most generous; and considering that our successors will have had no hand in the contracting of the debts, the burthen of which they will have to bear, it might also be said that such a course is the most just.

It will be seen that some saving has been effected between 1816 and 1839 in the charges of management. This saving was part of the bargain made by the government with the Bank of England on the renewal of its charter in 1833, and may be considered as a part of the price paid by that establishment for the prolongation of certain of its privileges then on the point of expiring. The system employed for the management of the public debt by that corporation is explained elsewhere in this work. [BANK, BANKER, BANKING.] The functions intrusted to the Bank of England with reference to the National Debt do not extend to the transaction of any matter connected with its reduction. Such business is placed under the control of a body of commissioners, who act *ex officio* under the provisions of an act of parliament. This board is composed of the speaker of the House of Commons, the chancellor of the exchequer, the master of the rolls, the lord-chief-baron of the Court of Exchequer, the accountant-general of the Court of Chancery, and the governor and deputy-governor of the Bank of England. The greater part of these commissioners do not take any part in the management of the business, the details of which are attended to by permanent officers, viz. a secretary and comptroller-general, and an actuary, with an adequate establishment of assistants and clerks: the ultimate control is exercised by the chancellor of the exchequer for the time being, assisted by the governor and deputy-governor of the Bank of England.

NATIONAL GALLERY. Of the origin of this public collection of paintings mention has already been made at the end of the article on the British Museum. Previously to the purchase of the Angerstein pictures, the gallery at Dulwich was almost the only one in the whole country, excepting the royal collections at Windsor and Hampton Court, to which the public had anything like free if not gratuitous access; for wealthy as England is in masterpieces of painting, they are dispersed through a great number of private galleries and cabinets, to which, if access is to be had at all, it is only occasionally. Consequently those stores of art have had little influence upon our national taste, but the public generally have been left to pick up their acquaintance with art at our annual exhibitions, where of course there is always a great preponderance of mediocrity. The exhibitions of the works of the old masters at the British Institution constituted almost the only opportunity of seeing works of that class which was afforded to artists and the public. Still, however desirable in themselves, such temporary exhibitions were insufficient. Hitherto government had scarcely ever done anything directly for art; and if it was to do so at all, no better beginning could be made than by securing for the nation the Angerstein collection, it being, although not very extensive, of choice quality, and containing some first-rate specimens. For the Sebastian del Piombo alone 20,000*l.* had been offered (by Mr. Beckford) and refused; therefore, 57,000*l.* for the whole was by no means an extravagant price, particularly if compared with what has since been given for single paintings, namely, 5000*l.* for Titian's Bacchus and Ariadne; 3800*l.* for the Virgin *au Panier*, by Correggio; 11,500*l.* for the two larger specimens of the same master (the Ecce Homo and the Education of Cupid), sold to the Gallery in 1834 by the marquis of Londonderry; and about 4000*l.* for Raphael's St. Catherine, a single half-length figure.

The original collection consisted of about forty pictures, chiefly of the Italian school, but is now (1839) augmented to more than treble that number, by purchases, donations, and bequests. The directors of the British Institution have liberally presented at different times five works, namely, the Parmegiano and Paul Veronese, and three specimens of the English school, Reynolds's Holy Family, Gainsborough's Market-Cart, and West's large picture of Christ healing the Sick. Sir George Beaumont's noble gift of his collection, in 1826, enriched the Gallery soon after its establishment with several choice specimens, particularly in the department of landscape, with the very fine one by Rubens, four Claudes, and two Wilsons: the others are, a Descent from the Cross (sketch) by Rembrandt, the portrait of a Jew, by the same master, a landscape by Both, West's Pylades and Orestes, and Wilkie's Blind Fiddler. The bequest of the Rev. William Holwell Carr constituted a very numerous and important accession of works of the Italian school, besides some others, as will appear from the following list:—Lionardo da Vinci—Christ disputing with the Doctors in the Temple; Michael Angelo's Dream; Andrea del Sarto—a Holy Family; Bronzino—a female portrait; Garofalo—Vision of St. Augustin; Giulio Romano—a Charity; Titian—an Adoration of the Shepherds; Sebastian del Piombo—Portrait of Cardinal Hippolito de' Medici, and another, supposed to be that of Giulia Gonzaga; Tintoretto—St. George; Paul Veronese—Europa; Domenichino—Tobias and the Angel; Ditto—Landscape, with St. George and the Dragon; Guercino—a Christ and two Angels; Claude—Landscape, with the story of Sinon; Gaspar Poussin—three landscapes, one of them with the Adventure of Dido and Æneas; Rubens—St. Bavon relieving the Poor; Rembrandt—a landscape, with Tobias and the Angel; also a female wading through a stream, which last, though disagreeable as a subject, is for its execution a superior specimen of that master.

Among other donations the principal are the two Guidos, Perseus and Andromeda, and Venus attired by the Graces, presented by William IV.; the allegorical subject, by Rubens, entitled Peace and War, given by the late duke of Sutherland; the two Cartoons, by Annibale Caracci, the gift of Lord Francis Egerton; and the picture representing the story of Phineus, presented by Lieutenant-general Thornton, called in the catalogue a Poussin, but asserted by some to be the production of Romanelli. The most considerable of the later bequests is that of Lord Farnborough, which has added fifteen pictures to the Gallery, nearly all by Flemish and Dutch artists, including three by Teniers and two by Vandervelde; therefore furnishing specimens of that school, of which there were previously scarcely any, excepting those of Rubens and Rembrandt. The same number of paintings have been bequeathed by Lieutenant-colonel Harvey Ollney, most of which also belong to the above school, except four small ones, originally described as Watteau's, but now recognised as being by Lancret, an inferior artist.

From the great increase which has thus taken place within the course of a very few years, there is room for supposing that the liberality of private possessors will in time augment the collection very materially; still, if it be desirable on the one hand that such disposition should be encouraged, it is equally necessary on the other to guard against the indiscriminate acceptance of whatever may be gratuitously offered; since if due regard be not had to quality, the character of the entire collection will be endangered by the influx of mediocre and indifferent works, inferior specimens of the masters whose names they bear. The three pictures, for instance, presented by the duke of Northumberland are certainly not of that rank which would have procured their admission into the original Angerstein collection. It has also been complained that sufficient discretion has not been exercised with respect to purchases; for while extravagant sums have been paid in some instances, many works of equal or even greater merit have been rejected, although offered at reasonable prices. 'No specified sum is placed at the disposal of the trustees every year; but if any work of art is strongly recommended, a memorial must be sent to the Treasury, which is followed up by an application for the amount to parliament: the delay and the system effectually prevent merchants and others from negotiating with the trustees, as the doubt and perplexity are not to be compensated by the price demanded. In some instances pictures of the highest quality have been peremptorily refused, for what reasons we are unable to say. Two of the finest works by Salvator Rosa (Diogenes casting away his Cup, and Heraclitus sitting among the remnants of Mortality) were offered by the earl of Lauderdale, on the part of the late dowager-marchioness of Lansdowne, and refused: the individual who had the chief voice in rejecting them afterwards purchased them for the marquis of Westminster, for 1400*l.* If they were worthy to be placed in the Grosvenor Gallery, they would have been ornaments to the national collection.' (*Brit. and For. Rev.*, No. 17, 'Works of Art, &c. in England.') The writer just quoted asserts that the prices of all the subsequent purchases after that of the first collection have been extravagant, with the exception of those for the two Londonderry Correggios and the Murillo (the Holy Family), added to the Gallery in 1837. The three pictures more recently purchased of Mr. Beckford, viz. the Raphael (St. Catherine), the Garofalo, and the Perruzzi, originally cost that gentleman 3628*l.*, but have cost the nation 7000*l.*, or nearly double that sum, a price greatly disproportionate to their worth; which may also be said of that given for the Titian (Bacchus and Ariadne), purchased of Mr. Hamlet for 5000*l.* The same authority further assures us that, besides the instances above given, several opportunities of obtaining superior specimens at very moderate rates have been very inconsiderately neglected, in consequence of which many fine pictures, that might have been procured for the Gallery at a much lower cost than some of inferior rank have been, have either been sent out of the country or disposed of to private collectors. Among them was a fine specimen of Guercino (the Beheading of St. Catherine), purchased by Mr. Higginson for 350*l.*; a Bellini, Carlo Dolce, and a Correggio (greatly superior, it is stated, to the Virgin *au Panier* in the Gallery), which, with another picture, were sold to Mr. Wynne Ellis for only 1200*l.*, though the Correggio alone was worth double that amount. Again, an exceedingly fine work by Bonefaccio (the Adoration of the Magi), almost equal to Titian, might have been had for the inconsiderable price of 200*l.* It further appears that notwithstanding the exceedingly large sums they have cost, some of the pictures are not in that high condition which they ought to be. The Correggio (Virgin *au Panier*) has suffered very materially, and the Raphael (St. Catherine) has undergone much repairing by stippling in the flesh parts. Even the Raising of Lazarus, by Sebastian del Piombo, had in some places been damaged by time, but were so finely restored by West as almost to defy detection. With regard to the authenticity of some of the pictures there is also considerable doubt: Dr. Waagen pronounces the Lionardo da Vinci to be not by that master, but by Bernardino Luini; while, according to the writer in the 'British and Foreign Review,' it is by Andrea Solario; nor is the subject Christ disputing in the Temple with the Doctors, but Joseph interpreting Pharaoh's dream. Again, though so assigned in the catalogue, the story of Phineus is not by Nicolo Poussin, but Romanelli.

The following is a numerical synopsis of the collection at present (1839), arranged according to the principal schools:—

Italian:—Baroccio, 1; L. Bassano, 1; Bronzino, 1; A. Caracci, 9; L. Caracci, 3; Claude, 10; Correggio, 4; Canaletto, 3; Domenichino, 4; Ercole da Ferrara, 1; Mazzolino da Ferrara, 1; Garofalo, 1; Giorgione, 1; Guercino, 1; Guido, 3; Michael Angelo, 1; Mola, 3; Paduanino, 1; Parmegiano, 1; Pannini, 1; S. del Piombo, 3; N. Poussin, 8; G. Poussin, 6; Raphael, 2; Giul. Romano, 1; Sal. Rosa, 1; A. del Sarto, 1; Titian, 5; Tintoretto, 1; A. Veronese, 1; P. Veronese, 2; Da Vinci, 1:—(85). *Spanish:*—Murillo, 2; Velasquez, 1. *Flemish and Dutch:*—Both, 1; Cuyp, 1; Decker, 1; Van Goyen, 1; Van der Helst, 2; Jordaens, 1; Maes, 2; Van der Neer, 1; Pether, 1; Rembrandt, 7; Rubens, 7; Storck, 1; Steinwick, 1; Vandervelde, 2; Vandyck, 4:—(33). *French:*—S. Bourdon, 1; Lancret, 4. *English:*—Beaumont, 2; Beechey, 1; Constable, 1; Copley, 1; Gainsborough, 2; Hogarth, 7; Hoppner, 1; Housman, 1; Jackson, 1; A. Kauffmann, 1; Lawrence, 4; Reynolds, 8; West, 4; Wilkie, 2; Wilson, 2:—(38).

The specimens of the English school are far from numerous, and some of them by no means *chefs-d'œuvre* of the artists to whom they belong; but it is to be hoped that the Gallery will in time deserve the epithet of National, by exhibiting proofs of native and national talent. It would be well therefore if, by the occasional purchase of the finest productions of living talent, our artists were incited to apply themselves to works of higher aim and more sterling character than are required for distinction at an exhibition-room, and to look forward to a place in the Gallery as to a monumental niche in the temple of Fame. It will however soon become necessary to consider how space is to be provided for fresh acquisitions, since, although the collection can even now be considered only as the nucleus of what it eventually will and ought to become, the increase has been such that the portion of the building allotted to the Gallery is already filled with as many pictures as it can properly contain, since it consists of no more than five rooms altogether, and two of them of very moderate dimensions.

This brings us to speak of the edifice itself, which has been more severely and more illiberally censured, both for its external appearance and interior accommodation, than almost any other architectural work. In either respect it is undoubtedly very far from what it ought to be; yet although the censure has fallen almost entirely upon the architect alone, many of the defects complained of were forced upon him by the inconveniences attending the site, and other unfortunate circumstances, and it is therefore very doubtful whether, fettered by the same untoward conditions, any one else would have been able to do much better, at least as far as accommodation is concerned. Not only was the plan restricted to an inconveniently narrow slip of ground, but the alleged, yet by no means apparent, necessity of keeping as public thoroughfares two passages through the lower part of the building, has caused the ground-floor to be so divided that should occasion for so doing arise, it will be found impossible to form a spacious gallery of any kind, either for sculpture or paintings, in that part of the building. Again, the necessity for providing two distinct entrances and staircases, without the means of projecting out the latter at the rear of the building, has unavoidably caused all the centre portion, amounting to about one-third of the interior, to be so appropriated, which of course seems a very great loss of space, although the same space would not have been at all extravagant if the Gallery itself had been in proportion to it. Such a building as St. Martin's workhouse ought never to have been allowed to be any obstacle in the way of a suitable plan for the Gallery, more especially as it could easily be foreseen that though the accommodation at first provided might be amply sufficient, the time would arrive when it would be found altogether inadequate. Consequently what is now erected should have been understood to be only provisional, and Mr. Wilkins should have been instructed to have formed his plans with the view of the building being extended northwards, both at its east and west ends. How additions may be made is shown in one of the plans of the Gallery accompanying the 'Report from the Select Committee of Arts,' &c., viz. by continuing the present suite of rooms westward, at the rear of the houses on the north side of Pall-Mall East, where there might be a building upwards of 100 feet square, enclosing an inner court. But were government to give up the site of the adjacent barracks, the plan might be much more extensively enlarged, as there would then be space for erecting, in continuation of the present edifice, a series of galleries upwards of 300 feet in length, by nearly 200 in depth, which would give a line equal to about 1000 feet, doubled by the walls on each side. Even this might be still further extended by building other galleries intersecting the square or quadrangle enclosed by the outer ones; for supposing these latter 30 feet wide, they would leave an internal space or court 200 feet one way and 100 the other. (*Public Buildings of London*, by W. H. Leeds, vol. ii.)

There may be difficulties, but surely not insuperable ones attending the scheme here proposed, which while it would provide sufficiently numerous and spacious galleries, that would lose nothing of their effect by being approached through the present rooms, would be recommended by economy, because all such additional buildings would be entirely shut out from view externally, and therefore require no finish or regard to design on their outside. The increase of space so obtained would, besides, be double what is above stated, since that refers only to the upper floor, whereas there would be equal additional extent gained beneath it; which might be appropriated to a gallery of modern sculpture, there being nothing of the kind at the British Museum. Such a plan might be carried on by degrees, a single room or gallery on each floor being erected as it should become necessary to do so; and some classification as to schools, and also subjects and sizes, might be observed, which, if not of much importance at present, will require to be attended to when the collection shall have become much more numerous. There would then be opportunity for introducing in such new galleries that greater attention to architectural splendour and decoration which the public seem to demand; for almost every one has spoken most contemptuously of the present rooms, not only as insufficient in size, but as mean in appearance. One writer calls them 'little poking boxes,' another ('Br. and For. Rev.') says, 'they are beneath contempt: they display neither grandeur nor style.' Undoubtedly not, but then neither does anything of the sort appear to have been contemplated; and, at all events, the architect is not to be reproached for not having attempted more than he was allowed to perform. The architecture of the rooms is quite subordinate, almost negative; there is nothing whatever in them to please as mere architecture, nor is there anything whatever to offend; while the principal object, that of showing the pictures, has been satisfactorily accomplished.

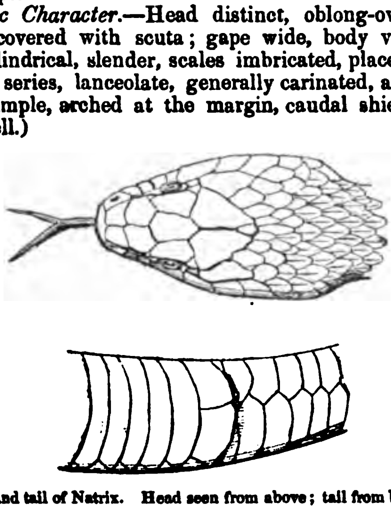
The exterior of the building has been criticised, or rather summarily condemned, with equal severity; and without any allowance being made for the difficulty thrown in the architect's way by his being under the necessity of making use of the columns formerly belonging to the portico of Carlton House. This seems to have cramped his design by limiting him as to the height of his portico, which he would else most probably have rendered a far more imposing and dignified feature by employing for it an order of larger dimensions, rising above the general height of the elevation as in the façade of the London University College; and had he done so, bestowing on that order a richer entablature than on the rest, together with a rather loftier pediment enriched with sculpture, and with statues on its acroteria, the dome, which is more of a blemish than an ornament in the design, might have been dispensed with, as the centre would have been sufficiently and more effectively distinguished, by its greater loftiness, without it. The entire extent of front is 460 feet, but this length is too much broken up into separate parts, and more so than would else probably have been done, it being required of the architect to set back the extremities in order that the east end of his building should not at all intercept the view of the portico of St. Martin's from Pall-Mall East; whereas had he been allowed to bring those parts as forward as the background of his portico, very much more space would have been obtained internally, and the end facing the church, which is now a very narrow and insignificant-looking bit, would have been considerably augmented. It is to be regretted, too, that the small windows at the sides of the entrances to the two thoroughfares were not got rid off, by being turned towards those passages; and perhaps a little more study and contrivance would have enabled the architect to dispense with those in that division of the façade from which the portico projects, and where they sadly cut up that mass. At all events, there would have been no difficulty whatever in entirely concealing the windows in the basement story, by merely continuing the podium as a low screen before them, with breaks forming pedestals for statues at intervals. By that means a deformity would have been got rid off, the ordinary dwelling-house look attending those kitchen-windows have been avoided, and an air of nobleness and richness, with some degree of novelty of design also, have been imparted to the whole façade. It is true, the rooms in the offices below would not have commanded the view they now do, yet that is a very minor consideration, and ought not to have been allowed to stand in the way of its being done. Fortunately however for such improvement it is even now not too late, since it may be carried into effect at any time without the slightest trouble or inconvenience. So also may the now empty niches be filled with statues; but there is no hope that anything will ever be done to remedy one prevalent and very serious defect, namely, the excessive poverty of the whole entablature, which renders it not only at variance with the richness of the columns, but insignificant in the general effect, whereas even some little exaggeration with respect to the depth of its members would have been allowable, if merely because a little more height might thus have been given. Notwithstanding these and other defects, some of which appear to have been forced upon the architect, there is much beauty in particular parts, especially the portico: but for further criticism on the building we must refer to the work above quoted, where elevations and plains of it will also be found. Plans of it have also been given in the 'Companion to the Almanac for 1837,' and the 'Penny Magazine,' No. 299. The latter publication also contains (Nos. 8, 12, 24, and 47) notices of some of the principal pictures. The building was begun in 1833 from the designs of W. Wilkins, R.A. (died August 31, 1839), and completed in 1837; and the first exhibition of the Royal Academy within its walls took place in 1838.

NATIONS, LAW OF. [LAW, p. 361.]

NATO'LIA. [ANATOLIA.]

NATRIX, Laurenti's name for a genus of *Colubridæ*, a family of snakes destitute of poison-fangs, and of which the common snake, *Natrix torquata* of Ray, may be taken as the example.

Generic Character.—Head distinct, oblong-ovate, depressed, covered with scuta; gape wide, body very long, nearly cylindrical, slender, scales imbricated, placed in longitudinal series, lanceolate, generally carinated, abdominal shields simple, arched at the margin, caudal shields biserial. (Bell.)



Head and tail of Natrix. Head seen from above; tail from below.

The *Common* or *Ringed Snake* is too well known to require description: the female is larger than the male. Its food consists of lizards, young birds, birds' eggs, mice, and more particularly frogs. The latter are generally captured by one of the hind legs, and in that case the prey is swallowed alive, and with the lower limbs and parts foremost, the head still continuing in its proper position, and disappearing last. During the operation of deglutition the cries of the frog are very distressing, and we have delivered more than one from its enemy—unfairly perhaps, in consequence of being attracted by the cries of the sufferer. The frog evidently remains alive for some time after it has been swallowed, in the course of which the jaws are dilated, and, so to speak, dislocated in order to allow of the passage of the disproportioned body to be conveyed into the stomach. Mr. Bell, who gives in his 'British Reptiles' a very accurate and clear account of the manner in which this operation is performed and the dilatation effected, states that he has heard a frog distinctly utter its peculiar cry several minutes after it had been swallowed by the snake. The same zoologist observes that the frog is generally taken by one of the hinder extremities, because the latter is most frequently in the act of fleeing from its pursuer when taken; and in that case, the prey, according to his experience, is swallowed as we have above described; but he adds, that if the frog be taken by the middle of the body, the snake invariably turns it by several movements of the jaws, until the head is directed towards the throat of the snake, when it is swallowed head-foremost. In taking lizards or birds, the snake, as far as Mr. Bell's observation goes, always swallows them head first. The same author gives a curious but painful description of an instance where two snakes had seized the same wretched frog, which, after a long and painful struggle, and some fighting between the snakes, was swallowed by the victor.

When the skin of the common snake has been just cast, it is a very beautiful serpent, and those who have seen it, as we have, gracefully swimming with elevated head and neck, and with the sun shining on its 'enamelled skin,' as it crossed the limpid water of some clear stream or little lake, will acknowledge its elegance and beauty. Mr. Bell has the following observations upon the subject of this change of the skin, which, as some misapprehension has existed on the subject, we proceed to lay before our readers. 'Snakes, like most other reptilia, shed their cuticle or outer skin at greater or less intervals. It is a mistake to assign a particular period to this process; some have stated it to occur once, some twice in the summer; but I have found it to depend upon the temperature of the atmosphere, and on the state of health, and the more or less frequent feeding of the animal. I have known the skin shed four or five times during the year. It is always thrown off by reversing it; so that the transparent covering of the eyes, and that of the scales also, are always found in the exuviæ. Previously to this curious circumstance taking place, the whole cuticle becomes somewhat opaque, the eyes are dim, and the animal is evidently blind. It also becomes more or less inactive, until at length, when the skin is ready to be removed, being everywhere detached, and the new skin perfectly hard underneath, the animal bursts it at the neck, and creeping through some dense herbage, or low brushwood, leaves it attached, and comes forth in far brighter and clearer colours than before.'

White and others have remarked an offensive power in this creature, that of 'stinking se defendendo,' as White describes it. He adds, 'I knew a gentleman who kept a tame snake, which was in its person as sweet as any animal while in good humour and unalarmed; but as soon as a stranger or a dog or cat came in, it fell to hissing, and filled the room with such nauseous effluvia as rendered it hardly supportable.' But this offensive odour, which is expelled from certain glands, is not emitted in self-defence alone. It is also said to be the concomitant of sexual excitement.

Reproduction.—Oviparous, as in the rest of the genus. The eggs, to the number of sixteen or twenty, are deposited in a connected chain in some dung-heap or warm situation, the connection being effected by a glutinous substance, and there left till the heat of the place or of the sun calls the young into life. In the museum of the Royal College of Surgeons (*Physiological Series*, No. 2708) is a preparation of a species of coluber, in which the ova in the ovaria are in an advanced state of development; the ovisac nearest the expanded anterior orifice of the left oviduct is near the period of discharging its contained ovum, and the longitudinal line is discernible, which indicates the place of the future rent by which it would have escaped. The cloaca is laid open; a bristle is placed in the termination of the rectum, behind which may be observed the semilunar fissure in which the oviducts terminate, and the bilobed prominence on which the ureters open. No. 2417 (the first illustration of the Ametabolian subclass, in which copulation is attended with intromission) exhibits the posterior part of the body of the *Common Snake* with the ventral integuments dissected off from the abdomen and tail, to show the testes and two penes *in situ*. The testes are small, slightly compressed, oblong bodies, situated anterior to the kidneys, the right about an inch in advance of the left, corresponding to the difference in the relative position of the kidneys; the penes, which consist almost wholly of a præputium or invertible sheath, and a small glans, are retracted within their subcaudal cells; bristles are inserted into the outlets of these receptacles, and pass into the cavities of the inverted præputia. The muscles which retract the penes and invert the sheaths are exposed as they pass backwards to their origins from the inferior spines of the caudal vertebræ. No. 2418 exhibits the termination of the abdomen and tail of a large *Coluber*, also prepared to show the male sexual organs. (*Catalogue*, vol. iv.)

Habits, &c.—The common snake commences its hybernation in some warm hedge, under the root of a tree, or other sheltered situation, about the end of autumn; and then they coil themselves up, sometimes in numbers, till the spring again brings them forth. Many instances of tame snakes have been recorded, and more than one has come under our immediate observation. Mr. Bell gives the following account, showing that these snakes may be made to distinguish those who caress and feed them. 'I had one many years since, which knew me from all other persons; and when let out of his box would immediately come to me, and crawl under the sleeve of my coat, where he was fond of lying perfectly still, and enjoying the warmth. He was accustomed to come to my hand for a draught of milk every morning at breakfast, which he always did of his own accord, but he would fly from strangers and hiss if they meddled with him.'

The following are the synonyms collected by the last-mentioned author: — *Natrix torquata*, Ray, Fleming, Jenyns, Bonaparte. *Coluber Natrix*, Linn., Shaw, Daudin, Turton. *Coluber torquatus*, Lacépède; *Natrix vulgaris*, Laurenti. *Tropidonotus Natrix*, Kuhl, Gray. *Ringed Snake*, Pennant. *Couleuvre à Collier*, Lacépède. It is the *Ringelnatter* of the Germans, and *Tomt-Orm*, *Snok*, and *Ring-Orm* of the *Fauna Suecica*.

The editor of the last edition of Pennant's 'British Zoology,' the Rev. L. Jenyns, and Mr. Bell, are all of opinion that the *Dumfriesshire Snake* of Sowerby's 'British Miscellany' is probably an immature variety of this species. The editor of Pennant seems however to be in doubt whether it is the young of the *Aberdeen Snake*, *Anguis Eryx*, or of the Natrix here treated of. But there can, we apprehend, be hardly any doubt that the Dumfriesshire Snake is the young of *Natrix torquata*. The *Aberdeen Snake* is nothing more than the *Slow-worm* or *Blind-worm*. [Blind-worm.]

Geographical Distribution.—Europe, 'from Scotland and the corresponding latitude of the Continent, to Italy and Sicily.' (Bell.)

With reference to the alleged inability of reptiles to live in Ireland, Mr. Bell says, 'I have already mentioned the existence of *Lacerta agilis* there, and with respect to the present species, the following is the result of my inquiries. It would appear not only that the common Snake is not indigenous to Ireland, but that several attempts to introduce it have totally failed. Mr. Ball some time since informed me of some trials of this kind.' Mr. Bell then prints the following letter from Mr. Thompson, which he had recently received, and which, as Mr. Bell observes, gives a very detailed and clear account of the actual facts.

'In this order (*Ophidia*) there is not now, nor, I believe, ever was there, any species indigenous to Ireland. In the Edinburgh "New Philosophical Journal," for April, 1835, it is remarked: "We have learned from good authority that a recent importation of snakes has been made into Ireland, and that at present they are multiplying rapidly within a few miles of the tomb of St. Patrick." I never,' proceeds Mr. Thompson, 'heard of this circumstance until it was published, and subsequently endeavoured to ascertain its truth, by inquiring of the persons about Downpatrick (where the tomb of St. Patrick is) who are best acquainted with these subjects, not one of whom had ever heard of snakes being in the neighbourhood. Recollecting that about the year 1831, a snake (*Natrix torquata*), immediately after being killed at Milecross, was brought by some country-people in great consternation to my friend Dr. J. L. Drummond, I thought this might be one of those alluded to; and recently made inquiry of James Clealand, Esq. of Ruth Gael House (county Down), twenty-five miles distant in a direct line from Downpatrick, respecting snakes said to have been turned out by him. I was favoured by that gentleman with the following satisfactory reply:—"The report of my having introduced snakes into this country is correct. Being curious to ascertain whether the climate of Ireland was destructive to that class of reptiles, about six years ago I purchased half a dozen of them in Covent Garden market in London; they had been taken some time, and were quite tame and familiar. I turned them out in my garden; they immediately rambled away; one of them was killed at Milecross,"—that alluded to as having been brought to Dr. Drummond,—"three miles distant, in about a week after its liberation; and three others were shortly afterwards killed within that distance of the place where they were turned out; and it is highly probable that the remaining two met with a similar fate, falling victims to a reward which it appears was offered for their destruction."'

To this Mr. Bell adds, that it certainly does not appear that the failure of these attempts to introduce snakes into Ireland is to be attributed to anything connected with the climate, or other local circumstances, but rather to the prejudices of the inhabitants; nor is there reason to believe that their absence from Ireland is other than purely accidental. (*British Reptiles.*)

Natrix torquata: Common or Ringed Snake.

NATROLITE. [Mesotype.]

NATRON, native sesquicarbonate of soda. [Sodium.]

NATRON LAKES are in a valley in the western desert which borders upon Lower Egypt running south-east and north-west between the calcareous ridge that skirts the western edge of the Delta and another parallel range which divides it from the Bahr-bela-ma. The Natron valley contains six lakes, remarkable for the great quantity of salt which they produce. The crystallizations are both of muriate of soda, or common salt, and of carbonate of soda, called natron or trona. The lakes are ranged in succession along the length of the valley, being separated from each other by barren sands; the whole occupy a length of about sixteen miles. The size of the respective lakes varies according to the season, and they are very shallow; the bottom is muddy, of mixed sand and clay. The lakes are supplied by water, which oozes out of the banks, chiefly on the side which is towards the Nile. It appears that the water flows abundantly when the Nile is high, and decreases with its decrease, until some of the lakes become quite dry. The banks of the lakes below the springs are covered with crystallizations. The natron is collected once a year, and is used both in Egypt and Syria, as also in Europe, for manufacturing glass and soap, and for bleaching linen.

There are three or four convents in the valley of the Natron lakes; their foundation is said to date from the fourth century of our æra; they are inhabited by Copt and Syrian monks, who are very poor and very ignorant. The valley itself is a barren desert.

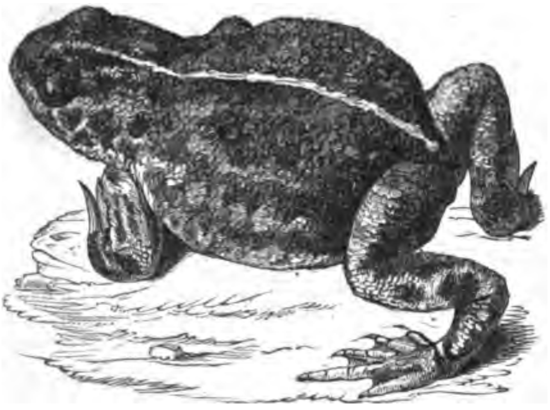
(Andreossi, *Mémoire sur la Vallée des Lacs de Natron.*)

NATTER-JACK, or **NATTER-JACK TOAD**, the English name for the *Bufo Calamita* of Laurenti. Its colour is light-yellowish inclining to brown and clouded with dull olive; but its most distinguishing mark is the bright-yellow line running along the middle of the back. The warts or glands on the body and the large glands behind the head are reddish; the under parts yellowish spotted with black, and the legs banded with black.

Sir Joseph Banks was the first who drew Pennant's attention to it as a British species: and the latter notices it as frequenting dry and sandy places, and as having been found on Putney Common and also near Revesby Abbey in Lincolnshire. The Rev. L. Jenyns records it as occurring in plenty on many of the heaths about London, as well as on Gamlingay Heath in Cambridgeshire, and in two or three localities in Norfolk. Mr. Bell (*British Reptiles*) states that he has found them in considerable numbers near ponds and ditches not far from Deptford, where they appeared to have congregated for the purpose of breeding. He observes that Dr. Fleming was not apparently aware of its being an inhabitant of Scotland, but Sir W. Jardine informed Mr. Bell that it is 'taken in a marsh on the coasts of the Solway Frith, almost brackish (certainly so in winter), and within a hundred yards of spring-tide high-water mark. It lies,' continues Sir William, 'between the village of Carse and Saturness (Southerness) Point, where I have found them for six or seven miles along the coast. They are very abundant.' The specimens sent to Mr. Bell by Sir W. Jardine were in every respect the same as those found in the neighbourhood of London. We long ago saw them frequently at Hillingdon near Uxbridge (Middlesex).

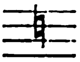
Pennant well describes the movements of the Natter-Jack. 'It never leaps, neither does it crawl with the slow pace of a toad, but its motion is more like running.' He says that its deep and hollow voice is heard to a great distance. Mr. Jenyns states that it spawns later in the season than the common toad. Mr. Bell gives the following dimensions:—

	Inches.	Lines.
Total length . . .	2	8
Length of fore leg . .	1	3
Length of hinder leg .	2	2



Natter-Jack.

NATURAL, a musical character, thus formed—



the use of which is, to make a sharpened note a semitone lower, and a flattened note a semitone higher; or, in other words, it brings into the scale of the natural key of C any note which had been made sharp or flat. But it must be observed, that the power of this character does not extend beyond the bar in which it appears, except where a lasting change of key is intended, in which case each natural placed at the clef removes a corresponding sharp or flat permanently, or until such sharp or flat shall be restored in like manner.

NATURAL ORDERS OF PLANTS. In classifying the vegetable kingdom according to the affinities of the species, it has been found necessary to collect together into groups such genera as have more resemblance to each other than they have to anything else, and to these the name of natural orders has been given. They constitute the foundation of all arrangements, and are wholly independent of the peculiar views which different writers have taken of the manner in which the vegetable kingdom should be otherwise classified; thus, while one author advocates the propriety of arranging Exogens by the modifications of their corolla, another by the insertion of their stamens, a third by what is supposed to be the progressive order of their development, and so on, the result of each of which methods is a different sequence of matter, the natural orders themselves remain unchanged. This being so, the study of their true limitation, and of the characters by which they are essentially distinguished, constitutes by far the most important branch of systematical botany, and accordingly we find that a large proportion of the natural orders yet founded are admitted without much difference of opinion. It must be obvious also to any one at all acquainted with such subjects, that in many cases there is in fact no room for discussion; as in the Apiaceous, Asteraceous, and Brassicaceous orders, or in Grasses, Sedges, and Orchidaceæ.

It is however sufficiently singular, that notwithstanding the general accordance of opinion that may be said to exist upon this subject in the majority of cases, no one should, as yet, have undertaken to prove what are really the essential characters by which natural orders ought to be distinguished, and what are unimportant or inapplicable to the limitation of such groups. In the absence of a settlement of this point, all that has yet been effected is, in its very nature, arbitrary and unsatisfactory, notwithstanding that it does appear to be, to a great extent, right; and there is an inconsistency and want of harmony in the different divisions of the natural system, which is most perplexing to the student. Up to the present time botanists have occupied themselves much more with searching for differences by which genera may be divided, than for resemblances by which they may be combined, a state of things which has proved advantageous to the science of botanical classification in its infancy, but which, if not corrected, will prevent its ever attaining maturity.

It is probable that such characters as the number of parts, the regularity or irregularity of flowers, the insertion of stamens, direction of ovules, and the presence or absence of particular organs, all which are at present considered of great importance, are so far from serving to separate plants into different orders, that they may be mere indications of a peculiar state of development in plants of the same order. Such orders as Myrtaceæ and Onagraceæ serve to place this in a striking point of view. In Myrtaceæ the stamens vary from an indefinite number in Myrtus to only 5 in the genus Bæckea: and from being polyadelphous in Calothamnus, to being distinct in Myrtus itself; the flowers are polypetalous in Myrtus, and apetalous in Eucalyptus; regular in the mass of the order, but irregular in Lecythis and its allies; the ovary is many-celled and many-seeded in Leptospermum, and one-celled with two seeds in Calytrix; altogether inferior in Eugenia, &c., and superior in the whole of the Leptospermeous division. In like manner in Onagraceæ, Œnothera has 8 stamens, and Hippuris one only; the flowers are polypetalous in the mass of the order, but apetalous in some Fuchsias; regular in the mass of the order, but irregular in Chamænerium; and the ovary is 2- or 4-celled in the greater number of genera, but 1-celled in Trapa, and in some plants referred to Haloragis. So, in like manner, is the position of the ovule within the ovary a character liable to much variation; for instance, among Urticaceæ, it is erect in Urtica, and pendulous in Dorstenia and Humulus; among Myrtaceæ, it is erect in Verticordia, peltate in Beaufortia; and among Onagraceæ, it is peltate in Epilobium, &c., erect in Circæa, and pendulous in Haloragis.

We ought therefore, in sound philosophy, to disallow all the differences just enumerated, as available for the discrimination of natural orders, and yet they are of constant employment. If they were disallowed, the effect would be to reduce very considerably the number of natural orders, and to limit the remainder in a more positive manner; an advantage of no little moment in the existing state of systematical botany, in as much as it would tend to simplify the distinctions of the orders, and to remove the numerous inconsistencies whose existence it is at present impossible to deny. Many prejudices would be violently shocked, but an entirely new light would be thrown upon the real nature of vegetable affinities; Corylaceæ would be brought into the vicinity of Combretaceæ, and Tamariceæ of Sali [illegible]; Begoniaceæ would be associated with Melastomaceæ; Solanaceæ and Scrophulariaceæ, Geraniaceæ, Tropeoleæ, and Limnanthaceæ, would be respectively consolidated, and many more such changes might be expected.

For the natural orders now admitted in the writings of botanists the reader is referred to EXOGENS and ENDOGENS and to the numerous names of orders introduced in their places in the alphabetical arrangement of this work.

NATURAL PHILOSOPHY. [PHYSICS.]

NATURALIZATION. [ALIEN; DENIZEN.]

NATURE, LAW OF. [LAW, p. 361.]

NAUCLE'RUS. [FALCONIDÆ, vol. x., p. 186.]

NAUDE', GABRIEL, born at Paris in the year 1600, displayed at an early age a great aptitude for philological and critical studies. In 1622-3 he studied medicine, but it was not till several years later that he took his doctor's degree in that science at Padua. In 1624 he made his first journey into Italy, and on his return to Paris he published his work, 'Apologie pour les grandes Personnages faussement accusés de Magie,' 1625. In 1631 he accompanied the papal nuncio Cardinal de' Bagni on his return to Rome, and was appointed his librarian. While he was at Rome the controversy concerning the authorship of the book 'De Imitatione Christi' began. [KEMPIS, THOMAS A.] The Benedictines claimed the authorship for one of their order, John Gersen, abbot of Vercelli; whilst the regular canons of St. Génévièye claimed it for Thomas à Kempis. Naudé, being in Italy, was requested to examine several MSS. of the work in question. His report was unfavourable to the claims of the Benedictines, who were much incensed against him, and accused him of bad faith. The affair then came before the courts in the shape of a charge of defamation; the suit lasted for years, and was at last compromised. In 1640 Cardinal de' Bagni died, and Naudé, after remaining some time with Cardinal Barberini, the nephew of the reigning pope Urban VIII., was recalled to Paris in 1642, and appointed librarian to Cardinal Mazarin. In this capacity he travelled through several parts of Europe to collect books and MSS. to enrich his patron's library, which was afterwards sold according to a sentence of the parliament of Paris, during the civil war of La Fronde, to the great sorrow of Naudé, who attempted to prevent what he considered an act of barbarism, 'Avis à Nosseigneurs du Parlement sur la Vente de la Bibliothèque du Cardinal Mazarin,' 1652. On receiving an invitation from queen Christina of Sweden, to be her librarian, Naudé went to Stockholm in 1652, where he was very well received. The climate of Sweden not agreeing with his health, he set out to return to Paris, but died on his way, at Abbeville, in July, 1653.

Naudé wrote numerous works in French and Latin, a catalogue of which is annexed to the 'Naudæana, ou Singularités remarquables prises des Conversations de M. Naudé,' 1701 and 1703; the latter edition is by Bayle. His principal works are—1, 'Instruction à la France sur la Verité de l'Histoire des Freres de la Rose Croix,' 1623, in which he shows the absurdity of the wonderful stories concerning the Rosicrucians, which had begun in Germany, and were then spreading into France. 2, 'Bibliographia Politica,' being a list of the principal writers upon politics, with his own remarks. 3, 'Avis pour dresser une Bibliothèque,' 1627. 4, 'Additions à l'Histoire de Louis XI.,' 1630. 5, 'De Studio Militari Syntagma.' 6, 'Jugement de tout ce qui a été imprimé contre le Cardinal Mazarin,' 4to., 1650. 7, 'La Marfore, ou discours contre les Libelles.' 8, 'Considérations politiques sur les Coups d'Etat,' Rome, 1639. Naudé says that he wrote this work at the request of and for the private perusal of his patron Cardinal de' Bagni, who however for his own convenience had twelve copies of it printed. The work was afterwards reprinted in Holland in 1667, and again in 1673, with comments by way of refutation, by L.D.M. (Louis Dumaz). The principles broached in this book are of a similar nature with those of the 'Principe' of Machiavelli. Among other things Naudé (in ch. iii.) approves of the massacre of St. Bartholomew, not on religious but on political grounds, considering the Huguenots as obstinate rebels, and says that the obloquy which has been thrown upon it is, 'because it was done only by half; for had all the heretics in France been cut off, the country would afterwards have enjoyed perfect tranquillity.'

Naudé was a man of irreproachable morals, of great learning, but self-opinionated and somewhat paradoxical. Father Jacob, in his 'Gabrielis Naudæi Tumulus,' 1659, has collected all the eulogies and epitaphs that have been written in his honour.

NAUMA'CHIA, the representation of a sea-fight among the Romans, which was sometimes performed in the Circus Maximus or amphitheatre, water being introduced sufficient to float ships, but more frequently in places made especially for the purpose, which were called Naumachiæ. Julius Cæsar appears to have been the first who gave a representation of a sea-fight on an extensive scale. He dug a lake in the Campus Martius for the purpose, which however was filled up in his life-time (Dion Cass., xl. 23; Suet., *Jul.*, c. 39, with Casaubon's note, and c. 43). Augustus also dug a lake near the Tiber for the same purpose, which was afterwards turned into a park or plantation ('*nemus;*' Suet., *Oct.*, 43; Tac., *Ann.*, xii. 56). Another lake was dug in the Campus Martius by Caligula (Dion Cass., lix. 10); but Claudius exhibited a naumachia on the lake Fucinus, now Celano. (Suet., *Claud.*, 21; Dion, lx. 33; Tac., *Ann.*, xii. 56.) The old naumachia (*vetus naumachia*), in which Titus is said by Suetonius (*Tit.*, 7) to have exhibited a sea-fight, has occasioned some dispute among the learned; some understanding it to be the Circus Maximus, and others the lake dug by order of Augustus (Ernesti on Suet., *Tib.*, 72). Domitian appears to have been the first who erected a building of stone around these artificial lakes (Suet., *Dom.*, 4, 5). Previous to his time the spectators appear to have sat upon wooden benches, which might be easily made to rise gradually above one another with the earth which had been dug out of the artificial lake. In later times the naumachiæ were usually surrounded with buildings like the amphitheatre or circus.

The ships which were engaged in these sea-fights were divided into two parties, which were called respectively by the names of different maritime nations, as the Tyrian and Egyptian fleets (Suet., *Jul.*, 39), the Sicilian and Rhodian (Suet., *Claud.*, 21), &c. The combatants, who were called Naumachiarii (Suet., *Claud.*, 21), were usually composed of captives or criminals, who fought to death, unless saved by the clemency of the emperor. These sea-fights were said to have been exhibited on such a scale of magnificence and splendour as almost to surpass our belief. In the naumachia exhibited by Nero there were sea-monsters swimming about in the artificial lake (Suet., *Nero*, 12), and Claudius caused a Triton, made of silver, to be placed in the middle of the lake Fucinus, who was made, by machinery, to give the signal for attack with a trumpet. (Suet., *Claud.*, 21.) In Domitian's naumachia the number of ships engaged was almost equal to two real fleets (*pæne justæ classes*, Suet., *Dom.*, 4); and in the sea-fight on the lake Fucinus, there are said to have been no fewer than 19,000 combatants. (Tac. *Ann.*, xii. 56.)

NAUMBURG, on the Saale, a very considerable town of Prussian Saxony, in the government of Merseburg, is situated in 51° 9′ N. lat. and 11° 40′ E. long., at a short distance from the junction of the Unstrutt with the Saale. It consists of the town itself, the liberties, and three suburbs. There are several remarkable buildings in this city, especially the churches. The cathedral (in the liberties), founded in 1028, is an interesting specimen of old German architecture; its antient monuments, altars, statues, carved work, paintings, are well worthy of observation. Connected with the cathedral are residences of the canons. The church of St. Wendel (which has a celebrated organ, and many fine paintings, one of which is by L. Cranach, 'Christ blessing the little Children') and the church of St. Maurice, with the monument of bishop Richwins, are likewise interesting. Among the other public buildings, the principal are the court of justice, the town-hall, the gymnasium (or cathedral school), and the city school. Besides the above, there are two churches, two orphan houses, six hospitals, and several schools.

Naumburg is the seat of the chapter, of the supreme tribunal for the governments of Merseburg and Erfurt, of several supreme courts of justice, a tribunal of commerce, &c. Naumburg is a very thriving town; the inhabitants, now above 12,000, carry on manufactures of woollens, linen, stockings, gloves, and leather; starch, white-lead, soap, vitriol, aquafortis, vinegar, beer, and brandy are made both for the consumption of the surrounding country and for exportation to foreign parts. Wine produced in the vicinity is a considerable article of trade; the red is better than the white, and is often sold as French. There are a few houses that carry on very extensive dealings n wool. There are two annual fairs, one in June, instituted in 1514, by the emperor Maximilian I.; the other, in December, instituted in 1818, by the king of Prussia. These, and three other annual cattle and horse fairs, contribute greatly to the prosperity of the town. An interesting ceremony, called the Kinderfest (*i.e.* the children's fête), is annually celebrated in commemoration of an attack made on the town on the 28th of July, 1482, by the Hussites under Procopius. On that day, by the advice of a citizen named Wolf, all the children, dressed in shrouds, each carrying a lemon and a green bough, went out of the city to beg mercy for their parents and for the city. Procopius, who had threatened utterly to destroy the town and the inhabitants, because the late bishop had voted at the synod of Köstnitz for the death of John Huss, was so affected that he raised the siege. Though the memory of this event has been handed down for above 300 years, some modern historians have doubted the fact. On the 5th of November, 1632, the great Gustavus Adolphus here took his final leave of his queen before the battle of Lützen.

(Müller, *Handbuch;* also local descriptions by Lepsius, 1822; and Kratsch, 1827.)

NAUPACTUS. [LOCRIS.]

NAU'PLIA. [NAPOLI DI ROMANIA.]

NAU'PLIUS. [BRANCHIOPODA, vol. v., p. 340.]

NAU'TILIDÆ, or NAUTILA'CEA, according to Lamarck, the sixth family of his *Polythalamous Cephalopoda*, consisting of the genera *Discorbites*, *Siderolites*, *Polystomella*, *Vorticialis*, *Nummulites*, and *Nautilus*. To these Mr. G. B. Sowerby, jun. adds *Simplegas* and *Endosiphonites*. In the system of M. de Blainville it is the fifth family of his *Polythalamacea*, and comprises the genera *Orbulites*, *Nautilus*, *Polystomella*, and *Lenticulina*.

NAU'TILUS, a genus of cephalopods with polythalamous or chambered shells, established by Linnæus, who gave the following as the generic character: '*Animal* ('Rumph. Mus.,' t. 17, f. D) *Testa* univalvis, isthmis perforatis concamerata, polythalamia.' And he divided the genus into

Spiral *rounded.*

In which section he placed the species *N. Pompilius*, *Calcar*, *Crispus*, *Beccarii*, *rugosus*, *umbilicatus*, *Spirula*, and *semilituus*. Of these, all, except *Nautilus Pompilius*, and *N. Spirula*, the latter of which is separated as a cephalopodous genus under the name of *Spirula*, are minute chambered shells, for the most part from the Adriatic Sea.

* *

Elongated, suberect (erectiusculi).

In this section the species are *obliquus*, *Raphanistrum*, *Raphanus*, *Granum*, *Radicula*, *Fascia*, *Sipunculus*, *Legumen*, *Orthocera*. Of these, all but *Orthocera* are minute, and from the Adriatic and Mediterranean. *Orthocera*, now established as a fossil genus of cephalopods under the name of *Orthoceras*, though described by Linnæus as fossil, seems to have been considered by him as not without a living analogue; for he writes,—'Habitat in alto Pelago; Fossilis:' and he has the following observation:—'Testa frequentissima petrificata in montibus nostris calcareis, inter omnia fossilia nobis nota sæpe longissima, *non dum visa immutata.*'

Lamarck thus characterises the genus *Nautilus* —

Shell discoid, spiral, multilocular; with simple walls (à parois simples). Whorls contiguous; the last enveloping the others. Chambers numerous, formed by transverse partitions (cloisons), which are concave towards the side next to the aperture; their disk perforated by a tube, and their edges very simple.

Lamarck records only two species, *Nautilus Pompilius* and *N. umbilicatus*. For the animal he refers to Rumphius and Denys de Montfort.

Cuvier observes, in his last edition of the 'Règne Animal,' that Linnæus united in his genus *Nautilus* the genera *Spirula* of Lamarck, and the *Nautili, properly so called.* Of the latter he remarks that they have a shell differing from that of the *Spirulæ*, inasmuch as the laminæ increase very rapidly, and the last whorls touch, but envelop the preceding whorls. The siphon, he adds, is in the middle of each septum. He refers to the *Nautilus Pompilius* of Linnæus as the species most known, and he refers to Rumphius for the animal, observing however, in a note, that the figure of Rumphius is not to be deciphered (indéchiffrable), and that it is matter of wonder that the numerous naturalists who have visited the Indian Seas have not examined or captured so curious an animal, and one which belongs to so common a shell.

M. de Blainville thus describes the genus:—

Animal having the body rounded, and terminated behind by a tendinous or muscular filament, which attaches itself in the siphon with which the chambers of the shell are pierced; mantle open obliquely, and prolonging itself into a sort of hood above, the head provided with tentacular appendages, which are, as it were, digitated, and surrounding the aperture of the mouth.

Shell discoid, but little compressed, with the back rounded or subcarinated, umbilicated or not, but never mammellated (mamelonée); the chambers simple, invisible externally; the last deeply hollowed and pierced by one or two siphons.

The same zoologist thus divides the genus.

A.

Species not umbilicated; back rounded; aperture round a single, subcentral siphon.

Example, *Nautilus Pompilius*, Linn.

B.

Species not umbilicated, with a carinated back and angular opening. (*Angulithes*, De Montf.)

Example, *Nautilus triangularis.*

C.

Umbilicated species, with the back rounded and a single siphon. (*Oceanus*, De Montf.).

Example, *Nautilus umbilicatus.*

D.

Umbilicated species, with the back rounded and two siphons. (*Bisiphites*, De Montf.)

Example, *Nautilus Bisiphites.*

M. Rang, under the genus *Nautilus* of Linnæus, places also *Aganides*, *Angulithes*, *Canthropes*, *Oceanus*, *Bisiphites*, and *Ammonites* of De Montfort. All De Montfort's genera, except Oceanus and Ammonites, are fossil only: the former he describes as coming from the Moluccas. It is, as far as one can judge from the figure, a very young shell, possibly the young of *Nautilus Pompilius*. *Ammonites* is described as coming from the China Seas, and is, apparently, a specimen of *Nautilus umbilicatus*. De Montfort considers it as the type of a species of *Ammonites* analogous to the Ammonites, or *Cornua Ammonis* 'à cloisons unies.' He further says that he possessed a superb petrification of this Ammonite a foot in diameter.

M. Rang gives the following generic character of Nautilus·—

Animal bursiform, lodged partially in the last chamber of the shell, furnished posteriorly with an appendage or particular organ, destined to traverse all the chambers, and placed in a siphon, which serves it as a sheath; mantle prolonged above the head, which is furnished with a great number of sessile arms surrounding the mouth.

Shell discoid, regularly spiral, rolled on the same plane, embracing or not, with contiguous whorls; siphon central, or placed 'contre le retour de la spire.'

The animal, he says, is only known from the figure of Rumphius, which leaves so much to be desired. He divides the genus into two subgenera.

I. Subgenus. Nautili, properly so called.

Animal, as described in the generic character.

Shell with a spire either embracing or not; chambers united (unies); siphon central, or approximated to the penultimate whorl of the spire, without being contiguous to it.

1st group.

Spire embracing (Genera—*Nautilus*, *Angulithes*, *Oceanus*, De Montf.).

Nautilus Pompilius, &c.

2nd group.

Spire exposed (à découvert)—(*Ammonites*, De Montf.).

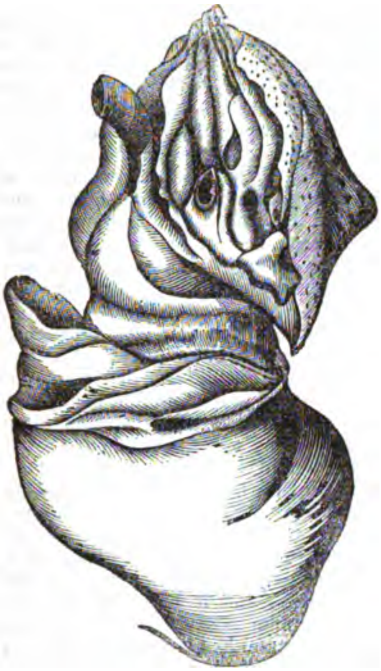
Nautilus umbilicatus, &c.

II. Subgenus (*Aganides*, De Montf.).

Animal unknown.

Shell with an embracing spire; partition disunited by two interior prolongations of its borders; siphon touching the penultimate whorl of the spire.

All the descriptions of the animal above given seem to have been taken from the figure of Rumphius. We therefore give a copy of this figure, which represents the animal in a supine position. The general form is not inaccurate, but the details are confused; and many of them incorrect, the funnel for instance, which is erroneously represented as round. That which an ordinary spectator would take for the eye, is merely an opening between the digitations: the mantle is torn, and so represented as to mislead the spectator.



Animal of Nautilus Pompilius, from Rumphius.

The following is the description of Rumphius, and it has much more merit than his figure:—

'The fish that inhabits this shell (the Nautilus) is a species of Polypus (*i.e.* Cephalopod; *πολύπους*, Aristotle; *Poulpe*, French), but of a particular aspect, moulded according to the concavity of the shell, which it does not quite fill when it holds itself retracted therein.

'The posterior part of the body fits into the bottom of the cavity, while the superior parts (which are inferior when the animal drags itself along the bottom) are flattened, but also rounded off, plaited, and of cartilaginous texture; coloured with brown or washed with red; spotted with blackish marks, which run one into another, as in the Cuttle-fish (*Veelvoet*). The posterior part of the body, which presses against the shell below the convexity (kiel), and which, in its progression, becomes the superior part, is also a little cartilaginous, but not so much so as the anterior parts, which are covered with a number of cavities (wratten).

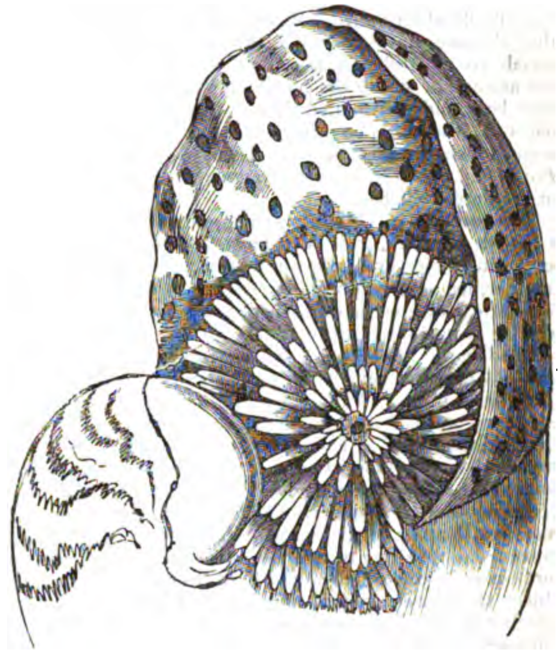
In the middle of these parts, in front of the head, there is a considerable lump of little feet, which terminate in fleshy processes laying one over another, and which cover the mouth on each side: these processes are formed like the hand of a child. The largest, or those which are exterior, are terminated by twenty of these fingers or little feet, each as long as half a finger, as thick as a straw, round, smooth, having none of those suckers we see on the feet of the Cuttles, but a little flattened or divided at the end. The great fleshy processes are succeeded by others, which are shorter, and have only sixteen fingers, and these are followed successively by others still shorter, which go on covering even to the mouth.

'The animal can retract or elongate these fingers at will, for they not only serve as feet to creep withal, but also as hands to seize his prey and carry it to the mouth. This mouth is armed by a very hooked beak, formed like that of a Coccatoo or a Seacat (Sepia?). The upper beak is large, hooked, dentated on the edge; the lower beak is small, concealed, or, as it were, shut up in the upper. Both sharp, and calculated to pierce flesh (*vleesch*). This beak is hard as bone, and its colour of a blackish-blue, surrounded by circular lips of a white colour, fleshy or parchment-like. These are produced sometimes so as to cover entirely the beak, which at other times is almost entirely concealed by a gelatinous deposition, and by the multitude of feet which surround it, so that it cannot be seen without violent means being used.

'The eyes are placed a little low down, laterally disposed, very large, large as beans, without an inferior eyelid, pierced in the middle; but we cannot find the lens (oogappel), they are filled with dark-brown blood.

'From the hinder part of the body, to wit, that which rests upon the last partition, goes a long artery (ader) through all the partitions and through all the chambers, even unto the extremity of the spire, the middle hole to which the fish hangs fast to the shell: excepting this part, the chambers are entirely empty, and it breaks readily when the fish is drawn out. Under the beak (snuit) is a half pipe (canal) of a rounded form, one side rolled over the other, of a whitish flesh, like as in the Sea-cat (Sepia), and in this is concealed a sort of tongue. It is most likely the same canal as that by which the Zeekat ejects its black blood.' (*Rariteit-Kamer*, book ii.)

This figure and description warmed the imagination of Denys de Montfort, who published a ludicrous representation of the supposed animal seated in its shell, and expanding its hand or sail. This has been copied by Shaw; and as it has been published by that zoologist in his Lectures, we give a copy of the monster, which was meant to pass current for the inhabitant of the shell.



Supposed animal of Nautilus Pompilius. (Denys de Montfort and Shaw.)

It will be now necessary to go back to the earlier authors, and to inquire whether this animal was known to them. After reading the following passages, few will hesitate to concede that it was known to the father of natural history.

Aristotle (*Hist. Nat.*, iv. 1), after well describing the different *μαλάκια* (naked cephalopods), says, 'There are also two Polypi in shells; one is called by some *Nautilus*, and by others *Nauticus*. It is like the *Polypus;* but its shell resembles a hollow comb or pecten, and is not attached. This Polypus ordinarily feeds near the shore; sometimes it is thrown by the waves on the dry land, and the shell falling from it, it is caught, and there dies. These are small, and in form like the *Bolitænæ'* (cephalopods probably, of the form of which *Eledone móschata* is the type). 'And the other,' continues Aristotle, 'is in a shell, like a snail; and this does not go out of its shell, but remains in it like a snail, and sometimes stretches forth its arms (or cirri, *πλεκτάνας*) externally.'

The first of these Polypi is evidently the *Nautilus* or *Pompilus* of Pliny and other antient writers, the *Argonauta* of Linnæus and the moderns, which is treated of in this work under the title PAPER NAUTILUS.

The second, to which the term *Pompilius* is now exclusively applied, is, as evidently, the *Nautilus* of Lamarck, to which genus alone this article will be confined.

Belon figured the shell of the animal, now termed *Nautilus Pompilius* (and we believe that his figure is the first that appeared) under the name of *Nautilus alter seu secundus;* but it seems clear that he was unacquainted with the soft parts. *Rondeletius*, apparently confounding Aristotle's two genera of Polypi, seems to refer the animal of the first to the shell of the second; and dwells on the impossibility of so delicate and feeble an animal dragging about so heavy a shell.

Gesner relates that 'Jo. Fauconerus,' a celebrated physician of England, formerly gave him the picture of a *Nautilus*, with a written description (by letter). This description Gesner gives; and it is not improbable that the soft parts there described may have been those of *Nautilus Pompilius* (it is clear that the shell was); but the account is so obscure and brief that there is room for doubt, though the term *velum* is used, which would hardly be applicable to the palmated arms or *vela* of the other kind.

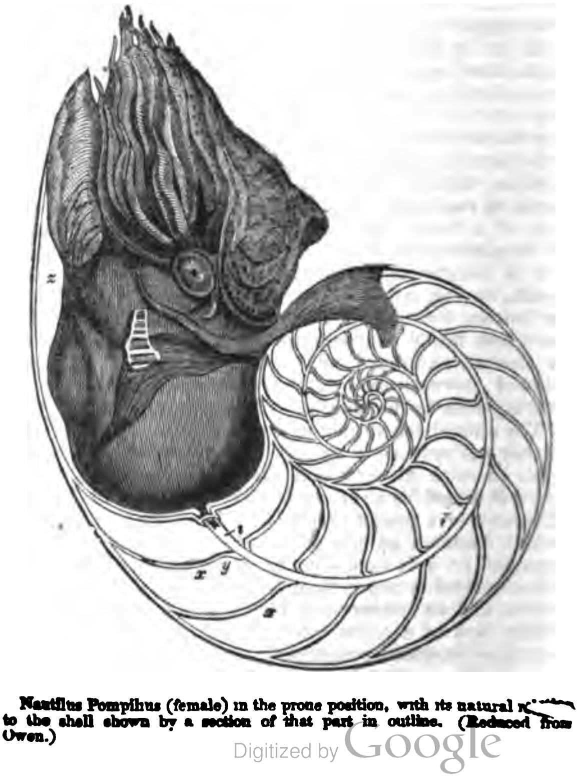
We now return to the period which followed the publication of Rumphius's figure; and for many years no further information was obtained, though special directions were given by the French and other nations to collectors to be assiduous in procuring the soft parts. These directions were given in vain, and all was conjecture. Fragments even of molluscous animals were caught at and published as probable parts of this much desired animal; and MM. Quoy and Gaimard published their 'Description d'un Fragment de Mollusque inconnu, presumé être celui du Nautile flambé' (Nautilus Pompilius, Linn.), with figures, in the 'Annales des Sciences Naturelles' (vol. 20). The materials are not sufficient to come to any safe conclusion as to the animal, of which the fragment was a part; but it may *now* be confidently denied that it is any portion of the soft parts of *Nautilus Pompilius*. The parenchyma of the fragment indeed is said to have been identical with that of *Firola* and *Carinaria*. This fragment is preserved at Paris in the Jardin du Roi.

The recovery of this interesting animal was reserved for a British voyager; and its structure has been demonstrated and illustrated by Professor Owen in a most masterly manner, leaving nothing to be wished, excepting that some fortunate collector may speedily capture a male specimen, and put it into his skilful hands.

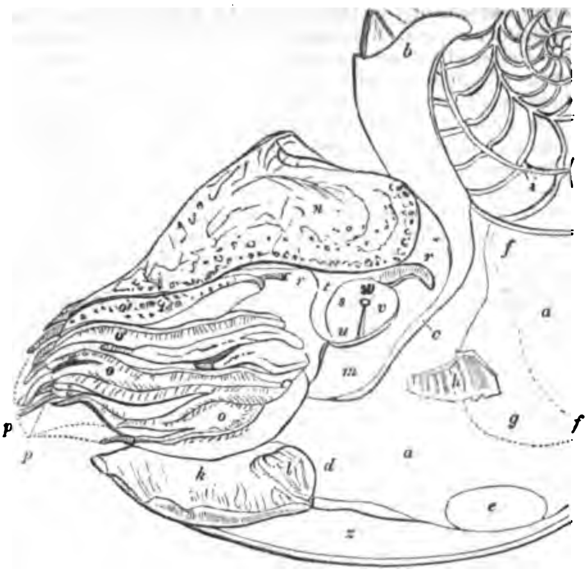
Mr. George Bennett, F.L.S., a member of the Royal College of Surgeons, thus describes the capture of this interesting animal in his 'Wanderings in New South Wales,' &c.:—'It was on the 24th of August, 1829 (calm and fine weather, thermometer at noon 79°), in the evening, when the ship Sophia was lying at anchor in Marakini Bay, on the south-west side of the island of Erromanga, one of the New Hebrides group, Southern Pacific Ocean, that something was seen floating on the surface of the water at some distance from the ship; to many it appeared like a small dead tortoise-shell cat, which would have been such an unusual object to be seen in this part of the world, that the boat which was alongside the ship at the time was sent for the purpose of ascertaining the nature of the floating object. On approaching near it was observed to be the shell-fish commonly known by the name of the Pearly Nautilus (*Nautilus Pompilius*); it was captured and brought on board, but the shell was shattered, from having been struck with the boat-hook in capturing it, as the animal was sinking when the boat approached, and had it not been so damaged it would have escaped. I extracted the fish in a perfect state, which was firmly attached to each side of the upper cavity of the shell. On being brought on board, I observed it retract the tentacula still closer than before, and this was the only sensation of vitality it gave after being caught; I preserved the soft parts immediately in spirits, after making a rude pen-and-ink sketch of its form. On breaking the lower part of the shell, the chambers or cavities were found filled with water. The *hood* has been stated by Dr. Shaw (*Lectures*, vol. ii., p. 165) as being of a pale reddish purple colour, with deeper spots and variegations; the colour however, as it appeared in this recent specimen, was of a dark reddish-brown, in fact, resembling the colour produced by the *Koka* on the stained cloth of the Tongatabu natives, intermingled with white. We had fine weather; light winds and calms a day or two previous to this animal being caught.' After noticing the incorrectness of Shaw's figure (which, as we have above noticed, was copied from those given by Denys de Montfort), and the greater general accuracy of that of Rumphius, Mr. White informs us that this species is called *Kika*, *Lapia*, and *Krang Modang* by the natives of Amboyna; and *Bia papeda*, *Bia cojin*, by the Malays. He then adverts to another instance of the capture of this animal, by an officer of H.M.S. Ariadne, on a reef at the island of Pemba near Zanzibar, on the east coast of Africa, in 1824. The animal was not floating upon the water, but was in a hole on the reef, and the officer did not recollect which part of the shell was uppermost. The mantle, like a thin membrane, covered the shell, and was drawn in as soon as it was touched, when the shell was displayed. 'I and others,' said this officer to Mr. Bennett, 'when it was first seen, did not notice it, regarding the animal, as the membrane enveloped the shell, merely as a piece of blubber; but having touched it by accident, the membranous covering was withdrawn, and we soon secured our beautiful prize. The fish was a large mass attached to the shell, which we soon extracted and threw away, *as we only wanted to collect shells*.' The same officer compared the mantle to what he had subsequently seen covering the shells of the *Harps* [ENTOMOSTOMATA, vol. ix., p. 455] and *Cowries*. [CYPRÆIDÆ.] Mr. Bennett states that a section of the shell captured by him was afterwards made on board, but none of the appearances, nor whether air or water was contained within, could be recollected. A mate of a whaler, who had been shipwrecked upon the Feejee Islands in the South Pacific, and had resided among that group for nearly three years, told Mr. Bennett that he had seen the shell of the *Pearly Nautilus*, containing the living animal, floating on the water near one of the islands. He had only seen two living, although the empty shells were very numerous among the islands. The first he saw when in a canoe with some other shipwrecked Europeans; it was then floating on the surface of the water with the mouth of the shell uppermost. It was enveloped in the mantle, which extended some distance upwards, and over the whole of the shell; and it had such an appearance as caused one of the men to say, 'There is a large piece of blubber upon the water.' On approaching it the animal, retracting the mantle, displayed the beautiful striped shell, and sank before they could capture it. (G. Bennett, *Wanderings*, vol. ii.)

The specimen captured by Mr. Bennett is preserved in the museum of the Royal College of Surgeons in London, and has produced the admirable 'Memoir on the Pearly Nautilus (*Nautilus Pompilius*, Linn.), with illustrations of its external form and internal structure,' published by direction of the council of the college, a summary of which we shall endeavour to lay before our readers.

The external form, of which an elaborate description is given, for which we must refer our readers to the 'Memoir' itself, will be collected from the following cuts, which are reduced from Professor Owen's figures.



Nautilus Pompilius (female) in the prone position, with its natural r[illegible] to the shell shown by a section of that part in outline. (Reduced from Owen.)



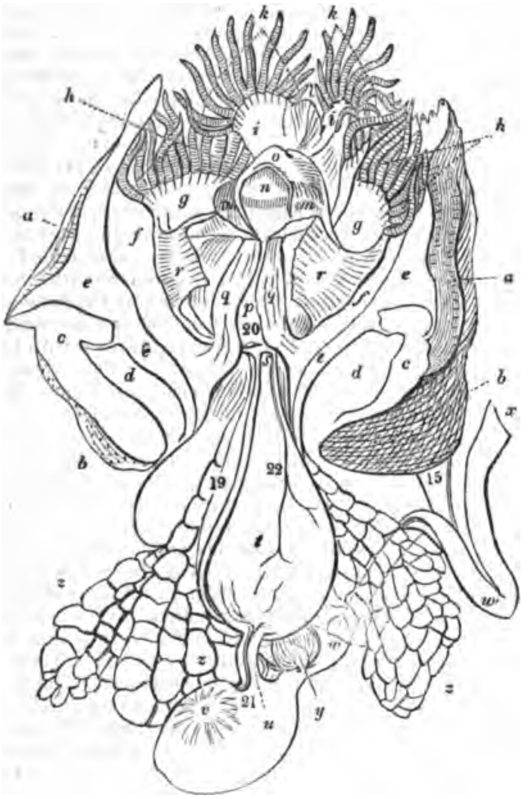
The same, with the animal as well as a part of the shell in outline, explanatory of the parts, on a larger scale. (Reduced from Owen.)

a a, the mantle; *b*, its dorsal fold, applied to the involute convexity of the shell; *c*, its free anterior margin; *d*, the orifice for the passage of the funnel; *e*, the convexity produced by the ovarian gland; *f f*, the horny girdle for the adhesion of the mantle to the shell; *g*, the horny laminæ covering the extremity of the left shell-muscle; *h*, a portion of the shell, which was left adhering to this muscle; *i*, the membranous tube or siphon, which traverses the testaceous tubes in the camerated portion of the shell; *k*, the funnel; *l*, the left lateral process of the funnel; *m*, the left crus or pillar of the funnel; *n*, the hood, or ligamento-muscular disk that surmounts the head; *o o*, the exterior digitations on the left side; *o'*, the larger one, with a papillose surface like that of the hood; *p p*, the digited tentacles, protruded from their sheaths; *q*, the groove which separates the hood from the papillose digitation; *r r*, the ophthalmic receptacles; *s*, the eye; *t*, its peduncle; *u*, the inferior ridge, or rudimentary eyelid; *v*, the ridge running from this to *w*, the pupil; *x x x*, the partitions of the chambers; *y y y*, the septal tubes, which give passage to the membranous siphon; *z*, the chamber of occupation. (Owen.)

Professor Owen thus concludes the elaborate description to which our limits have compelled us to refer our readers:—'From what has been already said, it will be seen how considerable are the external differences between the *Pearly Nautilus* and the higher *Cephalopods*; nevertheless its general plan of organization renders its claim to rank with them indisputable; and as its locomotive apparatus is confined to the head, the received denomination of the class remains undisturbed by its admission. The inferior or ventral pair of labial processes I consider as analogous to the superadded pedunculated arms of the Cuttle-fish and Calamary, which also come off more internally than the shorter arms, and are approximated or united at their bases on the ventral aspect of the mouth. The other pair in *Nautilus* appear to result from a higher degree of organization of the part analogous to the external lip in the preceding genera. The curtailed digitations are however but feeble representatives of the elongated and cotyligerous arms of the Poulp or Cuttle-fish; and the retractile tentacles, pedicellate eyes, and flattened disk, which, according to the testimony of Rumphius, is applied to the ground in the progressive motions of the animal, attest an obvious tendency towards the *Gasteropoda*. And while tracing these examples of affinity with the different and heretofore widely spread groups of *Mollusca*, between which this remarkable form, I apprehend, is osculant, there may also be perceived in the whole of this singular but at the same time regular and symmetrical arrangement of the palpigerous organs about the mouth, an analogical relation to the higher *Annulosa*.'

Before Mr. Owen enters upon *the Muscular System*, which is described carefully and in detail, he notices what he aptly terms the internal skeleton or frame-work from which its principal masses take their origin. Like that of the *Dibranchiate Cephalopods*, this skeleton, according to Mr. Owen, is cartilaginous, yields readily to the knife, and in texture and semitransparency closely resembles the cartilage which constitutes the skeleton of the Skate. In *Sepia*, he observes, this cartilaginous part completely encircles the œsophagus, and on the dorsal aspect of that tube is dilated into a large cavity, which contains the brain; but in *Nautilus* the circle is incomplete behind, and the brain is protected only by its membranous sheath.

Digestive System.—The jaws are two, endowed with a vertical motion, and in form resembling a parrot's bill reversed, the upper mandible being encased in the lower when they are closed. Posteriorly they are adapted to a muscular basis, to which they owe their motions. 'Thus far,' continues Mr. Owen, 'they resemble the mandibles of the *Dibranchiate Cephalopods*; but they are not composed entirely of horny matter, nor are they uniformly of a brown or black colour, their extremities being of a dense calcareous nature, and of a bluish-white colour; they are also less pointed at the end, and the oval margins of the lower mandible are notched and dentated.' They are larger in proportion than in the Cuttle-fish. Mr. Owen proceeds to state that the calcareous extremities of both mandibles are of a hardness apparently adequate to break through the most dense crustaceous coverings, or even shells of a moderate thickness. The extremity of the upper mandible is sharp-pointed, and solid to the extent of five lines from the extremity; but in the lower one the calcareous matter is deposited on both sides of a thin layer of the black horny substance, and thus a combination of tough with dense matter is obtained, which much diminishes the liability to fracture. This mandible is also more hooked than the upper one, but is more obtuse at the end. 'It seems,' observes Mr. Owen, 'from its dentated margin, evidently intended to break through hard substances, whilst the sharp edges of the beak of the Cuttle-fish better adapt it for cutting and lacerating the soft bodies of fish.' In the particulars here stated the mandibles of *Nautilus* differ, as Mr. Owen remarks, from those of every other known species of recent *Cephalopods*. The circular lip which surrounds the jaws is much deeper than in the Cuttle-fish, and the jaws are provided with four retractor muscles, and one for protrusion. The tongue is large, and supported by an oblong horny substance. The fleshy substance is produced anteriorly, and forms three caruncles, which are very soft in texture, and beset by numerous papillæ, having all the characters of a perfect organ of taste. The anterior extremity of the horny substance is embraced by a pair of retractor muscles, which arise from the posterior margin of the lower mandible, and four delicate retractor or depressor muscles are inserted into the anterior or terminal caruncle. Behind the caruncles the dorsum of the tongue is encased with a thin layer of horny matter, from which arise four longitudinal rows of slender recurved prickles between one and two lines in length, the same in number as the labial tentacles, viz. 12. There is an analogous structure in the *Cephalopoda* and in many the *Gasteropoda*. 'The necessity of such a structure,' says Mr. Owen, 'becomes very apparent in the *Pearly Nautilus*, if, as Rumphius has asserted, it creeps with the shell uppermost; since in that case the tongue, having its position reversed, would be opposed instead of being assisted by gravitation while regulating the movements of the food in the mouth. And it is worthy of remark that in the Flamingo, which turns the upper mandible to the ground while taking its food, the tongue is similarly armed with regularly developed recurved spines, calculated, as in the *Pearly Nautilus*, to rake the alimentary morsels towards the fauces.' [FLAMINGO, vol. x., p. 293.] Behind the horny parts the tongue again becomes soft and papillose, but the papillæ are larger and coarser. The only traces of a salivary system detected were in two broad fleshy processes projecting forwards from the sides of the fauces: they were papillose, and perforated in the middle of their inner surfaces by a small aperture which led into a glandular cavity between the folds of the membrane, and from these cavities an opaque whitish substance could be expressed. In the *Dibranchiate Cephalopods* these glands are remarkably developed. The alimentary canal, which was filled with the fragments of crustaceans, was everywhere connected to the parietes of the abdomen by numerous filaments; the only trace of a mesentary existed between the last two portions of the intestine, which were connected together by the ramifications of an artery and vein. Among the crustaceous fragments, portions of branchiæ, claws, and palpi were distinctly recognised, so as to leave no doubt that the greater part of them had belonged to a *Brachyurous Decapod* of a hirsute character, and not a swimmer. The crop, which was capacious and pyriform, was tensely filled with these fragments, and Mr. Owen remarks that the capability of propelling such rude and angular particles through a narrow canal into the gizzard without rupturing the tunics of the preparatory cavity is not one of the least extraordinary examples of the powers of living matter. The gizzard very much resembles that of a fowl, as it does in *Octopus*. A globular cavity communicates with the intestine at a little distance from the pylorus, and its reception of the biliary secretion renders it in some measure analogous to a gall-bladder; but Mr. Owen thinks that its chief use is probably to pour into the commencement of the intestinal canal a fluid necessary for digestion; so that, like the laminated and spiral cœcum of the higher *Cephalopods*, and the pyloric appendages of fish, it is essentially a simple form of pancreas. The interior of the alimentary canal, which was filled with smaller fragments of crustaceous shell, presented a few longitudinal rugæ and slight transverse puckerings. The liver is bulky, and extends on each side of the crop from the œsophagus to the gizzard. There was no trace of structure analogous to the ink-bag of the *Dibranchiate Cephalopods*.



Nautilus Pompilius, in the prone position, with the labial processes and tentacles, the mandibles, and the digestive organs displayed. (Reduced from Professor Owen's figure.)

a a, the hood, or upper part of the oval sheath, longitudinally divided; *b b*, the posterior lobes or angles of the hood; *c c*, the posterior concavity of the hood; *d d*, the ridge in the same; *e e*, the cut surfaces of the above parts; *f f*, the internal surface of the oval sheath; *g g*, the external labial processes; *h h*, the external labial tentacles; *i i*, the internal labial processes; *k k*, the internal labial tentacles; *l*, the olfactory laminæ; *m m*, the circular fringed lip, longitudinally divided; *n*, the superior mandible; *o*, the inferior mandible; *p*, the muscular basis on which the mandibles are fixed; *q q*, the superior pair of muscles which retract the jaws; *r r*, the semicircular muscle which protrudes the jaws, divided longitudinally; *s*, the œsophagus; *t*, the crop; *u*, the narrow canal leading to *v*, the gizzard; *w*, the intestine; *w'*, the terminal fold of intestine drawn out of its situation; *x*, the anus; *y*, the laminated pancreatic bag; *z*, the liver; 15, a branch of the anterior aorta, which ramifies in the membrane connecting the two portions of the terminal fold of the intestine; 19, the continuation of the posterior aorta along the dorsal aspect of the crop; 20, its bifurcation at the œsophagus, to form a vascular circle corresponding to the nervous circle round that tube; 21 and 22, arteries of the crop, gizzard, &c. (Owen.)

In the museum of the Royal College of Surgeons (*Physiological Series*, No. 499, A.) is a preparation exhibiting the crop, gizzard, and laminated pancreatic pouch. (See the *Catalogue*, vol. i.)

Circulating and Respiratory System.—Our limits will not permit us to go into the details of this system in the Pearly Nautilus, interesting as it is. The respiratory organs are elongated and pyramidal, and have the same laminated structure and symmetrical disposition as in the cuttle-fish; but *they are four in number*, being disposed two on either side, and each pair arising by a common peduncle from the inner surface of the mantle. 'From this difference in the number of branchiæ, in addition to the other peculiarities in the structure of *Nautilus*,' says Mr. Owen, 'the existence of at least two orders of the class *Cephalopoda* is, I imagine, demonstrated; and the denominations of these orders might conveniently be taken from the modifications of the respiratory system. Assuming therefore that it is common to the class to possess branchiæ of a laminated structure, symmetrically disposed, and concealed beneath the mantle, those genera which possess two such branchiæ will form an order under the term *Dibranchiata*, and the Pearly Nautilus and other cephalopods with shells of an analogous formation, a second order, under the term *Tetabranchiata*. It is in this sense that the expression 'Dibranchiate cephalopods' has been made use of in this memoir; and to this group most of the characters of the class, as given by the immortal Cuvier in his 'Règne Animal,' exclusively appertain.'

The preparation, No. 900, B. (*Physiological Series*) in the museum of the College of Surgeons, exhibits the circulation and respiratory organs of the species now under consideration. The branchial vessels are continued from a series at the lower part of the vena cava. They are four in number, corresponding to the four branchiæ, and have each three clusters of glandular follicles appended to them, representing the branchial auricles. The blood, after circulating through the branchiæ, is returned by four branchial veins, which open into the four corners of a transversely oblong ventricle. This has been laid open on the opposite side of the preparation to show the columnæ carneæ within. The blood is conveyed to the system in two arteries, one inferior and large, commencing by a muscular bulb, the other superior and small, which is seen partially injected with quicksilver. A branch of this artery winds over the ventricle, and is continued downwards into the membranous siphon, and a white bristle is passed through it along the pericardium, and through one of the apertures, by which the pericardium communicates with the branchial chamber. It is thus that the fluid contained in the siphon has an outlet, and on the supposition that the chambers of the shell contain gas, the sinking and rising of the Nautilus may be regulated by the varying proportions of gas and liquid in the chambered part of the shell. (*Cat.*)

We must refer the student for further and ample information to Mr. Owen's 'Memoir,' and the fifth and sixth plates illustrating it.

Nervous System and Organs of Sense.—This part of the system in the Pearly Nautilus is in many respects inferior to that of the Dibranchiate Cephalopods, though it is analogous to it. 'The part,' says Mr. Owen, 'which corresponds to the brain of the cuttle-fish, is neither enlarged nor lobulated, nor contained in a cartilaginous receptacle; but is a simple rounded chord or commissure placed transversely above the œsophagus, and connected at its extremities to the great ganglions. These are six in number; are disposed symmetrically about the œsophagus, and, together with the central commissure, are loosely enveloped in a tough membrane, or dura mater.' The double œsophageal collar is not peculiar to Nautilus, but is also found in other Mollusks, *Aplysia* for example; though in these latter cases the subœsophageal ganglions being more remote, the connecting filaments running to the common centre above are longer. The details of the nervous system are most clearly explained in Mr. Owen's Memoir, and beautifully displayed in the 7th plate. In the museum of the College of Surgeons the preparation (No. 1306, A, *Physiological Series*) exhibits the head and anterior or muscular part of the body of this species laid open longitudinally along the dorsal aspect, and the sides divaricated to show this part of the system. The brain, or supraœsophageal mass, will be seen to consist of a transverse chord-like ganglion, from the ends of which three nervous trunks are continued on each side. The anterior pair pass downwards and forwards by the sides of the œsophagus to unite below it, forming a ganglion on either side; these supply the digital processes and tentacles, and give off nerves to the organ of smell and the funnel. The middle and superior trunks dilate into the optic ganglions; the retina, which terminates that of the left side, is shown. The posterior chords surround the œsophagus in a manner analogous to the anterior pair, forming also two ganglionic swellings, from which the nerves of the great shell-muscles and those of the viscera are given off; the latter nerves are of small size, and are continued down by the side of the great perforated vein, and are analogous in their distribution to the sympathetic nerves and par vagum. (*Cat.*, vol. iii., part 1.)

Sight.—The eye of the Nautilus, as might be expected from the comparative inferiority of the brain, is less com plex than in the Dibranchiate Cephalopods. 'Indeed,' says Mr. Owen, 'it appears to be reduced to the simplest condition that the organ of vision can assume without departing altogether from the type which prevails throughout the higher classes. For although the light is admitted by a single orifice into a globular cavity or *camera obscura*, yet the parts which regulate the admission and modify the direction of the impinging rays are entirely deficient.' The eyes are not situated in orbits, but are attached severally by a pedicle to the side of the head, immediately below the posterior lobes of the head. This attachment to a muscular pedicle gives great mobility to the organ, and enables the animal easily to bring it to bear on objects in a variety of directions. Mr. Owen found that the contents of the globe had escaped by the pupil; but he comes to the conclusion, on satisfactory grounds, that if it had ever contained a crystalline lens, it must have been very small.

Hearing.—Mr. Owen was unable to detect a distinct organ for this sense; but he is inclined to the opinion that there does exist in the Nautilus a distinct organ of passive smell, formed after the type of that organ in the inferior *Vertebrata*, and especially in fish.

Taste.—The structure of the tongue and the nerves with which it is supplied indicate a considerable development of this faculty; greater, Mr. Owen seems to think, than the analogous part in many of the *Vertebrata*.

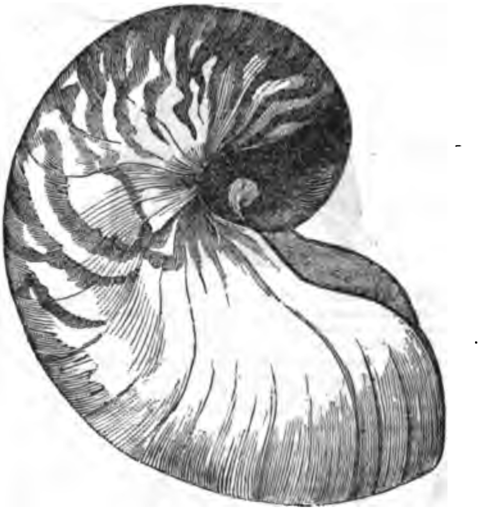
Touch.—Mr. Owen observes that the papillæ upon that part of the head which is termed the hood, if they could be proved to be endowed with nerves, would be peculiar to it among invertebrate animals; but he adds that the great difficulty experienced in tracing the nerves in the substance of the sheath renders their existence as nervous papillæ matter of conjecture only. The numerous tentacles however, soft in their texture, annulated on their surface, and well supplied with nerves, must give the animal an ample enjoyment of the sense of touch.

Generative System.—Aristotle was well aware of the distinctions of sex in the Μαλάκια; and Mr. Owen remarks that the propriety with which that great zoologist classed this animal, although it was covered with a shell to which it adhered like a snail, is fully borne out by the dissection of the female, upon which he operated. The organs consist of an ovary, an oviduct, and, as in the Pectinibranchiate Gasteropods, of an accessory glandular apparatus, and are delineated in the eighth plate of Mr. Owen's Memoir. No. 2651, A. in the *Physiological Series* of the Museum of the College of Surgeons, exhibits these organs. The single ovary is lodged in an appropriate peritoneal sac in the posterior part of the abdominal cavity. It is an oblong, compressed body, convex towards the lateral aspect, and on the opposite side having two surfaces sloping away from a middle longitudinal elevation. Its cavity is occupied by numerous ovisacs of different sizes, the largest of which appear to have recently discharged their contents. They present an elongated oval figure, and are attached by one extremity to the ovarian capsule, while the other floats freely in the ovarian cavity, and exhibits the rent by which the ovum has escaped. The ovisacs are smooth on their external surface, but present internally very numerous and minute wavy folds. They are principally attached along the line of the exterior elevated ridge, at which part the nutrient vessels penetrate the ovary. The oviduct is single, wide, and short; it is a continuation of the membranous external covering of the ovarium, the thick glandular and fibrous tunic of which presents, at the anterior extremity of the ovarium, a distinct perforation with plicated borders, which projects into the membranous commencement of the oviduct. At a short distance from this part a laminated glandular structure begins to be developed in the tunics of the oviducts, and increases in thickness to the external outlet of the canal. The eggs doubtless receive an outer covering from this gland, and a still more exterior nidamental coat, with probably also a connecting thread from the large laminated gland, which is here placed over the oviduct. This organ is situated, like the nidamental laminæ in the whelk, in the branchial chamber; it is adherent to the mantle, and gives rise to the two round convexities observable in the entire animal, in the ventral aspect of the body behind the infundibulum. It is a transversely oblong, trilobed mass, composed of numerous close-set pectinated laminæ, which are about a quarter of an inch in depth, and are disposed in three groups, forming the lobes of the gland; the laminæ of the larger group extend transversely across the middle line of the body, and have their free margins unprotected by a membrane; but the two smaller symmetrical groups have these margins covered by a thin membrane, which is reflected over them from the anterior margin of the glandular body; this is analogous to the detached laminated glands observable in the succeeding preparations. (*Cat.*, vol. iv.)

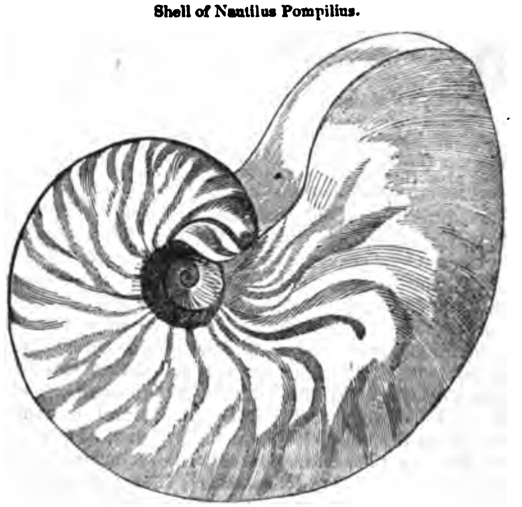
Habits.—Rumphius says of the Nautilus, 'When he floats on the water, he puts out his head and all his barbs (tentacles), and spreads them upon the water, with the poop (of the shell) above water; but at the bottom he creeps in the reverse position, with his boat above him, and with his head and barbs upon the ground, making a tolerably quick progress. He keeps himself chiefly upon the ground, creeping sometimes also into the nets of the fishermen; but after a storm, as the weather becomes calm, they are seen in troops floating on the water, being driven up by the agitation of the waves. whence one may infer that they congregate in troops at the bottom. The sailing however is not of long continuance; for having taken in all their tentacles, they upset their boat, and so return to the bottom. (*Rariteit-Kamer.*)

Mr. Owen, who quotes this passage, observes that the extent to which the Pearly Nautilus is covered by its shell, and its close attachment to it, indicated the affinity to the Gasteropods in too strong a manner to escape the penetration of Aristotle, who, as we have seen, directly compares it in this respect to a snail; 'and the general resemblance,' says Mr. Owen in continuation, 'must have been sufficiently striking when, with his house above him and in the supine position, he makes his way along the sand with a moderate degree of rapidity.'

We here give representations of the external appearance of the shells of two species



Shell of Nautilus Pompilius.



Shell of Nautilus scrobiculatus, or Umbilicated Nautilus.

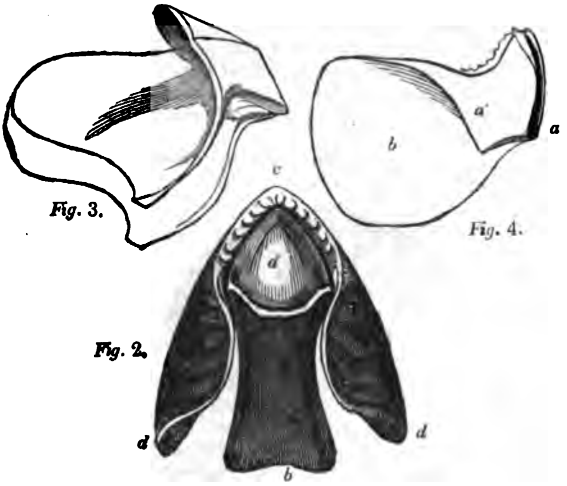
The genus Nautilus is thus characterised by Mr. Owen *Body* oblong, rounded posteriorly, terminated by a slender membranaceous tube. *Head* above with an ambulatory disk. *Arms* on each side, nineteen. *Tentaculiferous labial* appendages four, disposed around the mouth. Tentacles (ninety-two!) of three kinds, viz.: *Ophthalmic*, lamellose, on each side two; *Brachial*, annulose, on each side twenty; *Labial*, annulose, on each side twenty-four. The whole body laid up in the last chamber of a large multilocular shell, and affixed by two lateral muscles. [TETRABRANCHIATA.]

Geographical Distribution of the Genus.—The seas of warm climates, especially those of Asia and Africa, and their islands, Amboyna, Zanzibar, and New Guinea; and the Pacific and Australian Oceans.

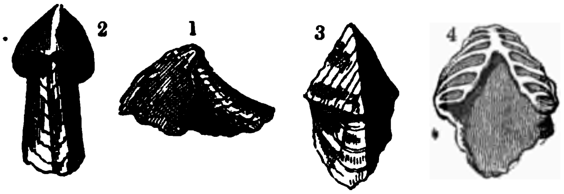
FOSSIL NAUTILI.

The *Rhyncholites*, formerly considered to be the beaks of birds, are now, upon unquestionable evidence, proved to be the jaws of fossil Nautili and Ammonites. Blumenbach recognised these *Rhyncholites* as being rather the mandibles of Cephalopods, differing from all recent genera then discovered; and M. d'Orbigny, who found some large ones in the same beds with the shell of a *Nautilus Gigas*, suspected that those Rhyncholites appertained to that species.

We here give figures of the mandibles or beaks of the Nautilus Pompilius, the structure of which is above noticed, and some of these *Rhyncholites*.



2, Mandibles of Nautilus Pompilius. *a*, calcareous extremity of upper mandible; *b*, extended internal horny laminæ of the same; *c*, notched calcareous extremity of lower mandible; *d*, *d*, external horny laminæ of the same. 3, Upper mandible, showing the form of the calcareous extremity, and the proportions of the external and internal horny laminæ. 4, One-half of the lower mandible, showing the different proportions of the two horny laminæ, and the extension of the horny substance at *a*, upon which the calcareous matter is deposited; *a'*, the internal horny lamina; *b*, the external horny lamina. Nat. size. (Owen.)



Rhyncholites, upper, side, and internal views.

1. Side view (muschelkalk of Luneville). 2, Upper view (same locality). 3, Upper view (lias of Lyme Regis). 4, Calcareous point of an under mandible, internal view, from Luneville. (Buckland.)

The oolite (Stonesfield), and the lias of Lyme Regis and Bath, will serve as examples of the British strata wherein these beak-stones occur.

Fossil Nautili occur both in the tertiary and subjacent strata. M. Deshayes (Tables) records four fossil species (tertiary). Dr. Mantell notices *Nautilus imperialis*, from the arenaceous limestone or sandstone of Bognor; *N. elegans*, from the chalk (Lewes); the last-named species and *N. expansus*, from the chalk marl; *N. inæqualis*, from the gault or Folkstone marl (Folkstone); and a nameless species, from the Shanklin sand (lower green-sand). Professor Phillips (*Yorkshire*) records the following:—*N. lineatus* (inferior oolite); *N. astacoides* (lias); *N. hexagonus* (Kelloways rock); *N. annularis* (lias); and others in the Speeton clay and Brandsby slate. Mr. Lonsdale (*Oolitic District of Bath*) enumerates *N. lineatus* (lias); and *N. obesus* (inferior oolite). Dr. Fitton (*Strata below the Chalk*) records *Nautili elegans, inæqualis, plicatus, radiatus, simplex, undulatus*, and an uncertain species, the first named species from the upper and the rest from the lower green-sand. Mr. Murchison (*Silurian System*) describes and figures one species, *N. undosus*, from the Caradoc sandstone.

Dr. Buckland, who, in his 'Bridgewater Treatise,' gives a note describing the *Modus operandi* of the *Nautilus Pompilius* in swimming and sinking, thus concludes his observations upon the affinities of the chambered shells of *Cephalopods*.

'It results from the view we have taken of the zoological affinities between living and extinct species of chambered shells, that they are all connected by one plan of organization, each forming a link in the common chain which unites existing species with those that prevailed among the earliest conditions of life upon our globe; and all attesting the identity of the design that has effected so many similar ends through such a variety of instruments, the principle of whose construction is, in every species, fundamentally the same. *

'Throughout the various living and extinct genera of chambered shells, the use of the air-chambers and siphon, to adjust the specific gravity of the animals in rising and sinking, appears to have been identical. The addition of a new transverse plate within the conical shell added a new air-chamber, larger than the preceding one, to counterbalance the increase of weight that attended the growth of the shell and body of these animals.

'These beautiful arrangements are, and ever have been, subservient to a common object, viz. the construction of *hydraulic instruments* of essential importance in the economy of creatures destined to move sometimes at the bottom and at other times upon or near the surface of the sea. The delicate adjustments whereby the same principle is extended through so many grades and modifications of a single type, show the uniform and constant agency of some controlling intelligence: and in searching for the origin of so much method and regularity amidst variety, the mind can only rest, when it has passed back, through the subordinate series of second causes, to that great first cause, which is found in the will and power of a common Creator.'

⁂ At page 109 (right-hand column) of this article, line 20 from the top, for 'hand' read 'hood.'

NAVAL ARCHITECTURE. [SHIP.]

NAVAN. [MEATH.]

NAVARETE, JUAN HERNANDEZ, was born at Logroño in Castile. He is commonly known by the name of *El Mudo*, from having been rendered deaf and dumb by an illness in the third year of his age. This misfortune probably led to the choice of a profession, in which he made such rapid progress in the school of Fr. Vicente, at Madrid, that he was soon able to visit Italy, and especially to study at Venice the works of Titian. After his return to Madrid in 1568, he was appointed painter to the king, for whom he painted his finest works, which are preserved in the Escurial. Among them are a small picture of the Baptism of our Saviour, the celebrated 'Presepio,'* in which the principal light proceeds from the infant, the 'St. Hippolytus, in search by night of the body of St. Lawrence,' and a Holy Family, generally considered as his masterpiece, in which the singularity of the accessories † attracted as much notice as the beauties of the composition. His works at Valencia, Salamanca, and Estrella are scarcely inferior to the preceding, and all are distinguished by a brilliancy of colouring which justly gained him the appellation of 'El Ticiano Español.'

He died in 1577, aged fifty-three years.

NAVARRETE DOMINGO FERNANDEZ, a learned Spanish Dominican of the seventeenth century, was sent in 1647 as missionary to the Philippine Islands, from whence he afterwards proceeded to China, where he remained many years, as head of the missions of his order, studying at the same time the language and the history of the country. He was at last put in prison by the Chinese authorities, but succeeded in escaping to Macao, from whence he returned to Europe in 1673. He gave to the pope an account of the missions in China, in which he exposed the latitudinarianism of the Jesuits in accommodating themselves to several of the superstitions of the natives, in order to increase the number of their pretended converts. This practice had already been denounced by Morales, another Dominican, and condemned by a papal decree of the 12th of September, 1645, of which Morales was the bearer to China. The Jesuits however, having obtained from Rome several modifications of this decree, persisted in their practices, which Navarrete himself appears to have winked at while in China.

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* Presepio, a stable; a term applied by the Spaniards to that in which our Saviour was born.

† A cat, a dog, and a partridge. They were perhaps the cause of his being obliged to bind himself in a contract with king Philip not to introduce cats, &c., again in such subjects: 'Y en las dichas pinturas non pongo, gato, ni perro, ni otra figura que sia deshonesta.'

On his return in 1673, Navarrete went to Rome, where he was well received by the pope. In 1678 he was appointed archbishop of Santo Domingo in the West Indies, where he died in the following year.

Navarrete wrote a work in Spanish, which has become very scarce, on the history and the moral and political condition of China, the first volume of which was published at Madrid in 1676; but the second volume, which contained an account of the disputes between the Jesuits and the Dominicans in China, is said to have been suppressed by the Inquisition. This work is entitled 'Tratados historicos, politicos, ethicos, y religiosos de la Monarchia de China,' fol., Madrid, 1676. It contains many curious particulars. At the end of the first volume are several decisions and decrees of the popes concerning the regulation of the Chinese missions.

NAVARI'NO, called *Neocastro* by the Greeks, a small town and fortress of Morea, built on the south coast of the bay of the same name, about five miles north of Modon, and about three miles measured across the bay from old Navarino, which is a ruined town with an old fort of the middle ages, built on a steep hill on the northern coast of the bay, near the site of antient Pylos, which, according to Pausanias, was situated on the promontory Coryphasium. But there was another Pylos in Eleia, and a third one in Tryphylia, and all three claimed the honour of being the Pylos of Nestor. The Messenian Pylos was deserted by its inhabitants in the second Messenian war. It seems however to have revived afterwards, and Pausanias (*Messen.*, 36) speaks of it as an inhabited place, and mentions a temple, a monument of Nestor, and other antient buildings existing in his time, of which no traces now remain. (Leake's *Morea.*) The island of Sphacteria, or Sphagia, lies across the entrance of the bay, and adds to its security, rendering it one of the best harbours in the Levant. Sphacteria is known in antient history for the defeat and capture of the Lacedæmonians by the Athenians, in the seventh year of the Peloponnesian war. (Thucyd., iv. 39.) [CLEON.] In modern times the bay of Navarino has become memorable for the naval battle which took place on the 20th October, 1827, between the French, English, and Russian combined fleet on one side, and the Turco-Egyptian fleet which was anchored in the bay on the other. The English had three ships of the line and four frigates, the French three ships of the line and two frigates, and the Russians four ships of the line and four frigates. The Ottomans had three ships of the line and twenty-five frigates, besides smaller vessels. Admiral Codrington had the command of the combined fleet, and his object was to oblige Ibrahim Pasha to evacuate the Morea. After some desultory negotiations and some evasions on the part of Ibrahim, Admiral Codrington resolved to attack Ibrahim's fleet. After a warm resistance, the Turco-Egyptians were completely defeated, with the loss of three ships of the line, four frigates, and about forty or fifty smaller vessels. The rest surrendered, and a convention followed by which Ibrahim evacuated the Morea, and the Greek prisoners whom he had sent to Egypt were restored to their country. The Egyptian ships which had not been destroyed were returned to the Pasha of Egypt. The battle of Navarino decided the independence of Greece.

The justice of the attack made by the combined fleets on the Turco-Egyptians at Navarino has been questioned on the ground of international rights, supposing those rights to be applicable to a semi-barbarous power as the Turks then were, which had frequently and unscrupulously violated them. The policy of the attack has also been questioned in reference to the national or individual interests of England and France. But one thing may be safely asserted in favour of the battle of Navarino: it fully attained the object for which it was fought—the emancipation of Greece. Unlike many other battles which have proved a useless waste of human lives, that of Navarino established the independence of a country and put an end to a murderous warfare. In this respect it may be compared to the battles of Trafalgar and Waterloo in our own times, as the former may be said to have put an end the maritime contest of France against England, and the second effectually terminated the Continental war. Before the battle of Navarino, the Greeks were obviously unable to drive the Ottomans and Egyptians out of their country, whilst at the same time they were determined not to submit; the contest had lasted seven years, and it could never have been terminated except by the extermination or transportation of the Greek population, measures which had begun to be carried into effect on a large scale by Ibrahim in the Morea. But the extermination of a whole people and the slavery and sale of the women and children are things which will not be tolerated in Europe at the present day.

NAVARRA (Navarre), a kingdom or province of Spain, lying between 41° 58′ and 43° 17′ N. lat., and between 43 and 2° 27′ W. long. It is bounded on the north by France, on the east by Aragon, on the south by the province of Soria in New Castile, and on the west by the provinces of Guipuzcoa and Alava in Biscay. In shape it is an irregular quadrilateral, about 80 miles in extreme length from north to south, and 64 in its greatest breadth from east to west. Its area is nearly 2500 square miles, and its population now 271,000; by the census of 1788 it was estimated at 288,000, of whom 3550 were priests, monks, and nuns, 9910 servants, and 13,054 nobles.

Three-fourths of the surface of Navarre are mountainous; the remaining fourth consists of a few large valleys and some small fertile plains. The grand chain of the Pyrenees, which forms the northern frontier, sends off numerous other chains, which gradually decrease in height as they approach the south. The loftiest mountain, Altobiscar, attains the height of 5380 feet above the sea. Adi is 5218 feet high, and Alcorrunz, Arza, and La Runa are all considerably above 3000 feet. That part of the province which borders on France is very rugged, barren, and thinly peopled, excepting however the valleys of Baztan, Santistevan de Lerin, and las Cinco Villas de Navarra (Lesaca Vera, Sumbilla, Echalar y Aranaz), a rich and delicious country. The southern part is much more level and fertile, and better inhabited.

The principal river is the Ebro, which, for nearly 40 miles, forms the southern boundary of the province; its tributaries are the Borunda, Ega, Arga, Aragon, Irati, Salazar, and Esca, all flowing from the north; and the Queilas and Alhama from the south. The extreme north of the province is watered by the Bidasoa, which rises in the Pyrenees, and empties itself into the Bay of Biscay at Fuenterrabia. Besides these rivers Navarre is watered by innumerable small streams, many of which, being formed wholly of melted snow, are dried up by the summer heats. The climate of the northern districts is exceedingly cold in winter, and rarely subject to excessive heat in summer; in the south it is far more genial, and highly delightful and salubrious. The soil in the low grounds is very rich, and susceptible of a higher degree of cultivation than it has received: there is also much fine pasture-land. The principal valleys are, Baztan in the north, containing fourteen villages and 7500 inhabitants, very fertile in fruit and maize, and abounding in cattle; that of Roncesvalles, renowned in history for the defeat of Charlemagne and his twelve peers, in 778; and those of Lescou, Roncal, Baigorri, Salazar, and Aescoa.

Navarre, from its mountainous character, is by nature almost isolated from the countries around it. In the northern frontier there are ten passes; the five principal are those of Vera, Maya, Roncesvalles, Ochagavia, and Isava. On the sides of Biscay and Aragon the approaches are more difficult of access; and on the side of Castile the deep and rapid Ebro forms a barrier passable only by the three bridges of Logroño, Lodosa, and Tudela. The roads which traverse the province are excellent.

Of the geology of Navarre little is known. The mountains are mostly of transition and secondary rocks; jasper and marbles are also found. There are many mines of iron and one of copper; one also of rock-salt near Valtierra, yielding annually about 298,000 lbs., and several hot springs.

Forests of pines (pinus sylvestris) cover the slopes of the Pyrenees, and much wood is cut and sent down by the mountain streams to the Ebro, by which it is floated onward to Aragon and Cataluña. The other principal forest trees are the oak, evergreen and deciduous, the olive, the chesnut, the beech, and box. The forests are not extensive, yet

Navarre yields more valuable timber than any other province of Spain. Heaths, ferns, and broom, with many aromatic plants, grow on the mountains. Of grain Navarre yields annually 3,452,800 bushels, of which about 2,053,550 are of wheat, 303,850 of maize, 673,200 of barley, 308,000 of oats, 70,850 of rye, and the remainder of spelt-wheat. Of vegetables (including chesnuts) the annual quantity is about 197,600 bushels, of which the principal part are broad and kidney beans. The annual produce of hemp is 600,000 lbs., of flax 200,000 lbs., of olive-oil about 130,000 gallons, and of wines, which are excellent, and of various descriptions, about 10,500,000 gallons. After a rich vintage people are invited by the public crier to take the old wine away from particular vaults gratis, in order to make room for the new. The old wine is even wasted sometimes, and allowed to run down the streets. A small quantity of cyder is also produced in the Baztan and Cinco Villas.

According to Miñano, there are in Navarre about 38,000 head of horned cattle, 630,000 sheep, 70,000 goats, 32,000 pigs, and 26,000 mules. The annual produce of wool amounts to 1,412,000 lbs. The mountains abound in game and the rivers in fish. The average value of all the natural productions of Navarre, animal, vegetable, and mineral, Miñano estimates at nearly 1,500,000*l*. The wild animals are wolves, foxes, and wild boars in the Larraun Mountain.

The manufactures of Navarre are inconsiderable. There are 634 factories of coarse linen, 319 of woollen cloth, 67 of leather, 12 of soap, 30 of iron, and of brandy the quantity annually distilled averages 2,000,000 gallons. Besides these are some potteries, a royal shot and shell foundry, and some manufactories of Spanish liquorice. At the commencement of the present century the average value of manufactures was 142,600*l*. per annum.

The greater part of the produce, natural and manufactured, is consumed in the province, but about 30,800 English bushels of grain, a little oil, half the wine, the greater portion of the wool, and two-thirds of the iron annually remain unconsumed, and are exported, which however fall very far short in amount of the cottons and silks, cutlery, tobacco, sugar, spices, and other luxuries imported, principally from France.

Navarre is divided into five districts, or *merindades*, as they are called, viz. that of Pamplona in the north, of Tudela in the south, Sangüesa in the east, Estella in the west, and Olite in the centre. Each *merindad* has a capital town of the same name. The kingdom contains 9 cities, 145 towns, 675 villages, with a total of 38,289 houses. It has two bishoprics, those of Pamplona and Tudela; 753 parishes, 70 convents and hermitages, 1 university, 4 colleges, and 12 hospitals.

The metropolis is Pamplona, situated on an eminence on the left bank of the river Arga, in the midst of a small, fertile, circular plain, called La Cuenca, enclosed by lofty mountains. It was antiently the court of the kings of Navarre, is still the residence of the viceroy of the province, the seat of administration, and see of a bishop, suffragan of Burgos. It is divided into twenty wards, and contains a cathedral (a neat Gothic edifice of great antiquity, disfigured by a modern façade), 4 parish churches, 7 convents of monks and 2 of nuns (suppressed in 1835, because under the authority of the queen), a royal and an episcopal palace, a senate-house, a town-hall, a mint, a public granary, a university, an hospice, a foundling hospital, a theatre, 41 inns, 1632 private houses, and a population of 15,000. The city, including the citadel, measures 960 yards from north to south, and 1633 from east to west. It is ill built, but contains a few handsome houses; the streets are narrow, but well paved, and kept thoroughly clean by means of sewers. There are 3 large and 3 small squares, in the largest of which bull-fights are occasionally held, 6 public fountains, and an aqueduct, by which the city is supplied with water from the mountain of Subiza, twelve miles distant. Pamplona is well fortified; the citadel is a regular pentagon, of 1000 feet each side: it was built by Philip II. There is a beautiful promenade, called Taconera, within the walls, and three others without. The manufactures of Pamplona are very trifling, namely, two tanneries, two factories of wax, one of woollen cloth, and one of guitar-strings, besides a paper-mill and six corn-mills on the Arga. Its commerce is confined to the importation of woollen and silken goods, principally from England and France; but some cloth is imported from Castile, serges and silk from Aragon, and a little Indian silk from Cataluña.

Pamplona is called Pompelon by Strabo (161. *Casaub.*), who adds, 'as if it might be Pompeiopolis,' that is, the city of Pompey. The people are called Pompelonenses by Pliny (iii. 3). The name of the city was corrupted by the Arabs, who took it in the beginning of the eighth century, into Bamblona. In 778 it was destroyed by the French, but afterwards rebuilt. In 907 it was besieged by the Moors, and in 1138 by the Castilians, but on both occasions it maintained a successful resistance. In 1277 it was again taken by the French. In 1512 it was blockaded and taken by the duke of Alba, general of Ferdinand the Catholic. In 1808 it was seized by the French, who had been allowed to enter as friends; in 1812 blockaded by Mina; and in 1813 it capitulated to the allies under the duke of Wellington, after the battle of Vitoria.

The city next in importance is Tudela, situated on the right bank of the Ebro, which is here crossed by a very fine bridge of seventeen arches and 1200 feet in length. It has a cathedral, 10 convents (lately suppressed), 2 hospitals, and a population of 8150. The streets are narrow and crooked, but well cleansed; the houses are lofty, and all contain fountains. About two miles east of Tudela is the commencement of the canal of Aragon, which, when finished, will connect Navarre with the Mediterranean.

The other cities are—Estella, a town lately fortified by the Carlists, with 4600 inhabitants, recently the stronghold of Don Carlos; Olite, with 5000 inhabitants, celebrated for its salubrious climate, and at one time the residence of the kings of Navarre; Corella, with 4000; Tafalla, with 2800; and Sangüesa, with 2500 inhabitants.

The political constitution and laws of Navarre are still the same which it enjoyed when an independent monarchy and differ altogether from those of the rest of Spain. It is governed by a viceroy, who presides at the royal council, the supreme tribunal for civil and criminal causes. The legislative body is composed of the three estates of the kingdom: the clergy, who attend by right of their station; the nobility, by right of birth; and the deputies, who are elected by the people. Navarre enjoys also peculiar fiscal privileges.

The inhabitants of Navarre are tall, well made, muscular, very hardy and brave, independent in spirit, strongly attached to their government and religion, and jealous of their privileges. The guerrilla bands under Mina proved most formidable opponents to the French in the War of Independence. The Navarrese are also grave and reserved, but witty and shrewd, obstinate and quarrelsome, and yet industrious and honest.

Castilian is the general language of the province, but the Basque, or a mixture of these two languages with French, is spoken in some districts.

The earliest inhabitants of Navarre were called Vascones by the Romans. In A.D. 470 they were subdued by the Goths. Early in the eighth century Navarre was conquered by the Arabs; but the Christian inhabitants who had fled to the recesses of the Pyrenees, resolving to expel the invaders, chose a noble knight, Garci Ximenez, for their chieftain or king; and thus was founded the monarchy of Navarre. His family became extinct in the middle of the ninth century, and the Navarrese then elected Iñigo Sanchez, count of Bigorre, in the hands of whose descendants the sceptre of Navarre remained for five centuries. In 1512 Ferdinand the Catholic obtained possession of that part of the antient kingdom of Navarre which forms the present province, and annexed it to the Spanish dominions, leaving unconquered the portion on the northern side of the Pyrenees, which was afterwards united by Henri IV. to the crown of France, and is now known as the department of the Lower Pyrenees. On the invasion of Spain by Bonaparte, Navarre eminently distinguished itself by its obstinate resistance: and it has recently attracted the eyes of all Europe as being, with Biscay, the principal theatre of the civil contest between Don Carlos and Isabel II. of Spain.

(Miñano, *Dic. Geog.*; Laborde, *Itineraire Descriptif de l'Espagne*; Antillon, *Geografia de España y Portugal*, 1824 Bowles, *Introduccion à l'Historia Natural de España*; Cook's *Sketches in Spain*; Mariana, *Historia General de España*; Conde's *Arabes*, &c.)

NAVARRE, BASSE. [PYRÉNÉES, BASSES.]

NAVE. [CHURCH.]

NAVICELLA. [NERITIDÆ.]

NAVIGATION. [Compass; Longitude and Latitude, Methods of finding; Mercator's Projection; Sailing.]

NAVIGATION LAWS. [Ship and Shipping.]

NAVIGATOR'S ISLANDS, a group of islands, situated in the Pacific, between 10° and 15° S. lat. and 185° and 195° E. long., consists of nine islands, of which the largest, called Pola, or Chatam, is the most western. It is twice as large as Otahiti, and not inferior in fertility and beauty. From east to west it measures about 45 miles. Eastward of Pola are Ojalava and Mouna, which are hardly inferior in size. The other six islands are small. They all appear to be volcanic; all the rocks of the beach, upon which the sea breaks with such force as to throw the water more than fifty feet high, are only pieces of lava, rounded basalts, or coral, by which the islands are wholly surrounded. In the coral reefs are narrow passages for boats. Along the beach are level tracts, but at some distance the country rises into hills and mountains. The islands are clothed even to the very summits of the hills with trees loaded with fruit, and are very populous. They abound in pigs, dogs, fowls, birds, and fish, and the lower parts are covered with extensive plantations of guavas, bananas, and other fruits. The sugar-cane grows spontaneously on the banks of the rivers. The inhabitants belong to the Malay race, and speak a language which is a dialect of that used in the Friendly Islands. They are averse to the visits of Europeans, and much inclined to quarrel with them. (La Perouse's *Voyage round the World*.)

NAVY. Before we describe the present constitution and force of the British navy, we shall give a short sketch of the rise and progress of that vast machine, to which England is so much indebted for the power and prosperity which she enjoys, commencing with the origin of naval enterprise among our barbarian ancestors.

All nations inhabiting the shores of the sea or navigable rivers possessed from the earliest period vessels of a rude construction. But these were so inadequate to withstand the winds and waves in our northern seas, that it was not until the reign of the emperor Probus, A.D. 276-82, that the veil of terror hanging over the ocean and distant voyages was removed. That emperor, in pursuance of his plan of colonising the border lands, which were exhausted by war, with people from the crowded countries of the barbarians, had carried a party of Franks into Pontus, with a view of defending that country against the Alani. Love of home induced some of these people to attempt their return; they seized ships on the Euxine, and plundered the coasts of Greece, Asia, and Sicily, either to supply their wants or for revenge: passing the Pillars of Hercules, they veered to the right, and completed their voyage by disembarking at the mouth of the Rhine. From this voyage we may date the origin of nautical enterprise. The Saxons took advantage of the rich harvest thus opened to all who would attack the Roman provinces by sea, and ravaged the coasts to such an extent as to oblige the Romans to establish a fleet in the English Channel to repel them. After the Saxons had been long in possession of England, they lost their naval arts, and in their turn became a prey to the constant attacks of the Sea-kings, Vikingr, and other pirates. We have no record of the size or number of the vessels which sustained so many conflicts with the Danes in the ninth century. Alfred the Great was the founder of the English navy. He first perceived the necessity of a fleet to protect the coasts from the swarms of pirates in the northern seas. A slight advantage gained by some ships of his over the Danes, in 876, induced him to build long ships and galleys, which, as his countrymen were not competent to manage them, he manned with such piratical foreigners as he could engage. After he had driven out the Danes, he applied his talents to improve his ships, and built vessels higher, longer, and swifter than before, some rowing thirty pairs of oars, others more. Ethelred made a law that whoever was lord of 310 hydes of land should furnish and build one vessel for the service of the country.

William the Conqueror established the Cinque Ports, and gave them certain privileges on condition of their furnishing 52 ships for 15 days, in case of emergency. King John claimed for England the sovereignty of the seas, and declared that all ships belonging to foreign nations, which should refuse to strike to the British flag, should be deemed fair and lawful prize. In the year 1293, an English sailor having been killed in a French port, war ensued, which it was agreed to settle by a naval action, which was fought in the middle of the Channel, and the English, being victorious, carried off above 250 sail. In 1340, when King Edward III. with 240 ships was on his voyage to Flanders, he fell in with and completely defeated, off Sluys, the French fleet of 400 sail, manned with 40,000 men. The same monarch blockaded Brest with 730 sail, containing 15,000 men. Many of the ships composing these fleets were Genoese and Venetian mercenaries, but they must have been very small, and the numbers of ships and men are probably exaggerated. Henry V. had something of a navy, for we find among the records in the Tower, a grant under his hand of annuities to 'the maistres of certaine of our owne grete shippes, carrakes, barges, and ballyngers.' Henry VII., who succeeded in 1485, seems to have been the first king who thought of providing a naval force which might be at all times ready for the service of the state. He built the Great Harry, properly speaking the first ship of the royal navy; she cost 15,000*l.*, and was accidentally burnt in 1553. Henry VIII. perfected the designs of his father. He constituted the Admiralty and Navy Office, established the Trinity House, and the dockyards of Deptford, Woolwich, and Portsmouth; appointed regular salaries for the admirals, captains, and sailors; and made the sea service a distinct profession: he also made laws for the planting and preservation of timber. In 1512, when a fleet was fitted out against France, under Sir Edward Howard, lord-high-admiral, the following allowances were made:—

	s.	d.
For his own diet, maintenance, wages, and rewards, per diem . . .	10	0
Each captain for ditto, ditto . . .	1	6
Every soldier, mariner, and gunner, for his wages per lunar month . .	5	0
And for his victuals . . .	5	0

The ships of this period were high, unwieldy, and narrow; their guns were close to the water, and they had lofty poops and prows, like Chinese junks, insomuch that Sir Walter Raleigh informs us 'that the Mary Rose, a goodly ship of the largest size, by a little sway of the ship in casting about, her ports being within 16 inches of the water, was overset and sunk.' This took place at Spithead in the presence of the king, and most of her officers and crew were drowned. The Henri Grace de Dieu, the largest ship built in this reign, is said to have measured above 1000 tons. At the death of Henry VIII., the tonnage of the navy was 12,000 tons. Elizabeth increased the navy greatly. The fleet which met the Spanish Armada numbered 176 ships, manned by 14,996 men; but these were not all 'shippes royal,' for she encouraged the merchants to build large ships, which on occasion were converted into ships of war, and rated at 50 to 100 tons more than they measured. She raised the wages of seamen to 10 shillings per month. Signals were first used in this reign as a means of communication between ships. In 1603 the navy had 42 ships, measuring 17,000 tons. In the reign of James I. lived the first able and scientific naval architect, Phineas Pett, and the king had the good sense to encourage him. Pett introduced a better system of building, and relieved the ships of much of their top hamper. Before the civil wars broke out, Charles I. built the Sovereign of the Seas, of 100 guns, and measuring 1637 tons. In this reign the navy was first divided into rates and classes. Cromwell found the navy much reduced, but his energy restored it, and he left 154 sail, measuring 57,643 tons, of which one-third were two-deckers. Cromwell first laid before parliament estimates for the support of the navy, and obtained 400,000*l.* per annum for that purpose. The navy flourished under Charles II., with the duke of York at its head, assisted by Samuel Pepys, as secretary, until 1673, when the duke's inability to take the test oath caused his retirement, and the king's pecuniary difficulties leading him to neglect the navy, it fell into decay. The duke of York was recalled to his post in 1684, and at his accession in the following year there were 179 vessels, measuring 103,558 tons. James II., on coming to the throne, took active measures for the restoration of the navy; he suspended the Navy Board, and appointed a new commission, with which he joined Sir Anthony Deane, the best naval architect of the time, who essentially improved the ships of the line by copying from a French model. Four hundred thousand pounds per annum were set apart for naval purposes, and so diligent were the commissioners that at the Revolution the fleet was in excellent condition, with sea stores complete for eight months for each ship. The force was

154 vessels, carrying 6930 guns, and 42,000 men, whereof nine were first-rates.

King William immediately on being placed on the throne went to war with France, whose navy was then very powerful; in 1681 it consisted of 179 vessels of all sorts, carrying 7080 guns, besides 30 galleys. An act was passed in his second year, for building 30 ships, to carry 60, 70, and 80 guns respectively. The dockyard at Hamoaze, out of which has since grown the considerable town of Devonport, which now returns two members to parliament, was then established. Queen Anne found at her accession the navy to consist of 272 vessels, measuring 159,020 tons, but this estimate includes hulks, hoys, and other vessels not carrying guns. In 1704 one of the greatest and most destructive storms ever known took place. It began in the middle of November, and did not attain its greatest height till the 27th. The Eddystone lighthouse was destroyed, no less than 10 men-of-war were totally lost, and many more were driven on shore and damaged. All measures adding to the strength and efficiency of the navy were exceedingly popular during this reign. We find at the death of Anne in 1714, that the number of ships was less, but the tonnage increased, being ships 198, guns 10,600, tons 156,640. The parliamentary vote of that year was 245,700*l.* and 10,000 seamen and marines. During the first four years of George I., large sums were voted for the extraordinary repairs which were required after the long war. A new establishment of guns also was ordered in this reign. The navy remained stationary till 1739, when hostilities commenced against Spain, and the navy was augmented, particularly in the smaller classes, and the dimensions of several classes were enlarged. War broke out with France in 1744, at which period there were 128 sail of the line. At this time all prizes taken by H.M.'s ships were declared to be the property of the captors. In 1747 a naval uniform was first established. The navy increased vastly during this war, in which 35 sail of the line were taken or destroyed by the English. George III. at his accession found the navy to consist of,

Ships of the line . . .	127	measuring 321,104 tons.
50 guns and under	198	

The vote for the year 1760 was 432,629*l.*, and 70,000 seamen and marines. In the short war of 1762, 20 sail of the line were added to the navy, and at the end of the American revolutionary war it was composed as follows:—

Sail of the line . .	174	about 500,000 tons.
Under	203	

The navy was kept in a high state of preparation, and when, on the 1st of February, 1793, the French republic declared war against England, this country was not unprepared. A period now commences in which the gigantic efforts made by England, and the protection necessary for a mercantile marine, which almost monopolised the commerce of the world, raised the British navy to such a height as to enable it single handed to maintain the sovereignty of the seas against all other navies combined. Sir Charles Middleton, afterwards Lord Barham, had, when comptroller of the navy in 1783, established the regulation that a great proportion of stores, sails, &c. should be laid by for each ship in ordinary; so that in a few weeks after the declaration of war there were 54 sail of the line and 146 smaller vessels at sea. The vote for the service of the navy was 5,525,331*l.*, 85,000 seamen and marines. The navy of France had never been so powerful: it amounted to above 200 vessels, of which 82 were of the line and 71 in addition were immediately ordered to be built. The English had about 115 sail of the line fit for service, but the majority of the French ships were larger and finer, and carried heavier guns on their lower or principal battery. The following abstract will show the losses on both sides up to the peace of Amiens, exclusive of the casual losses.

	Captured.	Destroyed.
British ships of the line .	5	..
Smaller vessels .	37	9
Total . . .	42	9
French ships of the line	32	11
Dutch do.	18	0
Spanish do.	6	5
Danish do.	2	0
	58	16
French smaller vessels .	266	44
Dutch do. .	62	6
Spanish do. .	57	10
Total	443	76

This estimate does not include 807 privateers, chiefly French, taken and destroyed. Of the above, 60 sail of the line and 94 under that size were added to the British navy.

During the peace of Amiens preparations for war were actively continued on both sides, and the declaration on the part of England was made in the month of May, 1803, at which time the navy was of the following force, as compared with 1793:—

	Ships of line.	Under.	Tons.
1793 . .	153 . .	411 . .	402,555
1803 . .	189 . .	781 . .	650,976

Notwithstanding the apparent increase, there were not so many line-of-battle ships fit for sea at the latter as at the former period by about ten. The French force in serviceable line-of-battle ships in March, 1803, was 66, the British 111. During this war there were employed from 100,000 to 120,000 seamen and marines till 1810, when the number was increased to 145,000. There were about 100 sail of the line, 150 frigates, and above 200 sloops, besides small armed vessels, amounting in the whole to about 500 sail of pendants constantly employed. The following abstract shows the losses on each side during the war:—

	Captured.	Destroyed.
British—Ships of line .	0	0
Under . .	83	7
	83	7
Enemies'—Ships of line	55	14
Under .	79	23
	134	37

of which 33 sail of the line and 68 under were added to the British navy.

In George III.'s reign the dockyard of Pembroke was established.

The parliamentary vote for the service of the navy, 1839-40, was as follows:—

Officers .	3,400	For the effective service	£3,492,132
Petty do.	3,998	For the non-effective do.	1,488,221
Seamen .	12,846	Other departments, viz., convicts and transport of troops . . .	217,158
	20,244		
Marines	9,000		
	29,244	Total charge .	£5,197,511

The following tables will show the force of the British navy at three distinct periods, viz.: the breaking out of the French revolutionary war; a few years subsequent to the peace; and the present time: also the disposition of the British naval force at the present time, as well as the naval force of other countries possessing a navy.

RATE.	1793.				1820.				1839.			
	In Commis.	In Ordinary.	Building.	Total.	In Commis.	In Ordinary.	Building.	Total.	In Commis.	In Ordinary.	Building.	Total.
First	1	2	2	5	2	14	7	23	4	14	6	24
Second	4	12	5	21	1	8	12	21	5	10	11	26
Third	21	70	5	96	11	69	3	83	15	31	2	48
Of the Line . .	26	84	12	122	14	91	22	127	24	55	19	98
Fourth	7	5	3	*15	7	7	7	21	2	15	2	19
Fifth	35	44	3	82	14	67	25	106	8	53	8	69
Sixth	15	20	..	35	14	7	18	39	21	3	4	28
Sloops	34	13	2	49	49	62	34	145	45	10	13	68
Steam-vessels . .	..	..	..	..	..	..	..	..	†30	4	10	44
Gun-brigs, Schooners, Cutters . .	18	..	..	18	15	10	2	27	‡45	9	12	66
Grand Total .	135	166	20	321	113	244	108	465	175	149	68	392

* In 1793 the fourth-rates on two decks formed part of the line of battle.

† Of these steam-vessels only seven appear to be adapted for war; the remainder are employed in carrying despatches, troops, &c. There are besides 30 steamers, not entered here, which are employed in the packet-service in Great Britain.

‡ There are also 23 sloops fitted for foreign packets, whose station is at Falmouth.

STATION.	First Rates.	Second Rates.	Third Rates.	Fourth Rates.	Fifth Rates.	Sixth Rates.	Sloops.	Steam Vessels.	Brigs, Schooners, &c.
Portsmouth	1	.	2	.	.	.	2	2	3
Plymouth	1	.	2	.	1	.	1	.	.
Rivers Thames & Medway	1	1	1	1	.	1	2	7	3
Mediterranean	1	3	5	.	1	5	4	7	2
North America and West Indies	.	.	1	.	4	4	13	6	4
South America	.	.	.	1	1	4	6	.	7
East Indies	.	.	1	.	.	2	6	.	2
Cape of Good Hope and Coast of Africa	.	.	1	.	.	.	5	.	15
Lisbon	.	1	2	.	.	1	1	.	1
Lakes of Canada	.	.	.	.	.	1	.	3	1
Surveying	.	.	.	.	.	.	4	1	4
Particular Service	.	.	.	.	.	2	1	3	3
Troop Ships	.	.	.	.	1	1	.	1	.
Packets	.	.	.	.	.	.	.	30	23
Total in Commission	4	5	15	2	8	21	45	60	68

ips of the Line.	FRANCE. In Commis.	In Ordinary.	Building.	Total.	RUSSIA. In Commis.	In Ordinary.	Building.	Total.	AMERICA. U. S. In Commis.	In Ordinary.	Building.	Total.	EGYPT. In Commis.	In Ordinary.	Building.	Total.	TURKEY. In Commis.	In Ordinary.	Building.	Total.	HOLLAND. In Commis.	In Ordinary.	Building.	Total.
0 guns and upwards	2	4	16	22	5	.	2	7	2	.	.	2	6	2	1	9	2	1	.	3	.	.	.	.
to 100 guns	5	2	11	18	16	2	5	23	.	2	8	10	2	.	.	2	5	1	.	6	.	2	.	2
to 80 guns	3	4	2	9	19	1	.	20	.	3	.	3	1	.	.	1	3	3	.	6	.	3	3	6
the Line	10	10	29	49	40	3	7	50	2	5	8	15	9	2	1	12	10	5	.	15	.	5	3	8
Frigates. azees and 60 guns	5	8	9	22	4	.	.	4	6	9	18	33	7	.	.	7	4	1	1	6	.	2	2	4
& 52 guns	5	7	8	20	.	.	.	.	.	.	.	.	.	.	.	.	3	2	.	5	.	.	.	.
to 50 guns	6	7	5	18	20	.	1	21	.	2	.	2	.	.	.	.	3	1	.	4	5	6	3	14
am vessels	22	6	9	37	8	.	.	8	1	.	9	10	1	.	.	1	1	.	2	3	3	.	1	4
and Total	48	38	60	146	72	3	8	83	9	16	35	60	17	2	1	20	21	9	3	33	8	13	9	30

America has contracted for a supply of timber to build 11 ships of the line. The French steam-vessels in the packet service are armed with heavy guns.

Ships of the Line.	DENMARK. In Commis.	In Ordinary.	Building.	Total.	SWEDEN. In Commis.	In Ordinary.	Building.	Total.	SPAIN. In Commis.	In Ordinary.	Building.	Total.	NAPLES. In Commis.	In Ordinary.	Building.	Total.	SARDINIA. In Commis.	In Ordinary.	Building.	Total.
100 guns and upwards	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
80 to 100 guns	.	4	1	5	.	5	.	5	.	1	.	1	.	.	.	.	.	.	.	.
70 to 80 guns	.	1	.	1	.	5	.	5	.	2	.	2	.	.	.	.	.	.	.	.
Of the Line	.	5	1	6	.	10	.	10	.	3	.	3	.	.	.	.	.	.	.	.
Frigates.																				
Razees & 50 guns	.	.	.	.	.	1	.	1	.	2	.	2	1	.	.	1	.	2	1	3
50 and 52 guns	.	.	.	.	.	.	.	.	.	2	.	2	1	.	.	1	2	.	.	2
36 to 50 guns	.	.	.	.	.	6	1	7	.	.	.	.	.	.	.	.	.	1	.	1
Steam-vessels	.	.	.	.	.	2	.	2	.	.	.	.	1	.	.	1	2	.	.	2
Grand Total	.	5	1	6	.	19	1	20	.	7	.	7	3	.	.	3	4	3	1	8

Holland has 104 gun-boats; Denmark, 67; Sweden, 337.

Until the Restoration there does not appear to have been any precise division into classes; nor have we any account of the armament of ships; at that time certain ships were ordered to be built to carry the following:—

Description of Guns.	1st Rate. 780 men.	2nd Rate. 660 men.	3rd Rate. 470 men.
Cannon = 42 pounders	26	..	..
Demicannon = 32 pounders	..	26	26
Culverins = 18 pounders	28	26	..
Demi do. = 12 pounders	..	..	26
Sakers = 6 pounders	28	26	..
Forecastle	4	..	4
Quarter-deck	12	10	10
3-pounders	2	2	4
Total number of guns	100	90	70

There was however no uniformity preserved; and in 1745 a committee was appointed, which recommended certain changes in the rating and arming, which however were not adhered to any more than the former systems. At the peace the Board of Admiralty represented this to the Prince Regent in a memorial. The present establishment of rates and classes was fixed by order in council, February, 1817:—

Class I.—Rated ships:
First-rate, comprising all three-decked ships.
Second. One of Her Majesty's yachts, and all two-decked ships whose war-complements consist of 700 men and upwards.
Third. Her Majesty's other yachts, and all ships whose complements are from 600 to 700.
Fourth. Ships whose complements are from 400 to 600.
Fifth. Ships whose complements are from 250 to 400
Sixth. Ships under 250.
Class II. Sloops and bomb-vessels.
All such vessels as are commanded by a commander.
Class III. All other smaller vessels, such as are commanded by lieutenants, or other inferior officers.

Table showing the armament of a ship of each class, and the weight of metal.

Number of Guns in each Ship.	Lower Deck.			Middle Deck.			Main Deck.			Upper Deck.		
	No.	Description & Weight.	Cwt.	No.	Description & Weight.	Cwt.	No.	Description & Weight.	Cwt.	No.	Description & Weight.	Cwt.
120-gun ship (old)	4 20	8-inch 32-pders.	65 56	2 32	8-inch 32-pders.	65 50	34	32-pders.	42	6 14	32-pders. 32-p. carronades	42 17
110-gun ship (new)	4 24	8-inch 32-pders.	65 56	4 26	8-inch 32-pders.	65 56	30	32-pders.	42	6 14	32-pders. do.	42 25
92-gun ship	6 26	8-inch 32-pders.	65 56	..	. .	..	4 30	8-inch 32-pders.	65 56	26	32-pders.	42
84-gun ship	6 24	8-inch 32-pders.	65 56	..	. .	..	2 30	8-inch 32-pders.	65 48	6 16	32-pders. 32-p. car.	42 17
80 guns	8 20	8-inch 32-pders.	65 56	..	. .	..	4 24	8-inch 32-pders.	65 50	24	32-pders.	42
78 "	4 26	8-inch 32-pders.	65 56	..	. .	..	2 30	8-inch 32 pders.	65 42	6 10	32-pders. do. car.	42 17
72 "	4 24	8 inch 32-pders.	65 56	..	. .	..	.. 28	 32-pders.	 42	4 12	32-pders. do. car.	42 17
70 "	4 22	8-inch 32-pders.	65 56	..	. .	..	2 26	8 inch 32-pders.	65 50	16	32-pders.	42
Frigates.												
50 guns, 1st class	..	. .	..	..	. .	..	6 22	8-inch 32-pders.	65 56	22	32-pders.	42
50 guns, 2nd class	..	. .	..	..	. .	..	4 26	8-inch 32-pders.	65 50	4 16	32-pders. do.	42 25
44 guns	..	. .	..	..	. .	..	2 26	8-inch 32-pders.	60 40	4 12	32-pders. do. car.	40 17
42 guns	..	. .	..	..	. .	..	2 26	8-inch 32-pders.	50 39	4 10	32-pders. do. car.	39 17
38 guns	..	. .	..	..	. .	..	2 24	8-inch 32-pders.	50 39	4 8	32 pders. do. car.	39 17
36 guns	..	. .	..	..	. .	..	4 18	8-inch 32-pders.	60 56	14	32-pders.	41
26 guns	..	. .	..	..	. .	..	2 16	8-inch 32-pders.	50 40	2 6	32-pders. do.	40 25
24 guns, corvettes	..	. .	..	..	. .	..	24	32-pders.	40			
26 guns, 2nd class	..	. .	..	..	. .	..	2 18	8-in. cars 32-pders.	36 25	6	32-pders.	25
26 guns, 3rd class	..	. .	..	..	. .	..	2 18	32-pders. 32-p. car.	25 17	6	18-pders.	15
Sloops.												
18 guns, corvette, 1st class	..	. .	..	..	. .	..	18	32-pders.	40			
18 guns, ditto, 2nd class	..	. .	..	..	. .	..	18	32-pders.	25			
18 guns, ditto, 3rd class	..	. .	..	..	. .	..	2 16	32-pders. do. car.	25 17			
16 guns, brigs	..	. .	..	..	. .	..	2 14	32-pders. do. car.	32 17			
10 guns, ditto	..	. .	..	..	. .	..	2 8	18-pders. 18-car.	20 10			
Brigantines, 1st class	..	. .	..	..	. .	..	1 2	32-pder. do.	40 32			
Brigantines, 2nd class	..	. .	..	..	. .	..	1 2	32-pder. 24-p. car.	40 13			

Great improvements have taken place in the size and form of the British ships, as well as in the arrangement of the materials composing them, especially during the present century. As France and Spain enlarged their ships, the English were obliged to do the same; while from many of their ships added to the English navy we greatly improved our models. The following view of the increase of the size of first-rates will demonstrate this point:—

Year.	Tonnage of First-Rates.
1677	1500 to 1600
1720	1800
1745	2000
1795	2350, the Ville de Paris.
1808	2616, Caledonia.
1839	3100, Victoria, and 3 others building.

There is now a frigate of greater tonnage than the first-rate of 1745, viz. the Vernon, of 2080 tons, and 50 guns.

We cannot do more than glance at the improvements in naval architecture. Sir Robert Seppings, late surveyor of the navy, introduced the circular bow and stern, the system of diagonal timbering or bracing, whereby the strength and durability of our ships are so immensely increased; the method of scarfing short pieces, by which the delay and difficulty often attendant on the procuring of crooked timber are avoided; the making frigate-timber applicable to the building of line-of battle ships, by the use of a circular coak, or dowel, instead of chocks, thereby effecting a saving of about 1000*l.* in the building of a 74-gun ship, and the use of iron knees, by which he effected an immense saving of timber and space.

Sir William Symonds, now surveyor of the navy, has effected a still further economy of space by removing the chocks behind the iron knees, and using metal diagonal braces instead of wood. In latter years the various naval architects, Sir R. Seppings, Captains Hayes and Symonds, R.N., and Professor Inman, have been permitted to try their respective systems in various experimental squadrons, composed of vessels built under their directions; and although many opinions are held as to the merits of each, there can be but one with regard to the general advantage arising to the science of naval architecture, so long neglected. A school for shipwright apprentices was established at Portsmouth, which, after producing more officers than could be provided for, was broken up. Our ships, those at least built of oak—for we have not yet worn out a ship built of teak—do not seem to be as durable as in former times. The Royal William, of 100 guns, which bore the flag of Sir Richard Bickerton at Spithead in 1813, and was shortly after broken up, was built in the year 1719. The Sovereign of the Seas, built in 1637, was repaired in 1684, when all the antient timber was so hard that it was difficult to work it. It was the practice in the north of England, and in Staffordshire especially, to bark timber standing, and to let it remain in that state for a time to season. The Sovereign of the Seas was built of such timber. The Achilles, 60, was built by contract in 1757, of timber barked in the spring and felled in the next winter: she was docked in 1770, and found exceedingly sound, and was sold 1784, because she was too small for the line-of-battle. The Hawke sloop was built in 1793. Half of this vessel was built of timber barked in 1787, and felled in 1790; the other half of timber felled in the usual manner from the same soil and neighbourhood. In 1803 she was so decayed that she was taken to pieces; both sides appear to have been equally decayed.

The government of the navy is vested in the lord-high-admiral, which office has been in commission since the Revolution, with the exception of two short periods, 1707-8 and 1827-8, when it was held respectively by Prince George of Denmark and his late majesty when duke of Clarence. At present the Board consists of a First Lord, who is a member of the cabinet, and five junior lords. By their orders all ships are built, sold, or broken up; commissioned, employed, and paid off. All appointments and promotions are made or approved by them; all honours, pensions, and gratuities are granted on their recommendation. All orders for the payment of naval monies are made by them; they prepare the navy estimates, and lay them before parliament. The civil departments of the admiralty are directed by the surveyor of the navy, accountant-general, storekeeper-general, comptroller of victualling, and physician-general.

The navy is composed of two bodies of men—seamen and marines.

There are commissioned, warrant, and petty officers.

The commissioned officers are flag-officers, captains, commanders, and lieutenants.

Flag-officers are divided into the following classes, and rank and command in the order here following:—

Admirals of the fleet.
Admirals of the red, white, blue squadrons.
Vice-admirals of the red, white, blue squadrons.
Rear-admirals of the red, white, blue squadrons.

There are superannuated and retired rear-admirals, who enjoy the rank and pay, but do not rise.

The admiral of the fleet, when in command, bears the union flag at the main-top-gallant-mast. The other flag-officers bear a square flag of the colour of their squadron at the main, fore, or mizen top-gallant-mast, according to their rank.

The flag-officer holding the chief command of a fleet or squadron employed within certain geographical limits, termed a station, is called a commander-in-chief. He is responsible for the efficiency and conduct of the fleet under his orders; he disposes of the vessels composing it in such manner as will be most advantageous for the service; but without some especial necessity he is never to send one beyond the limits of his station. All vacancies in ships under his orders which are caused by death or dismissal from the service by the sentence of a court-martial, are in his gift.

A temporary rank is given to captains called commodore; they are of two classes; the first class having the pay and allowance of a rear-admiral, with a captain under him; they bear a broad pendant, but must strike it in the presence of a senior captain. Captains and commanders are appointed to command her majesty's ships, except when the latter are appointed to flag-ships and ships of the line, under a regulation of his late majesty when lord-high-admiral; in which case they must have served three years in command of a sloop or as first-lieutenant of a rated ship.

When a captain or commander is ordered to commission a ship, he does so by hoisting a long pendant, having a St. George's cross on a white field next the mast, and a fly of the colour of the Admiral's flag under whose orders he is placed. No vessels, except such as belong to her majesty, or are hired for her service, and commanded by a naval officer, are entitled to wear this pendant. The ship being commissioned, a hulk, or receiving ship, is allotted for the use of the crew while fitting for sea; a party of marines, commanded in rated ships by a commissioned officer, is sent on board; seamen are entered as they volunteer, on being reported fit for the service after examination by the surgeon; stores are demanded as required, and the sea-stores, provisions, and water stowed away. When ready for sea, the ordnance and powder are received on board; the crew are paid two months' wages in advance, and the ship only waits the sailing orders from the admiralty to proceed to her destination. The duty of the captain as regards the books and accounts is regulated by act of parliament; but the interior arrangements and discipline depend mainly on himself, in which he has for his guidance the act 22 Geo. II., called the Articles of War, and the General Printed Instructions issued by the Admiralty. All muster and pay books, &c. are signed by the captain, commander, or senior lieutenant, master, and purser, or other officer in whose charge the stores in question may be placed. A commander must have been employed on actual service and full pay for one complete year to become eligible for promotion to the rank of captain.

The senior lieutenant is nominated by the captain, and has under his direction the whole management and superintendence of the internal arrangements of the ship; indeed on the qualifications of this officer must in a great measure depend the state of discipline and efficiency. The other lieutenants take the watch by turns, during which time they have charge and command of the ship; they are never to quit the deck without being relieved. The watches are periods of four hours, except that from four to eight P.M., which is divided into two, called the dog-watches. No mate is eligible for the rank of lieutenant until he has served six complete years in the navy, has completed his nineteenth year, and passed in seamanship and navigation.

A lieutenant must have served two complete years at sea to qualify him for promotion to the rank of commander. The warrant and petty officers take rank and command in the order in which they stand in the table of pay, with the exceptions here following:—

Masters, Secretaries, Physicians, Chaplains, Surgeons, Pursers,	Rank with, but subordinate to Lieutenants.	Mates, Second Masters, Assistant Surgeons, Gunners, Boatswains, Carpenters,

of whom, masters, mates, second-masters, gunners, boatswains, carpenters, and take military command.

The master has charge and stowage of the holds; a general charge of stores and store-rooms, over the gunner, boatswain, and carpenter; and navigates the ship under the directions of the captain. Secretaries are appointed by the flag-officer whom they serve.

Chaplains must be in priest's orders of the Church of England.

The purser has charge of the provisions, and the issuing of them, also of the slop clothing, soap, and tobacco; he enters into a penal bond with sureties for the honest discharge of his duties.

Mates are midshipmen who, having passed the examination qualifying them for the rank of lieutenant, receive a warrant from the captain; their rank and command cease on their discharge or the ship being paid off.

Gunners, boatswains, and carpenters must have served a complete year as petty officers before they can be promoted. The gunner has charge of all ordnance stores; the boatswain, of all the sails, rope, and rigging; the carpenter, of of all stores in his department, and is also to see the ports secure and water-tight, and to sound the well daily, and have the pumps in order for service.

In the event of the command of a ship devolving on petty officers, they are to take rank and command as they stand in the table of pay, except the following, who are not to take command:—

Schoolmasters, Masters-at-arms,
Clerks, Ship's corporals.

Midshipmen are rated by the captain, being fourteen years of age, and having served two years as volunteer of the first-class, or three in any other capacity; they are appointed by the captain, subject to the approval of the Admiralty, only one fresh entry into the service being allowed in each ship. They have no specific duties.

Schoolmasters must pass an examination to qualify them for that situation.

Cooks, Ropemaker,
Masters-at-arms, Caulkers,
Sailmakers, Coopers,

are appointed by warrant from the Admiralty or commander-in-chief.

The crew of a ship consists of petty officers, able seamen, ordinary seamen, landsmen, boys, and marines. In time of peace the whole crew are entered voluntarily; during war, the very superior rate of wages which the merchants are compelled to give, renders the press inevitable. The following persons are exempt from it, and no seaman can be impressed except by an officer having a press-warrant:—

Masters of merchant vessels;

Mates of those above 50 tons;

Boatswains and carpenters of vessels of 100 tons and upwards;

Men belonging to craft of all kinds employed in the navy, victualling, ordnance, excise, customs, and post-office;

Watermen belonging to the insurance offices in London and Westminster;

All men above 55 or under 18 years of age;

Apprentices not having used the sea before the date of their indentures, and not more than three years from the said date;

Landsmen not having served at sea full two years;

Harpooners, line-managers, steerers, and all seamen and mariners who have entered the Greenland and southern whale-fisheries.

The best seamen are rated petty officers by the captain; they are of two classes, distinguished by a crown and anchor for the first class, and an anchor for the second, worked in white cloth upon the left arm: they have an increase of pay, and are not amenable to corporal punishment while holding that rank.

There is a supply of boys to the navy from the asylum at Greenwich and from the Marine Society, but many more are brought into the navy by volunteering. Every ship, according to her rate or class, bears a certain number of marines, as part of her complement. [Marine.]

For the due maintenance of that discipline without which the navy would be powerless, the captain or commander of every ship or vessel is authorised to inflict corporal punishment on any seaman, marine, or boy, by warrant under his hand. Courts-martial are ordered by the Admiralty and commanders-in-chief.

The following abstract shows the daily allowance of provisions to every person in the fleet:—

Fresh meat, 1 lb. Soft bread, 1½ lb.
Vegetables, ½ lb. Beer, 1 gallon.

When the above are not issued, the following:—

Salt beef, ¾ lb. and Flour, ¾ lb. } alternately { Salt pork, ¾ lb. and Pease, ½ pint.
Biscuit, 1 lb.
Spirits, ½ pint, or wine, 1 pint; and, whether on fresh or salt provisions,
Cocoa, 1 oz. Vinegar, ½ pint } weekly.
Tea, ¼ oz. Oatmeal, ½ pint } weekly.
Sugar, 1½ oz.

A portion of the flour may be exchanged for a proportion of suet and raisins; and after 14 days on salt provisions, lemon-juice is allowed in addition.

The following tables will show the full-pay of every officer and seaman in each class of her Majesty's ships, and the half-pay of all officers entitled to the same:—

	Full-Pay.			Half-Pay.		
	£.	s.	d.	£.	s.	d.
Admiral of the fleet	6	0	0	3	3	0
Admiral	5	0	0	2	2	0
Vice-admiral	4	0	0	1	12	6
Rear-admiral	3	0	0	1	5	0
Commodore of first class and captain of the fleet	3	0	0	of their rank.		
Master of the fleet	0	10	11	0	0	0
Physician of less than three years	1	1	0	0	10	6
Physician of less than ten years	1	11	6	0	15	0
Physician of more than ten years	2	2	0	1	1	0
Secretary to admiral of fleet	1	7	4	0	0	0
Secretary to admiral commander-in-chief	1	1	11	0	0	0
Secretary to vice or rear admiral commander-in-chief	0	16	5	0	0	0
Secretary to a junior flag-officer or commodore	0	8	2	0	0	0

	Full-Pay.		
	s.	d.	
Two clerks to secretaries of commanders-in-chief, each	3	4	per diem.
One clerk to junior flag-officers	2	9	„
Admiral's coxswain	1	9	„
Admiral's steward Admiral's cook Admiral's domestics*	1	2	„

*The number of these ratings are, for the	
Admiral of the fleet	12
Admiral	10
Vice-admiral	7
Rear-admiral or commodore of 1st class	5
Captain of the fleet	3

In flag-ships all the lieutenants (including one extra as flag-lieutenant) are allowed 6*d.* per diem additional pay. Surgeons are paid according to their length of service.

	Per Diem.		
	£.	s.	d.
Of less than six years' service	0	10	0
Of more than six and less than ten	0	11	0
Of more than ten and less than twenty	0	14	0
Of more than twenty	0	18	0
Surgeons of hospital-ships	0	18	0

Half-Pay.

Captains.	Per Diem.	
	s.	d.
To each of the first 100 on the list in seniority	14	6
To the next 150	12	6
To the remainder	10	6
Commanders.		
To the first 150	10	0
To the rest	8	6
Lieutenants.		
To the first 300	7	0
To the next 700	6	0
To the remainder	5	0

Royal Marines. [MARINE.]

	Per Diem. s.	d.
Masters.		
To each of the first 100	7	0
To the next 200	6	0
To the remainder, having served 5 years in the navy	5	0
Surgeons.		
Of six years' service	6	0
Under that time	5	0
Assistant-Surgeons.		
Three years' service	3	0
Two years'	2	0
Dispensers	5	0
Chaplains.		
After eight years at sea or ten in harbour	5	0
For each year's subsequent service, 6*d*. per diem till it reach	10	0
Pursers.		
To the first 100	6	0
To the next 200	5	0
To the remainder	4	0
Naval Instructors and Schoolmasters.		
Two years' service	2	0
Three years' do.	3	0

The following table shows the number of officers for active service at three periods since the peace:—

Rank.	1816.	1830.	1839.
Admirals	65	41	38
Vice-admirals	68	62	53
Rear-admirals	76	65	64
Captains	848	853	687
Commanders	809	902	809
Lieutenants	3886	3564	2822
Masters	694	523	456
Surgeons	951	731	601
Assistant-Surgeons	462	358	360
Pursers	957	644	560
Chaplains	62	64	29

There are 19 naval instructors and schoolmasters appointed under regulations issued May 1st, 1837, who receive 6*l*. 14*s*. per lunar month, and 30*l*. per annum bounty, and 5*l*. a-year from each young gentleman who shall receive instruction from him. An additional rating of first-class petty-officers is also allowed, called 'seamen's schoolmaster

There are at present 56 retired rear-admirals and 8 retired captains; 100 retired commanders under order in council of 30th January, 1816, and 181 under order in council November 1st, 1830. There are 7 naval Knights of Windsor, 9 superannuated masters, 11 physicians, 81 retired surgeons, 40 retired chaplains, and, in the above table, there are 138 surgeons and 27 masters unfit for *active* service: of the lieutenants, probably not many more than 1000 are fit for active service.

Net Sea Pay of the Royal Navy.

	Ranks and Ratings.	First Rate. Pay per Mensem.	Second Rate. Pay per Mensem.	Third Rate. Pay per Mensem	Fourth Rate. Pay per Mensem.	Fifth Rate. Pay per Mensem.	Sixth Rate. Pay per Mensem.	Sloops. 100 Men and upwards. Pay per Mensem.	Sloops. Under 100 Men. Pay per Mensem.	Bombs. Pay per Mensem.	Gun-brigs, Schooners, Cutters. Pay per Mensem.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
	Captain	61 7 4	53 14 0	46 0 8	38 7 0	30 13 8	26 17 0				
	Commander	23 0 4	23 0 4	23 0 4	. .	. .	. .	23 0 4	23 0 4	23 0 4	
	First Lieutenant, of 7 years' standing	11 10 0	11 10 0	11 10 0							
	All other Lieutenants	9 4 0	9 4 0	9 4 0	9 4 0	9 4 0	9 4 0	9 4 0	9 4 0	9 4 0	11 10 0
	Master	13 0 8	12 5 4	11 10 0	10 14 8	9 4 0	8 8 8	7 13 4	7 13 4	7 13 4	7 13 4
	Chaplain	12 5 4	12 5 4	12 5 4	12 5 4	12 5 4					
	Surgeon	see ante									
	Purser	7 0 0	in all								
	Naval Instructor	see ante									
	Mates	3 18 8	in all								
	Second Master	5 9 4	do.								
	Assistant-Surgeon	9 4 0									
	Gunner Boatswain Carpenter	7 0 0	7 0 0	7 0 0	5 9 4	5 9 4	5 9 4	4 14 0	4 14 0	4 14 0	
	Engineers	see note									
1st Class Petty Officers.	Midshipman	2 8 0	in all								
	Master's Assistant	3 11 0	do.								
	Volunteer, 1st class	1 2 0	do.								
	Clerk	4 14 0	4 6 4	4 6 4	3 18 8	3 11 0	3 11 0	3 11 0	3 11 0	3 11 0	3 11 0
	Master-at-arms	2 12 0	2 12 0	2 12 0	2 9 0	2 9 0	2 9 0	2 7 0	2 7 0	2 7 0	2 7 0
	Seamen's Schoolmaster	2 12 0	2 10 0	2 8 0	2 6 0	2 4 0	2 2 0	2 1 0	2 1 0	2 1 0	2 1 0
	Captain's Coxswain Gunner's Mate Boatswain's Mate Quartermaster	2 6 0	2 6 0	2 6 0	2 4 0	2 4 0	2 4 0	2 2 0	2 2 0	2 2 0	2 2 0
	Captain of Forecastle Ship's Corporal Coxswain of Launch Captain of Hold	2 6 0	2 6 0	2 6 0	2 4 0	2 4 0	2 4 0	2 2 0	2 2 0	2 2 0	2 2 0
	Sailmaker Carpenter's Mate Caulker Ropemaker Blacksmith	2 12 0	2 12 0	2 12 0	2 9 0	2 9 0	2 9 0	2 7 0	2 7 0	2 7 0	2 7 0
	Ship's Cook	2 13 6	2 13 6	2 13 6	2 13 6	2 13 6	2 12 6	2 12 6	2 12 6	2 12 6	2 12 6
2nd Class Petty Officers.	Captain of Main-top Captain of Fore-top Captain of Mast Captain of Afterguard Yeoman of Signals Coxswain of Pinnace	2 1 0	2 1 0	2 1 0	2 0 0	2 0 0	2 0 0	1 18 0	1 18 0	1 18 0	1 18 0
	Sailmaker's Mate Cooper Armourer Caulker's Mate	2 6 0	2 6 0	2 6 0	2 3 0	2 3 0	2 3 0	2 0 0	2 0 0	2 0 0	2 0 0

Net Sea Pay of the Royal Navy—continued.

	Pay Per Mensem. £ s. d.
Captain of Mizen-top	1 16 0 in all rates.
Carpenter's Crew	
Sailmaker's Crew	
Cooper's Crew	
Purser's Steward	
Painter	
Able Seaman	1 14 0 do
Yeoman of Storeroom	
Sick-berth Attendant	
Trumpeter	
Captain's Steward	
Captain's Cook	
Ward-room or Gun-room Steward and Cook	
Midshipmen's Steward and Cook	

	Pay Per Mensem. £ s. d.
Ordinary Seaman	1 6 0 in all rates.
Purser's Steward's Mate	1 3 0 do
Cook's Mate Barber	1 6 0 do.
Landsman	1 3 0 do.
Seamen Gunners	0 2 0 do. 0 4 0 do. after 5 years' service. 0 5 0 do. after 10 years' service, in addition to the pay of any other rating they may hold.
Boys.—1st class	0 14 3 in all rates.
2nd class	0 12 9 do.
Engineer boys	see note.

	£.	s.	
Engineers of the 1st class	12	0	per lunar month, and 6*d.* a-day for each boy they instruct.
„ 2nd class	8	0	per lunar month.
„ 3rd class	5	6	per lunar month; and within the tropics, while the steam is up, one-half in addition to the above.

	£.	s.	d.	
Engineer boys, 1st class	1	14	0	per lunar month.
„ 2nd class	1	6	0	„
„ 3rd class	1	3	0	„
„ 4th class	0	14	6	„

The carpenter and each of his crew are allowed seven shillings per month additional for tools.

Where no surgeon is borne, the assistant-surgeon receives an increase of pay of 1*s.* 6*d.* per diem.

Having shown the emoluments of those who are fit for active employment in her Majesty's naval service, we will now turn to the rewards and pensions for services rendered and wounds or other injuries received; and in the first place we must name that noble establishment and asylum for worn-out seamen, Greenwich Hospital. The idea of establishing an hospital for infirm and disabled seamen originated with Mary, consort of William III., and Sir Christopher Wren was employed to build an additional wing to Greenwich Palace. The king granted 2000*l.* a-year towards it, large subscriptions were added by noble and wealthy persons, estates were willed to it by individuals, all mariners were made to subscribe 6*d.* per month, forfeited and unclaimed prize-money and various grants were given. The forfeited estates of the earl of Derwentwater, the net rental of which is now between 30,000*l.* and 40,000*l.* a-year, were given. The revenue of the hospital is about 150,000*l.* a-year. The establishment consists of a governor, lieutenant-governor (both flag-officers), four captains, and eight lieutenants, residing in the hospital. There are about 2710 in-pensioners, and 120 matrons and nurses, all of whom must be seamen's widows.

The following is the scale of pensions for officers and seamen wounded and worn-out in the service:—

	Per Annum. £.	s.		Per Annum. £.	s.
For an admiral, from	300	0	to	700	0
„ captain (wounds),	250	0	Loss of limb	300	0
„ commander „	150	0	„	200	0
„ lieutenant „	91	5	„	91	5

Marine officers, as in the army.

Every mate, second master, assistant-surgeon, midshipman, master's assistant, naval instructor, clerk, and volunteer of the first and second class, from 1*s.* to 2*s.* 6*d.* a day, according to the nature and degree of the injury.

Boatswains, gunners, carpenters, and engineers, when unfit for further service, shall receive a superannuation allowance of 3*l.* a year for each year they served in a ship in commission, and 1*l.* a year each year in ordinary, and a further sum of from 1*l.* to 15*l.* a-year may be added by the Admiralty. They retain besides any pension for servitude as a petty-officer to which they may be entitled, and for wounds from 15*l.* to 50*l.* a year in addition to all other pensions.

Every other petty officer, seaman, marine, and boy, shall receive for wounds from 6*d.* to 2*s.* a day; and every able seaman for twenty-one years' servitude, reckoning from the age of twenty, from 10*d.* to 1*s.* 2*d.* a day; if discharged from infirmity after fourteen years' service, from 6*d.* to 9*d.* a day; and under fourteen years' service, if discharged from disability contracted in the service, from 3*d.* to 6*d.* a day, or a gratuity in lieu, of 1*l.* to 18*l.* If a man become totally blind, he shall have 3*d.* a day added to any of the above. Ordinary seamen receive three-fourths, landsmen two-thirds, boys half the able seaman's pension. Marines, as able seamen.

The following petty and non-commissioned officers shall receive, in addition to the above, the following allowances:—

Superior Petty.	£	s.	d.	Yrs. of Service.	£	s.	d.	Inferior Petty.
	0	15	2½	1	0	7	7¼	
	1	10	5	2	0	15	2½	
	2	5	7½	3	1	2	9¾	
Master-at-arms	3	0	10	4	1	10	5	
Admiral's coxswain	3	16	0½	5	1	18	0¼	
	4	11	3	6	2	5	7½	
Ship's corporal	5	6	5½	7	2	13	2¾	Captain of main-top
Captain's coxswain	6	1	8	8	3	0	10	
	6	16	10½	9	3	8	5¼	Captain of fore-top
Quartermaster	7	12	1	10	3	16	0½	
Gunner's mate	8	7	3½	11	4	3	7¾	Captain of mast
Boatswain's mate	9	2	6	12	4	11	3	Captain of after-guard
Captain of fore-castle	9	17	8½	13	4	18	10¼	
	10	12	11	14	5	6	5½	Yeoman of signals
Captain of hold	11	8	1½	15	5	14	0¾	
Coxswain of launch	12	3	4	16	6	1	8	Coxswain of pinnace
	12	18	6½	17	6	9	3¼	
Ship's cook	13	13	9	18	6	16	10½	Sailmaker's mate
Sailmaker	14	8	11½	19	7	4	5¾	Caulker's mate
Ropemaker	15	4	2	20	7	12	1	Armourer's mate
Carpenter's mate	15	19	4½	21	7	19	8¼	Cooper
Caulker	16	14	7	22	8	7	3½	Corporal of marines
Armourer	17	9	9½	23	8	14	10¾	
Serjeant of marines	18	5	0	24	9	2	6	
	19	0	2½	25	9	10	1¼	
	19	15	5	26	9	17	8½	
	20	10	7½	27	10	5	3¾	
	21	5	10	28	10	12	11	
	22	1	0½	29	11	0	6½	
	22	16	3	30	11	8	1½	

Persons discharged with disgrace, or by sentence of a court-martial, are not entitled to a pension. On a ship being paid-off, the captain may recommend any petty-officer or seaman, non-commissioned officer or marine, for the medal and gratuity for invariable good conduct; 15*l.* for first-class petty-officers and serjeants, if they have served as such ten years, 7*l.* to second-class petty-officers and serjeants who have served as such seven years, and 5*l.* to able seamen and marines.

The widows of officers who are left in distressed circumcumstances receive pensions on the following scale, under the regulations and at the discretion of the Board of Admiralty

		Per Annum.
The widow of a	Flag-officer	120*l*.
	Retired rear-admiral	100
	Captain, three years' standing	90
	„ under three years,	80
	Commander	70
	Superannuated commander	60
	Physician	60
	Lieutenant	50
	Master	40
	Chaplain	40
	Surgeon	40
	Purser	40
	Assistant-surgeon	36

The amount paid in pensions to officers for wounds and good service, to widows of officers, widows and relatives of officers slain, and the out-pensioners of Greenwich Hospital, is 521,572*l*.

Abstract of Pensions paid to the Navy.

	£.
Good-service pensions	4,350
Commissioned and warrant officers	81,619
Widows and relatives of officers slain	11,786
Widows of naval officers	172,381
Widows of marine do.	10,356
Compassionate fund	14,000
Out-pensions of Greenwich Hospital	227,000
	521,572

There are two schools at Greenwich, called the Upper and Lower Schools.

The Upper School comprises two classes:

1st. One hundred sons of commissioned and ward-room warrant-officers of the Royal Navy and marines.

2nd. Three hundred sons of officers of the above or inferior rank, of private seamen and marines who have served or are serving her Majesty, and of officers and seamen of the merchant service.

They are admitted from eleven to twelve years of age, under certain regulations, and are subject to the same discipline, diet, education, clothing, and destination. The term of education is three years, at the expiration of which, or sooner if the course of education be completed, they are sent to sea in the queen's or merchant service, or otherwise disposed of, as may be determined on.

The Lower School consists of 400 boys and 200 girls, the children of warrant and petty officers, seamen and non-commissioned officers and privates of marines, who have served or are serving, or have lost their lives in the service of her Majesty. They are admitted from nine to twelve years of age, and quit at fourteen, the boys being sent to sea, and the girls put to trades and household service; any unprovided for at fourteen are sent to their parents. Any boy may be removed from this to the Upper School on obtaining a presentation, if not more than twelve years old, and possessing character and abilities.

We have seen that in 1744 all prizes were declared to be the property of the captors; the following is the scale of the distribution of prize-money by order in council, February 3, 1836:—the flag-officer or officers have one-sixteenth part of the proceeds; the captain or captains one-eighth part of the remainder, or, where there is no flag-officer, one-eighth part of the whole; the remainder shall be distributed in shares, according to the following scale:—

First class. The sea-lieutenants, captains of marines, master and physician of the fleet, and masters, ten shares each.

Second class. Lieutenants of marines, secretaries, chaplains, surgeons, pursers, mates, second-masters, gunners, boatswains, carpenters, and first engineers, six shares each.

Third class. Assistant-surgeons, midshipmen, masters'-assistants, schoolmasters, junior engineers, clerks, masters-at-arms, admirals' and captains' coxswains, quartermasters, gunners' and boatswains' mates, captains of the forecastle and hold, coxswain of the launch, sailmakers, ropemakers, carpenters' mates, caulkers, armourers, captains of the fore and main top, pilots and serjeants of marines, three shares each.

Fourth class. Volunteers of first class, ships' cooks and corporals, captains of the mast and afterguard, yeomen of signals and coxswain of the pinnace, sailmakers' mates, coopers', caulkers', and armourers' mates, and corporal of marines, two shares each.

Fifth class. Gunner's crew, seamen-gunners, carpenters, sailmakers', and coopers' crews, able and ordinary seamen, yeomen of store-room, stokers, privates and fifers of marines of seven years' service, one share each.

Sixth class. All other ratings, boys of the first class, and marines under seven years' service, two-thirds of a share each.

Seventh class. Volunteers of 2nd class and boys of 2nd class, one-third of a share each.

When captains and commanders share together, the captain to have double the commander. Lieutenants in command share as captains when not in company with a captain or commander. Clerks in charge, as pursers if no purser be present.

When any of her Majesty's ships carries bullion or jewels on freight, the captain or commander is allowed a per centage, regulated by the queen in council, as compensation for the risk and charge, one-fourth part of which is given to Greenwich Hospital, one-fourth part to the commander-in-chief if he shares the responsibility, and the other half to the captain.

Officers settling in the Australian colonies are allowed a remission of the purchase-money, in amount from 100*l*. to 300*l*., according to their rank and length of service.

(Reference has been made to Derrick's *Memoirs of the Rise and Progress of the Royal Navy*; James's *Naval History*; Sir W. Raleigh's *Essay on the Invention of Shipping*; Sharon Turner's *Hist. Anglo-Saxons*; Barrow's *Life of Lord Anson*; and various official papers.)

NA'XIA. [MAIADÆ, vol. xiv., p. 298.] Dr. Leach appears to have been the first who established the genus.

NAXOS, NAXIA, one of the larger Cyclades, between 36° 45′ and 37° 15′ N. lat. and 25° 20′ and 25° 35′ E. long., lies east of Paros, from which it is seperated by a channel six miles wide. It is situated in the middle of the Archipelago, about half way between the coast of Greece and that of Asia Minor. It was antiently called Strongyle (round) on account of its shape, and also Dia, in honour of Jupiter, and Dionysias, from the worship of Dionysus, who, according to the mythi, was brought up on this island. Its first inhabitants were said to have been Thracians. The name of Naxos has been stated by some to have been derived (Stephanus of Byzantium: Νάξος) from that of the leader of a Carian colony which settled on the island. According to Herodotus the Greek inhabitants of Naxos were Ionians from Athens (viii. 46). The island was taken by the Athenians in the time of Pisistratus. The Persians made a fruitless attempt to take the island, under the conduct of Aristagoras, but it afterwards was captured and ravaged by them under Datis and Artaphernes (B.C. 490). After the defeat of Xerxes at Salamis (B.C. 480), the Naxians threw off the Persian yoke and recovered their independence. After the battle of Mycale, Naxos became one of the confederate states, at the head of which was Athens; and it was the first of those states that fell under political subjection to Athens.

In modern times, Naxos, after the conquest of Constantinople by the Latins, became the seat of a dukedom founded by the Venetians, which embraced most of the other Cyclades. [ARCHIPELAGO, GRECIAN.] It was taken possession of by the Turks in the sixteenth century, and it now forms part of the new kingdom of Greece.

Naxos is the most fertile of the Cyclades, and its wine is much esteemed; it produces corn, oil, cotton, silk, most kinds of fruit, and abounds with game. The plains and valleys are well supplied with springs, and all travellers describe Naxos as a very pleasant country. The chief town, called Naxia, is on the western coast of the island, and near it is the harbour, called Porto Saline, on account of the sea-salt which is collected there. The castle of Naxia, on the hill above the town, was built by the Venetians, and was the residence of the dukes. According to Thevenot, the plant which produces the ladanum grows here, and in his time the substance was collected from the beards of the goats which fed on the plant, in the manner mentioned by Herodotus (iii. 112). There are about forty villages and many country-houses scattered about the island, the population of which is reckoned at 10,000. There is a Greek and a Latin bishop, with convents of both churches. The northern part of the island contains some mountains, from which came a kind of marble called by the Greeks ophites on account of its being spotted like a serpent's skin, and which was much valued. Emery is also found there, which is considered of the best kind, and constitutes an article of export. According to the description of Thevenot, what he calls the palace of Bacchus, that is the temple of Bacchus, must have been in tolerably good preservation in his time: but the Turks and others were then constantly employing the materials for various purposes. Tournefort, who travelled forty years later, describes the gate of the temple as the only part left standing, and gives a sketch of it; it was of white marble, of elegant though simple workmanship, 18 feet high and 11 wide; it stood on a detached rock near the coast of the harbour. There was an antient city of Sicily called Naxos, north of Catane and near the site of Taormina, which was founded by some Chalcidians from Eubœa. (Strabo, p. 267.)

Coin of Naxos.

British Museum. Actual Size. Silver.

NAZARENES. It appears from many parts of the New Testament, that the majority of the Jewish converts to Christianity continued to observe the precepts and ceremonies of the Mosaic law. The destruction of Jerusalem by Titus was the cause of many of the Jewish Christians laying aside their peculiar customs; and from this time those Christians who continued to preserve the Mosaic law appear to have received the name of Nazarenes and Ebionites. These two sects, though frequently confounded, differed in many essential particulars; the latter held many erroneous opinions on some of the leading doctrines of the Christian faith, while the former only differed from the orthodox in maintaining that Jewish Christians were bound to observe the Mosaic law as well as the precepts and commandments of the Christian religion. The early fathers do not appear to have regarded the Nazarenes as heretics. This may be the reason why we find no mention of them till the fourth century, when they are named, for the first time, by Epiphanius. On the gospel of the Nazarenes, see Gospel.

(Burton's *Lectures on the Ecclesiastical History of the Second and Third Centuries*, p. 89, 90; Mosheim's *Ecclesiastical History*, vol. i., p. 191, 192, ed. of 1826; Lardner's *Works*, vol. vi., p. 383-387; vol. x., p. 104, ed. of 1831; and the article Ebionites in this work.)

NAZARETH. [Syria.]

NEAGH, LOUGH, a lake in the province of Ulster, in Ireland. Its form approaches to that of a parallelogram, having its length from north to south, from the village of Toome to the place where the Blackwater river enters the lake, about 18 miles; and its breadth from east to west, about 11 or 12 miles. It is bounded on the north and east sides by the county of Antrim; on the south-east, for a very short distance, by that of Down; on the south side by that of Armagh; and on the west side by that of Tyrone. The area occupied by Lough Neagh is estimated at more than 98,000 English acres, or 154 square miles; and its circumference, following the windings of the shore, at about 80 miles. The surface of the lake is 48 feet above the level of the sea at low-water, and its greatest depth is about 102 feet. It is the largest lake in the British Islands.

The border of Lough Neagh forms by its windings several small bays; such as Antrim bay, which forms the north-eastern angle, Sandy bay and Bartin's bay, on the east side, and Washing bay, in the south-western angle. The points of land projecting into it are Ardmore and Lignabey points on the east side, Mulloch point on the west side, and Rauskin point in Washing bay. There are several islands, but they are very small; on Ram Island, one of them, there is an antient round tower. Lough Neagh receives a number of streams: the Blackwater enters it at the south-western angle, in Washing bay; the Upper Bann, which is incorporated with the line of the Newry canal, on the south side; the Six-mile-water at the north-eastern angle, near Antrim; the river Main on the north side; and the river Moyowla or Moyola in the north-western angle. The only outlet is the Lower Bann, which quits the lake at the north-western angle, near where the Moyowla enters it, and, passing through Lough Beg, enters the ocean below Coleraine.

The shores of Lough Neagh are low and flat, and in some parts marshy and liable to be frequently flooded; they are altogether deficient in picturesque beauty. The water of the lake possesses in several parts a petrifying quality, which it is supposed to derive from the adjacent shore The petrified wood is manufactured into approved hones, and the pebbles found in the white sand of the shores, chiefly chalcedony, are polished and employed for seals and necklaces. The char, the pullan, or fresh-water herring, the dollaghern (a species of trout), and other fish, are taken in its waters; and the swan, the heron, the bittern, the teal, and the widgeon frequent the shores.

Lough Neagh is navigated by small vessels, and communicates by one canal with Lisburn, Belfast, and by another with Newry. A steam-boat is employed on it in towing vessels across.

NEAL, DANIEL, an English dissenting divine and writer of considerable eminence, was born in London on the 14th of December, 1678. His early education was received at Merchant Taylors' school. In 1697 he entered the academy of the Rev. Thomas Rowe; and after having continued there about three years, went to prosecute his studies at Utrecht and Leyden. On returning to England he became assistant to Dr. Singleton, the pastor of an independent congregation in Aldersgate Street; and at the death of the latter in 1706, was chosen his successor. Notwithstanding his official duties, in discharging which he was eminently faithful, he found leisure for literary labours. In 1720 he published a 'History of New England,' and subsequently edited a 'Narrative of the Method of Inoculating for Small-pox,' practised in the same state. His printed discourses also are numerous. But his chief work is the 'History of the Puritans,' which is written with great minuteness and accuracy. It was originally published in 4 vols. 8vo., the first of which appeared in 1732, and the second, third, and fourth in 1733, 1736, and 1738 respectively. It has since passed through many editions. The first volume was reviewed by Dr. Maddox, bishop of St. Asaph, and the remaining volumes by Dr. Zachary Grey. To the former Neal himself replied; and an answer was given to the latter by Dr. Toulmin, in an edition of Neal's History, published in 1797. Neal died in Bath, in April, 1743, highly esteemed as an author and a divine. (*Neal's Life*, by Toulmin.)

NEANDER, CHRISTOPHER FREDERIC, deservedly esteemed as the author of some of the best specimens of devotional poetry in the German language, was equally estimable as a man. He was born at Ekau in Courland, December 26, 1724, and lost his father when about eight years old, but was so fortunate as to possess in his surviving parent not only a tender guardian, but a model for those virtues by which he afterwards distinguished himself. Having completed his studies at the university of Halle, he first became tutor in a private family, and in 1750 was appointed pastor of a small congregation in a retired part of the country, to whom and to the duties of his office he became so attached, that when a professorship at Halle was pressingly offered him, he refused to accept it, preferring to remain in obscurity, where he felt that he could be eminently useful. If he afterwards consented to quit his former living for the more lucrative one of Gränzhof, it was with no other interested motive than that of being thereby enabled to support a widowed sister and her five children. By this change too the sphere of his usefulness was greatly enlarged, for he became greatly followed as a preacher. In 1775 he was made dean of the diocese of Doblen; and in 1784 superintendent of church matters in the duchies of Courland and Semgallen; but he still continued to reside among his congregation at Gränzhof. He died July 21, 1802, regretted by all who knew him either as a man or as a writer. In the latter character his fame rests chiefly upon his 'Geistliche Lieder,' a collection of devotional songs, which may justly be regarded as models of that apparently easy, yet in reality exceedingly difficult species of composition. At once animated, simple, dignified, and breathing heartfelt piety, they are equally free from affected sublimity and bombast on the one hand, and from puerility or unbecoming familiarity on the other. They are the genuine effusions of devotional feeling regulated by cultivated taste.

NEAP or NEEP TIDES. [Tides.]

NEA'POLIS. [Naples.]

NEARCHUS, the son of Androtimus, was a Cretan by birth, but an inhabitant of Amphipolis on the Strymon.

He accompanied Alexander in his invasion of Asia, and was appointed by him to conduct to the Persian Gulf the fleet which had been built on the Hydaspes. The narrative of this voyage, the earliest of which any account is given, was written by Nearchus himself; and though the original journal has been lost, Arrian appears to have given us, in his 'Indica,' everything of importance which it contained. Strabo and Pliny have also preserved some account of this voyage, but their narratives are full of mistakes and inconsistencies, and cannot be compared with the full and accurate account of Arrian.

Dodwell and some other modern critics have considered the journal of Nearchus, as preserved by Arrian, to be spurious; but its authenticity has been fully established by Gosselin (*Géographie des Grecs*, p. 25), Sainte Croix (*Examen Critique*, p. 250), and especially by Vincent (*Commerce and Navigation of the Antients in the Indian Ocean*, vol. i., p. 68-77).

The course of the fleet from the Hydaspes to the mouth of the Indus is described under ALEXANDER (p. 300, 301), who explored in person the mouths of the Indus, and sailed into the great Indian Ocean.

The fleet under Nearchus took its departure from a station south of Pattala, about nine miles from the mouth of the Indus, in the beginning of October, B.C. 326. After getting clear of the mouths of the Indus, the first place which they reached in the Indian Ocean was Krokela, which Arrian describes as a sandy island. This place appears to correspond to the modern Curachee, or Crotchey Bay, in which there is a sandy island, dry at low-water. At Krokela, Arrian places the commencement of the territory of the Arabii, an Indian nation, and its termination at the river Arabis.

After remaining one day at Krokela, the fleet proceeded to the west, keeping a promontory (ὄρος) named Eirus (*C. Monze*) on the right, and a low island, almost level with the sea, on their left, which ran so near the coast as to leave only a narrow channel between both. Having cleared this passage and doubled the cape, they came to a bay, or harbour, protected from the ocean by an island called Bibacta (*Churna*, or *Chilney*). This harbour Nearchus called by the name of Alexander, and here he determined to remain till the season should be more favourable for his progress. It has been already remarked that he left the mouths of the Indus at the beginning of October; and as the north-east monsoon does not commence till November, and only becomes settled in December, a delay of some time was almost unavoidable. Having remained at this place for twenty-four days, he continued his voyage, though the monsoon had not yet completely changed; but he proceeded very slowly for some days. The fleet anchored successively at Domæ, Saranga, Sakala, and Morontobara, or Morontobarbara, the position of which places cannot be determined, and afterwards arrived at the mouth of the river Arabis (*Sonmeanny*), which separates the country of the Arabii from that of the Oritæ. From the Arabis they proceeded twelve miles and a half to Pagala, and from Pagala nineteen miles to Kabana, an open and desert shore: between Pagala and Kabana they lost two galleys and a transport. From Kabana they proceeded twelve miles to Kokala, where Nearchus disembarked his men and formed a camp on the shore. Here Leonnatus, who had been left in the country of the Oritæ by Alexander with a particular charge to attend to the preservation of the fleet, joined them, and supplied them with provisions.

After remaining some days at Kokala, they proceeded thirty-one miles to the river Tomerus. This was the longest distance they had sailed yet in a day; and their progress corresponds to the change of the monsoon, which would become more fixed about this time. They remained six days at the Tomerus, where they found barbarians, shaggy on the body as well as on the head, and with nails sharp and long like the paws of wild beasts. Thence they proceeded nearly nineteen miles to Malana (*Ras Malin*), where Arrian fixes the boundary of the Oritæ and the commencement of Gadrosia. The whole of the coast from Malana to Cape Jask, a distance of 450 miles in a right line, was inhabited by the Ichthyophagi (fish-eaters), who lived almost entirely on fish. Their bread was dried fish, pounded and made into loaves or cakes; and even the few cattle which they had fed upon dried fish. Arrian's description of the coast and the people is confirmed by modern travellers, one of whom, quoted by Vincent, informs us that 'they have few ports, little corn or cattle; their country is a low plain and desert; their chief support is fish, of which they take some of a prodigious size: these they salt, partly for their use, and partly for exportation; they eat their fish dry, and give dried fish likewise to their horses and cattle.'

From Malana the fleet proceeded thirty-seven miles to Bagisara; and on the following day they sailed round a rock or promontory, which extended a considerable way into the sea (probably *Cape Arubah*), and proceeded successively to Kolta and Kalama (*Kalyba*), where they found the dates green. Opposite to Kalama was an island called Karnine, which appears to be the same as the modern Ashtola, or Sungadeep Island. From Kalama they proceeded twelve miles to Karbis; and thence, after doubling a high rocky promontory, which projected nine miles into the sea, and which is probably the modern Cape Passeenoe, they reached a safe harbour, called Mosarna, which must be looked for a little to the west of this cape.

At Mosarna Nearchus found a pilot, who undertook to conduct the fleet to the Persian Gulf, and from this time they sailed on each day a much greater distance. From Mosarna they proceeded in succession to Balomus, Barna, Dendrobosa (perhaps the Dendrobilla of Ptolemy), and Kophas, the position of which places is uncertain, with the exception of Kophas, which is perhaps the same as the modern Koppah. From Kophas the fleet sailed round Cape Gwadel, and proceeded fifty miles to Kyiza, where they did not land, as the coast was rocky and barren. On the following day they surprised a small town, probably situated on Gutter Bay, and obtained some corn, which they were greatly in want of. They afterwards anchored at a cape in the neighbourhood called Bageia; and thence proceeded about eighty-seven miles in two days to Kanasis, a town in ruins, probably situated on Choubar Bay. From Kanasis Nearchus sailed twenty-four hours without intermission to a desert coast, where he was obliged to anchor at some distance from the shore, as the distress of the people was now risen to such a height, that if he had suffered them to land, he had reason to suspect that they would not have returned on board. From this place they proceeded, in great want of provisions, to Kanate (*Tanka*), Troi, and Dagasira, and at length reached Badis, a place on the western side of Cape Jask, which separated the country of the Ichthyophagi and Karmania. At Badis they found corn, vines, and fruit-trees of every kind except the olive, a town inhabited, and the inhabitants ready to relieve their wants.

From Badis they proceeded fifty miles, and came to an anchor on an open coast, opposite Cape Maketa (*Ras Mussendon*), from which point Nearchus considered that the Persian gulf commenced. From Badis they proceeded forty-four miles, to Neoptana (near *Karroon*), in the Persian gulf. From Neoptana they sailed on the following day six miles to the river Anamis (*Ibrahim*), at the mouth of which was a town called Harmozeia, the name of which is still preserved in the celebrated island of Ormuz, in the neighbourhood. Near this place Nearchus landed his men, and ordered the ships to be drawn on shore; and learning that Alexander was only distant a journey of five days, he went with a few attendants to his camp, and was received by the king with marks of the greatest honour and respect. At first Alexander would hardly believe that the fleet had arrived in the Persian gulf in safety; and when he was assured by Nearchus of the fact, he is reported to have said, 'By the Grecian Zeus and the Libyan Ammon, I swear to you that I am more happy in receiving this intelligence than at being the conqueror of all Asia; for I should have considered the loss of my fleet, and the failure of this expedition, as a counterbalance to all the glory I have acquired.' So anxious was Alexander to establish a commercial intercourse between India and the western provinces of his vast empire.

After remaining a few days with Alexander, Nearchus returned to the fleet, and set sail again about the beginning of the following year (B.C. 325). During the third day's sail three of the ships grounded during a storm on a shoal off the western coast of the island of Oaracta (*Kishma*); but they got off when the storm ceased, and joined the fleet on the following day. The remainder of the fleet escaped the danger by sailing to the south-westward, and anchored at the islands called at present the Great and Little Tomb. On the following morning they sailed again to the mainland, leaving on their left the island Pulora (*Polior*), and after a sail of two or three days arrived at Katæa (*Kaish*, *Guase*, or *Kenn*), a low desert island, opposite to which, according to Nearchus, is the boundary of Persis and Karmania on the coast.

From Katæa they proceeded along the coast of Persis, anchoring successively at Ila, opposite the island of Kaikandros (*Inderabia*); at Ochus, under a high mountain; at Apostani (*Shewar ?*), where they found many ships at anchor; at a bay, probably the same as the modern Nabend, on the borders of which were many villages with palm and other fruit-trees; at Gogana (*Congoon*), situated at the mouth of a mountain-stream called Areon; and at the river Sitacus, west of the modern *Ras Khann*, where Nearchus remained twenty-one days in order to repair and refit several of his ships, during which time he received a large supply of corn from Alexander. About the 1st of February they sailed from the Sitacus to Hieratis (*Khore*), a place well inhabited, and thence to Mesambria, and anchored at the mouth of a river called Padargos. Arrian describes the whole of this country as a peninsula, which corresponds most correctly with Aboushehr, generally called Bushire. Thence they proceeded to Taoke, near the mouth of the river Granis (*Khisht*), on which there was said to be a palace of the Persian kings, about 200 stadia up the country. Strabo (xv., p 728. *Casaub.*) also mentions a Persian palace near the sea, called Oke, which apparently is a shortened form of Ta-oke. From Taoke they proceeded in succession to Rhogonis (*Bunder Reight*), to Brizana, a winter torrent, and to the river Arosis, called Oroatis by Strabo, Pliny, and Ptolemy (*Tab.*), which, according to Arrian, divided Persis from Susiana.

At the Arosis they took in a supply of water for five days, as the pilots told them that no harbour could be gained without considerable danger, in consequence of the number of shoals which extended from the land far out into the sea. The whole of the navigation along the coast of Susiana was attended with great difficulty and danger; but the fleet eventually passed through the shoals in safety, and sailed up the river Pasitigris (*Karoon*), when Nearchus joined Alexander and his army, who where on their march from Persepolis to Susa. Vincent supposes that the expedition was concluded on the 24th of February, B.C. 325.

After the death of Alexander, we find that Nearchus was governor of Lycia and Pamphylia (Justin, xiii. 4), and that he attached himself to the fortunes of Antigonus, whom he accompanied in several of his expeditions. The time and manner of his death are unknown.

A very complete and interesting examination of the voyage of Nearchus is given by Vincent in the first volume of *The Commerce and Navigation of the Antients in the Indian Ocean*, from which the preceding account has been chiefly taken, compared with the maps of Beloochistan, and of antient and modern Persia, published by the Society for the Diffusion of Useful Knowledge.

The Greek text of Arrian, with some useful notes and a map, is contained in Schmieder's edition. [ARRIAN.]

NEATH. [GLAMORGANSHIRE.]

NEBRUS, one of the family of the Asclepiadæ, and the most eminent physician of his day, lived in the island of Cos, about 580 years B.C. The Amphictyons, having consulted the oracle of Delphi, in consequence of the plague breaking out among their army while besieging the town of Crissa in Phocis, were directed to fetch from Cos 'the young of a stag, together with gold.' This was interpreted to mean Nebrus[*] and his son Chrysus, who accordingly joined the camp of the Amphictyons, where the former helped to reduce the town by poisoning the water; and the latter was the first person who mounted the wall at the time of the general assault. (Thessali *Oratio ad Athen.*, *apud Hippocratis Opera.*) For the Crissæan war see Strabo, ix., p. 418; and Pausan, *Phoc.*, 37, who attributes the poisoning of the water to Solon.

NE'BULÆ. [STARS AND NEBULÆ.]

NECESSITY, in metaphysics, according to the common definition, is that quality of a thing by which it cannot but be, or whereby it cannot be otherwise. When, in a proposition which affirms any thing to be true, there is a fixed invariable connection between the subject and the predicate, then that thing is understood to be necessary. Necessity is opposed to chance, accident, contingency, and to whatever involves the idea of uncertainty and of possible variation. It is usually distinguished into logical, physical, and moral necessity. Logical necessity consists in the circumstance that the conception of something being different from what it is, implies a contradiction or absurdity. In this sense, it is necessary that two and two should be four, that converging lines, if produced far enough, should meet: thus also the eternal existence of being generally is necessary, as are innumerable other truths. Physical necessity has its origin in the established order and laws of the material universe. The necessity, in this case, differs from that formerly specified, in that it is only conditional, is a necessity of consequence. Everything that takes place in the natural world happens by virtue of certain laws: these laws are known by experience to operate regularly and uniformly; and the results of their operation are hence, with reference to them, said to be necessary. When we ascribe anything to chance, we merely state our ignorance of the law or laws to which its existence is to be referred. Physical necessity is founded on the relation of cause and effect. By tracing back this connection, we arrive at the knowledge of a great first cause, that is God, who is the only Being existing independently and by an absolute necessity. His infinity and other attributes are necessary; and it is evident that the purposes and acts of such a Being must also be necessary, being determined by that necessity by which he is what he is. He must always resolve and act with the most perfect wisdom, justice, and goodness. To affirm the contrary would be to affirm that he is different from what he is. Moral necessity has reference to the volitions and actions of rational agents, and is intended to express the connection between these volitions and actions, and certain moral causes, as inclinations, desires, or motives generally. Whether there be any connection which, strictly speaking, may be termed necessary, between such motives, and the resolutions of the human will, and the consequent actions, or whether, independent of them, the will has a self-determining power, is an inquiry which has largely engaged the attention of both philosophers and theologians. It is one of great interest, and which has an important bearing, on whatever relates to man as the subject of a moral government. [WILL.]

The doctrine of a universal necessity, or fatalism, was maintained by many of the antient philosophers; and formed the characteristic tenet of the Stoical school. According to it, necessity was to be considered as an inevitable and all comprehending principle, to which gods as well as men were subject. Everything was conceived to exist in a necessary series of causes and effects—the whole constitution of nature—the modes and circumstances of all things without exception—being irresistibly and unchangeably determined. Hence the language of Seneca, the elegant expounder of the opinions of this sect, in his treatise 'On Providence:'—'The same necessity binds both gods and men—Divine as well as human affairs proceed onward in an irresistible stream—one cause depends upon another—effects are produced in an endless series—nothing is the offspring of chance.' Democritus held opinions closely resembling the Stoical doctrine of fate; as also Heraclitus, the founder of the sect that went by his name. In modern times, the doctrine of necessity, especially in regard to the human will, has been defended by Hobbes, Leibnitz, Priestley, Hume, Kaimes, Hartley, and many others.

NECKAR, river. [RHINE.]

NECKER, JAMES, son of a professor of law at Geneva, was born in 1734. He was sent to Paris in his youth, and was employed in the house of Thelusson, the great banker, who, after a time, in consequence of his abilities and the services which he had rendered to the house, took him into partnership. In the course of twelve or thirteen years, Necker realised a very large fortune by various successful speculations, and retired from business at forty years of age. He now began to aspire to official situations, and wrote several works on financial affairs, which made him favourably known. He wrote concerning the French East India company, and also upon the corn-laws, 'Sur la Législation des Grains.' His 'Eloge de Colbert' obtained a prize from the French Academy. He afterwards wrote a memoir upon the French finances, suggesting the means of making up the deficiency in the revenue, and forwarded it to the minister Maurepas, the president of the council of finances. The president, being delighted with it, obtained for the author, from Louis XVI., after some hesitation on account of Necker being an alien and a Protestant, the appointment of director of the treasury, in 1776. This was a new office, and was created for the purpose of giving assistance to that of comptroller-general, which was filled by the counsellor of state Taboureau de Réaux, a mild and unassuming man, who, feeling his inferiority to Necker, resigned his place in the following year. Necker was appointed director-general of finances, in June, 1777, but without a seat in the council. That was a critical period; the finances had been long in a state of great embarrassment, and the impending war with England on account of the American colonies required a great increase of expenditure. Necker, being averse to imposing new taxes, endeavoured to make up the deficiency by economy and loans. [Louis XVI.] In 1781 he published his 'Compte Rendu,' which disclosed for the first time the state of the revenue and expenditure of France, and made him numerous enemies. In order to counteract their intrigues, Necker asked for a seat in the council as a mark of the king's confidence, but this being refused on the score of his religion, he tendered his resignation, which was accepted, in May, 1781. He withdrew to Switzerland, where he purchased an estate at Copet, on the banks of the Leman Lake, and here he wrote his work, 'Sur l'Administration des Finances,' 1784. 'Both Necker and his predecessor Turgot,' says a contemporary writer, 'worked for the public good, and both made war against abuses. But Turgot had the disinterestedness of a philosopher and a philanthropist who entirely forgot himself for the good of the state and of mankind. Necker was disinterested, but only in money matters, for he was tormented by the ambition of fame and popularity. Turgot had faith in his principles; Necker confided in himself. Turgot had fixed ideas on legislation, and he wished to give a durable government to France; Necker combated only partial abuses, and appeared to have no settled notions of the science of government. . . . Turgot wished to give to the French a political and moral education; he wished to form public opinion; Necker believed that public opinion in France was very enlightened, and he bowed himself before it. The former spoke to the people as a legislator, the other as a courtier of the people.' In his retreat however, after his second resignation, he altered his tone. 'Public opinion,' he says, in the preface to his work 'De l'Administration de M. Necker, par lui-même,' 1791, appears to me no longer as it did once. The respect which I felt for it has been weakened since I have seen that opinion influenced by the arts of the wicked, since I have seen it waver and tremble before men whom it ought to have rightly estimated and marked with its scorn and reprobation.' 'Necker's first resignation however was much to be regretted; it was a loss to France at a critical moment, and it was a great fault on his part, for he might have maintained himself in office; but his unconquerable self-love prevented him. He fancied that they could not do without him, and that he would be soon recalled, and thus become all-powerful. He was mistaken; and when at last he returned to office, the situation of the state was greatly changed, and circumstances had become such as to require talents very superior to his.' (Droz, *Histoire du Règne du Louis XVI.*, b. 11, 1839.)

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[*] νεβρὸς, in Greek, signifies 'a fawn,' and χρυσὸς, 'gold.'

In 1787 Necker returned to Paris, where he wrote against Calonne, who had just been dismissed from his office of comptroller-general of the finances, and he was, in consequence, banished from the capital, but was soon after recalled. In the following year (August, 1788), on the resignation of Brienne, and at the suggestion of that minister, Louis XVI. appointed Necker director-general of finances, as the only man capable of restoring order in the administration. The king had already promised the convocation of the states-general, and Necker urged him to keep his promise. But he failed as a statesman, in not arranging beforehand a plan for the sittings of those states, so as to prevent the collision that took place on their first meeting. In fact Necker was a financier, but no general statesman; he was a philosopher and a man of letters, but not a jurist or a legislator, and he was thus considered by a man well qualified to judge of these matters. [Mirabeau.] His second ministry was short. Unable to check or direct the popular storm, and not enjoying the confidence of the court, Necker, unwilling to become a watchword of the agitators, offered privately to Louis XVI. to quit his place and the kingdom, if he thought his absence would tend to calm the public effervescence. On the 11th of July, 1789, the king wrote him a confidential note, requesting him to set off quickly and privately. Necker obeyed, and set off for Switzerland that very night. But this step, instead of preventing, only precipitated the Revolution. After the taking of the Bastille, the National Assembly demanded the recall of Necker, and Louis complied. Necker was received in triumph, but his popularity was short-lived. He did not go far enough to please the movement-men. In December of the following year, 1790, he gave in his resignation to the National Assembly, which received it with cool indifference. He spent the remainder of his life in Switzerland, in retirement and study, and wrote several political tracts. He had written, several years before, a work, 'De l'Importance des Opinions Religieuses.' He died in April, 1804. His daughter has become celebrated as Madame de Staël. [Stael.]

NECRO'SIS (from νεκρός, 'dead') is the term applied particularly to mortification or death of bone. Its general causes and the mode of reparation are the same as those of mortification generally. [Mortification; Inflammation; Bone.]

NECTARINE. [Peach.]

NECTARINI'ADÆ. [Sun-Birds.]

NECTO'PODA. [Nucleobranchiata.]

NECTU'RUS, M. Rafinesque's name for a genus of *Derotremata*, placed by Cuvier between the *Axolotls* [Axolotl] and the *Proteii* of Laurenti. This form is the *Menobranchus* of Harlan and the *Phanerobranchus* of Fitzinger.

Generic Character.—Four toes on each foot. A row of teeth on their intermaxillaries, and another, parallel but more extended, on their maxillaries.

Necturus lateralis (*Triton lateralis* of Say; *Menobranchus lateralis* of Harlan; and *Phanerobranchus* of Fitzinger) is the species best known, and will serve for an example of the genus. It is olive, with blackish spots above, and a blackish stripe running from the muzzle just above the eye and reaching to the branchiæ, where it becomes continuous with the blackish belly, which is variegated with olive spots. The size is considerable; some say as much as two or three feet in length.

Geographical Distribution.—The great North American lakes.

Necturus lateralis.

NEDJED, or NEDJD. [Arabia.]

NEEDLE MANUFACTURE. This branch of industry is supposed to have originated in Spain, from the circumstance of the name *Spanish needles* being originally used in England, although the art was brought here from Germany. Needles were first made in England about the year 1565, by Elias Crowse or Krause, a German, who settled in London. This manufacture can never become one of much importance to a nation, and it is not therefore surprising that we are without any historical details of its progress. The reputation long enjoyed by *Whitechapel* needles points out the particular locality in London where the manufacture was carried on. At this time, the largest number of needles are made at Hathersage in Derbyshire, in Warwickshire, in and near Birmingham, and also at Redditch in Worcestershire.

The manufacturing processes are as follows:—Soft steel wire of the required thickness is first cut into lengths of about five inches, and these lengths, being placed together in a bundle, are bound together by means of iron rings, five inches in diameter, placed at each end of the bundle. This bundle is then placed on a cast-iron table, and rolled to and fro upon it, under the pressure of a flat bar of iron, by which means the wires are made perfectly straight. About a dozen and a half or two dozens of these wires are then taken by the grinder, and together are pointed on a small dry grindstone. This process requires considerable dexterity for its proper accomplishment, as each wire must be so held by the grinder as to revolve in contact with the grindstone. It is this dry-grinding which makes the trade of a needle-grinder so injurious to health, through the inhaling of the small particles of steel which are thrown off during the operation. A preservative against this evil has been provided: this consists of a mask of magnetic wire-gauze, worn so as to protect the mouth, and the particles of metal, being attracted by this means, are prevented from passing into the lungs. It is but seldom however that the grinders can be induced to wear these masks.

When the pointing is finished, the wires are cut into the required lengths, and the holes or eyes are perforated. This operation is usually performed by females. The tools employed are, a small anvil fixed on the work-bench, a hammer, a finely-pointed and well-tempered steel punch, a pair of plyers, a file, and a block of lead. The woman first slightly flattens the unpointed end by a stroke of the hammer, then makes an indentation on one side by means of the punch and hammer; the needle is then taken from off the anvil, and, being placed with the indented side downwards on the block of lead, the perforation is completed by striking with the punch and hammer on the opposite side of the needle. Holding then the needle in the plyers, the head is somewhat bent, and with the file the *guttering* is performed, which is the forming of the channel that may be seen on each side where the perforation is made. The head is then smoothed by passing the file over it. Needles to which the name drilled-eyed is applied are perforated in the manner here described, but the additional process is used of smoothing the eye by means of a drill after it is perforated.

For making the eyes and gutters in large needles, machinery is employed. The wires used for making these needles are pointed at both ends, and the channels and eyes are formed in the middle, when the two needles thus made are cut asunder, and their heads smoothed with a file.

These operations being performed when the steel wires are in a soft state, they are more or less bent, and must be straightened, which is done by rolling them on one plate of metal under the weight of another. The needles are then placed, many thousands together, in a kind of crucible, and covered over with ashes, when they are put into a close furnace and exposed to a cherry-red heat. When this degree of heat has been attained, the crucible is withdrawn, and the needles are dropped into cold water, from which they are taken out and put upon an iron plate almost red hot, where they are turned about so as to cause the heat to apply equally to all, and as fast as the needles become of a blue colour, they are removed as being of a proper temper.

Such of the needles as now appear crooked are straitened on a small anvil by blows from a hammer.

The needles are next ranged in parallel rows upon a coarse cloth, which has been smeared with a mixture of oil, soft soap, and fine emery powder. In this cloth from 40,000 to 50,000 needles are rolled up, and several of these rolls are placed together in a machine like a mangle. The rolling to which they are here subjected is continued, by means of steam or water power, for two and sometimes three days, during which time the cloth wrappers, being worn out, require to be once or twice replaced by new ones. When taken out, after this rolling, the needles are perfectly bright.

They must now be sorted, by placing the heads of all in the same direction. This task, as well as that of separating broken and spoiled needles from such as are sound, is performed by children. Placing a finger-stall of cloth on the fore-finger of the right hand, the ends of about a dozen needles are pressed against it, when such as have their points next to the cloth stick into it, and are withdrawn with ease. The needles thus arranged are then placed, a quarter of a hundred together, in papers for sale.

It is not possible to form any satisfactory estimate of the number of needles made and used in this kingdom, neither do we know the quantity nor value of such as are exported, as they pass at the Custom-house, with a great variety of small objects, under the general name of haberdashery. Needles of English make are very generally esteemed for their superior quality.

(Babbage's *Economy of Machinery and Manufactures*; Lardner's *Cabinet Cyclopædia*, 'Manufactures in Metal.')

NEEFS, PETER, called 'the Old,' born at Antwerp in the year 1570, was a disciple of the elder Henry Steenwyck, whose manner he closely imitated. He painted views of churches and convents, especially interiors, preferring those in the Gothic style of architecture. He possessed a profound knowledge of perspective, and represented his subjects, with all their rich ornaments, and every member of the architecture, with strict truth, and yet without betraying the appearance of anxious labour. Every object is marked with minute precision, and finished with an exquisite touch and a light pencil. His bright clear pictures, in which he avoided the darkish brown colouring sometimes observable in the works of his master Steenwyck, are the most esteemed. Being an indifferent designer of figures, he often got F. Francks, Van Thulden, Velvet Breughel, or Teniers, to paint the figures; those of the two last greatly enhance the value of the pictures of Neefs.

He died in 1651, at the age of eighty-one. His son, Peter Martin (called 'the Young') painted in the same style, and chose the same subjects as his father, but was by no means equal to him.

NEER, ARNOLD VANDER, born at Amsterdam in 1619, is well known to connoisseurs and artists both by the peculiarity of his style and by the handling and transparence of his landscapes. His subjects are chiefly views of villages with fishermen's huts on the low banks of rivers and canals. His pencilling is remarkably neat, his touch free and clear, and his imitation of nature faithful. His reputation is founded on his moonlight scenes, in which he has never been excelled, and perhaps never equalled. The lustre of his skies about the moon, and the reflection of the beams on the water, whether calm or slightly rippled, are inimitable. His genuine pictures are highly prized all over Europe. In some instances they are rather too black, probably from the effects of time. He died in 1683, aged sixty-four.

NEER, EGLON HENDRICK VANDER, son of the preceding, was born at Amsterdam in 1643. He studied first under his father, and afterwards under Jacob Vanloo. He was well versed in all the branches of the art. In history, his composition is skilful and his drawing correct; his portraits, both large and small, are spirited and well coloured; and his conversations have all the excellencies of Terburg. He lived first at Paris, then at Orange, and lastly at the court of the elector palatine at Düsseldorf, where he died in 1703.

NE EXEAT REGNO, the name of a writ which issues out of Chancery on the application of a party complainant, to prevent his debtor from leaving the realm. The writ is directed to the sheriff of the county in which the debtor is; and after reciting that 'it is represented to the king in his Chancery on the part of the complainant against the debtor, the defendant, that he the said defendant is greatly indebted to the said complainant, and designs quickly to go into parts beyond the seas (as by oath made on that behalf appears), which tends to the great prejudice and damage of the said complainant,' commands him to 'cause the said debtor to give sufficient bail or security, in the sum of *l.*, that he will not go, or attempt to go, into parts beyond the seas, without leave of the said court;' and in case the said debtor shall refuse to give such bail or security, the sheriff is to commit him to prison until he shall do it of his own accord, &c.

The question which always arises on application to the Court of Chancery for this writ, is nothing more than this: whether the plaintiff has made out a case which is conformable to the terms of the writ, as interpreted by the decisions of the court.

The writ cannot be applied for unless in a suit, that is, unless a bill is already filed; but a plaintiff may apply for it in any stage of a suit, whether the writ is prayed for by the bill or not. The plaintiff cannot have the writ if he is out of the jurisdiction. There must be a debt in equity actually due at the time when the writ is applied for; and the writ will not be granted for a demand on which a party can be held to bail at law. The application for the writ must be accompanied with an affidavit swearing positively to the debt, except where the bill is for an account, in which case it it sufficient if the plaintiff swear that he believes there is a balance in his favour; or except where there is other decisive evidence of the debt, such as may appear from the master's report absolutely confirmed, or from admissions in the answer. The affidavit must also show that the defendant is going abroad, or it must show facts which prove that conclusion, and that the debt will be in danger if he quit the realm. The writ may be moved for ex parte, and it issues until answer and further order. A defendant may apply to discharge the writ on putting in his answer.

It is unnecessary to enter into further particulars here.

This writ is founded on the real or supposed prerogative of the king to restrain his subjects from departing from the realm. The 'Natura Brevium' contains two forms of writs, one of which has for its object to restrain a clergyman from going abroad without the king's licence, and commands the sheriff to take security from him or commit him to prison; the other has for its object to prevent a layman from going abroad without the king's licence; but it requires no security from the party, and differs in several other respects from the other writ. These writs are both entitled De Securitate Invenienda, &c., and seem to be in substance, though not in name, writs of Ne Exeat Regno. From the former of the two the present writ of Ne Exeat seems to be derived.

It is said that the object of the writ, as applied to clergymen, was to prevent them from having frequent intercourse with the Papal see. Whether the prerogative on which these writs were founded was a usurpation on the part of the crown or not, is a matter which has been somewhat discussed. The opinion that such a power as that which is exercised by this writ 'appears to have been unknown to the antient common law, which, in the freedom of its spirit, allowed every man to depart the realm at his own pleasure' (Beames), is a vague surmise, expressed in language equally vague. This writ, which was originally designed solely for political purposes, has now been applied, as already explained, to the object of restraining a debtor from evading his creditor's demand by quitting the realm; this application has been sanctioned by long usage, the commencement of which is now unknown.

(*A Brief View of the Writ Ne Exeat Regno*, by Beames.)

NEGAPATAM, a town and port on the Coromandel coast, in 10° 45′ N. lat. and 79° 55′ E. long. The Portuguese had formerly a settlement here, which was taken from them in 1660 by the Dutch, who added materially to its defences, and made it their principal station in that quarter. They established a mint for coining gold money, and carried on an extensive trade from the port. The fort fell into the hands of the English, after an obstinate resistance, in 1781, and since then the European inhabitants have deserted the place. Many of the houses fell quickly into ruins, and others were pulled down, such of the materials as were of value being carried away to Madras. The native town is likewise much decayed, and the population is greatly diminished. The trade at present is quite inconsiderable, being almost wholly confined, as far as Europeans are concerned, to the procuring of refreshments for ships that touch at the port for that purpose.

NEGATIVE AND IMPOSSIBLE QUANTITIES. If the plan of this work had permitted detailed treatises on different branches of science, the subject before us would have fallen under the head of Algebra, and would have been fully treated in the description of the difference between algebra and arithmetic. As it is, the present article and that on Operation will embrace the consideration of those peculiar abstractions the attainment of which distinguishes the *science* of algebra from the *art* which was cultivated by the Italians of the sixteenth century

In the oldest treatises on algebra which exist there is mention of a modification of quantity unknown in arithmetic, called *negative* quantity, as distinguished from *positive*. In the Viga Ganita we find this distinction and the rules for its use precisely as in modern treatises: one of the commentators says that negation is contrariety; and the 'Liliwati' contains the geometrical interpretation of a negative line, namely, a line measured in the direction contrary to that of a positive line. The commentator says that Patna is fifteen yojanas east, and Allahabad eight yojanas west, of a place called Varanasi; 'the interval or difference is twenty-three yojanas, and is not obtained but by addition of the numbers. Therefore, if the *difference* between two *contrary* quantities be required, their *sum* must be taken.' Surely it will be said that algebra began in a strange confusion of ideas; but yet the fault is rather in expression than in conception. An art was in existence presenting undoubted means of discovering truth, commencing with a generalization of which the use was obvious, but not the meaning. In Diophantus we find the common rule announced as a definition (without even a previous notice of the distinction of quantities) in terms as broad as the following: '*Λεῖψις ἐπὶ λεῖψιν πολλαπλασιασθεῖσα ποιεῖ ὕπαρξιν*,' &c.; literally, 'Defect upon defect repeated, makes existence.' In Mohammed Ben Musa [Musa] the rules are announced in the same way, though the separate existence of positive and negative quantities does not seem to be assumed it must be remembered that this work was written for popular use. The European promoters of algebra, with the exception only of Vieta, adopted the use of two species of quantities, positive and negative, with the explanation above noticed. Vieta not only avoided the negative quantity, but, as far as he could, dispensed with subtractive terms and subtraction itself. He discards the double nature of quantities in the words 'Plus autem vel minus non constituunt genera diversa.'

It is not our intention to follow the earlier algebraists through their different uses of negative quantities. These creations of algebra retained their existence, in the face of the obvious deficiency of rational explanation which characterised every attempt at their theory. Newton and Euler distinctly admit the existence of the quantity less than nothing: the latter asserts that a man who has no property and is in debt 50 crowns, would only have nothing if any one else made him richer by a gift of 50 crowns, and therefore begins with 50 crowns less than nothing. Elementary treatises for the most part try to append an explanation of negative quantities to an algebra which is nothing more than arithmetic, instead of introducing those new abstractions which are the basis of the separate science: so that algebra, instead of being systematically learnt, is collected by slow and often dubious steps from arithmetical examples, in which the rules of operation of the former science are employed, preceded by the principles of the latter. Few therefore acquire a real perception of the meaning of the subject, except those who study mathematics to great extent. It is matter of notoriety that difficulties attend the beginner in algebra of a nature totally different from those which are found in geometry; so that while a person who has read a few books of Euclid may be imagined capable of writing an intelligent commentary on what he knows, another who has mastered a common elementary treatise on algebra is conscious only of a great increase of working power, with a glimmering of principles which owe their reception more to the never-failing accuracy of their results than to native evidence or logical deduction from easily admitted truths.

It is but recently that such a view has been given of algebra as will at once explain both the distinction of positive and negative quantities, and the difficulty attending the square roots of negative quantities, usually called *impossible* quantities. We shall endeavour to ascend to this view of algebra, on the supposition that the student has read what beginners usually read, and is well acquainted with the common operations. We must however premise that, as in all other cases where the first principles of a science have been matter of dispute, it by no means follows that one view of the subject is the most easy to every mind. Something must depend on the intellectual constitution of the individual; and if this be most probably true in geometry, the remark applies with still greater force to algebra.

The first abstraction which meets us in arithmetic follows the transition from actual magnitudes (concrete numbers, so called) to their numerical representations. We then find general properties of numbers, in which we learn to consider number independently of a specific concrete unit. Thus we see in $7+5-3=7-3+5$ a relation equally true, whatever may be the nature or magnitude of the unit. When we drop the concrete number and rise to the abstract, we gain something more by the transition than immediately appears; and this the student should particularly note, because some of the succeeding difficulties which attend the passage into algebra are very similar in character, though preceded by a stranger and harder process. The operation of multiplication takes a power and a property which it had not before: thus if we denote concrete number by Roman numerals, and if we speak of yards, it is clear that 5×VII =XXXV, or seven yards taken five times is thirty-five yards. But we may not therefore say that VII×5=XXXV, for VII×5, the number 5 multiplied by 7 yards [Multiplication], is an incongruous and unmeaning set of words, and it would be equally improper to say that it *is* and that it *is not* thirty-five yards. In abstract numbers no such caution is necessary; 7×5 and 5×7 are both the same. If men had never considered *number* independently of magnitude measured or repeated by it, the arithmetician would have confounded VII×5 and 5×VII, because he would soon have found that no false results would have sprung therefrom; while VII×5 would have been a sort of impossible quantity, useful in practice and difficult in theory.

We are now on the ground of abstract arithmetic, and on examining the four fundamental operations, we see no difficulty in either addition, multiplication, or division. As soon as we have mastered the subject of fractions, and have clearly admitted the introduction of a *part* of a repetition [MULTIPLICATION], we say as follows: let a and b be any two numbers or fractions, and $a+b$, ab, and $a:b$ must be real numbers or fractions, assignable by demonstrated operations as soon as a and b are assigned. But there is still a restriction upon the possibility of subtraction; $a-b$ has no imaginable existence, unless a be greater than b; when $a=b$, the magnitude of $a-b$ vanishes entirely, and when a is less than b, the direction to perform $a-b$ is just the same as asking for a part which shall be greater than the whole of which it is a part. If we confined ourselves to particular arithmetic, in which all numbers used have specific values, it would most likely be thought of no use to carry the subject further, and in one point of view correctly; that is, it would be of little moment to deduce methods by which an individual so careless as to write down and operate upon such a symbol as $3-4$ might be enabled to arrive at a subsequent correction of the mistake which a glance at the symbol should show him he has made. But when we use general symbols of number, we are liable to mistakes of two kinds, both dependent upon our liability to invert the order of terms of which the less should be subtracted from the greater.

First, we may mistake the nature of the quantity which results: thus if it be part of the conditions of a problem that I pay £a and receive £b, and if the application of the conditions requires that I should state how much I gain or lose, the answer should be either a loss of £$(a-b)$ or a gain of £$(b-a)$, according as a or b is the greater. We have then the choice between adopting one of these with the chance of being entirely wrong, or of working the problem in two distinct ways. And if it should happen that the conditions of the problem present this alternative in six distinct instances (and sometimes it happens oftener), there would be no less than 64 cases of solution, all, arithmetically speaking, essentially different in the mode of obtaining the answer, whether the answers obtained be the same or different.

Secondly, we may make an error of the same kind in the details of operation. For instance, suppose we have $a+b-c$, which it is convenient to exhibit in the form of a altered by one single addition or subtraction. If we assume an addition, and write $a+(b-c)$, we may be in error; for if b be less than c, the proper alteration is $a-(c-b)$.

It is evident that both species of mistakes are precisely of the same kind. Let us call them, for distinction, errors of interpretation and errors of operation, and let us show first that an error of interpretation will produce the error of operation and no other. If, in the first problem, we suppose $a-b$ to be lost where $b-a$ is really gained, and if the problem, for instance, require the result of the preceding to be annexed to a loss x, we shall suppose there is altogether a loss of $x+(a-b)$, whereas it should be a loss of only $x-(b-a)$. Secondly, the error of operation will produce the error of interpretation, whenever any interpretation is made; for when we look at $x+(a-b)$ as a loss, we shall evidently suppose it to be more of a loss than x, or that $a-b$ is lost besides; whereas, had we looked at $x-(b-a)$, we should have inferred that there is a less loss than x, or if x were lost, $b-a$ was gained. Now the first step of the young algebraist, before he attempts any transition from universal arithmetic to algebra, must be to examine by many instances the effect of both classes of errors upon the subsequent proceedings and results. We shall here only state the truths at which he will finally arrive, with an example of each. The beginner cannot, as the proficient may do, see a sufficient reason for these results in the common rules of algebraical operation; and we should doubt that anything but a large number of examples would serve to give him the necessary insight into the conclusions.

1. The mistake of operation, how often soever repeated, and how complicated soever the deductions which may be drawn from it, produces no result in any way different from that of the correct process; that is, its result can be reduced to the result of the correct process by the use of no more than those rules which apply in the rational process.

Thus if $x+a-b$, wrongly taken to be $x+(a-b)$, b being greater than a, be multiplied by $x+p-q$, wrongly taken as $x+(p-q)$, q being greater than p, we find as the (supposed) product

$$x^2+(a-b+p-q)\,x+(a-b)\,(p-q),$$

to which the application of the common rules gives

$$x^2+ax-bx+px-qx+ap-bp-aq+bq,$$

precisely the same as the product of $x+a-b$ and $x+p-q$. The reason of this is as follows:—In all the rational cases of the four operations, a term in the construction of which two signs are used has $+$ before it, if those two signs be alike, and $-$ if they be unlike, as in

$$a+b-(c-d),\text{ or } a+b-(0+c-d)$$
$$=a+b-c+d$$
$$(a-b)\,(c-d)\text{ or }(0+a-b)\,(0+c-d)$$
$$=0+ac-ad-bc+bd.$$

If then a term were subjected to the signs $++$, it would make no difference if the same term were subjected to the signs $+--$, for the effect of $--$ is the use of $+$. If then we take $x+a-b$ wrongly as $x-(b-a)$, we see that when we come to add this, say to c, we have

$$c+\{x-(b-a)\}$$

in which a, before it is disengaged, must come under the signs $+--$, or, if the phrase be less objectionable, under the application of the rules to those signs, successively. But the correct process would give

$$c+\{x+(a-b)\}$$

in which a falls under the application of the rules to $++$; and such application to $++$ gives the same result as that to $+--$, necessarily and demonstrably, though in one of the two applications there is the symbol of absurdity. In the same way the other cases may be proved, whence it follows that however many of these simple operations may be performed, no result can arise except either that of the correct operation or one which may be brought to it by the operations on signs, already described.

We must here pause to remind the reader that errors, however palpable and admitted, are not necessarily productive of error. *True* reasoning, on *true* principles, *must* lead to truth; but if for true we write false, and for truth falsehood, we have no longer any right to say *must*, but only *most probably will*. If then we can show of a particular class of errors that, used in a certain way, the results agree with those of true reasoning on true principles, we may demand the use of those errors as demonstrated means of finding truth. The mind of man would never stop at such a point; but, for all that, we have the conclusion, as a logical consequence of the rules of arithmetic, that the mistake of the impossible subtraction introduced in operations, and not having previously vitiated the interpretation by which the fundamental objects of operation (equations) were deduced from the conditions of the problem, will produce no falsehood in the result.

2. Let us now examine the consequences of the error of interpretation. The effect of this is, that we write $a-b$ instead of $b-a$, but at the same time we suppose the quantity of which we are thinking to be of a diametrically opposite character to that which it ought to have. But also at the same time we add this symbol where we should subtract it, and *vice versâ*; so that where we should take $a-b$, and add, giving $c+(a-b)$, we make one mistake in taking $b-a$, and another in subtracting, giving $c-(b-a)$. When mere rules come to be applied, we find the same result from both, namely, $c+a-b$ and $c-b+a$. We might then so manage as to elude the actual presentation of the negative quantity, as in the following problem:—Two persons are now aged 50 and 40; at what date is (was, or will be, as the case may be) the first twice as old as the second? Let us suppose that we reach the date by going a years forward and afterwards b years back from the epoch to which we then come: here is a supposition which is perfectly competent to yield any result, before or after the present epoch, by properly assuming a and b. But we must now choose a supposition; let it be that the ratio in question exists at some future time, that is, a is greater than b. In $a-b$ years then the thing happens; consequently,

$$50+(a-b)=2\,(40+(a-b)\,)\quad .\ .\quad (1)$$
$$50+a-b=80+2a-2b\quad .\ .\ .\quad (2)$$
$$80+2a-2b-50-a+b=0$$
$$30+a-b=0$$
$$b=a+30.$$

Or any number of years forward and 30 more years back is all the answer the conditions of the problem will give, or the event took place 30 years ago. But the correctness of this reasoning is only a semblance, for the result contradicts the supposition on which it was obtained, namely, that a is greater than b. To increase 50 by the excess of a over 30 *more than* a is beyond the power of the arithmetician. If then it be taken that a is less than b, or that the event happened $b-a$ years ago, we have

$$50-(b-a)=2\,(40-(b-a))\ .\ .\ (3)$$

$$50-b+a=80-2b+2a\ .\ .\ .\ .\ (4)$$

and (4) is the same as (2); so that we arrive at the same result as before, and find our conclusion to justify the supposition on which it was made. The steps (1) and (3) differ to the same effect as if an error of operation had been made on (4) or (2) in retracing the steps.

In the preceding, by the use of two symbols, a and b, we have enabled ourselves to obtain a correct and intelligible answer, even by the incorrect process, since we end with the determination of $b-a$ (=30), even where we reasoned on $a-b$. If however we had represented our unknown quantity by a single symbol, x, our first process would have stood as follows:—

$$50+x=2\,(40+x)=80+2x$$

$$x=50-80$$

And the answer is obviously impossible. Our second process is,

$$50-x=2\,(40-x)=80-2x$$

$$x=80-50=30.$$

From such instances as the preceding it may be collected that an error of interpretation, which causes us to write $a-b$ instead of $b-a$, will, in finding the value of $a-b$, cause an impossible subtraction to appear; and *vice versâ*, that the appearance of an impossible subtraction in the result can arise from nothing but a primitive error of interpretation in fixing the nature of that result. This point must be well ascertained by every beginner from repeated instances.

Such a result as 3−8 may be written 3−3−5, or 0−5; so that the error of attempting to subtract 8 from 3 is reducible to that of attempting to subtract 5 from nothing. At our present point we can say that the occurrence of 0−5 shows us that the result which we supposed ourselves about to obtain was diametrically wrong in quality in our previous supposition: thus in the preceding problem we found 50−80, or 0−30, and the real answer is 30 in its magnitude, but instead of being, as we supposed, 30 years after the present time, it is 30 years before it.

Having arrived at this point, the earlier algebraists at once received such symbols as 0−5 and 0−30, which they wrote −5 and −30, into the list of algebraical objects of reasoning, calling them *negative* quantities, and treating them as diametrically opposite in meaning to 5 and 30, which should for comparison be written 0 + 5 and 0 + 30. These they called *positive* quantities. And, because, in all possible subtractions the remainder is less than the minuend ($a-b$ is less than a) they called 0−5 less than nothing. The fault committed by elementary writers, in beginning algebraical works by an exhibition of these definitions without the least warning of the manner in which arithmetical terms had been extended, converted the whole science into a mystery.

If we extend the notion of quantity so as to give different names to those of diametrically opposite kinds, we may call one set of quantities direct, and the others inverse. Thus property and debt, distance north and distance south, time before and time after, ascent and descent, loss and gain, progression and retrogression, &c. &c., are of different kinds; either of any one pair may be called direct, but the other is then inverse. And in circumstances which require the addition of the direct quantity, the subtraction of the inverse is equally required: thus whatever an increase in A's property will augment, a diminution of it will diminish; whatever distance on a line progression on that line will increase, retrogression will diminish. If then we have $a+b$ where we imagine both quantities were what we took them to be; but if it should turn out that b is of the contrary kind, we know that we should have had $a-b$. If we put $+b$ for the quantity we thought we were using, and $-b$ for its opposite, the ordinary rule of signs will be sufficient to make the conversions which the correction of the mistake requires. Thus if, attending only to the rule that like signs produce + and unlike signs −, we treat

$$a+(+b) \quad\text{and}\quad a+(-b)$$

we find

$$a+b \quad\text{and}\quad a-b;$$

or, in this instance, the affixing of + or − to a quantity according as our initial supposition is correct or incorrect, leaves us with our result if we were correct, and makes the necessary alteration if we were incorrect. The application of the same reasoning leads to the same conclusion in all the cases of addition and subtraction. Observe also that if any one, disputing the propriety of making the signs + and − take a new meaning, should prefer, say, to denote direct quantity by the prefix of ¶, and inverse quantity by that of §, the rule he would arrive at by induction is that like signs produce + for operation, and ¶ for interpretation, while unlike signs produce − for operation and § for interpretation; where by like signs he would find he must mean + and +, or + and ¶, − and −, or − and §, and all others unlike. His final rule then would be, use ¶ as if it were +, and § as if it were −, so that he would ultimately differ from the algebraist by the continual use of two new signs without any new uses or practical meanings.

In the operations of multiplication and division the rule of signs is thus shown:—It is said that two negative quantities multiplied together produce a positive quantity, which means that a mistake of direct for inverse, or *vice versâ*, made in both the terms of a product, produces no mistake in the product, when the latter is formed by the usual rules. Thus, if a, which should be $x-y$, has been taken to be $y-x$, and if b, which should be $v-w$, has been taken to be $w-v$, the algebraical product

$$(w-v)\,(y-x) \quad\text{or}\quad wy-wx-vy+vx$$

at which we arrive in the mistaken process, is precisely the same as

$$(v-w)\,(x-y) \quad\text{or}\quad vx-vy-wx+wy$$

at which we should have arrived in the correct process.

The first step then from arithmetic to algebra is made by the following definitions:—

1. Quantities are distinguished into positive and negative, which are to be considered as of diametrically opposite kinds; and common arithmetical quantities (abstract numbers without signs) are to be considered as positive. 2. The rules of arithmetical algebra are to be applied to the extended algebra, and in all cases in which the latter presents a case unknown to the former, the rule of signs already known in the former must be applied. The purely verbal question of the terms *less than nothing*, &c., will be considered under the word NOTHING.

The preceding extension gives an extended meaning to all the terms of operation; thus addition is no longer the simple arithmetical process, but a compound operation, first reducing a multiplicity of signs to one alone, and then following the direction of that sign; and the same of subtraction. Thus $a-(-b)$ is $a+b$. It may be asked then how we are to trace our steps through any problem so as to form its equation out of symbols which seem to have various meanings; for it might appear as if the + of algebra were either the + or − of arithmetic, as the case may be. The answer is very simple: since the extended algebra is no more than arithmetic in its actual operations, however the meaning of those operations may be extended, we may be sure that if we assign a particular case of a problem, and treat it entirely as in arithmetic, we are, though with one case only in view, performing upon limited symbols (limited because we think at the time only of a limited meaning) the same steps which we should have to follow if we could, by one act of the mind, grasp the symbols in their utmost generality.

Our limits will not allow us to pursue this subject to the extent which might be necessary for an unpractised user of symbols, and we therefore pass on to the yet higher view of the question, in which the introduction is made to a purely symbolical algebra. If we examine any symbolical identity (the sign of identity being =) for example, so simple a one as

$$a+b=b+a$$

we see of course that its truth is a consequence of the definition of + and of the conceptions which are inseparable in our minds from the addition of quantity to quantity. The truth of the identity, then, follows from the meaning of the symbols, but the converse is not true; the meaning of the symbols does not follow from the truth of the identity. That is, let it be granted that $a+b=b+a$, and it does not follow that + means addition, for consistently with the preceding it might mean multiplication, or it might mean the formation of a rectangle by erecting a line equal to the second symbol upon a line equal to the first. In fact, the identity before us merely expresses that + is a symbol of an operation so connected with two subjects of operation that the latter may be interchanged without any alteration of the result. And the same may be said of any other fundamental symbol of identity; it may preserve its truth under many different meanings.

Next, when we perform operations of algebra with that mechanical expertness which practice teaches, we do not look back to the meaning of our operations at each step, but proceed upon a few rules of operation, of the meaning of which we must become conscious the moment we have to stop and contrive the mode of proceeding, dropping that consciousness as soon as we are again in the routine of operation. If we collect the symbols of algebra, we shall find them all in the following list. 1. The numerical symbols of arithmetic. 2. Letters denoting magnitudes. 3. The signs of addition, subtraction, multiplication, and division, the latter with their usual abbreviations of $a \times b$ into ab, and $a \div b$ into $\frac{a}{b}$. 4. The exponent, as in a^b, b being any algebraical magnitude. 5. The symbols of logarithms, sines, cosines, &c., which may be considered but as abbreviations of series composed of terms made up of and connected by the preceding symbols. The list of fundamental operations is not very large: such as

$$+(+a) = +a, \quad ab + ac = a(b+c), \quad \frac{ma}{mb} = \frac{a}{b}, \text{ \&c.};$$

so that it would be perfectly possible to imagine a person who had forgotten the meaning of the symbols able to perform the mere operations by reference to a few primary rules.

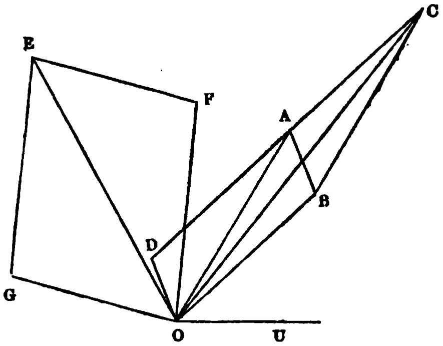
This being the case, suppose these few rules of reference collected together; we can then conceive a person operating by means of these rules, without thinking of their meaning. As it is of importance that a clear idea should be formed of this separation of symbolic from arithmetical reasoning, we shall propose the following illustration. A person who has thoroughly studied the algebra of positive and negative quantities, is attacked by a severe illness, on recovering from which he finds all memory of connection between his conceptions and the symbols which represented them totally gone, while his expertness in performing the mere transformations with which algebra abounds remains undiminished. When he sees $(a+b)^2$ he perfectly remembers that its substitute was $a^2 + 2ab + b^2$, but what a, b, $+$, &c. stood for, or might have been supposed to stand for, he has wholly forgotten.

He is now a purely symbolical algebraist. Suppose that he endeavours to recover the meaning of his symbols by close examination of their relations. He remembers, for example, that $a + b$ had such a meaning as made it identical with $b + a$, and he tries all meanings which will fulfil this condition, and attempts to give conformable meanings to other symbols, in the hope of picking out a set of definitions which shall be consistent with each other, and of which the relations which live in his memory shall be logical consequences. He succeeds in his attempt, and thus gives meaning to his transformations, and converts his symbolical algebra into a deduction from some fundamental notions of magnitude which he has slowly recovered. Perhaps the reader will say, he must then have discovered or remembered that a, b, c, &c. stand for numbers, that + and − mean addition and subtraction, &c. &c. By no means; the tenor of this article will require us to show another set of meanings on which he may have happened to alight, not only as consistent with each other as the arithmetical meanings, but more consistent; and in the article **Operation** we shall have to show still further the pliability of the algebraical system, by pointing out that the number of different interpretations under which its symbolical relations will represent truths, is absolutely unlimited. The basis of the algebra which our supposed recoverer of meanings might construct, is geometry, as arithmetic was that of the one which we imagine him to have forgotten: and its definitions are as follows. A plane is chosen and a point in it, and a line of a definite length, which may be called the *unit-line*, is drawn at pleasure from the point, in any direction in the plane. All letters denote lines drawn from the origin, either in the direction of the unit-line, or at any angle, angles being always measured in one given direction of revolution. An equation, $a = b$, means that the line a actually coincides with b, or is of the same length, and drawn in the same direction. The sign $a + b$ means the diagonal of the parallelogram whose sides are a and b: this becomes the sum when a and b are in the same direction. The sign $a - b$ means the remaining side of a parallelogram in which a is a diagonal and b one side. Again, ab means a fourth proportional to the unit-line, a, and b, directed so as to make an angle with the unit-line equal to the sum of the angles made by a and b with the unit-line; and $\frac{a}{b}$ is a fourth proportional to b, the unit-line, and a, placed so as to make an angle with the unit-line equal to the excess of the angle of a over the angle of b, in the usual direction of measurement (if the angle of a be the greater), or to the excess of the second over the first, in the *contrary* direction (if the second be the greater). All the other definitions follow as in common algebra; thus aa is abbreviated into a^2, and $\sqrt{a}$ means such a line that $\sqrt{a}.\sqrt{a} = a$. The numbers of arithmetic stand for lines measured on the unit line.

Grant such a change of definitions, and every formula which expressed a truth in the old algebra, expresses another and a very different truth in the new one. We shall now point out how to show (by construction) the truth of the old formula

$$(a+b)(a-b) = aa - bb,$$

supposing the terms to have their new meanings.



O U is the length and direction of the unit-line, and O A and O B those of the lines a and b. Hence O C is what is called $a + b$, and O D is $a - b$, since it is the other side of a parallelogram which has a for diagonal and b for one side. Again, take O E, a fourth proportional to O U, O A, and O A, with the angle U O E double of U O A, and we have what is called aa. Similarly O F is bb; whence O G is $aa - bb$, the other side of a parallelogram which has aa for diagonal and bb for one side. And it will be found on measurement that O G is also a fourth proportional to O U, O C, and O D, inclined at an angle which is the sum of the angles U O C and U O D: whence it is $(a+b)(a-b)$.

To show the truth of symbolical algebra, when the terms have the above-described meanings, would require a small treatise: we shall presently give references to works on the subject. We shall now recapitulate the conclusions at which we have arrived.

1. The conclusions of algebra may be made logical consequences of a few simple relations, without reference to the meaning of the symbols used: all algebra is true when these relations are true, so that all algebra is true under any meaning of the symbols which will allow of the truth of these relations.

2. It is not true that there is only one set of meanings under which the fundamental relations of algebra are truths, for three sets have been already alluded to in this article, namely, the common and limited arithmetical meanings, the extensions under which the difficulties of the negative sign disappear, and the geometrical meanings last described.

3. The order of discovery is as follows:—We first ask what sort of magnitude is to be reasoned upon; next, what are the obvious relations existing between such magnitudes; lastly, what is a convenient mode of representing the magnitudes in question; all that follows is an application of the logic common to all branches of reasoning. But when we wish to give the idea of symbolical algebra, we invert the order of the preceding questions; and we ask, firstly, what

symbols shall be used (without any reference to meaning); next, what shall be the laws under which such symbols are to be operated upon; the deduction of all subsequent consequences is again an application of common logic. Lastly, we explain the meanings which must be attached to the symbols, in order that they may have prototypes of which the assigned laws of operation are true.

We have two remarks to make before proceeding to the consideration of what are called, in common algebra, impossible quantities.

First, we have talked hitherto of change of meaning in symbols, as if we really passed from one to another and a totally different and even contrary meaning; keeping the same symbol to express both. The word *change* is too general; it is that particular change called *extension* which is employed, at least throughout this article. The meaning of a term is said to be changed by *extension*, or extended, when the new meaning contains all the old, and more; or when all cases which fall under the old meaning fall under the new one also. Thus in the preceding geometrical definition, the new meaning of $a+b$ (the diagonal whose sides are a and b) contains the old one (or simple addition); for if the two sides of a parallelogram be made to coincide, one diagonal becomes the sum of these sides. If then we call the last-mentioned set of definitions the new algebra, it may be made to appear that the old algebra is all that part of the new which treats of lines making no angle with one another. We shall presently see further illustration of it.

Secondly, we have noted the two extreme cases, in one of which we begin with the meanings of all symbols fixed, and in the other of which we have no specific meanings attached to any symbol, but wait for the time when it may be convenient to investigate sufficient meaning for all. But between these two comes the possible case of having found it advisable to affix meanings to some symbols of operation, leaving others only defined by the symbolic relations which dictate the manner of operating, and not further defined in meaning. Thus from the enumeration above given of the definitions of a geometrical algebra, it will be clear that a^{10} means the eleventh geometrical proportional to the unit and a, inclined to the unit-line at 10 times the angle of a. But it would be impossible from that enumeration to decide at once on all the cases of a^b, for instance, where $b=\sqrt{(-1)}$. In such a case, namely, where the meaning of a symbol is left undetermined, we must wait until we can investigate the question whether such meaning is possible to be given, consistently with the meanings attached to the previous symbols. This process is called INTERPRETATION, and in the article cited will be found an instance which occurs in common algebra. If such meaning cannot be given, then the symbol is properly *impossible*; if it can be given in more ways than one, it is usually called *ambiguous*.

We now drop what we have gathered on symbolical algebra, and take up the science at the point at which such extensions were made as abolished the difficulty of the simple negative quantity. It is then obvious that a^2, or $+a^2$, is both $+a\times+a$ and $-a\times-a$, so that every positive number has two square roots of equal numerical value, one positive and the other negative. But it immediately follows that a negative quantity has no square root, at least none within the range of quantity, as defined, for the squares of positive and of negative quantities are equally positive. Consequently such a symbol as $\sqrt{(-1)}$ is (with reference to this algebra) impossible, just as $7-10$ is impossible in simple arithmetic. This observation is as old as algebra: the 'Viga Ganita' says, 'there is no square root of a negative quantity, for it is not a square.'

The impossible quantity however, like the negative one, was admitted among the objects of algebra. Bombelli showed that the case in which the root of a cubic equation is a complicated function of impossible quantities, is precisely that in which all the roots are real and possible: Wallis and others attempted the explanation of impossible roots, but with no success; they continued to be used as algebraical symbols, and a large number of verified cases led to the following result. Whenever an algebraical operation, beginning with a symbolical truth, leads to a result in which no impossible quantities appear, that result will be not the less numerically true because the reasoning contained rules of operation on quantity applied to symbols which represent no quantities. This law stood upon the same sort of evidence as a physical law of nature; it was constantly found to prevail. It had also analogy in its favour, for precisely the same law had been observed as to negative quantities, though the explanation of the latter was obtained too soon to need the aid of induction in their case.

We will suppose ourselves using these impossible (or imaginary) quantities, not with a view to establish results, but to examine the consequences of applying to them precisely the rules which have been shown to apply to quantities. The following is perhaps the shortest synthetical mode of treating the subject.

If, by rules, we multiply together $\cos x+k\sin x$, and $\cos y+k\sin y$, k being merely an abbreviation of $\sqrt{(-1)}$, so that $k^2=-1$, $k^3=-\sqrt{(-1)}$, $k^4=1$, &c., we find as the result,

$$\cos(x+y)+k\sin(x+y)$$

if then $\phi x=\cos x+k\sin x$, we have

$$\phi(x+y)=\phi x\times\phi y;$$

from which relation, as shown at length in BINOMIAL THEOREM, it follows that

$$\cos x+k\sin x=\mathrm{K}^x$$

where K is a constant independent of x. From this it follows that

$$\cos nx+k\sin nx=(\cos x+k\sin x)^n$$

which is called *De Moivre's Theorem*. It is true for all values of n. Let $nx=\theta$, which gives

$$\cos\theta+k\sin\theta=\left(\cos\frac{\theta}{n}+k\sin\frac{\theta}{n}\right)^n$$

where $\theta:n=x$. The second side may take the form

$$(\cos x)^n(1+k\tan x)^n \text{ or } (1-2\sin^2\tfrac{1}{2}x)^n(1+k\tan x)^n.$$

Let $\sin\frac{1}{2}x:\frac{1}{2}x=p$, and $\tan x:x=q$, then it is known that both p and q have the limit unity when x is diminished without limit. The preceding is the product of $(1-\frac{1}{2}p^2x^2)^n$ and $(1+kqx)^n$: let these formulæ be developed by the binomial theorem, and they become (writing $\theta:n$ for x)

$$1-\tfrac{1}{2}p^2\frac{\theta^2}{n}+(\tfrac{1}{2}p^2)^2\frac{\theta^4}{n^2}\,\frac{n-1}{2}-\dots\dots$$

$$1+kq\theta+k^2q^2\theta^2\frac{n-1}{2n}+k^3q^3\theta^3\frac{n-1}{2n}\cdot\frac{n-2}{3n}+\dots\dots$$

If we now suppose n to increase without limit, x diminishing without limit so that nx remains $=\theta$, p and q approaching without limit to unity, we have unity as the limit of the first series, and

$$1+k\theta+\frac{k^2\theta^2}{2}+\frac{k^3\theta^3}{2\,.\,3}+\dots\dots \text{ or } \varepsilon^{k\theta}$$

as that of the second, ε being the base of Napier's logarithms. [LOGARITHMS.] Consequently

$$\cos\theta+k\sin\theta=\varepsilon^{k\theta},\quad \cos\theta-k\sin\theta=\varepsilon^{-k\theta}$$

the second of which is obtained from the first (which is true for all values of θ) by writing $-\theta$ instead of θ. From these, by addition and subtraction, the well-known *exponential* expressions for the sine and cosine are deduced, namely,

$$\cos\theta=\frac{\varepsilon^{k\theta}+\varepsilon^{-k\theta}}{2},\quad \sin\theta=\frac{\varepsilon^{k\theta}-\varepsilon^{-k\theta}}{2k}$$

expressions which, however widely used, never fail to give true results, in all cases in which they give results containing only even powers of k, or real algebraical quantities.

We shall give a glance at some of the symbolical consequences of the preceding, previously to entering upon their rational explanation.

1. The representation of impossible quantities. It might be supposed that such a symbol as k or $\sqrt{(-1)}$ would lead to a number of other symbols, just as -1 led to $\sqrt{(-1)}$. Such however is not the case, and it can be easily shown that any algebraical expression, however complicated, which is a function of $\sqrt{(-1)}$, can be reduced to the form $\mathrm{A}+\mathrm{B}\sqrt{(-1)}$, where A and B are possible quantities. For instance (k being $\sqrt{(-1)}$)

$$(a+bk)^{m+nk}=\varepsilon^{\mathrm{A}}\cos\mathrm{B}+k.\,\varepsilon^{\mathrm{A}}.\sin\mathrm{B}$$

where A and B are determined as follows. Let

$$r=\sqrt{(a^2+b^2)},\quad \tan\theta=\frac{b}{a},$$

$$\mathrm{A}=m\log r-n\theta,\quad \mathrm{B}=n\log r+m\theta.$$

If we take a simple quantity, $y=a+bk$, then if $\tan\theta=b:a$, $r=\sqrt{(b^2+a^2)}$, we have

$$y=r\ (\cos\theta+k\sin\theta)=r\varepsilon^{k\theta}.$$

2. The extension of the theory of logarithms. The whole revolution, or four right angles, being 2π [ANGLE], we have $\cos 2m\pi=1$, $\sin 2m\pi=0$, where m is any whole number, positive or negative. Consequently

$$\varepsilon^{2m\pi.k}=\cos 2m\pi+k\sin 2m\pi=1$$

for all such values of m. If then x be the common algebraical logarithm of y, positive or negative, we have

$$y=\varepsilon^{x},\ y\times 1=\varepsilon^{x}\times\varepsilon^{2m\pi.k}\text{ or }y=\varepsilon^{x+2m\pi.k}$$

so that according to the definition of a logarithm, the moment we admit impossible quantities, and in what sense soever we explain them, from that moment and in that sense we must say that x being the usual or *real* logarithm of y, it has an infinite number of other logarithms contained in the formula $x+2m\pi k$. In the same manner, using $(2m+1)\ \pi$ where m is a whole number (+ or −) we find that $-y$, which, when we talk of real quantities, has no logarithm, has now an infinite number, included in the form $x+(2m+1)\pi.k$.

3. The complete extraction of the roots of any quantity. We know that 1 has two square roots, three cube roots, and four fourth roots, since we can find them by common algebra. Now since unity can be represented in an infinite number of different ways, in the formula $\varepsilon^{2m\pi.k}$, and since the nth root of this formula is

$$\varepsilon^{\frac{2m\pi.k}{n}}\text{ or }\cos\frac{2m\pi}{n}+k\sin\frac{2m\pi}{n},$$

we might at first suppose that there is an infinite number of these roots, made by giving different whole values to m. On examining them however it is found that they occur in parcels, each containing n distinct roots, and each parcel being a repetition of the preceding one. [ROOT.]

4. The complete conversion of trigonometry into a branch of algebra. We see that we have given symbolic expressions for the sine and cosine of any angle, which would, were such a thing necessary, enable us to dispense with separate symbols for these functions.

5. Ready means of calculation, by means of the trigonometical tables, in cases where ordinary means fail. For instance, in what is called the IRREDUCIBLE CASE of cubic equations, Cardan's formula gives the root in the form

$$\sqrt[3]{(a+b\sqrt{(-1)})}+\sqrt[3]{(a-b\sqrt{(-1)})}.$$

If we assume $a=r\cos\theta$, $b=r\sin\theta$, or $r=\sqrt{(b^2+a^2)}$, $\tan\theta=\frac{b}{a}$, the preceding becomes (making $k=\sqrt{(-1)}$)

$$\sqrt{r}\cdot\{\cos\theta+k\sin\theta\}^{\frac{1}{3}}+\sqrt[3]{r}\ \{\cos\theta-k\sin\theta\}^{\frac{1}{3}}$$

$$\text{or }\sqrt[3]{r}.\ \left\{\cos\tfrac{1}{3}\theta+k\sin\tfrac{1}{3}\theta\right\}+\sqrt[3]{r}\ \left\{\cos\tfrac{1}{3}\theta-k\sin\tfrac{1}{3}\theta\right\}$$

which is $2\ \sqrt[3]{r}.\cos\frac{1}{3}\theta$; and since the original suppositions will not be altered by writing $\theta+2\pi$ and $\theta+4\pi$ instead of θ, the results of these latter suppositions are equally values of the expression under calculation: so that its three values are

$$2\sqrt[3]{r}.\cos\frac{\theta}{3},\qquad 2\sqrt[3]{r}.\cos\frac{\theta+2\pi}{3},\qquad 2\sqrt[3]{r}.\cos\frac{\theta+4\pi}{3}.$$

These three are distinct: but $\theta+6\pi$ (which might equally be written for θ) would give

$$2\sqrt[3]{r}.\cos\frac{\theta+6\pi}{3}\text{ or }2\sqrt[3]{r}.\cos\frac{\theta}{3}$$

a repetition of the first. This amounts to the discovery made by BOMBELLI.

We now come to the explanation of these quantities. Since we have used no rules except those which apply to real positive and negative quantities, it follows that if we had merely laid down the symbolical foundations of algebra, without reference to the meaning of symbols, the symbol $\sqrt{(-1)}$ and formulæ in which it occurs would have been logical consequences of the relations permitted at the outset, as much as those in which no such sign occurs. It is only when we come to attach meaning to signs, that we can say whether any result is real or not: and a result which is real under the extended meanings may be incongruous and self-contradictory under the limited meanings. Such was the case with the negative quantity, which is no less impossible than its square, considered with reference to strict arithmetical definitions. The preceding results, then, are rationally true, whenever such a signification is given to the symbols as will, first, satisfy the fundamental relations, secondly, give rational meaning to $\sqrt{(-1)}$. Ordinary algebraical definitions only fulfil the first of those conditions.

We shall now turn to the fundamental definitions of what we have called the geometrical algebra: this name is given because it is only in geometry that a subject matter has yet been found, our conceptions of which are wide enough to give meaning to all the symbols which result from the primitive rules. In most of the objects of calculation we can only conceive two states, which we call *diametrically* opposite; and this geometrical word enters here, precisely because in geometry there are other states of opposition, of a weaker character, so that when we wish to express the most decided opposition, we turn to that sort of magnitude in which a less degree can be conceived. Thus we have no word drawn from the relation of loss and gain to express complete opposition; nor could we have, since there is nothing less complete with which to compare it: between absolute loss and absolute gain there are no gradations. Thus property, debt, or neither, before, after, or now, may be compared with ascent, descent, or neither; but though we can, for instance, imagine time after to be represented by a line drawn north, and time before by another drawn southward, our power of comparison ends here; it would be impossible to give necessary or even obviously convenient meaning to a line drawn east. But in geometry there are an infinite number of directions, no one of which is north or south, all being intermediate. Again, a gradual passage from one state to its opposite can generally only be attained by a passage through the intermediate state in which magnitude vanishes: for instance, a gradual loss of property followed by a gradual increase of debt requires that at one moment there should be neither property nor debt. But in geometry, a line can attain the direct opposite of its first position without changing its magnitude, by revolution round one of its extremities. These preliminary observations will prevent its being matter of surprise if geometry should be found to admit a wider use of symbols, consistently with rational interpretation, than arithmetic or the algebra derived from it.

We have explained the meaning of $a+b$, $a-b$, $a\,b$, and $a:b$, from which it follows that we know how to construct $a\,a$, $a\,a\,a$, &c., which we may abbreviate into a^2, a^3, &c. And we are here in the position just now pointed out, namely, that some of the ordinary symbols of algebra have received meaning, whereas others are yet without it; for instance, a^{-n}, $a^{\frac{m}{n}}$, $a^{\sqrt{(-1)}}$, &c. And since our object is to detect meanings which shall make the symbolic relations of algebra true, we must always interpret exponents so that their meanings may make the following relations exist

$$a^{m}\,a^{n}=a^{m+n};\qquad (a^{m})^{n}=a^{mn}$$

We shall now proceed with the interpretation of symbols.

1. The symbol $-a$ must stand for a line of length equal, and direction opposite, to that of $+a$; for $0-a$ means the other side of a parallelogram of which the diagonal disappears, one side being a.

2. a^{-n} must represent $1:a^{n}$, and a^{0} must always represent the unit line; for a^{0} must be such that $a^{m}\,a^{0}=a^{m+0}=a^{m}$; that is, a fourth proportional to 1, a^{0}, and a^{m}, is a^{m}; whence a^{0} must be 1 as to length. In direction $a^{m}\,a^{0}$ is the same as that of a^{m}; whence the sum of the angles of a^{m} and a^{0} is that of a^{m}, or the angle of a^{0} is nothing. Again, a^{-n} must be so explained that $a^{n}\,a^{-n}$, and a^{n-n} or a^{0}, may be the same; whence $a^{n}\,a^{-n}=1$.

3. $a^{m:n}$ must be so explained that $a^{(m:n)^{n}}=a^{m}$; whence it means the first of $n-1$ mean proportionals between 1 and a^{m}, inclined at an angle which is the nth part of the angle of a^{m}.

But it is necessary to notice that any angle θ is, considered as pointing out a direction, the same thing as $2\pi+\theta$, or $\theta-2\pi$, or $\theta\pm 2m\pi$, m being a whole number That is to say, a line which sets out from the unit line may be conceived to have attained the position denoted by an angle θ, either by moving simply through θ, or by afterwards making any number of complete revolutions in either direction. So long as we multiply angles by a whole number, this makes no ambiguity; for instance, if a have the angle θ, or $\theta + 2\pi$, &c., a^4 has the angle 4θ, $4\theta + 8\pi$, &c., all of which indicate the same direction. But if we wish to find $a^{1:4}$ or to take the first of three mean proportionals between 1 and a, inclined at the fourth part of the angle of a, then the fourth parts of the angles

$$\ldots \theta-8\pi,\quad \theta-6\pi,\quad \theta-4\pi,\quad \theta-2\pi,\quad \theta,\quad \theta+2\pi,$$
$$\theta+4\pi,\quad \theta+6\pi,\quad \theta+8\pi,\ \ldots$$

are severally

$$\frac{\theta}{4}-2\pi,\quad \frac{\theta}{4}-\frac{3\pi}{2},\quad \frac{\theta}{4}-\pi,\quad \frac{\theta}{4}-\frac{\pi}{2},\quad \frac{\theta}{4},\quad \frac{\theta}{4}+\frac{\pi}{2},$$
$$\frac{\theta}{4}+\pi,\quad \frac{\theta}{4}+\frac{3\pi}{2},\quad \frac{\theta}{4}+2\pi,\ \ldots.$$

giving a succession of directions, each of which differs from the preceding, not by four right angles, but by one right angle. There are then four distinct meanings of this symbol $a^{1:4}$.

5. The symbol $\surd(-1)$ stands for a line equal in length to the unit line, and inclined to it at a right angle; for 1 and -1 make two right angles with each other, whence $(-1)^{1:2}$ is the mean proportional between 1 and 1 (or 1 itself) inclined at half that angle, or at a right angle. Similarly $-\surd(-1)$ is in the opposite direction, and makes three right angles with the unit line. Also $a\surd(-1)$ is a line in length equal to a, but making an angle with the unit line larger by a right angle than the angle of a.

6. Any line may now receive a simple representation; for the line a, inclined at the angle θ to the unit line, is the diagonal of a rectangle, of which the side in the direction of the unit line is $a \cos\theta$, and that perpendicular to the unit line is in length $a \sin\theta$, so that its symbolical representation is $\surd(-1).a\sin\theta$. Hence the line a, inclined at the angle θ, is

$$a(\cos\theta + \surd(-1).\sin\theta).$$

Hence we see the meaning of the symbol $a.\varepsilon^{\theta\surd(-1)}$; for since the definitions satisfy all the fundamental relations of algebra, the theorem

$$\varepsilon^{\theta\surd(-1)} = \cos\theta + \surd(-1)\sin\theta,$$

which is a necessary consequence of these relations, requires us so to define the first side as to establish its identity of meaning with the second. Consequently, $\varepsilon^{k\theta}$, k being $\surd(-1)$, must represent a line equal in length to the unit line, inclined at an angle θ.

To enter further into the details of this extension of algebra would require too great a length· we shall now proceed to some remarks upon it.

If any one should object that it is founded on geometry, we answer that it is not so much founded on geometry as applied to it. The symbolical algebra, which we draw in the first instance from arithmetical suggestions, and afterwards cut loose, so to speak, from that science, founding it upon purely symbolical definitions, is applied to geometry, because in the latter science, and in the latter only, do we find notions of magnitude, the different affections of which are sufficient to supply rational meaning to all its symbols. Let any one produce other ideas of magnitude, of loss and gain for instance, as varied in their different affections, and the general truths of symbolical algebra will find a new application.

The subject-matter of the preceding algebra is geometry of only two dimensions; whereas it might be supposed that the application would never be complete until it embraced geometry of three dimensions. No such extension has however yet been made; though it is not unreasonable to suppose that it may be made at some future time.

But perhaps it may be said that this new algebra, being based upon its own definitions, however logically its conclusions may follow from those definitions, can afford no aid to the common algebra in explaining those quantities which are as impossible in the latter as they are possible in the former. What does it profit us, troubled as we are with symbols which upon our own definitions we cannot rationally explain, to know that those same arbitrary marks, being made to have other meanings, would not present the same difficulties? It may almost seem as if we should relieve ourselves from the trouble of investigating the error of a process which ends in $2 + 2 = 5$, by remembering that those who should mean by 5 what we mean by 4 would not see any necessity for revising the operations. The difficulty thus broadly stated must be felt more or less by every one before he can entirely make up his mind, if not to the reception, at least to the proposed application of symbolical algebra. The answer is as follows:—

In the common operations of algebra we do not set particular value upon any symbols or meanings, except in so far as they answer our purpose. If that purpose be the discipline of the mind, there is no point at which a greater enlargement of its power takes place than must happen when it begins to comprehend that any set of definitions may be such as to require restriction upon operations; so that the alternative is, the enlargement of the definitions to an extent which will allow of every result of operation being rationally explained. If it be one of the errors to which our bounded faculties are liable, that we may invent the processes and mechanism of a genus upon the definitions incidental to the consideration of a species, or anything of that kind, we have made a discovery, when we find our error, which is well worth the trouble, even leaving out of consideration the expansion of views which is obtained by the investigation of the correction. But if the purpose be the investigation of a formula for practical use, whether in physics or any other branch of application, nothing can be more indifferent than the manner in which our result is obtained, provided only we are sure of its truth.

When we reason upon the principles of the old algebra, we are sufficiently sure of the truth of our results, partly by actual verification, partly by those imperfect views of the nature of symbolical algebra which preceded the new science. But it was not always possible to arrive at the highest degree of mathematical assurance, for even in cases where a result could be obtained free from impossible quantities, the intermediate steps could not always be fully comprehended; and their verification, if required, was sometimes (though not often) imperfect: and in every case, it must be remembered, no result was fit for actual application until the impossible quantities had disappeared.

Let us say that we are now considering such a case, namely, one in which quantities impossible in ordinary algebra have been used in the process, though they disappear in the result. The consequence is that if the extended definitions were employed, the answer represents a line drawn in the direction of the unit line if positive, or in the contrary direction if negative; and the same of the symbols of which the answer is a function. But for lines measured in that unit line the extended definitions coincide with the ordinary ones, as has been noticed. So that, as far as the result is concerned, we are sure of the same answer (when there is an answer that we call possible), whether we employ one or the other set of definitions; with the advantage of being able, in employing the new definitions, to put a rational interpretation upon every step of the process.

But has the new algebra no impossible quantities peculiar to itself? We cannot tell, for all time to come, what the answer to this question shall be; at present we can reply that though there are symbols which would indicate previous misconception if they appeared in a result, yet there are none which do not admit of interpretation. For instance, we see that angles in our definitions may be positive or negative (measured on one side or the other of the unit line), but we have no *angle* which $\surd(-1)$ can represent. If then, in the most extended algebra, the answer to the question, 'At what angle must a line assumed $=h$ be inclined to satisfy such and such conditions?' were, 'The angle must be $a + b\surd(-1)$,' we should at first say that the question was impossible. But if we examine further, we see that a line h applied at an angle $a + b\surd(-1)$ is represented by

$$h\,\varepsilon^{(a+b\surd(-1))\surd(-1)} \text{ which is } h\,\varepsilon^{-b}\ \varepsilon^{a\surd(-1)}$$

when treated by symbolical rules. We should conclude then that we have made some error by which h was determined in a manner which cannot satisfy the conditions, but that a line equal in length to $h\,\varepsilon^{-b}$, inclined at an angle a, will satisfy them. This last answer must at least be examined, before it is asserted that the question is impossible. The following formulæ, if they occur, may be interpreted by the identical expressions given in the second sides ($k = \surd(-1)$)

$$\cos(a+bk) = \cos a \frac{\varepsilon^{b}+\varepsilon^{-b}}{2} - \sin a . \frac{\varepsilon^{b}-\varepsilon^{-b}}{2} . k$$

$$\sin(a+bk) = \sin a \frac{\varepsilon^{b}+\varepsilon^{-b}}{2} + \cos a \frac{\varepsilon^{b}-\varepsilon^{-b}}{2} . k$$

The whole of the ambiguous cases of algebra depend upon this, that any quantity x can also be represented by $x . \varepsilon^{ak}$, where a represents any whole number of revolutions. As long as only multiples of a occur, different appearances of form present themselves, not indicating real alteration either of length or direction; but when submultiples of a occur, an alteration of direction takes place, unless such submultiple be also an exact number of revolutions.

The logarithmic theory of the most extended algebra merits a particular notice. It is remarkable that the first hint of it was given by a purely symbolical investigation, conducted entirely with reference to the common algebraical definitions. Some years ago Mr. Graves* asserted that the logarithms of unity, in the most general sense of the term, should be contained in the formula

$$\frac{2\pi m\sqrt{-1}}{1+2\pi n\sqrt{-1}}, \text{ instead of } 2\pi m\sqrt{-1};$$

m and n being any whole numbers.

If we define a logarithm by the symbolic relation $a^{\log x} = x$, where a is an arbitrary base, and if, for well-known reasons of a purely numerical character, we assume ε to be the length of the base, we may ask what is the logarithm of a unit inclined at the angle θ, the base being ε inclined at an angle ϕ. The answer must be such a value of x as will satisfy

$$\left(\varepsilon . \varepsilon^{\phi k}\right)^{x} = \varepsilon^{\theta k}, \text{ or } x = \frac{\theta . k}{1+\phi\ k}$$

in which if, as we may do, we increase or diminish either ϕ or θ by a whole number of revolutions, we find, as in other cases, that a line which has attained a certain position by one number of revolutions, distinguishes itself, always in form, and sometimes in results, from the same line in the same position, attained by another number of revolutions. If our unit be in the unit line after m revolutions, and the base be also in the unit line after n revolutions, the logarithm of such a unit to such a base is what was given as the logarithm of unity by Mr. Graves. Nor is the preceding process impossible: for it shows a set of real operations by which ε, inclined at an angle ϕ, might be converted into a unit inclined at an angle θ. If we ask whether the fundamental properties of logarithms remain true, we shall find that the logarithm of a unit added to the logarithm of a unit differently inclined, and with a differently inclined base, is still the logarithm of a unit, in which both the angles have received another alteration. If the logarithms of two units inclined at angles θ and θ', to bases inclined at ϕ and ϕ', be added together, the result is the logarithm of a unit inclined at an angle

$$\theta + \theta' - \frac{\theta\theta\ (\phi'-\phi)^{2}}{\theta(1+\phi'^{2}) + \theta'(1+\phi^{2})}$$

to a base inclined at the angle

$$\frac{\phi\theta(1+\phi'^{2}) + \phi'\theta'(1+\phi^{2})}{\theta(1+\phi'^{2}) + \theta'(1+\phi^{2})}$$

But these conclusions do not hold when the logarithm of a is added to that of b, a and b not being units, and the bases being differently inclined: nor is it necessary here to state the extensions which the above formulæ must receive in such a case.

The following list contains all the recent works of which we can collect the titles, in which general algebra, or the difficulties which preceded its introduction, are considered to any extent:—Woodhouse, 'Phil. Trans.,' 1802; Woodhouse, 'Principles of Analytical Calculation,' 1803; Buée, 'Phil. Trans.,' 1806; Argand, 'Essai sur la Manière de représenter les Quantités Imaginaires,' Paris, 1806; various papers in the 'Annales de Mathématiques, for 1813, &c.; Gompertz, 'On the Principles and Application of Imaginary Quantities,' 1817 and 1818; Warren, 'On the Geometrical Representation of the Square Roots of Negative Quantities,' Cambridge, 1828 (the first systematic elementary work based on extended definitions); Peacock, 'Treatise on Algebra,' Cambridge, 1830 (the first work on symbolical algebra); Davies Gilbert, 'Phil. Trans.,' 1831, 'On the Nature of Negative and Impossible Quantities;' Peacock, 'Report on certain branches of Analysis, in the Report of the Third Meeting of the British Association,' London, 1834. (This work contains the modern history of the extensions, and an account of several of those above cited.) See also a Review of Professor Peacock's 'Algebra,' in the ninth volume of the 'Journal of Education;' and De Morgan's 'Trigonometry,' 1837. On the method of determining the signs of geometrical magnitudes, see the 'Differential Calculus,' in 'Library of Useful Knowledge,' chapter xiv.

We cannot omit to mention a paper by Sir William Hamilton, recently published in the 'Transactions of the Royal Irish Academy.' The author treats algebra as the science of time, not of magnitude; and as far as the explanation of positive and negative quantities are concerned, it is not difficult to follow him. The symbol $\surd(-1)$ however is of a harder character. M. Cauchy and others had previously considered it as merely a symbolical contrivance to express the coexistence of two equations; thus

$$a + b\surd(-1) = c + d\surd(-1)$$

is a well-known method of implying $a = c$ and $b = d$, both in one equation. The manner in which Sir William Hamilton has connected this symbol with his system would justify us in saying that, if his science of time were re-translated into a science of magnitude, his explanation of impossible quantities would fall back into the one just alluded to; and it is difficult to describe it more fully without entering further into the matter than we have room for. We are inclined to think that this explanation of algebra with reference to time may finally be admitted as one method of supplying the foundations of the purely symbolical science; but we must confess ourselves not yet sufficiently clear upon the manner in which the symbol $\surd(-1)$ is connected with its definition, to hazard a positive opinion.

NEGRO. [Man.]

NEGROPONT. [Eubœa.]

NEGUNDO, a genus of trees, separated from Acer because of its pinnated leaves and diœcious apetalous flowers. Two species are known, one of which is a handsome hardy tree, inhabiting the United States of North America, and now common in the gardens of this country; the other is a native of Mexico, and at present but little known: it may be a mere variety of the other.

NEHEMIAH. [Ezra.]

NEISSE is a principality in Silesia, the larger portion of which, containing 480 square miles, with 110,000 inhabitants, belongs to Prussia; the remainder, which contains 320 square miles, with 56,000 inhabitants, belongs to Austria. The Prussian portion is very fertile, but the Austrian part is mountainous. Till 1820 the whole principality belonged to the bishop of Breslau, who now possesses only the Austrian portion, with the title of a duchy; the Prussian portion is converted into a royal principality, including the circles of Grottkau and Neisse, in the government of Oppeln.

Neisse, the capital, in 51° 25′ N. lat. and 17° 20′ E. long., is situated in the Prussian portion, at the conflux of the rivers Neisse and Biele, in a marshy and unhealthy spot, 574 feet above the level of the sea. It is said to have been built in the year 966, but was not fortified till 1594, since which time it has undergone several sieges, and its works have been gradually strengthened and extended, so that it is now one of the most important fortresses in the Prussian dominions. In 1743 Frederick II. laid the first stone of Fort Preussen, on an eminence, at the foot of which is the newly-built and strongly fortified suburb Friedrichsstadt, which extends to the Neisse. The fortress is surrounded by broad and deep moats, and the surrounding country can be laid under water in case of a siege. Neisse is a clean well-built town. The public buildings are, a splendid episcopal palace, six Roman Catholic churches, a Protestant church, a Catholic gymnasium, a town-hall, and a synagogue. There are numerous schools and charitable institutions. The gymnasium has very fine collections of various kinds; but the library of 10,000 volumes was destroyed in the siege in 1807. As the capital of the principality and the

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[*] Now professor of jurisprudence in University College, London; in a paper published in the 'Phil. Trans.' for 1829. This extension, however simply it may follow from the extended definitions, excited some discussion and opposition when advanced in connection with the ordinary principles of algebra.

circle, the town is the seat of the courts of justice and different public offices; and the inhabitants, who are about 11,000, gain their subsistence by breweries and manufactures of linen, woollen, ribands, and stockings, and a great trade in yarn. There are likewise a royal manufactory of arms and a powder-mill. In the environs there are quarries of excellent freestone, of which considerable quantities are exported.

NELEDINSKY-MELETZKY, YURII, the most eminent song-writer Russia has yet produced, was born in 1751, and served in the campaigns against the Turks, from the year 1770 to 1774, and, after the peace between the two countries, accompanied the Russian mission to Constantinople. Subsequently an office in the civil department was bestowed upon him by the emperor Paul, and in 1797-8 he accompanied that sovereign in his journey to Kazan and White Russia. This last mark of the imperial favour was followed by others of a more substantial nature, for an estate with several hundred peasants was shortly after allotted to him as the reward of his services, besides the order of St. Anne, to which that of St. Alexander Nevsky was added in 1809.

Though, considered singly, his songs and ballads may appear merely elegant poetical trifles, and indicate no very high literary effort or ambition, they prove him to have possessed a decided talent for that species of composition, and the power of infusing into it a gracefulness and charm for which the language afforded no previous models. To great simplicity they unite great tenderness and warmth of feeling. He died in 1829, at the age of 78.

NELLA MALA MOUNTAINS. [HINDUSTAN, vol. xii., p. 208.]

NELLIGREEN MOUNTAINS. [HINDUSTAN, vol. xii., p. 210.]

NELLORE, a district of the Carnatic province, lying between the 14th and 16th degrees of north latitude. It is bounded on the north by Guntore, on the east by the Bay of Bengal, on the south by the northern division of Arcot, and on the west by Cuddapah. The district is well watered by many streams, which rise in the Eastern Ghauts and fall into the Bay of Bengal. It is also traversed from west to east by the Pennar. The principal towns of the district are Nellore, Ongole, and Sarapilly.

The Ryotwary system prevails almost universally in Nellore, the cultivator paying the rent of the land directly into the hands of the government collector. The gross revenue received in 1817 amounted to 68,853*l*. As regards the numbers of the population, very different statements are given. According to returns made to the government of Madras in 1822, the total population was 439,467; while the number of inhabitants according to a statement laid before parliament in 1833 was 432,540 males and 406,927 females, together 839,467. There is evidently a great mistake in one of these statements; and it is probable, as the difference amounts to the number of 400,000 exactly, that the error has resulted from the accidental substitution of one figure for another in the returns of 1822; the larger number, being given with more circumstantiality, has the greater appearance of exactness.

Some copper-mines have been found in the district, but not under circumstances that admit of their being profitably worked. A considerable quantity of salt is made for account of the government on the coast near the town of Nellore.

The town of NELLORE is situated on the south bank of the Pennar river, in 14° 29′ N. lat. and 80° 3′ E. long. The town is surrounded by a mud wall, with some towers of stone at intervals. It is a populous place, and a considerable amount of business is carried on by the inhabitants: the principal street, which is three-quarters of a mile long, is composed of well-furnished shops, but there are no handsome buildings in the town. There is a ferry across the Pennar, which is here three-quarters of a mile wide.

Ongole, in 15° 31′ N. lat. and 80° 8′ E. long., is irregularly built, and contains very few buildings better than mere huts made of earth and thatched. It has a fort, in which a small English garrison is constantly stationed. Sarapilly is a place of no importance, in 14° 18′ N. lat. and 80° 2′ E. long.

NELOCI'RA. [ISOPODA, vol. xiii., p. 53.]

NELSON, ROBERT, born 1656, died 1714, author of various works in practical divinity, which have long been held in very high estimation by serious and pious persons. He is also remarkable for having been a bountiful contributor, both during his life and at his death, to institutions for the education of the poor and the diffusion of Christian knowledge.

He was the grandson of Lewis Roberts, a merchant of London, who is believed to be the person of that name who wrote 'The Merchant's Map of Commerce,' printed in 1638, and whose descendants, the Roberts, Nelson, and Hangers, were very extensively engaged in the trade to the Levant. How far he was himself connected with commerce does not appear; but he was of Trinity College, Cambridge, and while a young man elected a Fellow of the Royal Society. He was intimate with Halley, with whom he travelled in France and Italy.

It was while at Rome that he met with the lady who became his wife in 1682, Lady Theophila Lucy, widow of a baronet and daughter of the earl of Berkeley. This lady was a Roman Catholic, having been led to enter that church by the celebrated Bossuet.

This circumstance was a great grief to Mr. Nelson, whose mind was much occupied with the consideration of both the practical and controversial points in divinity, and whose chief friends were eminent divines in the English Church, particularly Bull, Hickes, Lloyd, and Tillotson: the last especially was his intimate friend.

At the Revolution he scrupled to take the oaths to King William, and remained a non-juror till the year 1709, when he returned to the Church of England as then established.

He died at Kensington, and was buried in the cemetery of St. George's, Queen-square.

The following are his principal works:—'Practice of True Devotion, in relation to the End as well as to the Means of Religion;' 'Companion for the Festivals and Fasts of the Church of England;' 'Great Duty of frequenting the Christian Sacrifice;' 'An Account of the Life and Writings of William Kettlewell.' He also published the English works of Bishop Bull, who had been his tutor, with an account of his life and writings.

The long inscription on Mr. Nelson's monument, written by Bishop Smalridge, may be read in the 'Literary Anecdotes of the Eighteenth Century,' by John Nichols, vol. iv., p. 190, where is a fuller account of the subject of this article.

NELSON, HORATIO, son of Edmund Nelson, rector of Burnham Thorpe, and Catherine his wife, was born at his father's residence in Norfolk, on the 29th September, 1758. His mother died in 1767, leaving eight children, for whom an early provision was desirable, on account of the slender income of their father. Nelson had neither a strong frame nor a hardy constitution, yet his weakness did not disincline him to leave home: he embraced willingly the opportunity of going to sea, which was offered through the position in the navy which was held by his uncle, Captain Suckling, who had been appointed to the Raisonnable, 64, in which Nelson was entered as midshipman. The Raisonnable was soon afterwards paid off, and service in a guard-ship, to which his relation was appointed, being objectionable for a boy, he entered the merchant service, and sought active employment in an outward-bound West Indiaman. Mr. Southey says, 'He returned a good practical seaman, but with a hatred of the king's service, and a saying then common among sailors, "aft the most honour, forward the better man." To remove this hatred, his uncle received him on board his guard-ship in the Thames, and though this service was less enterprising than might have been desired, it was advantageous to Nelson in two respects; it enabled him to overcome his prejudice against the navy, and to acquire skill in pilotage, which he afterwards turned to good account. By his uncle's influence he obtained a rating on board the Carcass, Capt. Lutwidge, in the North Polar expedition under Capt. Phipps: on his return he was placed on board the Seahorse, and went to the East Indies in her, from whence he was invalided. Recovering his health on the passage home, he was appointed acting-lieutenant to the Worcester, and subsequently lieutenant of the Lowestoffe and the Bristol; commander of the Badger, brig, in Dec., 1778; and post-captain to the Hinchinbroke, June, 11, 1779. He distinguished himself in the siege of Fort San Juan, Nicaragua, and took the island of St Bartolomeo. Pestilence reduced his crew from 200 to 10 men, and Nelson, crippled by disease, was obliged to return home. The Bath waters having restored him, he was appointed to the Albemarle, in which he cruised during the winter of 1781-2 in the North Sea, whence he was ordered by Lord Sandwich to Quebec. On this station he remained until peace was concluded, when he went for a short time to St. Omer. He was appointed to the Boreas, 28, and sent to the Leeward Islands, in March, 1784. The Americans were then trading with the British colonies on the footing of British subjects, but as they had become foreigners by their separation from Great Britain, and as such were not allowed to trade with these islands, Nelson determined to put a stop to these proceedings, and induced Sir R. Hughes to issue orders to enforce the navigation act, which orders however were subsequently recalled. Nelson then found he must either disobey his orders or the acts of parliament; he determined on the former, and seized four American vessels with freight at Nevis, carrying island colours. The whole colony rose against him, but the ships were ultimately condemned in the admiralty court. He married at Nevis, 4th March, 1787, the widow of Dr. Nisbet, a physician, and daughter of Mr. Herbert, President of that island, who had one son, named Josiah. He returned to England in June, 1787, and lived in retirement till the eve of the French revolutionary war, when he applied for employment. On the 30th of January, 1793, he was appointed to the Agamemnon, of 64 guns, and took with him Josiah Nisbet as midshipman. The fleet, under Lord Hood's orders, reached the south of France at a time when it would willingly have become a separate republic under the protection of England. Nelson was sent with despatches to the court of Naples, where he became acquainted with Sir William and Lady Hamilton. He afterwards joined Commodore Linzee at Tunis, to expostulate with the dey on the impolicy of supporting France. On the passage, he fell in with three French frigates, a corvette, and brig; a running fight of three hours ensued, when a change of wind enabled the enemy to get out of reach of the Agamemnon's guns, which ship had received so much damage in her sails and rigging, that she was unable to renew the action, and the enemy left her unmolested. Subsequently Nelson was detached with a small squadron to co-operate with Paoli in Corsica. The French having withdrawn from St. Fiorenzo to Bastia, Lord Hood, with Nelson as his senior captain, determined to reduce that place with a naval force, General Dundas having refused to co-operate. The garrison capitulated to Lord Hood, May 19, 1794. At the siege of Calvi, whither the Agamemnon was sent to co-operate with Sir Charles Stuart, Nelson lost an eye, from a shot striking the ground near him and driving the sand into it. Here the dog-days and an epidemic thinned his crew, whose health was previously impaired with hard service. Admiral Hotham had now succeeded Lord Hood in the Mediterranean command, and in the partial action with the French fleet which took place soon after, the Agamemnon engaged the Ça Ira; the action was renewed on the following day, when the Agamemnon again engaged the same ship, which was taken, together with the Censeur. Nelson was desirous of continuing the action with the rest of the fleet, but the admiral was satisfied with this slight success. The next service on which he was employed was the blockade of Genoa, in co-operation with the Austrian army, in order to drive the French out of that state. He had a squadron of frigates under his orders, and narrowly escaped capture by the French fleet within sight of the English fleet, which was becalmed in St. Fiorenzo Bay. Another partial action succeeded, in which the French ship L'Alcide, 74, was taken, but burnt by the explosion of some combustibles then in use among the French. Only 200 of her crew were saved. The Austrians, being beaten, gave the French possession of the Genoese coast, and Nelson sailed for Leghorn to refit. Sir John Jervis took command of the Mediterranean fleet in 1795, and Nelson resumed his station in the Gulf of Genoa. He next superintended the evacuation of Bastia, and having effected this, proceeded in the Minerva, Captain George Cockburn, to perform the same service at Porto Ferrajo. On the passage they fell in with two Spanish frigates, took one, and compelled the other to haul off, when a squadron, of which these frigates formed a part, hove in sight, and the prize was retaken. From Porto Ferrajo, Nelson took convoy to Gibraltar, fell in with the Spanish fleet at the mouth of the Straits, and joined Sir J. Jervis with the intelligence. He hoisted his broad pendant as commodore on board the Captain, 74 guns, Captain R. W. Millar, and was eminently distinguished in the general action of February 14, 1797, with the Spanish fleet, in which the Captain, after engaging, with the Culloden, three first-rates and three others, being at length crippled, fell alongside the San Nicolas, of 80 guns, and carried her by boarding. Nelson himself on this occasion boarded through the cabin windows. The San Josef, of 112 guns, was lying on the other side, and he led the boarders from the San Nicolas to her, with the cry of 'Westminster Abbey or victory!' Their efforts were crowned with success, and on the quarter-deck of this Spanish first-rate Nelson received the swords of the rear-admiral and his officers.

Before the news of the action reached England, Nelson had been promoted to the rank of rear-admiral; the order of the Bath was now bestowed on him, and the freedom of Norwich was voted to him, to which city he gave the sword of the Spanish rear-admiral. He now hoisted his flag in the Theseus, and commanded the in-shore squadron employed in the blockade of Cadiz. On the 3rd July, 1797, Lord St. Vincent bombarded that town. In withdrawing the bomb-vessel out of gun-shot, the Spanish gun-boats and launches endeavoured to capture her, but were successfully met by a similar force under Nelson, in which the Spanish commander attempted to carry his boat, and both distinguished themselves personally in a hand to hand fight. His next service was an unsuccessful attack on the town and fort of Santa Cruz, Teneriffe, with three sail of the line, one fifty-gun ship, and three frigates; the British gained a footing on the mole, but were repulsed. In the act of stepping out of his boat, Nelson received a shot through his right elbow. He was with difficulty carried on board his ship, where the arm was immediately amputated. The loss of the English amounted to 1 captain, 6 lieutenants, 37 seamen and marines killed; the admiral, 2 captains, 1 lieutenant, 101 seamen and marines were wounded; 97 were drowned in the Fox cutter, which was sunk; and 5 were missing. Notwithstanding the failure of this enterprise, fresh honours awaited him. He was rewarded with a pension of 1000*l*., on which occasion he was obliged to present a memorial, which exhibited a singular catalogue of services. He stated that he had been in four actions with hostile fleets, in three with boats employed in cutting out, and at the taking of three towns; employed at Bastia and Calvi; had assisted in capturing seven sail of the line, six frigates, four corvettes, and eleven privateers, taken fifty merchant vessels, and been in action 120 times; lost his right eye and arm, and received other severe wounds. He also received a pension of 1000*l*. a year, and the freedom of the cities of London and Bristol. Early in 1798, Sir Horatio hoisted his flag in the Vanguard, 74, and joined Lord St. Vincent at Gibraltar, by whom he was detached on the 9th May, to watch the port of Toulon, where the expedition for Egypt was then fitting. The Vanguard was dismasted in a heavy gale of wind off Toulon, on the 20th, and, during the thick weather that followed, the French fleet escaped. Having refitted his ship, and being reinforced by eleven sail of the line, he went in pursuit of the French fleet, with the following ships:—Culloden, Goliath, Minotaur, Defence, Bellerophon, Majestic, Zealous, Swiftsure, Alexander, Orion, Theseus, Audacious, and Leander, all of 74 guns.

Nelson heard of the enemy's armament at Malta, and shaped his course to Candia, but getting no tidings there, he returned to Sicily. Having obtained supplies at Syracuse, he sailed for the Morea on the 25th July, obtained intelligence at Coron which caused him to shape his course for Alexandria, where he arrived August 1, 1798, and found the French fleet lying in the bay of Aboukir. The haziness had prevented the two fleets from perceiving each other, although they actually crossed in the night of the 22nd June. The French had reached Alexandria on the 1st July, and Brueys, unable to enter the long-neglected port, moored his fleet, consisting of one first-rate, three second-rates, nine seventy-fours, and four frigates, in Aboukir bay. On perceiving the enemy's position, Nelson adopted the plan projected by Lord Hood in Gourjean Road, but which he had there found impracticable, of stationing his ships one on the outer bow, and another on the outer quarter of each of theirs. The action commenced at 6h. 20m. P.M., August 12th, and at noon of the 13th, of the French fleet one ship had blown up, eight had surrendered, two escaped, and two were aground, of which one yielded, and the other was burnt by her crew. The loss sustained by the English was 218 killed, and 678 wounded; that of the French is variously stated, but it probably amounted to 2000 killed, wounded, and missing. Brueys, after being thrice wounded, was blown up in his ship L'Orient, part of whose mainmast was made into a coffin by order of Captain Hallowell, and by him presented to Nelson. Nelson received a severe wound in his forehead from a piece of langridge-shot. The Culloden grounded at the commencement of the action, and was unable to take part in it. On this occasion Nelson was created Baron Nelson of the Nile, and pensions of 3000*l.* per annum were settled on him and his two next heirs male. The thanks of the parliament and gold medals were voted to him and all the captains engaged. From this time Nelson remained chiefly employed on the Neapolitan coasts, during which period he sanctioned that which must ever remain a blot on his character, and which tarnished the honour of the British flag—the murder of Prince Carraccioli. Capua and Gaëta now surrendered to the naval force under Nelson's orders. In February, 1800, Nelson sailed for Malta, and captured the French ship of the line Généreux, which escaped from Aboukir, and also a frigate. On Lord Keith's return from England, Nelson came home, leaving Captain Trowbridge in command of the squadron blockading Malta, which island capitulated in September, 1800. Within three months after his return, he separated from Lady Nelson, in consequence of his infatuated attachment to Lady Hamilton. He sailed, March 12, 1801, as second in command to Sir Hyde Parker, to the Baltic, with a fleet of eighteen sail of the line, frigates, bombs, fire-ships, &c., amounting in all to fifty-three sail, having on board the 49th regiment, two companies of rifles, and a detachment of artillery. The fleet arrived in the Sound, and after some time lost in negotiation by Mr. Vansittart, anchored between the island of Huen and Copenhagen. Lord Nelson having offered his services in the attack on the Danish fleet, he was detached with twelve ships of the line and smaller craft, making thirty-six sail, 1st April, 1801, and anchored at dark off Draco Point, two miles from the Danish line. The formidable force opposed to the British consisted of eighteen vessels, mounting 628 guns, chiefly 36 and 34 pounders, manned by 4849 men, moored in a line a mile in length, flanked by two batteries, called Trekroner, of thirty 24-pounders and thirty-eight 36-pounders, with furnaces, commanded by block-ships. The action commenced at nine A.M. and lasted five hours, when a truce was agreed upon by the crown-prince sending the Danish adjutant-general to the commander-in-chief to settle the terms, in reply to Lord Nelson's celebrated note: 'Vice-Admiral Lord Nelson has been commanded to spare Denmark when she no longer resists. The line of defence which covered her shores has struck to the British flag; but if the firing is continued on the part of Denmark, he must set on fire all the prizes he has taken, without having the power of saving the men who have so nobly defended them. The brave Danes are the brothers, and should never be the enemies of the English.' The British killed and mortally wounded were 350; and the wounded 850. The Danish loss was estimated at between 1600 and 1800 men killed and wounded: of the eighteen floating batteries, thirteen were taken or destroyed.

Amicable relations having been restored between England and the northern powers, Lord Nelson returned in command of the squadron to England (Sir Hyde Parker having been recalled), when the thanks of parliament were voted to him for Copenhagen. To allay the public alarm excited by Bonaparte's proposed invasion, Nelson took the command of the shores, reconnoitred Boulogne in the Medusa frigate, attacked the flotilla in the mouth of the harbour, and withdrew with a loss of 172 men, having gained no advantage. From this time he lived in retirement in Surrey, till he was called on to assume the Mediterranean command. He hoisted his flag in the Victory, on war breaking out in 1803. His chief employment was watching the French in Toulon. On the 17th January, 1805, the French fleet put to sea under vice-admiral Villeneuve, but was driven back by heavy gales. Villeneuve sailed again on the 29th of March, received a reinforcement at Cadiz, and made for Martinique, with seventeen sail of the line, seven frigates, and four sloops. On the 12th May, Lord Nelson sailed for the West Indies in pursuit of Villeneuve with ten ships of the line and three frigates, and arrived at Barbadoes on the 4th of June, on which day Admiral Villeneuve sailed from Martinique, and having effected nothing except the recapture of the Diamond Rock, and made prizes of a convoy of fifteen sail of West Indiamen, returned to Europe, and arrived off Cape Finisterre, July 9. Lord Nelson quitted Antigua, June 18th, and made Cape St. Vincent, July 17th, having been absent sixty-six days. Thus frustrated in his plans, he judged best to reinforce the Channel squadron, lest the enemy should bear down on Brest.

With this view he joined Admiral Cornwallis off Ushant, and leaving his fleet there, he went home, and struck his flag. He hoisted it again in the Victory on the 15th of September, 1805, and arrived off Cadiz on the 29th (his birth-day), to take command of the Mediterranean fleet. The force under him consisted of twenty-seven sail of the line, and four frigates, which he withdrew from the vicinity of Cadiz to a station sixteen or eighteen leagues to the westward, in the hope of inducing the enemy to put to sea. On October 21st, at day-break, the combined French and Spanish fleets, consisting of thirty-three sail of the line and seven frigates, were seen a-head twelve miles to leeward. At 11h. 40m., while bearing down in two lines on the enemy, whose position was in the form of a crescent, concave towards the British, Lord Nelson hoisted the celebrated telegraphic signal, 'England expects every man to do his duty.' At ten minutes past noon Collingwood, in the Royal Sovereign, commenced the action on the part of the British. At one P.M. the Victory passed under the stern of the Bucentaur. In the heat of the action, about 1h. 25m., while in the act of turning in his walk on the quarter-deck, Lord Nelson received his death-wound by a musket-ball fired from the Redoubtable, which entered his left shoulder, and lodged in the spine. He expired in three hours and a half. The total British loss was 450 killed, 1250 wounded. Seventeen French and Spanish ships were captured, and one burnt. Admiral Dumanoir escaped to the southward with four sail, which were shortly after taken by Sir R. Strachan. Admiral Gravina, with the remaining eleven ships, got into Cadiz.

On the 9th of January, 1806, the body of Nelson was buried at St. Paul's. His brother William was created an earl, with a grant of 6000*l.* per annum; 10,000*l.* were voted to each of his sisters, and 100,000*l.* for the purchase of an estate.

Sir James Mackintosh says, 'Nelson seems to have been born with a quick good sense, an affectionate heart, and a high spirit; he was susceptible of enthusiasm either of the tender or the proud feelings, and easily melted or inflamed; to say that he was fearless seems unnecessary; he was not merely averse to falsehood or artifice, but he was in the highest degree simple and frank. These qualities formed no small part of his genius; they secured to him attachment and confidence, and revealed to him the feelings of other men, that great secret in the art of command, which reason alone can never disclose. His understanding was concentrated on his profession, and as danger always excites when it does not disturb, by stimulating his mind in the moment of action it roused his genius to the highest exertions. A passion for glory, indignant contempt of money, the sincerity of his character, and energy of his sayings, distinguish him from other modern heroes; while the murder of Carraccioli and his breach of faith to the two garrisons in the Bay of Naples are too atrocious to pass without notice. He believed the prisoners or their ringleaders deserved death, and thought that the existence of the government required a terrible example; by this error in judgment, by the drunkenness of guilty passions, and the maddening power of political fanaticism, he was driven into these deplorable acts.'

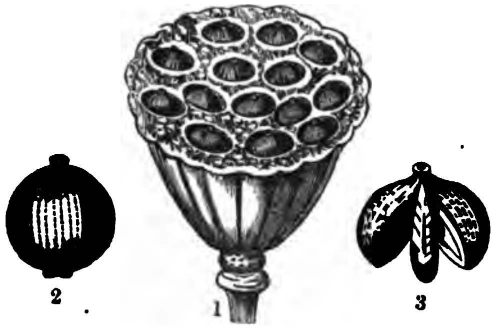
'The death of Nelson,' says Southey, 'was felt in England as a public calamity; yet he cannot be said to have fallen prematurely whose work was done, nor ought he to be lamented who died so full of honours and at the height of human fame.'

(James's *Naval History;* Southey's *Life of Nelson;* Sir J. Mackintosh.)

NELUMBIA'CEÆ, a natural order of exogenous plants, by some writers associated with Nymphæaceæ, or Water-lilies, which they resemble in appearance and manner of life, inhabiting the fresh waters of the temperate parts of the world, and producing large polypetalous flowers with numerous stamens. But these orders differ in such important circumstances that they can hardly be regarded as plants of very close alliance, much less as members of the same order; for Nelumbiaceæ have no albumen, and their system of female organs is broken up into its original elements, while in Nymphæaceæ there is an abundance of albumen, and the female system is completely consolidated.

Nelumbiaceæ are readily known by their carpels being distinct, one-seeded, and buried in the cavities of a large truncated fleshy receptacle, which eventually forms a broad hard bed, filled with holes, in each of which there is a single ripe nut. Notwithstanding their large flowers, these plants must be regarded as among the lowest forms of the exogenous type. The best known species is Nelumbium speciosum, a magnificent water-plant floating in the rivers and ditches of all the warmer parts of Asia, and also found in the Nile: its nuts are supposed to have been the sacred bean of Pythagoras; its fleshy stems are used as food by the poorer inhabitants of China.

Nelumbium speciosum.



1, the ripe receptacle of Nelumbium speciosum; 2, a seed; 3, the same, with the two cotyledons so separated as to show the large plumule which they enclose.

NEMATO'PODA. [Cirripeda.]

NEMATU'RA. [Trochoidea.]

NE'MEAN GAMES, one of the four great national festivals of the Greeks, derived their name from Nemea, a village in the north-eastern part of Argolis, on the borders of the Corinthian territory. They were celebrated under the presidency of the Corinthians, Argives, and inhabitants of Cleonæ (*Scholiast.* on Pindar); but in later times they appear to have been entirely under the management of the Argives. (Liv., xxxiv. 41.) They are said to have been celebrated every third year; and sometimes, as we learn from Pausanias, in the winter (ii. 15, § 2; vi. 16, § 4).

The Nemean games are said to have been first established by the Epigoni, in memory of Opheltes (*Schol.* on Pind.; Apollod., iii. 6, 4; Paus., x. 25, § 2), and to have been afterwards revived by Hercules in honour of Zeus, in consequence of his victory over the Nemean lion.

The crowns bestowed on victors were made of parsley. [Olympic Games.]

NEMERTE'SIA. [Sertularia.]

NEMESI'ANUS, MARCUS AURELIUS OLYMPIUS, a Latin poet, said to have been a native of Carthage, lived under the reigns of Carus and his sons Carinus and Numerianus. Nothing more is known of the particulars of his life. He wrote a poem on hunting, 'De Venatione,' which he dedicated to Carinus and Numerianus, and which has come down to us unfinished. He also wrote four eclogues, which have considerable poetical merit, and have been repeatedly published, together with the eclogues of his contemporary Calpurnius. Mairault has made a French translation of Nemesianus's eclogues, with copious notes, 8vo., 1744. The writings of Nemesianus have been inserted in the collection 'Poetæ Rei Venaticæ,' with notes, by G. Kempher, Leyden, 1741.

NE'MESIS (Νέμεσις), a female Greek divinity, who appears to have been regarded as the personification of the righteous anger of the gods. She is represented as inflexibly severe to the proud and insolent. (Paus., i. 33, § 2.) According to Hesiod, she was the daughter of Night. (*Theog.*, 223; compare Paus., vii. 5, § 1.) There was a celebrated temple sacred to her at Rhamnus, one of the demi of Attica, about sixty stadia distant from Marathon. In this temple there was a statue of the goddess, made from a block of Parian marble, which the Persians had brought thither to erect as a trophy of their expected victory at Marathon. Pausanias says that this statue was the work of Phidias (i. 33, § 2, 3); but Pliny ascribes it to Agoracritus; and adds that it was preferred by M. Varro to all other statues which existed. (*Hist. Nat.*, xxxvi., 4, § 3.) A fragment, supposed by some to be the head of this statue, was found in the temple of Rhamnus, and was presented to the British Museum in 1820. (*Elgin and Phigaleian Marbles*, i., p. 120; ii., p. 123.) The inhabitants of Rhamnus considered Nemesis to be the daughter of Oceanus. (Paus., vii. 5, § 1.)

The practice of representing the statues of Nemesis with wings was first introduced after the time of Alexander the Great by the inhabitants of Smyrna, who worshipped several goddesses under this name. (Paus., vii. 5, 1; ix. 35, 2.)

According to a myth preserved by Pausanias, Nemesis was the mother of Helen by Zeus; and Leda, the reputed mother of Helen, was only her nurse (i. 33, § 7); but this myth seems to have been invented in later times to represent the divine vengeance which was inflicted on the Greeks and Trojans through the instrumentality of Helen.

There was a statue of Nemesis in the capitol at Rome; though we learn from Pliny that this goddess had no name in Latin. (*Hist. Nat.*, xxviii. 5; xi. 103.)

NEME'SIUS, bishop of Emesa in Syria, and one of the ablest of the antient Christian philosophers. Of his life very few particulars are known; and even the time when he lived is uncertain, though this is generally supposed to have been during the reign of Theodosius the Great, towards the end of the fourth century. He has been accused of holding some of Origen's erroneous opinions, but has been defended by Bishop Fell (*Annot.*, p. 20, ed. Oxon. 1671), who however confesses, with regard to the pre-existence of souls, that he 'differed from the commonly received opinion of the church.' But it is as a philosopher and physiologist that Nemesius is best known, and his work 'De Naturâ Hominis' is one of the most accurate treatises of antiquity. Some persons (among whom we may mention Bishop Fell, in edit. Oxon.; Fabricius, 'Biblioth. Gr.;' and Brucker, 'Hist. Philos.') have even supposed that he was acquainted with the circulation of the blood; but in the opinion of Freind (*Hist. of Physic*), Haller (*Biblioth. Anat.*), and Sprengel (*Hist. de la Médecine*), he has no right whatever to be considered as the author of this discovery. Still the passage which has given rise to the discussion is certainly remarkable: 'The motion of the pulse,' says he, 'takes its rise from the heart, and chiefly from the left ventricle of it: the artery is with great vehemence dilated and contracted, by a sort of constant harmony and order. While it is dilated, it draws with force the thinner part of the blood from the next veins, the exhalation or vapour of which blood is made the aliment for the vital spirit. But while it is contracted, it exhales whatever fumes it has through the whole body and by secret passages, as the heart throws out whatever is fuliginous through the mouth and nose by expiration' (cap. 24, p. 242, ed. Matth.). There is another passage equally curious respecting the bile, which is constituted, he says, 'not only for itself, but also for other purposes; for it helps digestion, and contributes to the expulsion of the excrements, and therefore it is in a manner one of the nourishing powers; besides, as a vital faculty, it imparts a sort of heat to the body. For these reasons therefore it seems to be made for itself: but because it purges the blood, it seems to be made partly for the sake of the blood' (cap. 28, p. 260, ed. Matth.). From this passage Nemesius has been supposed to have known all that Sylvius afterwards discovered with respect to the functions of the bile; but his claim in this case is no better than in the former, and indeed Haller and Sprengel both say that his physiology is not at all more perfect than that of Galen

But even if we cannot allow Nemesius all the credit that has been claimed for him, still from his general knowledge of anatomy and physiology (which is quite equal to that of the professional men of his time), his acuteness in exposing the errors of the Stoics and the Manichees, the purity and elegance of his style compared with that of his contemporaries, and the genuine piety which shows itself throughout his work, he has always ranked very high in the list of antient Christian philosophers. The following opinions in his book are recorded by Sprengel (*Hist. de la Méd.*) as worthy of notice: 1, He calls the substance of the lungs *ἀφρώδης σάρξ*, 'frothy flesh' (cap. 28, p. 256); 2, he distinguishes the nerves from tendons, and says that the former possess the power of sensation, which the latter do not (cap. 27, p. 251); 3, he says that the semen is prepared in the brain, that it descends by certain vessels (which he calls 'two veins and two arteries') situated behind the ears, which he says is the reason why 'when those veins that are near the ears and those near the carotid arteries (*καρωτίδας*, or, as some read, *παρωτίδας*, 'the parotid glands') are wounded, the animal becomes barren;' that it is distributed throughout the whole body, and is deposited at last in the testicles (c. 25, p. 244); 4, he explains the senses, like Aristotle, by an intelligent spirit, which is propagated from the organ of sensation to those of the senses (c. 6, p. 176); 5, he places the sensations in the anterior ventricles of the brain, the intellect in the middle, and the memory in the posterior (c. 13, p. 204); 6, he says that the elements composing the human body are in a manner mutually opposed to each other, and that the assistance of certain intermediate substances is necessary in order to effect their union (c. 5, pp. 151-156); and 7, that food and medicines only differ inasmuch as the former is similar to the elementary particles of our body, while the latter are opposed to them (c. 1, p. 49). The treatise *περὶ φύσεως ἀνθρώπου*, 'De Naturâ Hominis,' was first edited by Valla in Latin, Lugd. 1538, ap. Seb. Gryphium; the first Greek edition was by Ellebodius, Antwerp, 1565, 8vo., ap. Christ. Plantin; the next was by Dr. (afterwards bishop) Fell, Oxon., 1671, 8vo.; the last and most complete is by Matthaei, Halæ Magd., 1802, 8vo. There is an English translation by George Wither, Lond., 1636, 12mo., and a German one by Osterhammer, Salzburg, 1819, 8vo.

NEMORHÆDUS, Colonel Hamilton Smith's name for the Goral antelopes. [Antelope, vol. ii., p. 89.]

NEMO'SIA, a genus of birds established by Vieillot, and placed by Mr. Swainson in the subfamily *Tanagrinæ* in his family *Fringillidæ*. [Tanagrinæ.]

NE'MOURS. [Seine et Marne.]

NE'MOURS, DUKES OF, a title derived from a town of France in the department of Seine et Marne. It was borne first by a branch of the Armagnac family, the last of whom, Louis d'Armagnac, duke of Némours, held a command in the army of Louis XII., in Italy, against the Spaniards under Gonsalo of Cordova, and was killed at the battle of Cerignola in Apulia, in April, 1503. With him ended the line of Armagnac, which was descended from Caribert, son of Clotarius II., who died A.D. 630. The duchy of Némours was then bestowed by Louis XII. upon Gaston de Foix, son of Mary, the sister of the king. Gaston fell, at twenty-three years of age, in the battle of Ravenna, against the Spaniards and Italians, in 1512. The duchy of Némours was afterwards given by Francis I. to his uncle Philip of Savoy, in 1528, in whose line it continued till 1659; when Henry of Savoy, duke of Némours, died, the last male descendant of Philip. His widow Mary of Orléans, daughter of the duke of Longueville, survived him many years. She inherited in 1694, from her brother the Abbé de Longueville, the county of Neufchâtel, in Switzerland, and died in 1707: with her ended the line of Orléans Longueville. [Neufchatel.] The title of duke of Némours is now borne by the second son of the present king of the French, Louis Philippe.

NEN, River. [Northamptonshire.]

NE'NNIUS, or **NINNIUS**, a monk of Bangor, in Wales, who lived in the first part of the ninth century, according to several passages of his own work, if these passages are genuine. Vossius (*De Historicis Latinis*) says that he lived in the early part of the seventh century, but he assigns no authority for this assertion. Nennius states himself to have been a Briton, and not a Saxon, and a disciple of the holy bishop Elbodus, or Elvodug. He wrote a history of Britain, styled 'Eulegium Britanniæ,' which, he says at the beginning, he compiled from all he could find; 'from the Roman annals and the chronicles of the Fathers, as well as from the writings of the Scots and the Angli, and from the traditions of our ancestors.' The history begins with a fabulous genealogy of Brutus, grandson of Æneas, who reigned in Britain. The author afterwards relates the arrival of the Picts in North Britain, and of the Scots in Ireland; and after a brief and confused narrative of the Roman conquest and empire in Britain, he comes to the only part of the work which is deserving of some attention, namely, the Saxon invasion and gradual subjugation of the country. It appears that Nennius's MS. was sadly mutilated and interpolated by an ignorant transcriber, who signs himself 'Samuel,' and 'a disciple of Beularius Presbyter,' and who acknowledges that he left out what he thought useless in Nennius's work, and added what he gathered from other writers concerning the towns and wonders of Britain. See end of chap. 64 of Nennii Banchoriensis *Eulogium Britanniæ*, edited by C. Bertram, and published together with 'Gildas' and 'Richard the Monk of Westminster,' 8vo., Copenhagen, 1757.

NEOLOGY. [Rationalism.]

NEO'MERIS, a group of articulated Corallines thus named by Lamouroux. [Pseudozoaria.]

NEOMORPHA, a new genus of birds, established by Mr. Gould on two species from New Zealand; but the specimens wanted the feet and the greater part of the wings.

Generic Character.—*Bill* longer than the head, compressed at the sides, arched, horny, solid, sharp at the apex, with a denticle. *Nostrils* open, placed in the basal furrow; carinâ mandibulæ superioris in pontem tendente. *Tongue* hard, slender, bristly at the apex; angles of the mouth with pendent fleshy caruncles. *Wings* ——. *Feet* ——. *Tail* as long as the body. Total length of the largest species 17½ inches. (*Zool. Proc.*, 1836, where it is announced as one of the birds from which drawings had been taken for Mr. Gould's great work on the Birds of Australia.) We cannot find the genus either in the 1st or 2nd part, and suppose that the figure is advisedly kept back, in the hope that Mr. Gould may obtain further information as to the wings and feet, before his return from New Zealand and Australia.

NE'OPHRON. [Vulturidæ.]

NEOPHYTES (from a Greek word which means 'newly planted') is the appellation given to the converts to Christianity who have just received baptism. In the early church the Neophytes, after that solemn ceremony, wore white garments for eight days. They were also subject to a strict discipline or probation for a much longer period. The Jews, Mussulmans, or Pagans, who are converted to Christianity, are called Neophytes by the Catholic missionaries. and there are houses at Rome and other places for their reception and instruction.

NEO'TRAGUS, Colonel Hamilton Smith's mame for the Pygmy Antelopes, the *Guevi* (*Antilope pygmæa*), for instance. [Antelope, vol. ii., p. 82.]

NEOTS, ST. [Huntingdonshire.]

NEO'TTIA is a name given to a brown, leafless, scaly plant, found in woods in this country, growing parasitically on the roots of other species. It belongs to the natural order Orchidaceæ, and flowers in May and June. The only species is the *Nidus Avis*, or bird's nest, so called from the appearance of the entangled fleshy fibres of the root. Some modern botanists strangely enough apply the name of Neottia (itself meaning literally a nest) to plants having no entanglement of the roots that can justify the appellation, and more generally called Spiranthes: by those writers the true bird's nest is called Listera nidus avis, a perversion of nomenclature for which there is no necessity, and which no necessity could justify. This genus gives its name to a division in the Orchidaceous order, called after it *Neottieæ*, composed of terrestrial species, especially characterised by the anther being placed at the back of the stigma, not vertically upon the end of the column, and by the pollen being pulverulent.

NEPAUL, or **NEPAL**, a country in Asia, situated almost entirely within the range of the Himalaya Mountains, between 26° and 31° N. lat. and 80° and 88° E. long. It extends in length from west to east 450 miles, and from north to south, on an average, 100 miles; its surface is about 45,000 square miles, or about 5000 miles less than that of England. On the north it borders on Tibet, on the west on the English province of Kumaon, on the south on the plains of the Ganges, and on the east on Sikim and Bootan.

Surface, Soil, Climate, and Productions.—The Himalaya Mountains are the natural boundary between the elevated table-lands of Central Asia and the extensive lowlands on the banks of the Ganges. The highest part of these mountains is contiguous to the table-lands: towards the plain of the Ganges they slope down with an exceedingly broken surface. The high masses of the range occupy the surface of Nepaul along its northern boundary, and a great portion of this lofty mountain region is always covered with snow. Among the elevated peaks are the highest mountains on the globe. The Dhawalaghiri, or White Mountain, attains in its highest summit, called Ghosa Cotee, an elevation of 28,000 feet above the sea-level. It lies between 28° 30′ and 29° N. lat., and between 82° 30′ and 83° E. long., and is separated by a narrow valley from Mount Swetaghar, or White Tower, which rises to 25,261 feet. Farther east, between 85° and 86° E. long. and 28° and 28° 30′ N. lat., extends the Dhayabung range, in which the Gosaingthan peak rises to 23,044 feet. The Salpu range is between 86° and 87° E. long., on both sides of 28° N. lat.; two of its summits attain more than 24,000 feet. Farther east are the snow-capped summits of the Mirgu range, which have not yet been measured. In the mountains extending west of Dhawalaghiri to the Tri Sula Mountains in Kumaon, the number of snowy peaks is likewise great, and extensive tracts of country between them are covered with snow all the year round, as their surface rises above the line of perpetual congelation. These enormous mountain masses are furrowed by a comparatively small number of very narrow valleys, a circumstance which may be attributed to the small quantity of snow which is annually dissolved. Rain is said to fall on the mountains only in winter, and even then not frequently; and the periodical rains, produced by the south-west monsoon, do not rise to the elevation of the great snow-masses: probably they do not ascend much more than 8000 feet of perpendicular height. Yet during their prevalence the heated vapours which rise from the rain-drenched surface of Bengal and Bahar dissolve a portion of the snow, and the rivers swell to a certain extent, but far less so than in countries where the mountains rise with a more gradual ascent. The narrow valleys are cultivated in their lower parts, where they sink down to about 6000 feet, but the upper parts are only inhabited during four months of the year by herdsmen, who find pasture for their cattle and sheep on the lower declivities of the mountains. They have also a small number of chowry-tailed cattle or jacks. In these regions the Tibet musk (*Moschus moschiferus*, Linn.) is frequent, and also a species of wild sheep, and a kind of wild dog. The antelope Hodgsonii occurs north of the Mirgu range. The few forests contain, in addition to pine-trees and birch, two new species of juniper, which grow to the height of large trees; the boards cut from them are sent to Tibet and China.

The steep descent of this high mountain region lies about 30 miles south of the northern boundary-line of Nepaul, and south of the steep descent extends the elevated region which constitutes the most fertile and best cultivated portion of Nepaul. It varies between 30 and 40 miles in width, and its southern boundary is formed by a range of mountains of moderate height, running at the distance of 15 or 20 miles from the level plains on the Ganges. This range, which, at least in a great part of its extent, is called the Lama Dangra Mountains, may attain in general an elevation of 6000 or 7000 feet above the sea. The surface of the country between the Lama Dangra Mountains and the Himalaya is between 4000 and 5000 feet above the sea, except in some valleys, where it appears to sink considerably below that level. The surface is very uneven and broken, numerous hills and ridges of hills rising to 3000 or 4000 feet above their base, and occupying by far the greatest portion of it. In the northern districts these ridges run mostly north and south, and are connected with the Himalaya; but in the southern they generally extend east and west, parallel to the Lama Dangra range. The valleys which lie between these ridges are long, but generally not more than one or two miles wide: in a few places they expand into plains of moderate extent. Agriculture however is not limited to them; it extends on the declivities of the hills nearly to their summits, when they are not too steep. This country is subject to the periodical rains of the monsoon, which last longer here than in Bengal; and to this circumstance Sir Francis Hamilton ascribes the fact that some fruits, as peaches and grapes, do not ripen, whilst oranges come to the greatest perfection. Pine-apples are only grown in some less elevated valleys, and are of excellent quality. In winter the more elevated summits of the hills are covered with snow, and frost is usually experienced. We know only the mean temperature of the spring. At Khatmandu it is 64° and at Chitlong 58° of Fahrenheit. The principal object of cultivation is rice, to which grain nearly one-half of the cultivated lands are appropriated, as the unevenness of the ground allows irrigation generally. Besides rice, the inhabitants raise maize, cotton, several kinds of legumes, wheat, barley, sugar-cane, and two species of madder. The pastures are indifferent, and hence the number of cattle and buffaloes is small. The small horses, the *Tunguns*, are noted for their hardihood and activity, but they are not natives, but introduced from Tibet, and it is said that they degenerate on the south of the Himalaya Mountains. Sheep are very plentiful; in winter they find pasture on the hills of this country, and in summer they pass to the declivities of the Himalaya Mountains. They are of a large size, give much milk, and have a fine wool. This region also contains several metals in abundance, especially iron, lead, copper, and zinc; the first three are worked rather extensively. Gold is found in the sand of some rivers. The mountainous districts which are not cultivated are covered with large trees, many of which are yet unknown to botanists; but oak, fir, walnut, chesnut, prickly-palms, birch, and others also are frequently found among them. Some of the trees which are yet unknown furnish excellent wood for furniture.

The Lama Dangra range does not extend to the plains on the Ganges, but is divided from them by a hilly tract about 15 miles wide. The hills rise to a considerable height near the range, but subside as they approach the low plain, until they entirely disappear. Some of the valleys between these hills are wide and well cultivated, producing the common grains and plants of Bahar; but most of them are narrow, and these, as well as the hills, are covered with almost uninterrupted forests, consisting principally of oaks, of the Shorea robusta, and of different kinds of laurels, bamboos, &c. On the higher hills are pines and different species of mimosas; from the juice of the latter great quantities of catechu are made, which goes to Patna and Benares. These woods contain numerous parrots, which are trained and sent to Bengal. The climate of this region is very hot: Hamilton found that the thermometer rose to 74° at the end of March.

Nepaul contains a small portion of the Gangetic plain, which is contiguous to the hilly country. It is a portion of the Tarai, or swamp, but of a much better description than that which lies south of Bootan, and belongs to Bengal. The Nepalese Tarai is not a continuous forest, but the greater part of it is covered with a long coarse grass, which at certain seasons is destroyed by setting fire to it, and the herds of cattle pasture on the new grass which immediately springs up. The forests cover a considerable part of the plain, though in several places they have been destroyed, and the ground cultivated. The soil produces good tobacco and cotton. As it is watered by a great number of small rivers which rise in the hilly tract or in the Lama Dangra range, and the soil is very fertile, it would sustain a great population, but for its unhealthiness. From the beginning of April to the month of September, the inhabitants are exposed to continual diseases, but still the climate is more healthy than that of the Tarai of Bengal, and the country is more populous. The forests contain numerous wild animals. Tigers are rare, but the elephant and the rhinoceros are common; also bears, deer, jackals, foxes, and hares.

Rivers.—Most of the rivers which drain the mountain-region of the Himalaya do not originate on the highest portion of that range, but beyond it, on the table-land of Tibet. This is particularly the case with the two principal rivers which drain Nepaul, the Gunduc and the Coosy. The Gunduc is formed by two branches, which rise 150 miles from one another. The western branch, properly called Gunduc or Salagrani, originates, as it is supposed, not far from the banks of the Sampoo (Brahmapootra), the great river of Tibet. It flows southwards, and after entering Nepaul, runs through the narrow valley which separates the Dhawalaghiri from Mount Swetaghar. It soon leaves the high mountains and enters a tolerably wide valley. At Rerighat it becomes navigable, and continues to be so until it breaks through the Lama Dangra range, where its course is interrupted by some rapids. Soon afterwards it enters the plain of Bahar. The eastern branch, which is called Bori Gunduc in its upper course, likewise rises on the table-land of Tibet, and in its south-western course surrounds a portion of the Dhayabung range. Afterwards it runs southwards, and is called Trisul Ganga; it then runs west-south-west, and joins the Gunduc before it breaks through the Lama Dangra range. It does not appear that this branch is navigable. The Coosy is also formed by two branches. The western and principal branch rises within the Himalaya Mountains, in the valley which separates the Dhayabung range from the Salpoo Mountains, and runs first southward and then westward under the name of Bhotiya Coosy. Where it turns to the south-east at Dumja, it becomes navigable, and is called San Coosy. It runs about 100 miles to the east and south-east, until it breaks through the Lama Dangra range, where it has some falls which interrupt navigation. The eastern branch of the Coosy is called Arun: it rises within the Himalaya Mountains, but flows first northwards and enters the table-land of Tibet, on which a considerable part of its course is said to lie, until it turns by degrees southwards and enters Nepaul, where it continues to flow in the same direction to its junction with the San Coosy. Its current is too rapid for navigation.

Towns.—Nepaul contains several considerable towns, which owe their origin or prosperity to the circumstance of this country being the principal thoroughfare by which the table-land of Tibet and the plains of the Ganges exchange their productions or supply their wants. Other towns owe their origin to the fertility of the country which surrounds them. This is particularly the case with those which are found in the plain called Great Nepaul. This plain, which is surrounded by mountains rising from 3500 to 4000 feet above it, is only about twenty miles long and sixteen miles wide, and yet it contains three large towns, Khatmandu, Lalita Patan, and Bhatgong, and several smaller towns. Khatmandu, the present capital of Nepaul, contains 4000 houses, and, as it is said, a population of 48,000 or 50,000. The great number of temples and steeples, built in the style of Tibet, gives to the city a considerable degree of magnificence. The palace of the Ghorcali princes is an extensive but irregular building. Lalita Patan is said to be still larger, and to contain 24,000 houses. Bhatgong, the third royal residence, is stated to contain 12,000 houses, and to exceed the other two in the magnificence and size of its buildings. It is the school of learning, and its temples contain large libraries in Sanscrit and other languages relating to the Buddhist literature. The plain on which these three towns are built is nearly 4800 feet above the sea-level. Kirkpatrick assigns to it a population of half a million, which Hamilton thinks an exaggeration, but he admits that it is cultivated with great care and is very populous.

Noyacote, north-west of Khatmandu, on a high hill, near the banks of the Trisul Ganga, is a considerable place, being situated on the most frequented mountain-road which leads to Tibet along an affluent of the Trisul Ganga, and over the mountain-pass of Kheru. In 1792 the Chinese army invaded Nepaul by this road. Baglung Chaur, in the valley of the Gunduc Proper, or Salagrani, is a large place of trade, being situated on another much frequented road to Tibet. In the western districts of Nepaul is Cheenachin, the capital of Jemlah, or Yumila, built in a plain, which is stated to be not inferior in extent to that of Khatmandu, and equally well cultivated and populous; but its elevation above the sea-level is greater, and the sugar-cane does not succeed: rice, maize, and wheat are raised in abundance. The town is very large, but not regularly built. It has a great trade in horses, salt, musk, and chowry-tails.

In the eastern district of Nepaul, in the wide and well-cultivated valley of the river San Coosy, are several considerable towns, among which the best-known is Calesi. In the valley of the Arun the principal trading place is Tumling Tar, which has 6000 inhabitants; it is situated in a plain six miles wide and nearly eighteen miles long. Hatiya, farther north, has also a considerable commerce with Tibet.

Inhabitants.—Several tribes inhabit the alpine valleys of Nepaul. According to the opinion of Sir Francis Hamilton, the structure of their body shows that they belong to the Mongol race, though some of them, on account of their intermixture with Hindus, rather resemble the Malays, who seem to form a link between the Chinese and Hindus. The best-known of these tribes are the Newars, or Newari, who inhabit the plain of Khatmandu. They have attached themselves to one of the sects of Buddhism, but have introduced the division of castes, and their priests do not depend on the lamas of Tibet. The Newars are mostly cultivators of the soil, and exercise many arts and trades. They make coarse cotton-cloth, and work very well in iron, copper, and brass, and are particularly ingenious in carpentry. This tribe, as well as some others, still speak their own language, which is quite different from those of their neighbours. The higher region of the Himalaya Mountains is occupied by the Bhot, the same nation which inhabits Tibet. Their language seems to be diffused over the greater part of the table-land of Central Asia, and they have a rich literature, which hitherto is little known in Europe. They are Buddhists, and chiefly occupied with their herds and with commerce. The majority of the population south of the high mountain are either Hindus, or a mixed race, the offspring of the Hindus, and native tribes. They are called Parbatiya, because they speak the Parbatiya Basha, a dialect of the Prakrit. This language continually becomes more and more prevalent, and in some districts it has already destroyed the languages of the native tribes. It is spoken by the reigning family and their tribe, the Ghorkas. The Parbatiya adhere to Brahmanism, are employed by the Ghorkas in administration, and occupy themselves with the culture of the ground and commerce.

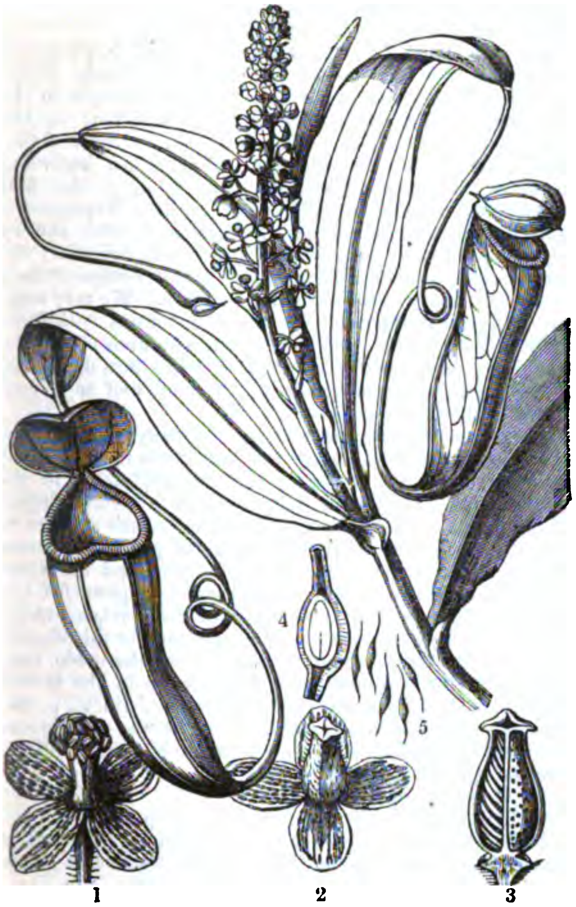
Commerce.—The trade with Tibet is mostly in the hands of the Bhot, who transport their goods on the backs of sheep or men over the mountain passes. They bring from Tibet to Nepaul sheep, musk, skins of the musk-deer, chowry-tails, quicksilver, borax, sal ammoniac, Chinese silk stuffs, paper, drugs, gold, and silver; and they carry back rice, wheat, oil, iron, copper, cotton-cloth, catechu, juniper-boards (which are used in fine cabinet-work), pepper, spices, indigo, tobacco, otter-skins, sugar, and some smaller articles.

Nepaul exports to British India elephants' teeth, timber, hides, ginger, catechu, turmeric, wax, honey, oranges, long pepper, ghee, bastard cinnamon, large cardamums, and some smaller articles. It exports from the British dominions in Bengal cottons and muslins, silks of various sorts, raw silk, gold and silver, laces, carpets, English cutlery, saffron, spices, sandal-wood, quicksilver, cotton, tin, zinc, lead, soap, camphor, tobacco, pepper, and coral.

History.—In former times this country seems to have been divided among a great number of princes, each of whom was an independent sovereign of a valley, district, or tribe. In the middle of the last century the chief of one of these tribes, the Ghorkas, Goorcas, or Ghorcalis, began to extend his dominions by conquest, and he and his successors were so successful, that in less than half a century they subjected all the countries situated within the mountains between Bootan on the east to the river Sutlej on the west, and they carried more than once their arms to Teshoo Lumloo, in Tibet. In 1792 their depredations on that side were stopped by the Chinese, who entered Nepaul with an army of 70,000 men, and, after several victories, advanced as far as Noyacote. After that time they turned their ambitious views towards the plains of the Ganges, and came to a war with the English in 1814. Though the British arms in the beginning were only partially successful, the Ghorkas, by the peace concluded in 1816, were obliged to cede to the British all the countries situated between the Sutlej and the Kali rivers, and to evacuate the territories of the Sikim Raja. Since that time they have been quiet.

(Kirkpatrick's *Account of Nepaul;* Sir Francis Hamilton's *Account of the Kingdom of Nepaul;* Hodgson's 'Notices on the Languages, Literature, and Religion of the Bauddhas in Nepaul and Bhot,' in *Asiatic Researches*, vol. xvi.)

NEPENTHA'CEÆ are exogenous plants inhabiting the damper and warmer parts of Asia, and having, in the place of leaves, large hollow bodies, furnished with a lid, and containing water, secreted from a peculiar glandular apparatus with which they are lined. These bodies, or pitchers, as they are called, appear at the end of a leafy tendril-like expansion of the bark, and are considered to be a hollow state of the apex of the petiole of a leaf, while the lid that closes them is regarded as the blade. Their flowers are diœcious, green or brown, apetalous, arranged in cylindrical racemes, and are succeeded by a capsular fruit filled with fine fusiform seeds, which look like very small sawdust. They are considered to be closely akin to Aristolochiaceæ, and with them have been recently referred by the writer of this to a new class in the vegetable kingdom called Homogens. [PTYCHOGENS.]



Nepenthis distillatoria.

1, a male flower; 2, a female flower; 3, a vertical section of the ripe capsule; 4, a vertical section of a seed very much magnified; 5, the seeds.

NEPER. [NAPIER.]

NEPHELINE. *Sommite.* This mineral occurs in attached hexagonal prisms. Primary form a rhomboid. Indications of cleavage parallel to the planes of the prism. Fracture conchoidal, shining. Hardness, scratches glass. Colour white; streak the same. Lustre vitreous. Transparent, translucent. Specific gravity 2·360.

When a transparent fragment is put into cold nitric acid it becomes cloudy, and afterwards gelatinizes. Before the blow-pipe the edges are rounded; with borax it slowly melts into a colourless transparent glass.

Occurs on Monte Somma, Vesuvius; and in the lava of Capo di Bore near Rome.

Analysis by Arfwedson, from Vesuvius:—Silica, 44·11; Alumina, 33·73; Soda, 20·46.

NEPHRITE. *Jade; Axe Stone.* Occurs in masses. Structure compact. Fracture coarse, splintery. Hardness 7·0. Very tough. Colour dark-green and green of other shades. Translucent on the edges. Specific gravity 2·9 to 3. Before the blow-pipe, whitens but does not fuse, but with borax forms a transparent glass.

Analysis by Kästner:—Silica, 50·50; Alumina, 10·00; Magnesia, 31·00; Oxide of iron, 5·50; Oxide of chromium, 0·05; Water, 2 75.

NEPHRI'TIS. [KIDNEYS, DISEASES OF.]

NEPHROPS. [HOMARUS, vol. xii., p. 274.]

NEPOS, CORNE'LIUS, a native of Hostilia (now Ostiglia) on the Po, was a Roman writer and a friend of Cicero, who speaks of Nepos in several of his Letters (*Epist. ad Attic.*, xvi. 5 and 14). Macrobius (*Saturn.*, xi. 1) quotes the second book of Cicero's Epistles to Cornelius Nepos, which have not come down to us. Lactantius mentions Nepos's Letters to Cicero, and Aulus Gellius (xv. 28) speaks of Nepos's 'Life of Cicero.' Catullus dedicated his poems to him. Nepos however was most intimate with Pomponius Atticus, whom he survived a few years, and whose life he wrote. He also wrote a short notice of Cato the Censor, in which he says that, at the particular request of T. Pomponius Atticus, he had written a more extended biography of Cato, which however has been lost. According to the old scholiasts, the lives of Atticus and Cato formed part of a larger work of Nepos, 'De Historicis Latinis.' In a passage in the Life of Dion, in the 'Vitæ Imperatorum,' attributed to Nepos, the author mentions a work which he had written 'on the Greek historians,' and the grammarian Charisius (*Instit. Grammat.*, lib. i.) quotes a sentence of the sixteenth book 'Illustrium Virorum' of Cornelius Nepos.

The work styled 'Vitæ Imperatorum,' which is put into most schoolboys' hands, not being mentioned by any antient writer, was for a long time attributed to Æmilius Probus, who lived in the fourth century, and who in the MSS. appears as having presented a copy of the book to the emperor Theodosius I., and prefixed to it some verses in which he seems to claim the authorship. Accordingly the earliest editions of the 'Vitæ Imperatorum,' the first by Janson, 1471, that of 1506, and others, were entitled 'Probi Æmilii Excellentium Imperatorum Vitæ.' But afterwards the critics began to question the claims of Probus to the authorship of the work. The style and especially the sentiments of the lives certainly appear not suited to a writer of the age of Theodosius, such as the manifest disapprobation of a monarchical government, which is exhibited in many passages, among others in the lives of Timoleon (i. 3) and Dion (ix. 5). It is remarkable that the author in his preface addresses the work to Atticus; and yet at the end of the last life, that of Hannibal, when speaking of the uncertainty about the date of that great commander's death, he says that 'Atticus, in his "Annals," had left it written ('scriptum reliquit') that Hannibal died under the consulship of M. C. Marcellus and Q. F. Labeo;' speaking thus of Atticus as of a person dead. After the first editions of the 'Vitæ Imperatorum' were published, Petrus Cornerus found in an old MS. containing the letters of Cicero to Atticus, the life of Atticus and the short notice of Cato the Censor above mentioned. These two biographies were published together with the 'Vitæ Imperatorum,' and the whole under the name of Æmilius Probus, contrary to all evidence, as the author of those two biographies speaks of Atticus as a personal acquaintance. At last Lambini, in the commentary to his edition of the 'Imperatorum Vitæ,' 1568, asserted the claims of Nepos as author of the whole. But several solecisms and barbarisms which occur in the 'Vitæ' appearing to invalidate Lambini's supposition, as not being likely to occur in a writer of the Augustan age, Barth and some other critics have supposed that Probus abridged the original work of Nepos in the same manner as Justin has epitomised the history of Trogus Pompeius. Vossius however (*De Historicis Latinis*, i. 14), Funccius (*De Virili ætate linguæ Latinæ*, part 11, ch. 14, § 38), and others, maintain that there is nothing in the 'Vitæ Imperatorum' which could not have been written by the Cornelius Nepos of the Augustan age, and that neither Probus nor any writer of the Theodosian age could have written in so pure a Roman style. Tzschucke's Proemium to his edition of Nepos, Göttingen, 1804; Schoell, 'Abrégé de l'Histoire de la Littérature Romaine;' and Dunlop, 'History of Roman Literature,' may be consulted as to this controversy. It is worthy of remark that in some of the old MSS. of the 'Vitæ Imperatorum,' which furnished the text of the earlier editions, there is written at the end, 'Completum est opus Æmilii Probi, Cornelii Nepotis,' as if the copyist had been in doubt as to the real author. (Lambini, *Commentarius*.)

The 'Vitæ Imperatorum' are short biographies of twenty Greek commanders, and of two Carthaginian, Hamilcar Barcas and Hannibal. From a passage at the end of the last it appears that the author intended to write also the lives of the great Roman commanders, 'that their exploits might be compared with those of the Greek, in order to judge which were the greatest.' These lives of the Roman commanders, if ever written, have not come down to us, but it seems that some of them at least were written, and, it would appear, by Nepos, as Plutarch quotes the authority of Nepos for facts concerning the lives of Marcellus and Lucullus. The 'Vitæ Imperatorum,' besides the faults in language which are pointed out by Tzschucke in his proemium and in the commentary which follows the text, contain many erroneous statements of facts, such as mistaking Miltiades, the son of Cypselus, for the great Miltiades, the son of Cimon, confounding the battle of Mycale with that of the Eurymedon, and others which are noticed by Tsschucke and Schoell. The author however gives many details of private life and manners, which are curious, as in the life of Epaminondas. The sentiments expressed by the author of the 'Vitæ' are generous and virtuous, though often puerile and trifling. The sketch of the character of Alcibiades has been admired for its graphic touches; but the life of Pomponius Atticus is much better both for the matter and manner than any of the rest, and, although too panegyrical, gives a lively description of his character. [Atticus.] It has been translated into English by Sir Matthew Hale, 1677, and by the Rev. E. Berwick, 1813.

The editions of the 'Vitæ Imperatorum' are numerous: those of Longolius, 1543; Lambinus, 1569; Bosius, 1657; Van Staveren, 1734, 1773; Tzschucke, 1804; Harles, 1806; Fischer, 1806: and lastly, Breme, 1827, are reckoned the best.

NEPOS, FLA'VIUS JU'LIUS, was the nephew of the patrician Marcellinus, who, in the confusion into which the affairs of the Western Empire had fallen after the death of Majorianus, A.D. 460, made himself independent sovereign of Dalmatia, was acknowledged as such by Leo I., emperor of the East, and was afterwards killed in Sicily in an expedition against the Vandals. Leo, having given his niece in marriage to Nepos, named him emperor of the West, A.D. 473, after the death of Olybrius. But a certain Glycerius, supported by the Burgundian and other barbarian auxiliaries who were then the real masters of Italy, had already been proclaimed emperor at Ravenna. Nepos sailed from Constantinople with some troops in 474, and landing at Ostia, surprised Glycerius in Rome, made him prisoner, and, having stripped him of the imperial garments, caused him to be ordained bishop of Salona in Dalmatia, which was considered as a kind of exile. Nepos made peace with Euric, king of the Visigoths, by ceding to him the provinces of Gaul which lay west of the Rhone. But soon after, A.D. 475, Orestes, a native of Pannonia, who had long served in the Roman armies, revolted against Nepos, and marched upon Ravenna, when the emperor, unable to oppose him, fled across the sea to Dalmatia, over which province he seems to have retained his authority, with the title of Augustus; whilst Orestes had his own infant son Romulus proclaimed emperor of the West. Nepos applied in vain to Zeno, emperor of the East, to assist him in recovering Italy. In the year 480 he was murdered at Salona by two officers of his court, upon which Odoacer, who then ruled over Italy, passed over into Dalmatia and conquered that province. Nepos is said to have been a good and amiable but weak man, and unfit for the times. Sidonius Apollinaris praises him for the excellent choice which he made of those whom he employed under him.

NEPTÆA, a genus of alcyoniform Zoophyta, established by Blainville.

NEPTU'NUS, or NEPTUMNUS, a Roman divinity, whose attributes are nearly the same as those of the Greek Poseidon (Ποσειδῶν). Poseidon was the son of Kronus and Rhea, and the brother of Jupiter and Juno, and appears to have been one of the antient divinities of Greece; although, according to Herodotus (ii. 50), he was not originally a Greek deity, but was imported from Libya. Poseidon was the god of the water in general, of the sea, the rivers, and the fountains; but he was more particularly regarded as the god of the sea, which he acquired as his share in the division of the dominions of his father Kronus. His wife was Amphitrite, and their son Triton.

Poseidon is said to have produced the horse in his contest with Athena (Minerva) for the right of naming the city of Athens; by which myth we are to understand, according to the interpretation of some writers, that the horse was imported into Greece by sea. But this explanation is far from satisfactory. It is difficult to give a reason for the connection of Neptune with the horse; but it is evident from several passages in the Greek writers that he was regarded as a kind of equestrian deity, as well as the god of the sea. (Aristoph., *Knights*, l. 449.) Poseidon had a magnificent palace beneath the sea at Ægæ (*Il.*, xiii. 20). The animals offered to him in sacrifice were usually black bulls, rams, and boar pigs.

Poseidon was not originally a god of the Doric race. He was principally worshiped by the Ionians, who were in most places a maritime people. In those Dorian cities however which had acquired a love for foreign commerce, we find that the worship of Poseidon prevailed extensively; as for instance, at Tænarum, whence it was carried to Tarentum, at Cyrene, in Ægina, and more particularly on the Corinthian isthmus, and at Trœzen, from which place the worship of this god was transmitted to Posidonia in Italy. (Müller's *Dorians*, vol. i., p. 417, 418, tr.)

The etymology of the names Poseidon and Neptunus is doubtful. Poseidon is written in Doric Greek, Poteidan (Ποτειδᾶν), of which we have another example in the name of Potidæa, written Poteidaia (Ποτειδαία) in the inscription, now in the British Museum, on those Athenians who fell before this city. The name, according to some writers, contains the same root, in the first syllable, as we find in *ποτός* and *ποταμός*. Neptunus is derived by Cicero from *nando* (*Nat. Deor.*, ii. 26); and by Varro from *nuptu*, because this god covers (*obnubit*) the earth with the sea (*De Ling. Lat.*, iv. 10); but neither of these derivations has the least show of probability. We may compare the form of the word Nept-unus or -umnus, with Port-umnus, Vert-umnus, and the word al-umnus; but the meaning or origin of the root *Nept* or *Nep* seems uncertain. It may perhaps be connected with the same root as is contained in the Greek *νίπ-τω*.

The statues of Neptune resembled in many respects those of Jupiter; but the figure of the former was more angular, and there was less of repose and thoughtfulness in the countenance. The Greek sculptors gave a certain degree of roughness to the statues of Neptune, which appears to have been regarded as appropriate to the god of the ocean. His hair was usually somewhat in disorder, and the whole of his figure was represented as exceedingly powerful and muscular. Hence the 'chest of Poseidon' (*στέρνον Ποσειδάωνος*, *Il.*, v. 479) is the poetic expression for this characteristic of the deity, which is illustrated by the noble fragment from the pediment of the Parthenon in the British Museum. (*British Museum*, 'Elgin Marbles,' vol. ii., p. 26.) His right hand held the trident; and he was usually surrounded by dolphins and other marine objects. (Müller's *Archäologie der Kunst*, p. 452.)

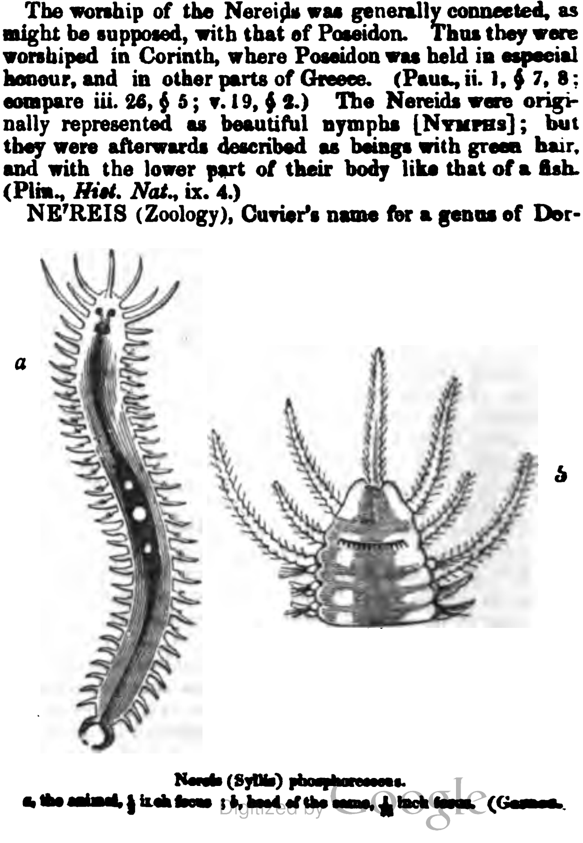
NERAC. [Lot et Garonne.]

NERBUDDA. [Hindustan, vol. xii., p. 211.]

NEREIDS (Νηρηΐδες), nymphs of the sea, were the daughters of Nereus and Doris. Nereus was the eldest son of Pontus and the Earth (Hesiod, *Theog.*, 233); and Doris was one of the daughters of Oceanus. The Nereids are said by most antient writers to have been fifty in number, but Propertius makes them a hundred (iii. 5, 33). The most celebrated of them were Amphitrite, the wife of Poseidon; Thetis, the mother of Achilles; Galatea, Doto, &c.

The worship of the Nereids was generally connected, as might be supposed, with that of Poseidon. Thus they were worshiped in Corinth, where Poseidon was held in especial honour, and in other parts of Greece. (Paus., ii. 1, § 7, 8; compare iii. 26, § 5; v. 19, § 2.) The Nereids were originally represented as beautiful nymphs [Nymphs]; but they were afterwards described as beings with green hair, and with the lower part of their body like that of a fish. (Plin., *Hist. Nat.*, ix. 4.)

NE'REIS (Zoology), Cuvier's name for a genus of Dor-



Nereis (Syllis) phosphorescens.

a, the animal, ½ inch focus ; b, head of the same, [illegible] inch focus. ([illegible] sibranchiate Annelids, comprehending the genus *Lycoris* of Savigny. Tentacles equal in number are attached to the sides of the base of the head; a little more forward are two other biarticulated ones, and between them two simple ones: they have only one pair of jaws in their proboscis (trompe). The branchiæ only form small laminæ on which a net-work of vessels creeps: there are besides two tubercles to each of their feet, two bunches of filaments, a cirrhus above, and one below.

Lamarck states that the antennæ of the Nereids are in general short. The eyes, when distinct, he says, are four in number. The proboscis is large, open at its extremity, and often furnished with salient points or small tentacles. Lamarck divides them into six genera, viz.: *Lycoris*, *Nephtys*, *Glycera*, *Hesione*, *Phyllodoce*, and *Syllis*, principally on the ground of the presence or absence of jaws and the modifications of the antenuæ. To these he adds *Spio*.

Geographical Distribution.—The Nereids are widely spread, and some of the species are found in most seas. Some are found on our own coasts.

NERI, FILIPPO DE', born in 1515, of a noble Florentine family, after studying in his native country, proceeded to Rome, where he fixed his residence. Naturally of warm feelings and benevolent disposition, he turned his whole attention to the relief of the poor, the instruction of children, and the reclaiming of vicious persons. In the pursuit of these objects he displayed a sincerity and a single-heartedness which exposed him to the sneers and the slanders of the worldly, the prudish, and the sticklers for outward decorum. The particulars of his life, some of which are very curious, have been fully narrated by his biographers Bacci and Gallonio. He founded an asylum for poor and sick strangers, and other houseless or helpless persons, in which they were sheltered until they were able to return to their home. Having taken holy orders, he associated with himself several pious friends, among whom was Baronius, afterwards a cardinal. They performed spiritual exercises together, and instructed the poor, and especially youths, in the streets, at the doors of the churches, and in the market-places. He attended the sick and the dying, visited the prisoners, and pleaded in the courts of justice for the oppressed. Neri was not gloomy or morose; his piety was not repulsive: he conversed freely with all kinds of people; and being a man of education and general information, he entered into the spirit of their respective pursuits, and joined in their harmless mirth, whilst he checked any excess or vicious tendency. He was the founder of the oratorios, or sacred musical entertainments, the object of which was to attract the youth and wean them from the public theatres and their temptations. At first the oratorios were hymns which were sung after the sermon, accompanied by music. Afterwards dramas were introduced, founded upon scriptural subjects, and some of them were written by distinguished writers, such as Zeno and Metastasio, and the parts were sung like those of an opera, with this difference, that there was no acting or stage, the singers being stationed in a gallery of the chapel. The chapel being called in Italian 'Oratorio,' that is, a place of prayers, gave its name to the performance; and the congregation or order constituted by Neri took the name of 'Fathers of the Oratory.' But Neri, more prudent in this than other founders of monastic orders, did not bind the members of his congregation by perpetual vows: he said that the spirit of charity should be the only common bond. The institution was approved of by Gregory XIII. in 1575, and it soon spread over Italy, France, and other countries. The congregation 'de l'Oratoire' has produced many distinguished men, Baronius and Massillon among others. Study, preaching, and the education of youth are the chief occupations of its members. Their handsome church at Rome, Santa Maria in Vallicella, has a good library, and the oratorios continue to be performed in a chapel devoted to the purpose. Neri, after resigning the generalship of his congregation to his disciple Baronius, died in 1595. He was canonised by Gregory XV. Some of his letters, and his 'Ricordi,' or advice to youth, have been published, as well as two sonnets out of many which he composed. He was an amiable, virtuous, and religious man, and his example had a great influence on the clergy of Rome.

NERI, POMPE'O, was born at Florence in 1707. After studying in the university of Pisa, he was made professor of law in that institution. He was afterwards appointed by Francis of Lorraine, the new grand-duke of Tuscany, secretary to his council. In 1749 Maria Theresa called him to Milan and made him president of the 'Giunta di Censimento,' or commission for the valuation of all the landed property in Lombardy. This undertaking was effected, and the tax was laid equally upon all landed property: the new 'Cadastro,' or register, was published in 1759. The communal administration was at the same time reorganised. This example was followed by several Italian and other governments. The empress also commissioned Neri to confer with the Sardinian minister for a concordat concerning the currency of both states. It was in consequence of this commission that Neri wrote and published his book on currency, 'Osservazioni sopra il Prezzo Legale delle Monete,' 1751. In 1758 Neri, being recalled to Florence, was named one of the counsellors of the regency during the minority of Leopold. He died at Florence in 1776. Besides the work above mentioned, he wrote other treatises on political economy, on taxation, on the municipal laws in Tuscany, and on the former contrasted with the actual condition of the nobility in that country. Neri ranks among the first Italian economists of the eighteenth century, with Carli, Verri, Genovesi, and others.

NERI'TA. [Trochoidea.]

NERI'TIDÆ. [Trochoidea.]

NERITI'NA. [Trochoidea.]

NERITOPSIS. [Trochoidea.]

NERO, CLAU'DIUS CÆSAR, the sixth of the Roman emperors, was born at Antium in Latium, in the latter end of A.D. 37, nine months after the death of Tiberius (Suet., *Nero*, c. 6). He was the son of Domitius Ahenobarbus and Agrippina, the daughter of Germanicus, and was originally named Lucius Domitius. After the death of Domitius and of a second husband, Crispus Passienus, Agrippina married her uncle the emperor Claudius, who gave his daughter Octavia in marriage to her son Lucius, and subsequently adopted him with the formal sanction of a Lex Curiata. (Tacit., *Ann.*, xii. 26.)

The education of Nero was carefully attended to in his youth. He was placed under the care of the philosopher Seneca, and he appears to have applied himself with considerable perseverance to study. He is said to have made great progress in the Greek language; of which he exhibited a specimen in his sixteenth year by pleading in that tongue the rights or privileges of the Rhodians and of the inhabitants of Ilium. (Suet., *Nero*, c. 7; Tac., *Ann.*, xii. 58.)

On the death of Claudius, A.D. 54, Nero succeeded to the sovereign power. Agrippina, who had paved the way for the accession of her son by the murder of her husband, endeavoured to obtain the chief management of public affairs; and her vindictive and cruel temper would have hurried Nero, at the commencement of his reign, into acts of violence and bloodshed, if her influence had not been counteracted by Seneca and Burrus, to whom Nero had entrusted the government of the state. Through their counsels the first five years of Nero's reign were distinguished by justice and clemency. He discouraged public informers, refused the statues of gold and silver which were offered him by the senate and people, and used every art to ingratiate himself with the people. But his mother was enraged to find that her power over him became weaker every day, and that he constantly disregarded her advice and refused her requests. His neglect of his wife Octavia, and his criminal love of Acte, a woman of low birth, still further widened the breach between him and his mother. She frequently abused him with the most contemptuous language; reminded him that he owed his elevation to her, and threatened that she would inform the soldiers of the manner in which Claudius had met his end, and would call upon them to support the claims of Britannicus, the son of the late emperor. The threats of his mother only served to hasten the death of Britannicus [Britannicus], whose murder forms the commencement of that long catalogue of crimes which afterwards disgraced the reign of Nero.

But while the management of public affairs appears from the testimony of most historians to have been wisely conducted by Burrus and Seneca, Nero indulged in private in the most shameless dissipation and profligacy. He was accustomed, in company with other young men of his own age, to sally into the streets of Rome during the night in order to rob and maltreat the passengers, and even to break into private houses and take away the property of the owners. But these extravagancies were comparatively harmless; his love for Poppæa, whom he had seduced from Otho, led him into more serious crimes. Poppæa, who was ambitious of sharing the imperial throne, perceived that she could not hope to obtain her object while Agrippina was alive, and accordingly induced Nero to consent to the murder of his mother. The entreaties of Poppæa appear to have been supported by the advice of Burrus and Seneca; and the philosopher did not hesitate to palliate or justify the murder of a mother by her son. (Tac., *Ann.*, xiv. 11; Quint., *Inst. Orat.*, viii., c. 5.

In the eighth year of his reign Nero lost his best counsellor Burrus, and Seneca had the wisdom to withdraw from the court, where his presence had become disliked, and where his enormous wealth was calculated to excite the envy even of the emperor. About the same time Nero divorced Octavia and married Poppæa, and soon after put to death the former on a false accusation of adultery and treason.

In the tenth year of his reign, A.D. 64, Rome was almost destroyed by fire. Of the fourteen districts into which the city was divided, four only remained entire. The fire originally began at that part of the Circus which was contiguous to the Palatine and Cœlian hills, and raged with the greatest fury for six days and seven nights; and after it was thought to have been extinguished, it burst forth again and continued for two days longer. Nero appears to have acted on this occasion with the greatest liberality and kindness; the city was supplied with provisions at a very moderate price; and the imperial gardens were thrown open to the sufferers, and buildings were erected for their accommodation. But these acts of humanity and benevolence were insufficient to screen him from the popular suspicion. It was generally believed that he had set fire to the city himself, and some even reported that he had ascended the top of a high tower in order to witness the conflagration, where he amused himself with singing the destruction of Troy. From many circumstances it appears improbable that Nero was guilty of this crime. His guilt indeed is expressly asserted by Suetonius and Dion, but Tacitus admits that he was not able to determine the truth of the accusation. In order however to remove the suspicions of the people, Nero spread a report that the Christians were the authors of the fire, and numbers of them were seized and put to death. Their execution served as an amusement to the people. Some were covered with skins of wild beasts, and were torn to death by dogs, others were crucified, and several were smeared with pitch and other combustible materials, and burned in the imperial gardens in the night: 'Whence,' says the historian, 'pity arose for the guilty, though they deserved the severest punishments, since they were put to death not for the public good, but to gratify the cruelty of one man.' (Tac., *Ann.*, xv. 44.)

In the following year, A.D. 65, a powerful conspiracy was formed for the purpose of placing Piso upon the throne, but it was discovered by Nero, and the principal conspirators were put to death. Among others who suffered on this occasion were Lucan and Seneca; but the guilt of the latter is doubtful. In the same year Poppæa died, in consequence of a kick which she received from her husband, while she was in an advanced state of pregnancy.

During the latter part of his reign Nero was principally engaged in theatrical performances, and in contending for the prizes at the public games. He had previously appeared as an actor upon the Roman stage; and he now visited in succession the chief cities of Greece, and received no less than 1800 crowns for his victories in the public Grecian games. On his return to Italy he entered Naples and Rome as a conqueror, and was received with triumphal honours. But while he was engaged in these extravagancies, Vindex, who commanded the legions in Gaul, declared against his authority; and his example was speedily followed by Galba, who commanded in Spain. The Prætorian cohorts espoused the cause of Galba, and the senate pronounced sentence of death against Nero, who had fled from Rome as soon as he heard of the revolt of the Prætorian cohorts. Nero however anticipated the execution of the sentence by requesting one of his attendants to put him to death, after making an ineffectual attempt at suicide. He died, A.D. 68, in the thirty-second year of his age, and the fourteenth of his reign.

It is difficult to form a correct estimate of the character of this emperor. That he was a licentious voluptuary, and that he scrupled at committing no crimes in order to gratify his lust or strengthen his power, is sufficiently proved; but that he was such a monster as Suetonius and Dion have described him, may reasonably admit of doubt. The possession of absolute power at so early an age tended to call forth all the worst passions of human nature, while the example and counsels of his mother Agrippina must have still further tended to deprave his mind. Though he put to death his adoptive brother, his wife, and his mother, his character appears to have been far from sanguinary; his general administration was wise and equitable, and he never equalled in his worst actions either the capricious cruelty of Caligula or the sullen ferocity of Domitian. Nero was a lover of the arts, and appears to have possessed more taste than many of the emperors, who only resembled him in their profuse expenditure. The Apollo Belvedere is supposed by Thiersch (*Epochen der bildenden Kunst unter den Griechen*, p. 312), and some other writers, to have been made for this emperor.

His government seems to have been far from unpopular. He was anxious to relieve the people from oppressive taxes, and to protect the provinces from the rapacity of the governors; and it may be mentioned as an instance of his popularity, that there were persons who for many years decked his tomb with spring and summer flowers, and that in consequence of a prevalent rumour that he had escaped from death, several impostors at various times assumed the name of Nero and gave no small trouble to the reigning emperors. (Tac., *Hist.*, i. 2; ii. 8; Suet., *Nero*, c. 57, and Casaubon's note.) During the reign of Nero, the Roman empire enjoyed in general a profound state of peace. In the East the Parthians were defeated by Corbulo; and in the West the Britons, who had risen in arms under Boadicea, were again reduced to subjection by Suetonius and Paulinus. [Boadicea.]

(Tacitus; Suetonius; Dion Cassius.)

Coin of Nero.
British Museum. Actual size. Copper.

Reverses of Coins of Nero.

NERO'CILA. [Isopoda, vol. xiii., p. 52.]

NEROS. [Saros.]

NERTSHINSK MOUNTAINS. [Altai.]

NERTSHINSK. [Siberia.]

NERVA, MARCUS COCCEIUS, the thirteenth Roman emperor, was born at Narnia, in Umbria, in A.D. 27, according to Eutropius (viii. 1), or in A.D. 32, according to Dion (lxviii. 4). His family originally came from Crete; but several of his ancestors rose to the highest dignities in the Roman state. His grandfather, Cocceius Nerva, who was consul, A.D. 22, and was a great favourite of the emperor Tiberius, was one of the most celebrated jurists of his age. We learn from Tacitus that he put an end to his own life (*Ann.*, vi. 28).

Nerva is first mentioned in history as a favourite of Nero, who bestowed upon him triumphal honours, A.D. 66, when he was prætor elect. The poetry of Nerva, which is mentioned with praise by Pliny and Martial, appears to have recommended him to the favour of Nero. Nerva was employed in offices of trust and honour during the reigns of

Vespasian and Titus, but he incurred the suspicion of Domitian, and was banished by him to Tarentum.

On the assassination of Domitian on the 18th of September, A.D. 96, Nerva succeeded to the sovereign power, chiefly through the influence of Petronius Secundus, commander of the Prætorian cohorts, and of Parthenius, the chamberlain of the palace. The mild and equitable administration of Nerva is acknowledged and praised by all antient writers, and formed a striking contrast to the sanguinary rule of his predecessor. He discouraged all informers, recalled the exiles from banishment, relieved the people from some oppressive taxes, and granted toleration to the Christians. Many instances of his clemency and liberality are recorded by his contemporary the younger Pliny; he allowed no senator to be put to death during his reign, and practised the greatest economy in order to relieve the wants of the poorer citizens. But his impartial administration of justice met with little favour from the Prætorian cohorts, who had been allowed by Domitian to indulge in excesses of every kind. Enraged at the loss of their benefactor and favourite, they compelled Nerva to deliver into their hands Parthenius and their own commander Petronius, both of whom they put to death. The excesses of his own guards convinced Nerva that the government of the Roman empire required greater energy both of body and mind than he possessed; and he accordingly adopted Trajan as his successor, and associated him with himself in the government. Nerva died in the beginning of A.D. 98, after a reign of sixteen months and nine days. (Dion, lxviii. 4.)

(Dion; Aurelius Victor; Eutropius; the younger Pliny.)

IMP NERVA CAES AVG P M TR P COS
FISCI IVDAICI CALVMNIA SVBLATA
S C

Coin of Nerva.

* British Museum. Actual size. Copper.

NERVE and NERVOUS SYSTEM. The nerves consist of fine tubular filaments of a white or greyish colour and of a peculiar substance, which are arranged nearly parallel to each other in sheaths of fibrous tissue, and which are more or less directly connected with the brain and spinal chord, from which as a centre they proceed in all directions to be distributed in the substance of nearly all the tissues of the body. The nervous filaments vary in diameter from $\frac{1}{1500}$ to about $\frac{1}{7000}$ of an inch, and each filament extends unbroken from the brain or spinal chord to the part in which it is distributed; the size of the nerves, that is, of the bundles contained in a common sheath or neurilema, depends on the number of filaments enclosed in each. In their course the nerves give off and receive numerous branches; in many parts their ramifications and connections are so numerous as to form a coarse kind of network or plexus; but in all these divisions and reunions there is no branching or communication of the ultimate filaments; the only change is that the filaments pass out of one sheath into another, and the only end that appears to be had in view is the more convenient passage of certain filaments to particular parts. *Fig.* 1 is a nerve, that is, a sheath containing a number of nervous filaments branching and receiving branches from another adjacent to it. *Fig.* 2 is a portion of nerve in which the sheath has been removed and the fibres and smaller fasciculi of filaments separated from each other.

Of the mode of termination of the nerves in the tissues little is distinctly known. In the retina [Eye] the nervous fibrils terminate in the small pointed processes by which the internal surface of that nervous expansion is beset; and it is very probable that a similar mode of termination exists in other analogous recipients of special sensation, and in the papillæ of the skin and mucous membranes; but for the nerves of the other tissues, whether the filaments unite in loops or form networks, or whether they terminate abruptly or gradually merge into the substance of the tissue in which they are placed, is at present undecided, the minuteness and obscurity of the objects having hitherto presented insuperable obstacles to certainty of microscopic observation.

Fig. 1.

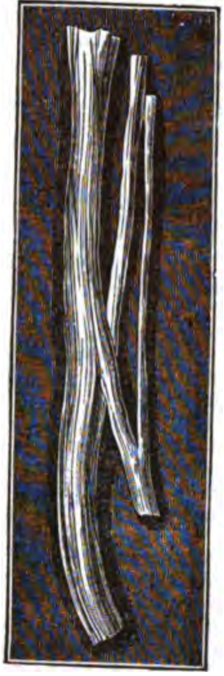
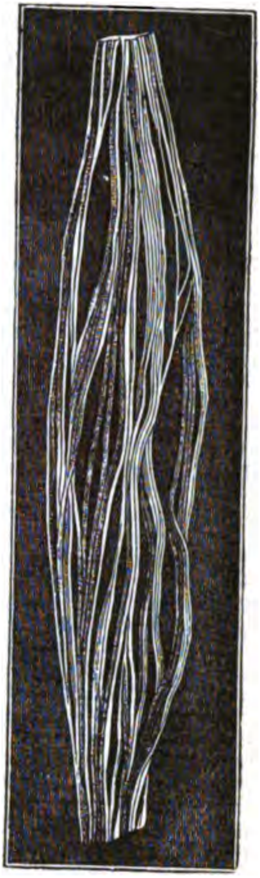


Fig. 2.



On many parts the nerves bear ganglia—small rounded vascular masses of nervous matter, not arranged in fibres, but composed of globules scattered in a network of vessels. Nervous filaments enter into the ganglia on one side, and pass from them on the opposite, but they lose their filamentous character within them and appear to merge into the substance of the general mass.

The nerves are arranged in two systems, the cerebrospinal, or nerves of animal life, and the ganglionic, or great sympathetic system, or nerves of organic life. The nerves of the first system are all immediately connected with the brain and spinal chord, and include all those which are the media of sensation and voluntary motion; the second system contains those nerves which are connected with the brain and spinal chord, or the nerves proceeding from them, only by very small filaments, which bear numerous ganglia in all parts of their course, and which are subservient to the actions of those parts which are engaged in the nutritive functions, and upon which the mind has in general no direct influence.

These two systems of nerves are developed together from almost the lowest animals. Nervous filaments have not yet been seen in the bodies of the polygastrica, nor in the poriphera, nor in the polyp-bearing animals, though many of them are sensible to light and other impressions, and their motions indicate the agency of the same means as those which act in the higher animals. In those of the radiata in which distinct nerves are traceable, their distribution is circular, and hence the name of cyclo-neurose, often given to this class. A nervous circle is placed around the mouth, in a single or double cord, bearing minute ganglia, from which filaments radiate to the several divisions of the body, and especially to the tentacula and other moving or sensitive organs.

In the articulata, or diplo-neurose classes, the nervous system assumes the same lengthened form as the animals themselves possess. The same form of a nervous circle placed around the entrance to the digestive cavity is preserved, but the nerves proceeding from it are not all of equal length or similar in distribution as in the radiata, but one much larger and more distinct than the rest is continued as a double cord, extended along the under surface of the body. The ganglion on the upper part of the nervous ring around the pharynx constitutes the first trace of a brain, from which in many genera nerves proceed to the antennæ, the eyes, &c. The cords or columns proceeding along the body are more or less approximated and often united to each other. Each is composed of two distinct tracts, on the lower of which there are ganglia over which the upper tracts pass without communicating with them; the lower ganglionic tract supplies the sensitive, the upper, not ganglionic, the motor nerves, a relation similar to that which exists in the vertebrata, if we allow for the generally inverted position of the organs in the articulata. Besides these tracts another is placed between the motor columns and the viscera, which has no connection with the ganglia, and whose nerves are principally distributed to the respiratory organs. The first trace of a distinct sympathetic system is found in a few nervous filaments passing off from the œsophageal ganglia and distributed around the dorsal artery and the adjacent viscera.

The size of the ganglia on the longitudinal cord of the articulata and of the nerves connecting them and given off from them is directly proportioned to the volume and complexity of the sensitive or motor organs adjacent to and supplied by each. Thus in those which exercise important motions and have their chief organs of sense about the head, the supra-œsophageal ganglion is very large, as in the rotifera and the complete insects; while in those in which the chief nervous influence is required for lateral limbs that ganglion is small, but the ganglia and cords along the whole or some particular part of the trunk are developed proportionally to the organs adjacent to them. In the higher genera of this class the nervous cords are contained in a cavity separate from that which encloses the other viscera, as they are also much more distinctly in all the vertebrata.

The most striking character in the nervous system of the preceding classes is the repetition of similar elements in the several similar parts of the animal. In both classes the animal is made up of a number of similar parts, which in the radiata are arranged round a common centre, and in the articulata are placed longitudinally. Each of these parts in both receives its nerves from a distinct ganglion, and therefore possesses to a certain extent an independent nervous system, and an independent life. In higher animals, in which particular portions of the body contain organs for special functions to be performed for the benefit of the whole, this repetition and equal distribution of central nervous organs no longer exists.

In the mollusca, or cyclo-gangliata, the nervous œsophageal ring is still present, and is often provided with numerous distinct ganglia, whose size bears a direct proportion to the organs of sensation placed near the mouth, and to the activity and complexity of the masticatory apparatus. The columns continued along the abdominal portion of the animal are usually, like itself, short; and except when active motions are performed by a foot or other locomotive organ, they bear but few and very small ganglia.

The nervous system of the mollusca is thus chiefly concentrated about the head, and its development is proportioned to that of the organs of sense and motion which are subservient to nutrition, while the nerves of the body are but little developed. In the articulata, on the other hand, in accordance with the greater proportionate development of their locomotive powers, the part of the nervous system belonging to the trunk becomes predominant. In the vertebrata, or spini-cerebrata, which possess both nutritive and locomotive powers more highly developed than either of the preceding classes, the types of both are united; the cerebral mass being a more highly developed form of the large supra-œsophageal ganglion of the higher mollusca, while the spinal chord, with the ganglia on its sensitive roots, corresponds with the long ganglionic cords of the articulata.

The most essential part of the nervous system of the vertebrata is the spinal chord, with its continuation in the cranium as far as the crura cerebri and cerebelli, and the ganglia formed upon them, which together constitute that which is termed the cerebro-spinal axis. This axis is always enclosed in an osseous sheath placed in the posterior part of the body, and it is never as in the invertebrata, traversed by the alimentary canal.

The sympathetic system of nerves distributed to the viscera, which in its simplest form, in the annelica, is composed of a few filaments from the supra-œsophageal ganglion, which pass along the dorsal artery, preserves in all the classes the same separation from the sensitive and motor cords, and the same general distribution about the viscera. It increases in complexity in the same degree as the cerebro-spinal system, and acquires in the vertebrata an extensive and still increasing development. It forms in the highest of them numerous and complicated plexuses, with many and some large ganglia, which follow the course of the principal blood-vessels, and are distributed to all the organs of organic life; it still communicates but little with the cerebro-spinal axis, sending only small filaments, which mingle with the spinal and some of the cerebral nerves near their roots.

The part of the nervous system of the vertebrata which is subject to most alteration is the brain. The chief differences in its form depend on the degree in which the hemispheres of the cerebrum and cerebellum are developed. In fishes these are usually smaller than the ganglia on the origin of the optic nerves; but ascending in the scale, they become more and more predominant in size over the rest of the nervous centres, and appear to have a certain relation to the development of intelligence in the animal. In the highest animals and in man the lobes of the cerebrum and cerebellum are by far the largest of all the nervous organs; their surfaces are convoluted and furrowed, the quantity of the grey matter upon them augmented, and the complexity of their structure greatly increased. But as a special article is devoted to this subject [BRAIN], it need not be further considered here; for similar reasons we shall here treat of only the general phenomena and laws of the actions of the nerves as they are observed in man, and the cerebro-spinal system only in reference to the nerves of common sensation and motion; referring for the description of the special senses to the articles EYE, EAR, &c., and for the peculiar influence of the nervous system in the most important organs, to the articles devoted to them. [HEART; STOMACH, &c.]

The constant functions of the cerebro-spinal nerves are, to convey impressions, made on the points in which they are distributed, to the brain, where they are perceived as sensations, or to the spinal chord, where they are perceived without sensation; and to convey the influence of the will from the brain, or some involuntary influence from it or the spinal chord, to the muscles by which some motion is to be performed. The influences that thus pass to and from the brain are conveyed through distinct nervous filaments, though the filaments subservient to each are generally enclosed in the same sheath, and appear to form a single and simple nerve. The filaments which convey impressions to the nervous centres are called sensitive or centripetal; while those conveying impressions from the centres to the muscles are named motor or centrifugal filaments.

The spinal chord, in which all the nerves of the trunk have their apparent origin, is composed of two lateral halves, symmetrical in form and size, and united together by a part of their inner surfaces at the median line. The outer portion of the chord is composed of white nervous matter, the inner of grey, an arrangement the reverse of that of the brain, in which the cortical substance is grey, and the medullary or central white. Each lateral half of the spinal chord is again obscurely divided by superficial furrows into an anterior and a posterior column, and a smaller middle portion between them. All the nerves by which sensitive impressions pass, arise from the groove between the posterior and middle columns; and all those (with the exception of the spinal accessory nerve [BRAIN]) by which the excitants to muscular motion are conveyed, arise from the groove between the anterior and middle columns. They all arise by what are called roots, that is, by a number of fine nervous threads or narrow bands attached to the grooves and passing for a short distance into the substance of the cord, which, as they proceed outwards, converge and unite into a single cord or nerve. There is an important distinction however between them; the roots of the posterior or sensitive nerves have a ganglion at their union just where they are leaving the vertebral canal, while those of the anterior or motor nerves unite without any ganglion into a single cord, which passes over, but does not communicate with the ganglion on the posterior roots. Beyond this ganglion the anterior and posterior roots unite in a common sheath, in which their filaments, though they continue distinct, are indiscriminately mixed; and in this manner they proceed through the varied branchings of the sheath to nearly all parts of the body, conveying the power of perceiving impressions to all, and the power of motion to the muscles and probably a few other tissues.

Nearly the same mode of origin and distribution, and the same distinctness of office, are found in the nerves that have their centre in the brain, in which those of the fifth pair [Brain] are almost exactly analogous to the spinal nerves. But in the other cerebral nerves there is less regularity of origin, the nerves of peculiar sensation having no muscular nerves corresponding to them, the seventh nerve, or portio dura, being exclusively motor, without any corresponding sensitive root, &c. Thus of the nerves proceeding from the brain, some are in all their course sensitive only; others are (except for the occasional connection of some of their branches with branches of the fifth) entirely motor; others (part of those of the fifth) mixed, that is, containing in a common sheath both sensitive and motor filaments, like all the nerves derived from the spinal chord.

The conveyance of those impressions which produce common sensation is the property exclusively of those nervous filaments which arise from the posterior columns of the spinal chord and their continuations in the brain. To possess this power, their connection with the brain, either directly or through the medium of the spinal chord (which, in this view, may be regarded merely as a collection of a vast number of the nervous filaments, which have their centre in the brain), must remain uninjured. Hence, when any sensitive nerve is cut through, all the parts to which its filaments are distributed beyond the place of division are rendered perfectly insensible. The nearer to the brain that the injury is inflicted, the more extensive is the destruction of sensibility. When the spinal chord is injured by fracture of the vertebræ, or by disease, or any other means, all the parts whose nerves come out from the portion below that which is destroyed become insensible; they lose also all power of voluntary motion, but for the present we shall consider the sensitive filaments and their functions only. If the posterior roots of a nerve be divided, all the parts supplied by that nerve lose their sensibility; or if a nerve be divided in any part of its course, then all the parts supplied by branches given off between the point of division and the brain retain their sensibility, while those which are supplied by branches given off in the other part of the nerve more distant from the brain are rendered insensible. These facts prove that the influence of an impression upon the distal or peripheral extremity of a nervous filament can only be conveyed to the brain so as to produce sensation through a continuity of nervous tissue, and only through the very filaments that are impressed; and that there is no such communication of adjacent filaments, that if one is injured, another can convey the impression made on it, as in the circulation, by the anastomosis or communication of the blood-vessels, when one is obliterated, the blood which should traverse it passes through another. The same facts evidently explain also many of the phenomena of partial paralysis.

If that part of a divided nerve which is still connected with the brain be stimulated, the same sensation is perceived as if the stimulus were applied to all the parts in which the branches that the nerve gives off below the division are distributed. This is shown in the sensation which every one must have felt on striking the inside of the elbow (the *funny bone*, as it is commonly called); the tingling pain that the blow produces, and which appears to have its seat in the inner side of the fore-arm and hand, and in the little and ring fingers, is owing to the filaments of the ulnar nerve (which passes behind the elbow) being distributed to those parts, and to the sensation being always referred to the peripheral termination of the filament, in whatever part of its course it is irritated. It is of course impossible to experiment upon a single nervous filament, but the accuracy with which the imagined seat of sensation produced by irritating a bundle of filaments accords with their distribution leaves no doubt of the fact just mentioned. The nearer to the brain that the stimulus is applied, the more extended is the sensation; hence in disease of the spinal chord, pain is often felt in all the parts supplied with nerves coming off from the chord below the diseased portion, and the pain of dividing a nerve is felt over all the parts to which its branches are distributed. The same circumstance gives rise to the apparently strange ideas which those who have lost a limb entertain, that they still possess it, till by their sight or some other means they correct the erroneous impressions of their sense of touch. For example, the constant cry of a patient who has just lost his leg, while the stump is being dressed, is that his attendants are squeezing his knee, or cutting his foot, or injuring some other part of the limb, which he cannot believe has been cut off. The reason is, that when those filaments of the nerves in the stump which are destined for the knee are touched, the knee seems to be touched; when those which are going to the foot are injured, the foot appears to suffer. So deceptive are these sensations, that even years after the loss of a limb, or for the rest of their lives, persons occasionally endeavour to perform some act with the stump which they were accustomed to do with the part they have lost. From the same circumstance of the sameness of sensation, whatever be the part of a nervous filament to which the stimulus is applied, arises the well-known feeling of the foot having fallen asleep, when the ischiatic nerve has been pressed upon, and the peculiar character of the pain in many cases of tic doloureux, in which the trunk of a nerve being diseased, the pain is referred to all the parts to which its filaments are distributed.

The laws deduced from these facts, and which are of great importance in the explanation of many diseases of the nervous system, are briefly these. The impressions producing sensation always pass from the circumference of the distribution of the nerves to the centre; they are always centripetal, and their centre, the seat of sensation, is the brain. They can pass only through the tissue of the nervous filaments to which they have been applied, and whose connection with the brain must therefore be unimpaired. The sensation is the same on whatever part of the nervous filament the impression is first made, and it is always referred to the peripheral end of the filament.

If the connection of the nerve with the brain be broken, the same impression may pass along its filaments to the part where its continuity is destroyed, but it will produce no sensation; though when the spinal chord remains, its passage may be indicated by the phenomena of *reflex motion*, which will be presently considered. It is chiefly through the medium of the nerves of common sensation that we become acquainted with all that the contact of other palpable bodies teaches, as their form, size, hardness, heat, &c. For the perception of these properties we must suppose a peculiar condition of nervous matter; for although the laws under which impressions are conducted through all the sensitive nerves to the brain are the same, yet the nerves of peculiar sensation, as the optic [Eye] and the auditory [Ear] are no more capable of perceiving the impressions of contact of non-vibrating bodies, than the nerves of the limbs, &c. are of perceiving light and sound. If the retina be touched in an operation on the eye (as in the experiments which M. Magendie has often made in operating for cataract), the sensation produced is that of a brilliant flash of light; if the auditory nerve be electrified, the sensation is that of a sudden loud noise: but in neither case is pain produced, unless the nerves of common sensation, with which parts of the eye and ear are supplied, be irritated at the same time.

Our ideas of the form and size as well as of the hardness of bodies are dependent in some degree on another sense, which is peculiarly connected with the muscles [Muscle], and is called muscular sensibility. By it we know what degree and extent of muscular force we exert at any given time. Thus if the hand grasps a ball, we estimate its size by the degree in which the fingers are extended to enclose its circumference, for the mere impression of its contact on the fingers would be the same whether the ball were large or small; we estimate its weight by the muscular exertion which we feel it necessary to make to prevent it from falling; and its hardness by the degree of exertion which is sufficient or insufficient to make an impression on its exterior. In like manner, if the body be larger than the hand can grasp, then (unless we can see it) we estimate its size by the distance through which the hand moves in passing over the whole surface, and its form by the differences of position in which, in thus passing over it, the hand is from time to time placed. It is only the smaller differences in the form of the surfaces of bodies, their smoothness and roughness, and other similar characters, that are estimated by the touch alone. Thus when a sensitive part (as the hand) is placed or moved with a certain force on the surface of a body, we know that it is smooth if all the hand receives the same sensation, or rough if the sensation of contact is perceived at points distant from each other. In like manner, from the extent of surface touched we form our ideas of the sharpness or obtuseness of bodies.

Perceptions of temperature are also the peculiar attributes of the nerves of common sensation, but they do not admit of our forming very accurate ideas of the heat of bodies, because our sensations depend rather on the rapidity with which heat is abstracted from or added to our bodies, than on the quantity which we lose or receive. Hence we feel marble, which conducts heat rapidly, as if it were much colder than a slowly-conducting carpet of the same temperature; and when the difference of temperature between the hand or any other part of the body and that which it touches is very great, we lose all power of judging, and cannot directly tell whether it is in contact with (for example) ice or boiling water. Peculiar states of the circulation in and around the nerves give rise to very different sensations of heat, as in fever or in shivering, in which, though the skin feels as if it were burning or freezing, the actual temperature of the surface does not in either case differ more than five or six degrees from that which is natural to it.

The acuteness of the common sensibility of parts probably depends, *cæteris paribus*, in the healthy state, on the closeness with which they are beset with the terminations of sensitive nervous filaments. E. H. Weber (*Annot. Anatom. et Phys.*) has suggested a mode of estimating the degrees of sensibility of different parts of the surface of the body by touching two adjacent points of it at the same instant, and observing at what distance from each other the two contacts can be discerned as two distinct impressions. This may be effected by putting small pieces of cork on the points of a pair of compasses, and pressing both at the same instant on the part to be examined; the angles which the legs of the compass form will thus measure the distances at which the two impressions are distinguished or are confounded into one. By this method of examination it is found that the tip of the tongue is the most sensible of all the surface of the body, being able to distinguish two impressions when the distance between the points on which they are applied is not more than $\frac{1}{20}$ of an inch, a result which might have been anticipated, from the accuracy with which the tongue perceives and estimates the characters of the smallest portions of foreign matter in the mouth, and from the great share which the sense of touch takes in what we confound in the general idea of taste. The balls of the fingers can distinguish double impressions from $\frac{1}{12}$ to $\frac{1}{4}$ of an inch apart; the palm at about half an inch, and other parts of the skin at various greater distances. Applied to the skin at the back of the neck, of the upper arm, the thigh, and some other parts, such double impressions are confounded into one when the points touched are upwards of two inches asunder.

Numerous circumstances have the power of modifying or increasing the sensibility of parts, giving rise to varieties of agreeable and painful sensations. Most parts moreover have certain sensations peculiar to themselves; thus no other tissue than the skin is ever the seat of the sensations of tickling, or itching, or burning heat, &c.; the muscles alone feel fatigue; the pain of disease in different tissues is as varied as any other of its phenomena. Certain parts also are insensible to any but particular impressions; the tendons and other similar tissues may be cut or burnt, or in any way injured without exciting any sensation, unless they are pulled or twisted, or subjected to any other of those mechanical influences which it is their office in the animal economy to resist. Other parts again, as most of the internal organs, the bones and cartilages, are insensible during health, but in disease excite severe and peculiar pain. For all these differences however no explanation is yet known. It is known that certain nerves (the motor) never, under any circumstances, convey sensible impressions; that others (the nerves of the sympathetic system) are, if ever, only occasionally conductors of sensations; that others (the nerves of the peculiar senses) convey only the impressions of those agents for the reception of which certain organs are peculiarly adapted; and that others have the constant office of conveying impressions of contact, heat, &c.; but upon what differences of structure or arrangement these varieties of function depend no reasonable opinion can at present be formed.

Many of the phenomena illustrative of the mode of conduction of the nervous influence in the sensitive nerves are repeated in the motor filaments, with this difference, that while in the sensitive nerves impressions always proceed from the circumference to the centre, or from the termination of the nervous filament in any tissue, to its termination in the brain or spinal cord; in the motor nerves the impressions always pass in the opposite direction, that is, from the centre to the circumference, or from the brain or spinal chord to the muscle or other contractile tissue. When the motor filaments of a nerve are irritated in any part of its course, no pain is felt, but the muscles to which it is distributed contract; when a similar nerve is cut through (or otherwise prevented from conveying the nervous influence), all the muscles to which the filaments that pass off from it, beyond the injured portion, are distributed, lose the power of being acted upon by the will, and very soon of being excited by any stimulus, while those from between the injured part and the brain retain their power. If the end of that portion of a divided motor nerve which is still connected with the nervous centre be irritated, no perceptible effect follows; if the end of the other portion, which is now separated from the brain, be irritated, the muscles to which its filaments proceed will for a time continue to contract. The same observations on the necessity of a continuity of nervous substance, on the absence of any communication between adjacent filaments, by which one might assume the office of another, and on the sameness of effect, whatever part of a nervous filament is irritated, may be made of the motor as of the sensitive filaments. As in by far the greater number of nerves, sensitive and motor filaments are contained within the same sheath, the phenomena, which have been described separately, will, in the case of injury or other affection of such nerves, be combined. Thus when the nerve of any limb is irritated, sudden pain is felt and coincident convulsions ensue; when a similar nerve is divided, the limb becomes both senseless and motionless; if the upper part of the divided nerve (that still connected with the brain) be irritated, pain is felt, but no motion is excited; if the lower part be irritated, convulsions of the limb take place, but no pain is felt.

Of the nature of the influence which, passing along the nerves, excites motion, and of the manner in which it is set in motion, nothing whatever is known. Through some nerves it can be transmitted at will, and the muscles supplied with these are therefore called voluntary; through others the will has no influence in sending the excitant to motion, and the involuntary muscles to which they pass are entirely removed from any connection with the mind, except in the excitement of violent passion or grief, or other exalted mental affection. Whatever stimulus is applied to the motor nerves, the same effect is produced; whether it be the stimulus of the will, or of any mechanical, chemical, or electrical application, the same muscular contraction, varying only in degree, is produced. The mind alone has the power of determining the strength and extent of muscular contraction, and this it effects by an operation which it scarcely appreciates; for even one who knows accurately the position and the mode of action of each muscle cannot, except in certain cases, order the act of a single muscle, but to produce a certain kind or strength of motion, is obliged to exert coincidently all the muscles that can minister to that motion. Thus there are two muscles, at least, that bend the fore-arm, and no person can make one of them act while the other remains inactive; the will can only determine certain effects, but it cannot determine the muscles by which they shall be accomplished.

In all the phenomena hitherto considered, the mind takes a part; but in some circumstances an impression passes along a sensitive nerve to the nervous centre, and although no sensation may have been produced, an influence is in return conveyed back from the centre through a motor nerve, and motion is produced, either in the muscles adjacent to the part first impressed, or in those of some other part of the body. The phenomena of this class are those of what is called the *reflex function;* a term which is derived from the idea that the impression, passing centripetally, is *reflected* from the centre as soon as it arrives there, and made to pass from it centrifugally.

For the occurrence of these reflex actions, it is essential that the nerves acted upon should retain their connection with the spinal chord or with the brain. The spinal chord is sufficient for some of these actions, and the power is therefore often spoken of as if it belonged exclusively to it; but it is evidently possessed by the whole cerebro-spinal axis. Thus, if the hind-leg of a reptile or any other animal be separated from the body, and the skin of any part of it be irritated, no motion of its muscles will ensue; but if the leg be allowed to retain its connection with that part of the spinal chord from which its nerves come out, the same irritation of the skin will produce convulsive contractions of the muscles. In the first case the impression on the skin, if it passed along the sensitive nervous filaments at all, was lost at their cut extremity; in the second, it passed through them to the spinal chord, and thence either it or some other influence returned immediately through the motor nerves to the muscles.

On this property of reflecting the impressions received from sensitive to motor nerves, many of the muscular motions which were formerly regarded as instinctive or sympathetic, and many others of the most important phenomena, depend. Thus when light falls on the retina, the impression received by the brain is instantly reflected through the third nerve, and the iris, without any effort of the will, contracts; and if the light be very strong and sudden, the eyelids involuntarily wince, as they do before any expected injury. In like manner a stimulus applied to the nose excites involuntary sneezing; food, or any other substance in the fauces or pharynx, excites the involuntary act of swallowing, and still more an irritation of the larynx is reflected from the medulla oblongata, and excites in all the respiratory muscles involuntary coughing. In all these cases sensation coexists with the reflection of the impression through the motor nerves; but sensation is by no means essential to the phenomena; on the contrary, in the most marked examples the centripetal impression is not perceived by the brain. Thus the sphincter muscles are constantly maintained in a state of contraction under the influence which passes unfelt from the spinal chord; and all the motions occurring in decapitated animals (in which the reflex actions are more remarkable than under any other circumstances) must probably be regarded as unaccompanied by sensation, since exactly similar phenomena occur in persons suffering from some forms of paralysis, and who can never feel the impression on the skin upon which the involuntary motions instantly follow. In the case of reflection from the optic nerve to the nerves of the iris, and in most of those in which the sensitive nerves pass directly to the brain, sensation is produced with the reflex action; but in all the cases where the centripetal nerves pass to the spinal chord, the reflex actions take place as well, or even more certainly, after the removal of the brain. The spinal chord is essential for a reflex action in the nerves that pass out from it; the brain for a similar action in its own nerves: in the first case sensation is not involved, in the second it generally is.

Mr. Grainger ('Observations on the Spinal Chord') believes that the impressions which produce reflex actions, and those which pass to and from the brain in sensation and voluntary motion, are not conveyed by the same sets of nervous fibres. He considers that there meet in the spinal chord four sets of nervous filaments: one passing only to the exterior white matter, and then ascending to the brain, to which they convey sensations; a second, corresponding to these, which pass from the brain along the exterior white matter of the chord, and thence to the muscles, for the conveyance of the influence of the will to them. These two sets are the same as the commonly described sensitive and motor filaments; the others are analogous to these, but are supposed to be subservient only to the reflex actions; they pass to and from the chord with the others, but instead of being continued up with them to the brain along the exterior of the chord, penetrate into its substance, and lose themselves in its central grey matter—the recipient and reflector of the impressions which they convey. The observations of the course of the filaments of the nerves, where they pass into the spinal chord, upon which this very ingenious view is founded, have not yet been sufficiently confirmed to establish its truth beyond doubt; but it still affords the most intelligible explanation of the manner in which impressions, passing apparently through the same filaments, in some cases produce sensation, and in others none; and in which, for certain purposes, organs supplied with nerves from the cerebro-spinal axis are yet usually removed from the influence of the brain.

It deserves particular remark, that in the cases in which the impression is conveyed only to the spinal chord, as in beheaded animals, the motions that result from the reflected influence, evince design. Thus, when a bird's or any other lower animal's (as a frog's) head is cut off, the body endeavours to escape, and evinces method in its attempts; if a limb is touched, it is drawn away from the contact; if a part of the body is irritated, the foot will sometimes be raised in an endeavour to remove the source of irritation. These actions are similar to those of monsters born without brains, many of which have been known to cry, to take milk, and perform other apparently voluntary acts. Are we from these facts, indicating design in the actions of brainless animals, to believe that the spinal chord is capable of any exercise of will? Such an idea is very opposed to opinions which are deemed well founded, but is still far from groundless; the motions are scarcely otherwise explicable.

Of the nature of the agent which, passing along the nervous filaments, produces sensation or excites motion, nothing satisfactory is at present known. The imperceptible velocity of its passage naturally suggested the idea of an electric current, and except by the supposition of the motion, or the vibration of the particles of some such subtle material as electricity or the other imponderable agents are conceived to be, its velocity is scarcely to be accounted for. Some idea may be formed of its rapidity of passage along the nerves to and from the brain, by a rough calculation which the writer lately made, that when a person plays rapidly on the piano, upwards of 1000 distinct movements are performed within the minute; each of which has its time, place, and strength exactly ordered. At the same time that the mind imparts this number of impressions to the muscles, it is receiving not less than 2000 impressions by each of three distinct senses, the eye, the ear, and the touch, and perceives the most minute variations with each. From the similarity of this velocity of the nervous agent, to that of the passage of electricity, and from a few apparent analogies, some have imagined the nervous agent or fluid to be identical with the electric; but the grounds for such an opinion are at present few and uncertain, while many evident facts militate strongly against it, as the equal conducting power of all the moist tissues as well as the nervous; the improbability that electric fluid should be isolated in the filaments. the inconstancy of the results of experiments in which a current of electricity is used to replace a removed portion of a nerve, &c.

The nervous agent is prepared in the brain and spinal chord, and probably in all parts where there is ganglionic or grey nervous matter, and from them distributed to the nerves. Thus, if the trunk of a mixed nerve be divided, that part which is separated from the nervous centre soon loses that which may be called its stock of excitability, while that which remains attached to the centres retains its excitability as if no injury had been inflicted. For the maintenance of the excitability on which the reflex actions depend, the spinal chord alone seems to be necessary; for it is not more rapidly expended after the removal of the brain than when the brain is present. For the maintenance of the excitability for other actions the brain is essential.

Each impression made on the sensitive nerves, and each excitant to motion, may be considered to cause a certain consumption of the nervous influence, which it is the office of the nervous centres to replace; and a healthy condition of the nervous system may reasonably be conceived to depend on a due proportion between the waste and the supply. When the former has been excessive, weakness or fatigue of the senses, or of the power of muscular motion, is produced, which a period of sleep or rest from excitement is necessary to replace. The necessity of such rest is indicated to us by the fatigue at the close of each day, and cannot long be safely resisted; for after the loss of the night's rest, the excitant necessary to produce a certain effect is found to become greater in a rapidly increasing ratio through every hour of the succeeding day. During rest, the brain may be considered as producing the excitability by which the nerves may act during the period of exertion; and hence exertion is not less necessary for health than rest; and many disorders show that excitability may, for want of being wasted by exertion, accumulate. Hence much of that which passes under the popular name of nervousness—a condition in which a given excitant produces a greater effect than is natural or healthy; and this (although the use of terms usually applied to material things may give too definite an idea of it) we may reasonably believe to result from an accumulation of nervous influence, as fatigue, or the need of a greater excitement to produce a certain effect, results from its waste. The influence of exercise of the nerves follows the same rule as that of exercise of the muscles or any other tissue; by it, within certain limits, the power of perceiving impressions and of exciting motion is progressively increased; the excitability of each organ or of the whole system being, within those limits, capable of adaptation to the need of the individual; hence the power by practice of attaining to perfection of touch, or of hearing, or sight, or any other sense. Impressions are distinctly felt by the practised sense which are completely imperceptible to that which has been only casually employed. In like manner, when the organ of one sense is destroyed, and thus one outlet for excitability is closed, the rest acquire increased acuteness; hence the accuracy of the hearing and touch in the blind, of the sight in the deaf, &c.

The system of the great sympathetic nerve is that whose branches are distributed to all the organs of organic life, the heart, lungs, digestive canal and glands, &c., chiefly following the course of the blood-vessels, bearing numerous and large ganglia in all parts of their course, and communicating with the brain and spinal chord or their nerves only by few and small filaments. The parts to which the branches of the sympathetic nerve are distributed have but vague if any sensibility, unless under peculiar circumstances of disease; and the motions which some of them possess are usually quite independent of the mind. Numerous experiments of irritating the ganglia of the sympathetic to see whether it produces pain, have had unsatisfactory results; nor would any results of apparent insensibility be conclusive, because the ganglia might, like part of the brain, be insensible to injury, though fully capable of perceiving the impressions transmitted to them through their nerves. But the pain of the diseases of internal organs is amply sufficient to prove their sensibility, though it does not determine whether the impression of pain is conveyed through filaments of the sympathetic system or through those few of the cerebro-spinal system which are mingled with the former in the common sheath. In the same manner, in extraordinary cases, the brain and spinal chord have an evident influence on the motions of the organs supplied by the sympathetic nerve, as in the effects of strong passion and other mental affections on the circulation, the digestive functions, &c. The impressions conveyed from the viscera to the brain and spinal chord may also be reflected either to the voluntary muscles, as in the convulsions of children with disordered digestion, or to the involuntary muscles, as in the increased rapidity of pulse, the sickness, &c. which occur in various diseases.

In the natural state however, the organs chiefly supplied by the sympathetic nerves are entirely independent of the cerebro-spinal system, and will maintain their actions for a time even after their removal from the body. Thus the peristaltic motion of the intestines, the contractions and dilatations of the heart of some animals, and some other similar actions, will continue for a considerable time after they are separated from the body, or after all the nerves passing to them have been divided. Many other facts prove also that the internal organs are much less dependent on the influence of the sympathetic nerve than the external animal organs are on that of their cerebro-spinal nerves: severe irritation of the sympathetic nerves, such as, if applied to the cerebro-spinal motor nerves, would excite sudden and violent convulsions of their muscles, gives rise to but weak and slow contractions of the viscera; and these follow at perceptible intervals after the application of the stimulus, so that it is often difficult to say whether the irritation have exerted any influence at all.

The office of the numerous ganglia placed in the course of the sympathetic nerves is perhaps the most obscure point in the whole range of physiology. Some have regarded them as so many brains, by which impressions are received through the branches of which each ganglion is the centre, and from which excitements to motion are sent out; others have believed that they exercise a power of isolating the organs they supply from the influence of the mind or of obstructing the constant passage of impressions to and from the brain; and many other functions have been supposed to be performed by them: but for each and all the evidence is altogether unsatisfactory.

The sympathetic nerve or system of nerves has received its name from the idea that it is of ultimate importance in the phenomena of what is called sympathy, in which one part of the body is affected in consequence of some peculiar condition of another. A great number of the phenomena which were formerly regarded as the effects of sympathy are now more clearly explained by the reflecting action of the cerebro-spinal axis; many others depend on some generally operating influence, as a peculiar condition of the blood, &c.; and in those that remain it is questionable whether the sympathetic system of nerves exercises any peculiar power. The universality of its distribution among the viscera is the only ground on which it can be believed to possess this property of exciting impressions or actions in one, in consequence of being itself excited by the condition of another.

It exerts a more evident influence in the various secretions of the glands and other surfaces which it supplies. In some instances the excitant to secretion is conveyed primarily from the brain, either directly, as in the flowing of tears in grief, &c., or by a reflex action, as in the tears that flow when the mucous membrane of the nose is irritated, or as in the flow of saliva in a strong irritation of the membrane of the mouth, in the sweating of fear or of great agony, &c. In the more constant secretions the influence of the sympathetic nerves is in some degree assumed; but there are sufficient facts to prove that their injury is very soon followed by a suppression or modification of the secretion in the organ to which the injured nerves are destined. The cerebro-spinal nerves also exercise an influence on the secretion and nutrition of the parts which they supply; but its amount is indistinct, in consequence of the interruption of other circumstances favourable to those processes, by the same injury which cuts off the secretory power of the nerves, as the loss of exercise of the muscles, &c.

The best general account of the physiology of the nerves is in Müller's 'Physiologie,' translated by Dr. Baly; for all that relates to the distinct functions of the roots of the nerves, the several works of Sir Charles Bell (by whom this most important discovery was first made) may be consulted, and with them the physiological treatises of Mr. Mayo and M. Magendie. On the reflex actions, the best works are, Prochaska's 'Physiologie,' in which it is first distinctly announced, though long before alluded to by Glisson (*Tract. de Ventriculo et Intestinio*), and the works of Dr. Marshall Hall, by whom the subject has been most fully illustrated and raised to its just importance, and of Mr. Grainger and Dr. Volkmann. The electrical theory of the nervous fluid is most extensively illustrated in the writings of Dr. Wilson Philip. The best account in English of the comparative anatomy of the nervous system will be found in Dr. Grant's 'Outlines of Comparative Anatomy.'

NE'SEA. Lamouroux gives this name to some of the articulated Corallines.

NESS, LOCH, is a lake in Scotland, situated between 57° 10′ and 57° 27′ N. lat. and between 4° 20 and 4° 40′ W. long. It is 22 miles long: its breadth varies from a mile and a quarter to three-quarters of a mile. It extends south-south-west and north-north-east over a considerable portion of Glenmore, through which the Caledonian Canal passes. The depth of the water is from 106 to 129 fathoms in the middle parts; but near the ends of the lake it decreases to 85, 75, and much less. At the north-east end the depth is reduced to 7 and 9 fathoms. This lake is never covered with ice. At its south-western extremity it receives the waters of the small river Oich, which issues from Loch Oich, which lies farther south. From its north-eastern extremity issues the river Ness, which, after a course of six miles, discharges its waters into Moray Frith. Loch Ness is enclosed on both sides by lofty, rugged, steep, and barren mountains, which attain an average height of 1000 feet. The highest mountain-masses are on the western shore and near the middle of the lake, where they rise in the huge summit of the Mealfourvouny. This mountain is stated to be 2730 feet high, but it is probably higher, if the fact be true that not far from its summit there is a small lake which is always frozen. On the north and south of this enormous mass of rocks two pastoral glens open upon the lake, Glen Urquhart and Glen Morison, and the rivers which drain them bring a large quantity of water to the lake. The mountains south and north of these two glens are much less elevated: this is also the case with the rocks which skirt the eastern shores of the lake. These rocks are cut by deep gullies and frightful precipices, and the rivers Farrigag and Feachloin rush violently into the lake through two narrow fissures. These rivers drain Strath Erick, a pastoral valley, which is more than 400 feet above the level of the sea, and extends parallel to the lake for about fifteen miles. It is a beautiful tract of country, and its charms are increased by the cataracts of Foyers or Fyers, which the river Feachloin forms in breaking through the line of elevated rocks which divide the strath from the lake. It rivals in beauty the waterfalls of the Clyde and of the Tumel.

(*Parliamentary Reports on the Caledonian Canal*; Sinclair's *Statistical Account of Scotland*; and MacCulloch's *Highlands and Western Islands.*)

NESTOR (Ornithology). [PSITTACIDÆ.]

NESTORIANS, the name of an important and early sect of Christians, which is derived from Nestorius, a Syrian by birth, who became patriarch of Constantinople in 428, under the reign of Theodosius II. He showed himself very zealous against the Arians and other sectarians; but after some time a priest of Antioch, named Anastasius, who had followed Nestorius to Constantinople, began to preach that there were two persons in Jesus Christ, and that the Word, or divinity, had not become man, but had descended upon the man Jesus, born of the Virgin Mary, and that the two natures became morally united as it were, but not hypostatically joined into one person; and that when Jesus died it was the human person and not the divinity that suffered. This doctrine, being not only not discountenanced, but supported by Nestorius, was the origin of the Nestorian schism. Nestorius refused to allow to the Virgin Mary the title of Theotokos, or mother of God, but allowed her that of Christotokos, or mother of Christ. Nestorius met with numerous opponents, among others Eusebius of Dorylæum; and the controversy occasioned great disturbances in Constantinople. Cyril, bishop of Alexandria in Egypt, with his characteristic violence, anathematised Nestorius, who in his turn anathematised Cyril, whom he accused of degrading the divine nature and making it subject to the infirmities of the human nature. [CYRIL OF ALEXANDRIA.] The emperor Theodosius convoked a general council at Ephesus to decide upon the question, A.D. 431. The council, which was attended by 210 bishops, condemned the doctrine of Nestorius, who refused to appear before the council, as many Eastern bishops, and John of Antioch among the rest, had not yet arrived. Upon this the council deposed Nestorius. Soon after John of Antioch and his friends came, and condemned Cyril as being guilty of the Apollinarian heresy. The emperor, being appealed to by both parties, after some hesitation, sent for Nestorius and Cyril, but it appears that he was displeased with what he considered pride and obstinacy in Nestorius, and confined him to a monastery. But as his name was still a rallying word for faction, Theodosius banished him to the deserts of Thebais in Egypt, where he died. His partisans however spread over the East, and have continued to this day to form a separate church, which is rather numerous, especially in Mesopotamia, where their patriarch resides at Diarbekr.

The Nestorians at one time spread into Persia, and from thence to the coast of Coromandel, where the Portuguese found a community of them at St. Thomé, but they persecuted them and obliged them to turn Roman Catholics.

(*Histoire du Nestorianisme*, by Father Doucin, a Jesuit, 1698; and a *Dissertation on the Syrian Nestorians*, in the 4th volume of the *Bibliotheca Orientalis* of J. S. Assemani.)

Eutyches, in his zeal to oppose the Nestorians, fell into the opposite extreme of saying that there was only one nature in Christ, namely, the divine nature, by which the human nature had become absorbed. [EUTYCHIANS.]

NETHERLANDS, THE. This kingdom as now constituted consists of the territory of the antient republic of the Seven United Provinces and of some portions of the province of Limburg, but not including the grand-duchy of Luxemburg, which the king of the Netherlands possesses, with the title of grand-duke, as a part of the German Confederation. The kingdom of the Netherlands is situated between 50° 44 and 53° 34′ N. lat. and 3° 30′ and 7° 10′ E. long. It is bounded on the east by Germany, on the north and west by the German Ocean or North Sea, and on the south by Belgium. The frontier line which divides it from Belgium is described in the article BELGIUM, as fixed by the treaty of 15th November, 1831, which has now been accepted and ratified by both parties. The area of the kingdom is about 11,000 square miles; the population, on the 1st of January, 1839, was 2,583,271.

The kingdom is now divided into ten provinces —

	Area. Sq. miles.	Population.
North Brabant . .	1,942	366,160
Guelderland . .	2,000	336,401
North Holland . .	930	423,873
South Holland . .	1,170	509,661
Zealand	640	145,542
Utrecht	525	140,574
Friesland . . .	1,027	227,415
Overyssel . . .	1,240	191,062
Groningen . . .	770	172,437
Drenthe . . .	920	70,146
Total . . .	11,164	2,583,271

That part of Limburg (with 147,527 inhabitants) which is restored to the kingdom of the Netherlands is annexed in perpetuity to that crown, but is constituted as *the duchy of Limburg*, and is to form a part of the German confederation, in lieu of that part of Luxemburg which the German diet consents to cede to Belgium; but Maestricht and Venloo remain an integral part of the kingdom of the Netherlands.

Face of the Country; Soil; Climate.—The Netherlands are part of the great plain of Northern Europe, and are not separated from Germany on the north-east by any natural boundaries. The provinces about the mouths of the Schelde and the Rhine, and the country to the north of them, Zealand, North and South Holland, Friesland, Groningen, Drenthe, and Overyssel, are indeed most appropriately called the Netherlands, that is, the Lowlands. They form one unbroken flat without a hill or rock, without forests or running waters, they lie in part even below the level of the sea, against the inroads of which they are protected partly by immense dikes, and partly by sandhills or *dunes* from 80 to 180 feet high, which have been cast up by the ocean, and, running parallel with the coast, protect it against the element to which they owe their origin. Nothing can be more dreary than this ocean of sand; it is a perfect image of aridity and barrenness; some broom scarcely green, some stunted shrubs growing at intervals in the hollows, where they are protected from the wind, alone interrupt this dreary solitude. From the Helder to the mouth of the Maas, a distance of 75 miles, these gloomy though protecting deserts everywhere extend between the cultivated country and the sea. The land thus rescued from the sea, consisting of moor and mud, is traversed by numberless canals, which are absolutely necessary to drain it and render it fit for cultivation. The labour is amply rewarded, for the land is extremely fertile and covered with the richest pastures. The lowest parts are called polders. When a marsh is to be drained, it is first enclosed with a rampart or dike to prevent any water from flowing into it. Windmills are then erected on the edge of the dike, each of which works a pump. As the mills raise the water, it is discharged into a canal, which conveys it to the sea or to some inland piece of water. But in general the operation cannot be performed at once; where the marshes are too deep below the surrounding country, two or three dikes and as many canals are made at different levels, rising by degrees to the upper canal, in which the whole terminates. The girdle of windmills, which announces at a distance the position of the polder, has the appearance of sentinels placed to guard the entrance. All the polders have an extremely rich slimy soil, which is generally used for pasturage, but in some places produces rich crops of corn. The eastern provinces nearest to Germany contain many meres and marshes, and especially the great series of turf moors which extend from the mouth of the Schelde eastward to the Maas, and there join the great morass called the Peel, on the east frontier of North Brabant, which is 10 leagues long and from 1 to 3 leagues broad.

This marshy country, which is so wholly artificial that it has justly been said 'the Dutch built Holland,' is one of the best cultivated, the most wealthy, and the most populous in Europe; and it would be difficult to find elsewhere, in so small a compass, such a number of large and well-built villages, towns, and cities. The atmosphere in these low tracts is for the most part damp, thick, and heavy; fogs and storms are very frequent; but both the heat and the cold are more moderate than in Northern Germany. The climate is unhealthy, especially for foreigners. The want of good spring water is very sensibly felt. The climate is more healthy in the eastern provinces, which are rather more elevated, and contain some hills, which the inhabitants dignify with the name of mountains.

Bays, Rivers, Canals, and Lakes.—The whole coast, which is much broken and indented with considerable bays, large inlets of the sea, and the mouths of great rivers, would measure near 500 miles, or about 1 mile of coast for every 22 square miles. The German Ocean, or North Sea, which borders Belgium and the Netherlands from the frontier of France, a few miles east of Dunkirk, to the mouth of the Ems, has produced in the lapse of ages great physical revolutions in the maritime provinces. The most remarkable of these revolutions have been the retreat and encroachment of the sea, and the changes in the course of the Rhine. The whole country probably once belonged to the ocean, but the oldest accounts that we possess represent the land as more extensive than at present. The Yssel, it appears, ran into an inland lake called Flevo, from which a river pursued its course for fifty miles to the sea. That lake, with the adjacent continent, has been covered for many centuries by the Zuyder Zee, the only remains of the continent being the islands of Texel, Vlieland, Schelling, and Ameland, which lie in a curved line, convex towards the ocean, in front of and protecting the entrance of the Zuyder Zee. This inland sea, which is enclosed by the islands and the provinces of Holland, Utrecht, Guelderland, Overyssel, and Friesland, resembles a great lake: it is 80 miles long from north to south, and its breadth varies from 20 to 30 and 40 miles. On account of its great extent, the navigation is dangerous in stormy weather for small vessels, which however cross it from South Holland to Friesland rather than go all round the coast. The entrances between the islands being much obstructed by sand-banks, the trade of Amsterdam derives infinite benefits from that noble work the North Holland Canal. The Lauwer Zee, between Friesland and Groningen, and the Dollart, between Groningen and the German province of East Friesland, were formed by similar irruptions of the sea in the thirteenth century; and so late as the fifteenth century a great salt-water lake, called the Bies Bosch, was suddenly formed to the south-east of Dort, by the sea bursting through a dam and overwhelming 72 villages, with 100,000 inhabitants.

The principal river is the Rhine, which, coming from Germany, enters the Netherlands at Lobith, where it is 2300 feet broad; but in traversing this country it is divided into three arms, and before it reaches the sea even loses its venerable name. Soon after crossing the frontier it divides into two branches, the larger and left arm forming the Waal. The right or northern arm flows to Arnheim, where it again divides into two branches; one, called the Yssel, flows northwards to the Zuyder Zee; the other runs to Wijk, where it again divides into two streams, the larger, called the Leck, joining the Waal above Rotterdam, and the smaller, now reduced to an insignificant river, passing by Utrecht to Leyden and the sea. Till the beginning of this century, this branch was lost in the sand, the mouth being completely choked up; in 1804 works were commenced to re-open this mouth of the river near Katwyck, and the operation was happily completed in 1807. The other principal rivers are, the Maas, Maese, or Meuse, which comes from Belgium, and joins the Waal at the fort of St. Andries; and the Schelde, which, likewise coming from Belgium, enters Holland below Antwerp, and divides into two arms, the East and the West Schelde; the West Schelde falls into the ocean at Flushing, and the East Schelde between the Zealand islands of Schouwen and North Beveland. Of the canals the most important is the North or Helder Canal. [HOLLAND, *North*.] The greatest lake is that of Haarlem, which it has now been resolved to drain. [HAARLEM.]

Natural Productions.—The horses, which are a large strong breed, well adapted for draught and for heavy cavalry, are about 200,000 in number. The horned cattle are mostly remarkable for their size and beauty, and amount to about a million. Vast numbers of lean cattle from Denmark and Germany are fattened in the rich pastures of North Holland. There are about 700,000 sheep. The swine are of the German breed, and are most numerous in the provinces next to Germany. The only kind of game is hares, which are rare; wild rabbits however are very numerous among the sand-hills. Domestic poultry is plentiful. There are wild geese and ducks, snipes, woodcocks, and plovers. This is the paradise of storks, it being considered a great offence to kill one. Accordingly they build their nests on the house-tops, and walk about unmolested and unconcerned. Fish is abundant on the coasts and in the rivers; the cod fishery on the Doggerbank and the Greenland whale fishery are very productive. But the herring fishery on the coast of the Shetland islands, formerly a chief source of the wealth of the Dutch, has greatly declined. In 1601 there were 1500 vessels employed in the herring fishery; in the years from 1795 to 1807 and 1808 there were only 30; but the number has since increased to nearly 200.

Sufficient corn for home consumption is not raised; hemp and flax are grown in great abundance.

There are no minerals, except a little bog-iron in Overyssel and Guelderland: there are brick-earth and potters' clay in most of the provinces. Fullers' earth (but mixed with too much sand) is got in pretty considerable quantities about Tilburg; and immense quantities of turf are dug in Holland and Friesland: some sea-salt, but in small quantities, is made on the coasts of Holland and Friesland.

Trade.—The history of the commerce of the Netherlands properly begins with Bruges in Flanders, in the fourteenth century. From Bruges the trade was for the most part transferred at the end of the fifteenth century to Antwerp, which became the greatest emporium in the world. But the ravages of the war with Spain and the capture of the city after the memorable siege in 1585 drove the wealthiest inhabitants to the northern provinces, especially to Amsterdam. The new republic of the 'Seven United Provinces,' founded on principles of civil and religious liberty, became a sure asylum for the oppressed, while religious dissentions and persecutions prevailed in many other parts of Europe. Poor as the country then was in natural resources, it was necessary to find for the rapidly increasing population employment beyond the seas. The republicans, who were at first driven by necessity to become bold corsairs against the Spanish squadrons, soon became excellent and intrepid seamen, and enterprising indefatigable merchants, who traversed every sea, for whom no source of gain was too remote, and to whom no obstacle was insurmountable. The commerce of Antwerp, Cadiz, and Lisbon fell into their hands, and thus, in the middle of the seventeenth century, the United Provinces became the first commercial state and the greatest maritime power in the world, and the trade of Amsterdam acquired an unparalleled degree of prosperity. The East India Company, founded in 1602, with a capital of only 6,500,000 florins, conquered kingdoms and islands in Asia. With 200 ships it traded with China and Japan; it alone furnished Europe with the costly productions of the Spice Islands; the gold, the pearls, and the diamonds of the East passed only through its hands. The prosperity of Amsterdam remained almost unimpaired till towards the latter end of the eighteenth century, when the French revolution in 1795 gave it the death-blow, and its rival, London, became the commercial capital of the world. Reduced to the condition of a vassal and afterwards of a province of France, and consequently engaged in a constant war with England, Holland lost its ships, its colonies, its commerce, and its public credit. After recovering its independence on the expulsion of the French in 1813, the commerce of Holland revived in a remarkable manner, but is still very far below its former magnitude. During the union of the northern and southern provinces, under the name of the kingdom of the Netherlands, both Holland and Belgium flourished. Holland indeed lost the colonies of Berbice, Demerara, and Essequibo, with the Cape of Good Hope and Ceylon. The very profitable contraband trade formerly carried on with Spanish America has also been destroyed, since those colonies declared themselves independent. The trade with India has undergone a great change, not only by the loss of the Cape and Ceylon, but by the fall of the East India Company and the throwing open of the East India trade to all the subjects of the Netherlands, excepting that to the Moluccas and to Japan. On the other hand the improved administration of Java has led to a vast increase of the productions of that fine colony, and new and profitable channels have been opened to Dutch commerce in Brazil, Cuba, and Haiti. The precarious state of affairs from the time of the revolt of the southern provinces in 1830 till the confirmation of their independence by the treaty of peace concluded in April last (1839), was certainly a great check to the progress of commerce; yet it continued to improve even during that period, and there is little doubt that it will again become very flourishing, and more so perhaps than during the union with Belgium.

The following official tables, for the year 1837, show:—I. The number of ships cleared inwards, to what countries they belonged, how many to each country, and their tonnage. II. At what ports in Holland they arrived, how many at each port, and how many under the flag of the Netherlands. III. From what countries they came; how many from each country, and how many under the Netherlands flag. IV. How many ships cleared outwards, and under what flags:—

Ships cleared Inwards.

Table I.

Of what Nation.	Ships.	Tons.	Ballast.
Netherlands .	2721	313,982	(7051)
English . .	1191	199,602	
North American	73	20,366	
Portuguese .	3	171	
French . .	9	15,221	
Russian . .	54	9,724	
Swedish . .	51	7,588	
Norwegian .	472	101,188	
Danish . .	247	13,940	
Prussian . .	86	16,874	
Hanoverian .	496	24,950	
Mecklenburg .	70	11,665	
Oldenburg .	95	3,841	
Lübeck . .	5	971	
Bremen . .	9	2,135	
Hamburg . .	6	711	
Rostock . .	3	447	
Papenburg .	2	105	
Kniphuisen .	98	7,688	
Austrian . .	2	580	
Sardinian .	1	250	
Sicilian . .	2	307	
Spanish . .	2	113	
Neapolitan .	3	678	
Total .	5787	753,105	

Table II.

Arrived at	Ships.	Neth. Flag.
Amsterdam . .	1987	875
Minden . .	5	5
Zaandam . .	151	82
Enkhuizen .	3	2
Medemblik . .	38	3
Edam . .	120	90
Monnikendam .	32	28
Alkmaar . .	45	35
Helder . .	20	14
Tornhilling . .	8	2
Quomenude .	68	7
Brielle . .	6	..
Maassluis . .	10	10
Helvoetsluys .	3	1
Rotterdam . .	1439	393
Delfshaven . .	8	6
Schiedam . .	145	80
Vlaardingen .	58	55
Dordrecht . .	244	110
Vliessingen (Flushing)	30	14
Veere . .	1	1
Zierekzee . .	4	1
Brouwershaven .	4	1
Middelburg .	36	13
Lemmer . .	17	17
Workam . .	68	68
Harlingen . .	431	229
Dockum . .	26	25
Kampen . .	5	5
Zwelle . .	30	27
Delfzyl . .	282	208
Termunterzyl .	176	102
Groningen . .	236	165
Oudé Pekelet .	20	17
Langlekkerschans	9	3
Zoltkamp . .	28	27
Total .	5787	272

Table III.

From what Countries.	Ships.	Neth. Flag.
The Kleine Oost, Mecklenburg, and Lübeck	444	228
Hanover . .	694	276
Denmark . .	111	29
Prussia . . .	370	343
Russia . . .	444	261
Sweden and Norway	1161	654
Great Britain . .	1665	476
France . . .	307	177
Portugal . .	69	13
Spain . . .	20	12
Italy . . .	43	23
Levant, Egypt, and Barbary	18	10
Canaries, Azores, and Cape Verd	2	2
Guinea Coast . .	1	..
Cape and East Indies	142	130
China . . .	2	2
South America and West Ocean	18	17
Curaçoa . .	6	5
Brazil . .	15	6
Berbice and Demerara	4	4
Surinam . .	71	70
North America .	174	37
Greenland and Davis Straits	1	1
Total .	5787	2721

IV. *Ships cleared Outwards.*—5784 ships, 776,300 tons with cargoes—3526 ships, 497,174 tons; the remainder in ballast. Dutch flag, 2720 ships, 327,481 tons. English, 1200 ships, 202,807 tons. North America, 65 ships, 20,598 tons. French, 94 ships, 14,462 tons. Norway, 463 ships, 100,589 tons. Denmark, 242 ships, 13,692 tons. Hanover, 492 ships, 26,230 tons.

Of which there were bound to Great Britain, 1692 ships, 83,769 tons; Russia, 239 ships; Denmark, 104 ships; Sweden and Norway, 1095 ships, 153,524 tons; Cape and East Indies, 135 ships, 72,032 tons.

The inland trade employs 5600 of the vessels called trekschuyts, and 15,000 boats.

The exports consist, 1st, of colonial produce from the East and West Indies, coffee, sugar, spices, tea, silks, and other articles from China and Japan; and 2nd, chiefly of the productions of the country, among which they export to England annually 18 million pounds of butter and 27 million pounds of cheese; likewise flax, hemp, and corn, where the importation is permitted; tobacco, madder, flower-roots (especially hyacinths and tulips), cattle, and horses: 3rd, the produce of their fisheries, especially herrings, and of their distilleries and manufactories. The chief articles of importation are corn, salt, wine, timber in very large quantities, partly from Norway and partly from Germany, whence it is floated down the Rhine; stone, such as blocks of granite from Norway for the dikes, and freestone for building; marble, and various manufactured goods; besides colonial produce of every kind from the possessions in Asia, Africa, and the West Indies. After the separation of the seven provinces from Spain, the Dutch, in the seventeenth century, held in their hands the greater portion of the carrying trade of Europe, and Holland was a general magazine of the productions of all countries; at that time a list of its exports and imports would have been an encyclopædia of merchandise; and though this cannot be now said, it is still true in a great degree.

Manufactures.—The principal manufactures are, linen of the very best quality; woollens, once the most celebrated in the world; silks, and leather. The sugar refineries have increased of late years in a very extraordinary degree. Tobacco-pipes are made in large quantities, both for home consumption and exportation. The distilleries of Geneva, or Hollands, of which there are 200 at Schiedam, have long been celebrated. It is remarkable that the distillers last year petitioned the government for a reduction of the excise-duty, on the ground that their exportation to the United States of North America has greatly diminished in consequence of the establishment of Temperance Societies in that country. Since the revolt of the Belgian provinces in 1830, great efforts have been made to establish manufactures, especially of cottons, in the northern provinces, which appear to have been very successful; so that in a few years the kingdom of the Netherlands, as now constituted, may probably be placed in the rank of manufacturing as well as commercial nations.

Religion.—The established religion is Calvinism, or, as it is called, the Reformed religion; but a general toleration has so long prevailed, that religious sects of almost every kind enjoy the free exercise of their own forms of worship. The exact proportions at this moment have not been published, but in 1837 it was estimated that there were—Calvinists, 1,700,000; Lutherans, 357,000; Mennonites, 120,000; Remonstrants, or Arminians, 40,000; Anabaptists, 2500; some other Christian sects, 15,000; Roman Catholics, 280,000; and Jews, 50,000. The proportions have probably not much altered since.

Education is very generally diffused throughout the kingdom. Besides the parish schools, under the protection of the government, private boarding-schools are as numerous as in England. No person is allowed to set up a school without a licence, which he cannot obtain without a previous examination by a special commission. There are four classes of licences, according to the branches of education to be taught; and no person is permitted to undertake a higher branch than that for which he has passed his examination. For the higher branches there are seminaries, called Royal Schools, where the antient and modern languages, mathematics, rhetoric, and drawing are taught; of these there is one in every large town. The universities are those of Leyden, Utrecht, and Groningen, the first of which was formerly one of the most illustrious in Europe, and can boast a long and splendid list of learned men who have been educated within its walls. There are likewise schools for particular branches of education, such as military and naval schools.

The *Constitution* of the kingdom of the Netherlands is contained in the *Grond Wet*, or fundamental law of the kingdom of the Netherlands, promulgated by a royal ordinance of 24th August, 1815. This constitution resembles in many particulars that of Great Britain. The crown is hereditary in the male line, and, in default of male descendants, in the female line. The executive power is in the hands of the king, whose person is inviolable, his ministers being responsible. The legislative power is in the king and the states-general, consisting of two chambers: the members of the first chamber are appointed by the king for their life; the second chamber is elected by the provincial assemblies, and one-third of the members go out annually by rotation, but they may be re-elected. All new laws are proposed by the king to the second chamber. The sittings of the second chamber are open to the public; those of the first are not. Each province has its own provincial assembly, which has various important local duties, such as the superintendence of religious worship and charitable institutions, the care of the roads and bridges, and the election of the deputies to the second chamber. This constitution, having been made for the kingdom of the Netherlands as constituted in 1815, is to undergo various alterations and modifications, in consequence of the separation of the northern and southern provinces.

Finances.—This is a subject of extreme intricacy, rendered still more complex by the union with Belgium, and the precarious state of the country, which was neither at war nor at peace with Belgium, after the revolt of the latter in 1830, till the final separation of the two countries. The whole must be amply discussed in the present session of the states-general. We can here only state that the budget presented by the minister of finance on the 25th of October, 1839, proposes an expenditure for the year 1840 of 56,378,600 florins, of which 21½ millions are for the interest of the national debt, above 14 millions for the army, and 5½ millions for the navy. The ways and means are estimated at 56,386,298 florins. One of the items worth notice in the ways and means is the sum of 11,220,000 florins from the revenues of the colonies.

Army and Navy.—The amount and the organization of the army cannot at present be fully known. A very great reduction has already been made since the peace by disbanding the militia and volunteers. The navy consists of about eighty vessels, of which twelve are ships of the line. These are however of lower rates than in the British navy, there being only one 90-gun ship.

Colonies.—The Dutch still possess many important colonies: in Asia—Java, Amboyna, Banda, Ternate, Macassar, and settlements in Sumatra, Borneo, and Coromandel; in Africa, thirteen forts on the coast of Guinea; in the West Indies, the islands of Curaçao, St. Eustatius, and part of St. Martin, and, on the continent of South America, Surinam, and a right to send stores and receive produce from Demerara, Essequibo, and Berbice, formerly their colonies, but now in the possession of Great Britain.

History.—Julius Cæsar, in prosecuting his conquests in Northern Gaul, advanced as far as the Rhine. The inhabitants of the north bank of the Rhine were called Batavi, and considered as belonging to Germany. They were engaged in many wars, either with the Romans, or as their allies. We afterwards find them partly as trading, partly as seafaring people, and as pirates, who were in the end subdued by the Romans. In the fifth century the Batavians, and in the sixth the Belgæ, were conquered by the Franks, but the Frieslanders not till the seventh century. At the peace of Verdun, in 843, Batavia and Friesland were incorporated with the newly created kingdom of Germany, of which Ludwig (*i.e.* Lewis), surnamed the German, was the first king, and were under governors, who afterwards made themselves independent. From the year 1000 to the end of the eleventh century, the country was divided into duchies, counties, and imperial cities. Utrecht became a bishopric, and extended its temporal power over Groningen and Overyssel. Of all these princes the counts of Flanders were the most powerful, and their country having become subject, in 1383, to the still more powerful house of Burgundy, the latter made itself master of almost the whole of the Netherlands. Charles the Bold, the last duke of Burgundy, fell in a battle with the Swiss, and his only daughter and heiress Maria marrying Maximilian, son of Frederick III., duke of Austria, and emperor of Germany, the Netherlands came under the dominion of the house of Austria. Maximilian's grandson, Charles V., by the Pragmatic Sanction in 1548, united all the seventeen provinces for ever with Spain; they however retained the name of the circle of Burgundy, and were attached to the German empire. During the reign of Charles V., the Protestant religion began to spread in these provinces, though grievously oppressed, for the number of persons in the seventeen provinces put to death in his reign as heretics is estimated at several thousands. His son and successor Philip II. not only deviated from the policy of his father, who had respected the antient liberties of the people, but introduced the Inquisition, and carried on religious persecution with a cruelty before unknown. The patience of the people was exhausted, and they rose in open rebellion, which the atrocities of the bloodthirsty Alba could not quell. The heads of the noblest of the nation, among whom were Egmont and Horn, fell indeed under the axe of the executioner. The prince of Orange, who escaped, long maintained an unequal combat, and though often defeated by Don John of Austria and Alexander duke of Paris, at length triumphed in the cause of liberty and the Protestant religion.

The struggle would certainly have been sooner and more easily ended, but for the jealousies between the several provinces and the nobles, and the unfortunate reciprocal distrust of the Protestants and the Roman Catholics. It is true that almost all the other provinces concluded with Holland and Zealand, the convention of Ghent, in 1576, and formed a still closer alliance in the following year, by the Union of Brussels. But the consummate abilities of the prince of Parma succeeded in bringing all the southern provinces under the authority of Spain. In 1579 the five provinces of Holland, Zealand, Utrecht, Guelderland, and Friesland concluded the celebrated Union of Utrecht, in which they declared themselves independent of Spain. They were joined in 1580 by Overyssel. On the 26th July, 1581, they renounced their allegiance to Philip 'as a tyrant,' and being joined in 1594 by Groningen, formed the celebrated republic of the Seven United Provinces, which was afterwards generally called Holland, from that province, which exceeded the others in extent, population, wealth, and influence. Though Philip III. was obliged to conclude, in 1609, a thirteen years' truce, called the peace of Antwerp, and the independence of the provinces was recognised by all the European powers except Spain, it was not fully secured till the peace of Münster, at the close of the Thirty Years' War, in 1648. Towards the end of the seventeenth century, they were engaged in war with France and England, and at the beginning of the eighteenth century, in the war of the Spanish succession. Holland was weakened by these efforts, while republican jealousy of the attempts of the House of Orange to increase its authority sowed the seeds of party rage and civil war. In 1747 the House of Orange triumphed, and William IV. obtained the hereditary dignity of stadtholder in all the seven provinces. In 1786 the republicans again raised their heads, but the wife of the stadtholder William V., who was sister to Frederic William II., king of Prussia, having been insulted by some violent patriots, applied to her brother, who sent a Prussian army of 25,000 men to avenge the indignity she had received, and secure the rights of her husband. The patriots resisted in vain; the rights of the House of Orange were confirmed and enlarged, and a close alliance concluded between the republic and Great Britain and Prussia. In 1794 the republican or Anti-Orange party, encouraged by the approach of the victorious armies of France, again rose. Pichegru easily conquered Holland, being favoured by the severe winter and by the popular party, and the stadtholder, with his family, was obliged to fly to England. The provinces were now organised under the title of the Batavian Republic. A necessary consequence of this change was war with England, which led to the capture of their fleets, the destruction of their trade, and the loss of their colonies, to all which evils were added the exorbitant demands of their French allies, who also changed several times the constitution of the republic. In 1806, it was formed by Napoleon into a kingdom, and given to his brother Louis, who studied the welfare of his subjects, but lost the friendship of his brother after the landing of the English, and unexpectedly resigned the crown in favour of his eldest son, a minor, on the 1st of July, 1810. Napoleon however refused to recognise his brother's arrangement, and incorporated the kingdom with the French empire, with which it remained united till November, 1813, when the people, encouraged by the disasters of the French, rose and expelled them from the country, and recalled the Orange family. The Prince landed from England on the 30th of November, 1813, and was welcomed with a delirium of joy which seemed to be marvellous in so cool and phlegmatic a people. The prince governed the country by the title of 'Sovereign Prince,' till 1815, when the seven northern and the ten southern provinces, after a separation of two hundred years, were again united, by the name of the Kingdom of the Netherlands, a grand and noble conception, destined to accomplish the object which England had so long attempted,—the union of all the provinces in one independent state, calculated to serve as a real barrier against France. This union continued for fifteen years, to the advantage of both countries, and especially of the Belgians, who however were not satisfied with the new state of things. In 1830, encouraged by the Revolution which had expelled Charles X. and his family from France, they revolted from their allegiance, and claimed to become an independent state distinct from Holland. This end they have at length attained, not however without the aid of France and England. The independence of Belgium is secured by the treaty concluded in April, 1839, which is guaranteed by Great Britain, France, Austria, Russia, and Prussia.

Literature, &c.—It is not a little remarkable, that of a people whose shores lie opposite our own, and whose national character likewise runs in many respects parallel with ours, who have been animated by a similar spirit of industry, commercial enterprise, and maritime ardour—even the language should be hardly at all known in this country, notwithstanding the study of it is calculated to throw so much light upon our own, which has not only the same common origin, but has immediately borrowed a great number of words and expressions from it. So far from meriting that contempt with which the insolence of ignorance has branded them, there are few nations which have contributed more towards the civilization of Europe, and to learning and science, than the people of the Netherlands. The country that has produced an Erasmus and a Grotius, a Swammerdam, a Leeuwenhoek, and a Boerhaave; that has done so much for the physical sciences, for medicine, jurisprudence, philology, classical and oriental literature; that can boast of such writers as a Vondel, and in our times a Bilderdijk; that has done so much for the cultivation of its language; that possesses so many literary societies and institutes, together with others for the encouragement of the fine arts,—ought not to be stigmatised as one inhabited by a dull plodding race of merchants. One circumstance, which, if it has served to diffuse over Europe the labours of its learned men, has also merged their celebrity in that of continental literature generally, has been the practice of employing Latin, a circumstance which has rendered an acquaintance with the Dutch language unnecessary for the purpose of profiting by their studies or their discoveries. Most probably too the universal celebrity of the Dutch scholars throughout the learned world has in no small degree tended to divert attention from and excite a prejudice against the vernacular language and literature, as being rude and uncultivated, and unfitted for any nobler purpose than that of carrying on the intercourse of daily life. Yet so very far is this from being the case, that there is scarcely any modern tongue which either contains within itself more plastic elements or which has been more carefully wrought up and polished; nor have any people paid greater attention to purity of style and elegance of diction than the writers of Holland of late years. It cannot be said that the difficulty of acquiring it has deterred us from attempting to form any acquaintance with the literature of this country; because, of all foreign idioms, it is that which bears the strongest family resemblance to our own—so much so, that flippant and ignorant travellers have sometimes described it as a sort of bastard English, which is just as correct as it would be for a Hollander to call English a bastard jargon of Dutch. Those who have picked up a few commonplace phrases, and decide that the language in which Vondel wrote is a barbarous one, would be capable of pronouncing with equal effrontery that the language employed by Milton is altogether rude and unpolished, if they judged of it only as they could make out what was said to them by innkeepers and postillions. It certainly has its defects, but they are those of our own language, which sounds equally harsh to Southern ears, and is condemned as being clogged with consonants and abounding in monosyllables.* At the same time it possesses far greater homogeneousness, and, like the German, the power of combining out of its own elements and roots that class of words which we borrow immediately from the Latin and the Greek; for instance, *onnavolgbare*, 'inimitable,' *vereeningen*, 'to unite,' *veelomvattende*, 'comprehensive,' &c.; whereas we have only a very few of the kind, such as 'unchangeable,' wherein the Saxon root is employed. Hardly indeed is an Englishman a fair judge in such a case, because, while familiarity with them blinds him to the deficiencies and imperfections of his own language, his prejudices are shocked by one which is at once so similar and so unlike his native tongue. An Italian would be a more impartial umpire, inasmuch as he would have no particular prepossession in favour of either. We do not say that the literature of the Dutch language contains so much to reward the student as that of Germany, but it certainly contains a very great deal, and much too that is equally or even more worthy of finding translators in this country than many of the productions which have been imported from Germany into our own literary market; and by way of specifying at least something rather recent worthy of appearing in an English dress, we may mention the 'Plinius Secundus' and the 'Messala Corvinus' of Van Hall. There is indeed a current of sound and healthy feeling in the literature of Holland, which, but for our extravagant prejudices, would have recommended it to the sympathies of our countrymen. That devotional fervour and that regard for the hallowing influences of domestic life, together with nobleness and independence of spirit, which pervade so many of the higher poetical productions of that country, would at least, it might be imagined, secure them some attention among ourselves.

After indulging in the preceding remarks, it may perhaps be deemed somewhat inconsistent to say that we cannot attempt to give anything like a connected historical summary of the literature; yet though our limits prevent us from doing this, we have considered it important to correct popular prejudices against the subject itself, since by so doing, and pointing to it as one of considerable interest, we are likely to direct further inquiry more serviceably than by merely stating a few facts.

Although they now stand in somewhat the same degree of relationship to each other as the English and Scotch, the Dutch and Flemish languages were originally the same; the difference between them has been occasioned by that of the northern provinces having been cultivated and refined and employed in literature, while the other has continued almost stationary in its primitive rudeness. Even in the twelfth century the Dutch began to be used in public decrees and civil acts; nor was it long before writers arose who began to mould it into rhythm, if not always into poetry. Contemporary with our Roger Bacon, Jacob van Maerlant (1235-1300), who has been called the Father of the Poets of the Netherlands, may be said to have preceded Chaucer by an entire century, as the latter lived from 1328 to 1400. His most celebrated productions are his 'Rijmbibel' and 'Spiegel Historiael' (or Historic Mirror). Neither was he the only writer in the language of that age; for Melis Stoke, Jan van Heln, Thomas van Ghessaert, Heijnric van Holland, and others of less note, belong to the same century. In the following one sprung up the literary societies known by the name of the 'Kamers der Rederijkers,' or 'Chambers of Rhetoric,' but which, so far from advancing poetry, rather corrupted the language itself; besides which, the party and civil dissensions that prevailed during the 14th and 15th centuries were exceedingly unfavourable to the progress of literature. It was in the last-mentioned period however that Holland distinguished itself by two most important inventions, that of oil-painting and that of printing. It is true that as regards printing rival claims to those of Haarlem in behalf of Laurence Koster have been made by both Mainz and Strasburg in favour of Guttenberg; but if even Koning's work on the subject has not completely established the former, neither are the arguments hitherto adduced to the contrary sufficient to completely invalidate them.

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* As one instance at least that even in poetry an entire verse of monosyllables is not necessarily either rugged or poor, we may be allowed to quote a line of Darwin's, which is perhaps one of the most sonorous and energetic in our language—

'Cleaves the dark air, and asks no star but thee!'

Of the services of Erasmus both to letters and to religious liberty, or of the share which Holland took in the Reformation, it is not our purpose to speak; neither can we bestow any notice on those writers of the 16th century who obtained celebrity by works of erudition or science. The period we now arrive at may be considered as not merely the dawn but the morning of Dutch literature; and one of the first who contributed towards purifying and refining the native tongue was Dirk Volkertzoon Koornhert, who was born at Amsterdam in 1522, and became private secretary to the States of Holland in 1572. Among other contemporary names of note appear those of Philip van Marnix, Peter Heijns, Spieghel, and Roemer-Visscher. The last-mentioned has been styled the Martial of Holland, but he is now chiefly indebted for celebrity to the fame of his daughters Anna and Maria, who, on account both of their learning and poetical talents, obtained the title of the 'Dutch Muses.' By the end of the century a new generation had begun to spring up, who not only greatly surpassed all their predecessors, but suddenly advanced both the language and literature in an extraordinary degree. The æra from the commencement of the seventeenth century to 1679, the time of Vondel's death, comprises some of the most illustrious names in the literary annals of Holland—those of Hooft, Cats, Decker, Kamphuysen, Anslo, and Antonides van der Goes. Referring to the respective articles in this 'Cyclopædia' for some biographical account of the three first-mentioned, we shall briefly sum up their literary merits. It is difficult to decide whether the prose or the poetical compositions of Hooft did most for the refinement of the language. His versification is particularly fluent and melodious, and, as far as his own talent is concerned, his poetry may deserve the preference; yet, by cultivating a prose style, he furnished a model which was then most wanted. Together with Vondel, he may be considered the chief founder of the Dutch tragic theatre. Of Cats it is difficult to comprise an adequate eulogium in a few words; yet, if ever there was a truly national and popular writer—one who has addressed himself to all the best feelings of his countrymen—one whose works are prized by all classes for whom he wrote—that writer is 'Father Cats.' The popularity which his works enjoy is as honourable to the character of his countrymen as to his own fame, for a vein of morality, benevolence, and strong religious principle runs through them all. If Decker's poems are not of the highest class on account of their subjects, they exhibit superior talent, and contributed very much to the improvement of the language. Kamphuysen's productions display great poetical power, both in regard to the ideas and the expression, and his religious pieces breathe intense devotional ardour. Reinier Anslo was greatly admired in his own time and praised for his talents by Vondel himself; and even now his poems may be perused with interest, especially his 'Pest tot Napels' (or Plague at Naples), the horrors of which are described by him with great power.

Before we come to speak of Vondel himself, there are several names which it would be unjust to pass by wholly in silence, although they did comparatively little for the native literature of their country, their reputation being based chiefly upon their Latin productions. Huig de Groot, Dan. Heins, Kasper van Baerle, may seem strangely obscure names, but those of Grotius, Heinsius, and Barlæus are certainly—the first two at least—of European celebrity. Constantine Huijgens was not one of the least gifted or least remarkable writers of this period, since nearly all his productions are stamped by originality both of thought and expression. He was employed upon missions to various courts, and came over to this country on one to Charles II., and afterwards, although then greatly advanced in years, visited Italy, chiefly for the purpose of beholding Vaucluse. Jan Vos, originally a glazier at Amsterdam, where he was born in 1620, was a man of some ability as a dramatic writer, but his taste was by no means equal to his talent, for his 'Aran en Titus' and his 'Medea' are filled with extravagances; yet his versification is masterly, and some of his comic pieces possess strong humour. The two daughters of Roemer-Visscher have already been named, but some few particulars relative to them may be acceptable. Anna, the elder of them, was highly esteemed both by Cats and by Grotius, the latter of whom translated into Latin her poem on his escape from prison. Maria, the younger, and by far the more gifted, was not only one of the most learned, but one of the most accomplished females of the age, nor was she less admirable for the excellence of her disposition. She enjoyed the friendship of Hooft, Vondel, Huijgens, and other eminent literary men. Her poems have much merit, and a translation by her of Tasso's 'Jerusalem' was greatly extolled by her friends, but appears to have been never completed nor published.

Referring for fuller particulars to the article **Vondel**, we can now merely take a glance at one of whom Holland has just cause to be proud, for never has poetic genius displayed itself more forcibly or with greater sublimity than it does in all his best productions. He was one of those superior spirits who give celebrity to their country and to their age; and if Camoens singly has sufficed for the literary glory of Portugal, Vondel alone would be sufficient to confer fame upon the land which, if it did not actually give him birth—for he was born at Cologne—was that which reared and cherished him. His tragedies are confessedly his master-pieces, not that they exhibit much of dramatic quality, of action, character, and passion, but rather on account of the lofty strains with which they abound, more especially in the chorusses, they being all moulded upon the ancient model, and some of them, such as his 'Lucifer,' 'Adam in Ballingschap,' 'Abraham;' 'Jephtha,' not at all adapted to the stage, on account of their subjects. They therefore may be characterised rather as dramatic oratorios without music than as dramas. Among his productions of this class his 'Lucifer' stands pre-eminent, and has given rise to comparison between the genius of Vondel and that of Milton; it may therefore be proper to observe that it preceded 'Paradise Lost' by fourteen years. As may be supposed from what has above been said, his odes and lyrical pieces abound in beauties; but he was scarcely inferior as a satirical poet, in which character however he displays far more of the spirit of Juvenal than of Horace. Defects avoided by far inferior writers may be detected in all his productions, but his merits are of first-rate order.

Jan Antonisz, or Antonides van der Goes, who belongs not only to Vondel's time, but also to his school, having been his friend and pupil, was gifted with great power of imagination, and his 'Ijstroom' is considered one of the best descriptive poems in the language. Of his two friends Dirk Buysero and Jan Pluymer, the former was rather the patron of literature than a writer by profession, but he wrote several dramatic pieces; the latter was director of the theatre at Amsterdam, and author of 'Inez de Castro' and some other tragedies.

Towards the close of the seventeenth century, French literature began to find imitators, and for a short time originality was checked. Vollenhove, another literary friend of Vondel's, author of the sacred poem entitled the 'Kruistriomf' (or Triumph of the Cross) and of some miscellaneous poems (1686), was still living; as was likewise Lucas Rotgans, who had produced an epic poem, of which our own William III. was the subject, and two tragedies, which have been highly extolled by Van Effen. Elizabeth Hoofman, or, according to her marriage name, Koolaert, may be included among the writers of this century, having been born in 1664. This lady would deserve notice were it only as one of the most learned women not only of her own but of almost any age or country. In her sixteenth year she made translations from Anacreon and Horace; and was so well skilled in Latin as to compose several poems in that language, while her ability in her own is proved by that entitled the 'Schowburg der Verwoesting,' in which she eloquently moralises on the transitoriness of all worldly grandeur, and of which the versification is no less smooth and flowing than the ideas and images are striking.

The first half of the eighteenth century was marked by the productions of Van Effen and those of Poot, Hoogvliet, Schim, Feitama, De Marre, Steenwijk, and Langendijk. Scarcely to any one is the prose literature of Holland more indebted than to Justus van Effen, who has, without any great exaggeration, been styled the Dutch Addison, not only as being a distinguished essay-writer, but on account of the terseness and elegance of his style. His 'Hollandsche Spectator' has deservedly taken its place as a classical work in the language, as a model both of style and correct taste. Hubert Corneliszoon Poot was another writer of much originality and talent, and obtained great popularity by his comic poetical tales, which, like those of Wieland, are chiefly founded upon mythological subjects. Arnold Hoogvliet, on the contrary, took a higher flight: he aspired to the sacred epic, and took for his subject the history of Abraham. Notwithstanding its defects, this poem displays genuine talent; the versification is masterly, and many of the descriptions and other passages both powerfully and finely touched. He had also previously distinguished himself by a clever translation of Ovid's 'Fasti.' Hendrik Schim was also a writer of religious poetry, viz. 'Bijbel-poesie,' 1723; 'Bijbel en Zededichtn,' 1726; and 'Heerlijkheid van Christus,' 1731, &c. If not gifted with superior talent, Sybrand Feitama was a poet of most extraordinary patience and perseverance, for he spent upwards of thirty years upon his translation of Fénélon's 'Telemachus' into verse, and full twenty more on that of the 'Henriade.' In his own day his reputation was very considerable, nor was it wholly undeserved, for he certainly did much towards perfecting the mechanical part of poetry. He also produced two tragedies, 'Titus Vespasianus,' and 'Romulus,' besides translations of eleven others from the French, of which language he was a great admirer.

Jan de Marre, a seaman by profession, who, upon his return from a voyage to the East Indies in 1731, was appointed superintendent of the public buildings at Amsterdam, contributed to the Dutch stage one of its best and most popular tragedies, namely, 'Jacoba van Beijeren.' He also wrote a poem in six books entitled 'Batavia,' besides a variety of miscellaneous pieces. Peter Boddaert, a jurisconsult, antiquary, and secretary to the admiralty, obtained repute as a writer of religious and moral poetry, and also adapted Crebillon's 'Thyestes' to the Dutch stage. Frans von Steenwijk, the pupil of Feitama, published in 1748 his religious heroic poem of 'Gideon,' the plan of which is greatly superior to the execution, if we except the style and versification. Almost about the same time, viz. 1752, another poem of the same class, on the subject of the patriarch Jacob, was produced by Frederick Duim, who also wrote several pieces of religious poetry. Peter Langendijk, originally a damask-weaver by trade, was one of the principal comic dramatic writers of this period; and that he possessed a natural genius for comedy can hardly be denied, when it is known that his 'Don Quixote,' which is still a stock-piece of the Dutch stage, was composed by him at the age of sixteen, though afterwards considerably improved. His 'Alexander the Great,' in which a countryman is served as Christopher Sly was, and made to believe, on waking, that he is the Macedonian hero, is highly comic, though defective from its want of interest in the plot. He also wrote several humourous poems and parodies—rather coarse in taste, among which may be mentioned 'Æneas in his Sunday Coat.' Dirk Smits, author of an excellent imitation of Pope's 'Eloisa to Abelard,' was, if not a forcible, a pleasing poet in his original compositions, which are chiefly of the lyric class. His friend Adrian van der Vliet wrote pastoral poetry.

Coming to those who, for convenience sake, may be considered as another generation, for some of them might with equal propriety have been introduced above, we have now to pass in review the writers who fall within the latter half of the eighteenth century, reserving till afterwards such as have distinguished themselves chiefly in the present The first names to be mentionod are those of William and Onno van Haren, two brothers of noble family, whose productions make an epoch in the poetical literature of their country, by their originality and spirit, which stamp them as of a quite different class from the school of Feitama. The 'Friso' of William van Haren is a romantic epopœia, founded upon old chronicles and legends of Friesland, and full of adventures, the scene of which commences in India. This poem has, with many defects, many striking beauties also, many interesting scenes and episodes, much graphic description, and further contains many noble sentiments and moral reflections. William van Haren also distinguished himself as a lyric poet; but considerable as his talents were, they were greatly surpassed by those of his brother. Onno Zweier van Haren filled, at various times, many high posts in the state, but his highest title to fame now rests upon his 'Geuzen' (first published in 1769, under the title of 'Het Vaderland'), which is not so much an epic as a cycle of national poems celebrating the leading events in the history of the Netherlands. Upon the whole, this production is the chef-d'œuvre of the Dutch literature in the eighteenth century. It has gone through many editions, one of which was edited with a volume of commentaries, by Bilderdijk, in 1826. Lucretia Wilhelmina van Merken, or Madame van Winter, the most distinguished female poet of the century, acquired great reputation by her 'David' and her 'Germanicus,' the latter of which is said by De Vries to be greatly superior to the other, while a contrary opinion is expressed by Van Kampen, who remarks that there is more of poetic power in the touches of Tacitus. Her husband Nicolaas Simon van Winter was also a poet of considerable ability, who published a collection of fables and other pieces, two tragedies, and 'De Jaargetyden' (1769), an imitation of Thomson's 'Seasons.'

Like Madame van Winter, Jan Nomsz attempted epic, choosing for his hero William I., but with inferior success in his tragedies he displayed more talent. His 'Ledige Uuren' (Leisure Hours) establish Lucas Trip's claim to notice as a writer of religious and moral poetry; in which class of subjects his friend Johannes Eusebius Voet (who was by profession a physician) likewise distinguished himself.

If we could here speak of him as fully as he merits, Bellamy would detain us for some time, for he was not only a genuine poet, but he gave a fresher and more energetic tone to Dutch literature, and was almost the very first who ventured to shake off rhyme. Admiration of his genius is not lessened by knowing that until rescued from that situation by the liberality of other patrons, who took the charge of his education, he was originally apprenticed to a baker; or that what he actually did was only the promise of what he would have done, had he not been cut off when scarcely twenty-eight years old. Bellamy's is perhaps the only poetry which the Germans have transplanted from the literature of Holland into their own.

About the same time that his country lost the no less amiable than highly gifted Bellamy, it also lost, in the Baroness Cornelia Juliana De Lannoy, an accomplished woman, whose tragedies are extolled by De Vries as very superior to any similar productions by her contemporaries. Kastelyn, who was a man of considerable attainments in chemistry, distinguished himself also in poetry, especially by his didactic poem called 'Geloof aan de Voorzienigheid' (Trust in Providence), in which there is a tone of tender melancholy and resignation that recommends it to those who, like himself, have been schooled in affliction. Of Nieuwland [NIEUWLAND] we shall here only observe that he was scarcely inferior to Bellamy, while he resembled him in many of the circumstances of his life, its premature end not excepted. His poetical talents constitute but a small share of Van Alphen's claim to fame, for as a moralist, a philosopher, and a critic, he was no less distinguished. Admirable in themselves, his Cantatas have the further merit of being the first productions of the kind in the language, and are still unrivalled in it.

The two attached friends Elizabeth Bekker (Wolff) and Agatha Deken, both of whom died on the same day, may be considered as the first who introduced the modern novel into Holland, their productions of which class were eminently successful, and some of them were translated into German. Petronilla Moens was another female author in the same branch of literature, but she possessed less truth to nature. In the drama and likewise in history and biography, Simon

Stijl was a popular writer, more especially in the last-mentioned class of composition. Peter Leonard van de Kasteele, the pensionary of Haarlem, and Van Alphen's friend, showed considerable poetical talent, both by his original compositions, chiefly on religious and devotional subjects, and his translations from Klopstock and Wieland, besides his version of Ossian in hexameter verse. As a humourous and satiric writer, Arend Fokke stands without a rival in the language, and is styled by Van Kampen the Callot and Hogarth of Dutch literature, a distinction to which he is well entitled by his 'Boertige Reize' (Comic Journey through Europe), his 'Ironical Comic Dictionary,' &c.; while his 'Catechisms of the Arts and Sciences,' in 11 vols., show him to have been also a man of solid and extensive information.

Rhynvis Feith, Helmers, and Bilderdijk, are writers of whom any country might be proud. Both as a poet and as a critic, Feith is entitled to admiration. His 'Grave' (which first appeared in 1792, and has been translated into German), is a masterly production, with equal beauties and perhaps fewer defects than Young's 'Night Thoughts.' His 'Thirza,' 'Lady Jane Grey,' and 'Iñez de Castro,' exhibit his powers as a tragic poet; while his 'Letters,' his 'Essay on Heroic Poetry,' &c. place him in a high rank as a prose writer. Helmers, a merchant by profession, affords a striking proof that the pursuits of commerce are not uncongenial to or incompatible with those of literature and taste, since, apart from their other merits, his poems breathe the most noble and generous sentiments, and are replete with striking ideas and imagery. Of Bilderdijk, one whose varied powers exhibited themselves with equal success upon the most opposite subjects, to attempt to speak here appears almost an injustice, since we have no space even to particularise any of his numerous productions, except it be to express regret that so fine a poem as his 'Ondergang der eersten Wereld' (the Destruction of the first World) should never have been continued beyond the fifth book. Kinker, who, though born in 1764, is, we believe, yet living, is another excellent poet, and has produced admirable translations of Schiller's 'Maid of Orleans' and 'Lady Jane Grey.' Loots, Loorjes, Tollens, Immerzeel, Van Hall, Da Costa, Van Lennep, all of them still or till very lately living, are writers who do honour to the literature of their country, which has recently lost in Van Kampen its historian, one to whose labours we are indebted for much of the information contained in this article, or rather which is here merely pointed at. To those who care for more than the necessarily imperfect outline of the subject here presented to them, we can recommend Van Kampen's 'Beknopte Geschiedenis der Letteren,' &c. as a most interesting guide in the study of the literature of the Netherlands; nor does he confine himself to the literature alone, but takes a view of all that his countrymen have achieved in every branch of science; and if territorial extent, and we may add population, can be taken as a standard in such matters, the Netherlands have certainly contributed infinitely more than their share towards the general civilization and enlightenment of Europe.

The table here appended, which might have been made much more complete, will be useful as a chronological map, wherein are supplied, as far as authority for them could be found, those dates which are not mentioned in this brief historical sketch. It is arranged according to the dates of the deaths.

	Born.	Died.
Brederode	1585	1618
Roemer-Visscher		1620
Kamphuyzen		1626
Groot, Huig de (Grotius)	1583	1645
Hooft, Pet. Corn.	1581	1647
Roemer-Visscher, Maria	1594	1649
———————— Anna	1584	1651
Heinse, Dan. (Heinsius)	1580	1655
Brune, Jan de	1585	1658
Cats, Jacob	1577	1660
Van der Veen		1660
Dekker, Jeremias	1610	1666
Anslo, Reinier	1622	1669
Vondel, Joost van	1587	1679
Antonides von der Goes, Jan	1647	1684
Brandt, Gerard	1626	1685
Huygens, Constantine	1596	1686
Broekhuizen, Jan	1649	1707
Vollenhove, Jan	1631	1708
Rotgans, Lucas	1645	1710
Poot, Hubert Corn.	1689	1733
Van Effen, Justus	1684	1735
Hoogvliet, Arnold	1687	1735
Schim, Hendrik	1695	1742
Smits, Dirk	1702	1752
Boddaert, Peter	1694	1760
Marre, Jan de	1696	1763
Feitama, Sybrand	1694	176[illegible]
Steenwijk, Frans		1772
Voet, J. Eusebius		1778
Van Haren, Willem	1710	
———————— Onno	1713	1779
Nomsz, Jan		1779
Van der Vlict	1702	1780
De Lannoy, Jul. Cornelia	1738	1782
Trip, Lucas	1712	1783
Bellamy, Jacob	1758	1786
Kasteleyn	1750	1793
Nieuwland, Peter	1764	1794
{Van Merken, Lucretia	1722	
{Van Winter	1718	1795
Bakker, Huizinga	1718	1801
Van Alphen	1746	1803
Bekker, Eliz.	1738	1804
Deken, Agatha		1804
Stijl, Simon	1731	1804
Kasteele, Pet. Leon.		1811
Fokke, Arend	1755	1812
Feith, Rhynvis	1753	
Helmers, Jan Fred.	1764	1813
Moens, Petronilla	1753	
Bilderdijk, Will.	1756	1813
Van Kampen		1839
Loots, Cornelius	1764	
Kinker, Johan	1764	
Loosjes, Adrian	1762	
Tollens, Hendrik Corn.	1780	

NETSCHER, CASPAR, was born in 1619, at Heidelberg, from which place his family removed to Arnheim. In this city he was adopted by Dr. Tullekens, a rich physician, who placed him first under Koster, a painter of poultry and dead game, and afterwards under Gherard Terburg, at Deventer. He afterwards set out on his travels, intending to pass some time in Italy, but he got no farther than Bordeaux, where he married, and after the birth of his eldest son, in 1661, returned to Holland and settled at the Hague.

C. Netscher was one of the best painters of the Dutch school on a small scale. The necessity of providing for a numerous family obliged him to devote a considerable portion of his time to portrait-painting, in which he acquired great reputation, though he had talents for higher departments of the art. His most admired works are his Conversation pieces. His colouring is true to nature. He was a perfect master of chiaroscuro; his touch is extremely delicate; above all, he is remarkable for his skill in representing linen, white satin, silks, and velvet, the draperies of which are cast in large and elegant folds. All the accessories, the furniture, ornaments, Turkey carpets, &c., are painted with inimitable truth and minuteness, but still they do not divert attention from the figures, with which they form a delightfully harmonious whole. King Charles II. invited him to London, but he declined that honour, preferring the enjoyment of an established reputation in his own country. He died in 1684, aged forty-three years.

Theodore Netscher, his eldest son, who was born in 1661, was his father's disciple. He went at an early age to Paris, where he remained twenty years, highly esteemed, and acquiring considerable wealth by possessing the happy art of taking an agreeable likeness. He was employed to paint a vast number of portraits of the principal persons about the court, especially the ladies.

In 1715 he came to London as paymaster of the Dutch forces, and was introduced to the court by Sir Matthew Decker. He remained in England six years, and acquired large sums of money by his painting. After his return to the Hague he lost a considerable sum through some deficiency in his accounts, and retired in disgust to Hulst, where he died in 1732.

Constantine Netscher, the second son of Caspar, born in 1670, closely imitated the style of his father, many of whose portraits he copied in order to form his hand, but he did not neglect the study of nature. He attained to a high degree of excellence, and was earnestly solicited by the duke of Portland, whose portrait he had taken, to go with him to England, but he was too infirm to undertake the voyage, being severely afflicted with the gravel, which at last carried him off, in 1722, at the age of fifty-two years.

NETTLE, a name applied to various plants. The true Nettles are various species of the genus Urtica, well known for their stinging properties, which are owing to the presence of an acrid poisonous secretion, that in some Indian species is so dangerous as to cause excruciating pain and even death. Dead-nettles are species of Lamium, monopetalous plants belonging to Labiatæ, and wholly inert. The Nettle-trees belong to the genus Celtis, also destitute of stinging properties, but having leaves resembling those of some kinds of Urtica.

Notwithstanding the acridity of the true Nettles, they are, when young, used for food, after being boiled, and form a favourite and wholesome ingredient in the spring-broth of the country-people in many parts of England, especially in Yorkshire. They also yield a tough fibre which may be used as a substitute for hemp; one of the species is indeed named *Urtica cannabina*, in consequence of its resemblance to Cannabis, or hemp, in the uses to which it is applied.

NEUBECK, VALERIUS WILHELM, born at Arnstadt in Thuringia, January 21, 1765, studied at Göttingen and Jena, at which latter university he took his degree as doctor of medicine, and practised first at Liegnitz, and afterwards at Steinau. His only professional production was his thesis 'De Natatione frigida, magno Sanitatis Præsidio;' it being as a poet that he acquired his literary reputation, chiefly however by his didactic poem entitled 'Die Gesundbrunnen' (or Mineral Springs), a production that has been greatly extolled by Schlegel as the very best that had then appeared in the language, enriched with admirable descriptions and imagery, and one in which the German hexameter verse is treated with the greatest ability. It was first published at Breslau, in 1795, and in 1798 a splendid folio edition of it appeared at Leipzig. Among his other productions is a translation of Dr. F. Sayer's 'Dramatic Sketches of the Antient Northern Mythology,' and several contributions, both in prose and poetry, to various literary journals.

NEUBURG, sometimes called **NEUENBURG**, is a well-built town in the Bavarian circle of the Upper Danube, agreeably situated on an eminence on the Danube, and opposite to an island which is connected with the town by a bridge. Among the public buildings are a large handsome palace, which contains the great hall, with a collection of antient armour; a college, formerly belonging to the Jesuits; a rich library, a collection of antiquities, a gymnasium, extensive barracks, the church of St. Peter, with a wonder-working image of the Virgin, two other churches, an hospital, and an orphan asylum. Neuburg is the seat of a court of appeal, and of the courts of justice of the circle and the town. The inhabitants, who are 6000 in number, have considerable breweries and distilleries, a manufactory of earthenware, and a flourishing trade. In the neighbourhood are the royal country-seats of Grunau and Petzelheim, the royal stud at Rothenfeld, and, near the village of Unterhausen, the monument erected in honour of Latour d'Auvergne, 'the first grenadier of the French army,' who lost his life there, by the wound of a lance, on the 27th of June, 1800. Neuburg was formerly the residence of the palsgrave, and the capital of the antient principality of Neuburg, called also the younger palatinate, which, in 1794, consisted of several detached portions, amounting together to 1050 square miles, with 96,586 inhabitants, chiefly Roman Catholics. It yielded a net revenue of 136,000 florins. At the beginning of the sixteenth century it was allotted to a separate line of palsgraves, which was divided into the branches of Neuburg and Sulzbach. The elder line, that of Neuburg, succeeded in 1685 to the electorate of Bavaria, and became extinct in 1742, on which the younger branch of Sulzbach inherited both the principality of Neuburg and the electorate.

There are several other towns, of less importance, of the same name in different parts of Germany.

NEUFCHÂTEAU. [VOSGES.]

NEUFCHÂTEL. [SEINE INFERIEURE.]

NEUFCHÂTEL (generally written *Neuchâtel*, but called *Neuenburg* by the Germans), a canton of Switzerland, situated in the Jura mountains, which here form several parallel narrow ridges running in the direction of north-east to south-west, and separated by elevated longitudinal valleys. The greatest length of the canton is about thirty-one miles, from the Verrières, on the frontiers of France, on the road from Pontarlier to Neufchâtel, to Le Pasquier at the north-east extremity of the Val de Ruz, on the road to the Val d'Imier, in the canton of Bern; its greatest breadth, from the lake to the river Doubs, on the French frontier, is about thirteen miles direct distance. Its area is reckoned at about 250 square miles. It is bounded on the west by the French department of Doubs, the river Doubs forming the boundary along one part of the line; on the south by the Canton de Vaud, on the east by the lake of Neufchâtel, and on the north by the canton of Bern. The canton is naturally divided into three regions: 1, the 'Vignobles,' being the banks of the lake, the level of which is 1400 feet above the sea, and the lower hills which rise immediately above, and are planted chiefly with vines; 2, the 'Vallon,' or the two fine valleys, Val de Travers and Val de Ruz, which run between two parallel ridges of the Jura, and rise from 2000 to 2400 feet above the sea; they produce corn, pulse, and fruits; 3, the 'Montagnes,' or highlands of the Jura, nearer to France, consisting of some naked and some wooded ridges, with high bleak valleys intervening, which are known by the names of La Chaux de Fond, Locle, Chaux du milieu, La Brevine, and La Sagne; they are nearly 3000 feet above the sea, and produce little else than grass, but have become the seat of manufacturing industry, especially watchmaking and jewellery. The highest summits in the canton of Neufchâtel rise to about 4000 feet above the sea, but their visible elevation, as seen from the neighbouring valleys, is not striking, the whole country being highland.

Nearly one half of the surface consists of pasture-land or artificial meadows; one-eighth is arable land, another eighth is forest, and about 5000 acres are planted with vines. The wines of Neufchâtel are the best in Switzerland; the red wine of Cortaillod is equal to good Burgundy. Three-fifths of the wine are exported. The rearing of cattle and making of cheese constitute two other important branches of rural industry. According to recent returns there are about 16,000 head of large cattle, 7500 sheep, 7200 goats, and 2200 horses and mules. Honey is made in considerable quantity.

The population of the canton in 1837 amounted to 58,616, of whom 14,534 were natives of other parts of Switzerland, and 3214 strangers from other countries. Neufchâtel is one of the few countries where foreigners enjoy the same protection and security as the natives, are subject to the same laws without distinction of country or religion, and can form a settlement and purchase property; they do not however possess all the rights of citizens unless they become naturalized, which is easily effected. Of this population about 10,000 are employed in agriculture, 7000 are watchmakers, and between 3000 and 4000 are employed in cotton and linen manufactories. The women, especially in the Val de Travers, are employed in the manufacture of lace. The common trades, such as those of carpenters, masons, bakers, tailors, and shoemakers, are chiefly carried on by foreigners, as the natives prefer employing themselves in watchmaking and other ingenious industry. The religion of the people is the Protestant Calvinist, with the exception of about 2000 Catholics, who live chiefly in the district of Landeron. The language is French, which is spoken correctly by educated people, but the country-people speak various patois resembling those of their neighbours of Franche Comté and of the Canton de Vaud.

Neufchâtel, the capital, is built partly on the bank of the lake and partly on two hills divided by the river Seyon, which comes from the Val de Ruz. It contains 667 houses and 6300 inhabitants. On one of the two hills is the castle, which was built in the thirteenth century, and near it the cathedral, which dates from the tenth, and contains the tombs of the antient counts of Neufchâtel, and of Farel, who established the Reformation at Neufchâtel. In the lower town are the hôtel-de-ville, or town-house, which is very handsome, and the hospital for the burgesses, the orphan asylum, the hospital founded in 1810 by Pourtales the wealthy merchant, and a fine college, which was completed in 1835, and contains a public library and a cabinet of natural history. The lower town, generally speaking, is well built, and has a fine appearance when seen from the lake. Neufchâtel has several elementary schools, a savings' bank, an insurance company, a bible society, and a missionary society. There is no other town of any importance in the canton, but there are many large villages, and the valleys of the Locle and La Chaux de Fond contain a great number of scattered habitations occupied by manufacturers.

Neufchâtel is a principality of which the king of Prussia, as representative of the house of Brandenburg, is the sovereign prince, but it has a representative assembly or legislative body consisting of eighty-five members, of whom seventy-five are returned by the electors of the various districts, and ten are named by the prince. They are appointed for six years. All the native or naturalized subjects of Neufchâtel who are twenty-two years of age, and not paupers or bankrupts, are electors. The candidates for the legislative body must be possessed of landed or house property of the value of 1000 francs. The laws are proposed by the executive, and also by the members of the legislature. The king or his representative gives or refuses his sanction to the bills which have passed the legislature. All the officers in the administration must be natives, except the governor, who is generally a Prussian officer of rank, and receives a salary of 10,000 francs annually. The civil list of the prince amounts to 70,000 francs.

The county of Neufchâtel was a fief of the old kingdom of Burgundy, and it had its line of counts until A.D. 1288, when it passed into the house of Châlons, from which it came into that of Longueville. Mary duchess of Némours, the last of this house, dying in 1707, Frederic I., king of Prussia, claimed the succession as heir of the house of Châlons, and the assembly of the three estates of the county recognised his claim. Bonaparte obliged the king of Prussia to surrender Neufchâtel in 1806, and he gave it to General Berthier, but in 1814 the county returned to the allegiance of the house of Brandenburg, and it was at the same time received as a canton into the Swiss confederation, of which it had already been for a long time an ally.

The *Lake of Neufchâtel*, called also the *Lake of Yverdun*, is twenty-five miles in length from north-east to south-west, and about five miles in its greatest breadth; but it is much narrower in its southern part, being not quite two miles wide near the town of Yverdun, which is at its south-west extremity. Its greatest depth towards the middle is about 400 feet. Its feeders are, 1, the river Orbe from the south-west, which has its source in the Jura, and crosses a great part of the Canton de Vaud; 2, the Broie, which comes from the lake of Morat in the canton of Friburg; 3, the Reuse, which flows from the Val de Travers in the canton of Neufchâtel; and 4, the Seyon, which comes from the Val de Ruz, also in the same canton. The outlet of the lake of Neufchâtel is the Thiele at the north-east extremity, which carries its waters into the neighbouring lake of Bienne, from whence there is an outlet into the river Aar. [BIENNE.] The lake of Neufchâtel abounds with fish. A steam-boat of 20-horse power plies on this lake, and proceeds also by the Thiele into that of Bienne as far as the town of that name, and occasionally it also ascends by the Broie into the lake of Morat. The country lying between these three lakes is called Seeland, and is mostly low, and in seasons of great floods part of it is inundated, so as to form only one lake. This was the case in 1816. The basin of the lake of Neufchâtel belongs to the water-system of the Rhine, and is divided from that of the lake of Geneva by the ridge called Jorat, which runs from south-east to north-west, through the centre of the Canton de Vaud. The level of the lake of Neufchatel is nearly 200 feet above that of the lake of Geneva. (Lerescbe, *Dictionnaire Géographique de la Suisse.*)

NEUHAUS (in Bohemian, *Gindrzichu Hradecz*) is a well-built town in the circle of Tabor, in Bohemia, 68 miles south-south-east of Prague. It is the chief place of a lordship belonging to Count Czerny, whose palace is a very magnificent edifice. It has one of the finest churches in Bohemia; a gymnasium, which formerly belonged to the Jesuits; a school; and extensive manufactories of woollens, linen, paper, and playing-cards. The population of the town and suburbs amounts to nearly 6000. A great part of the town was destroyed by fire in 1801. Fine topazes are found in the vicinity.

NEUHOFF, THEODOR VON, known at one time as King Theodore, a German adventurer, was born towards the end of the seventeenth century, of the noble family of the counts of La Mark in Westphalia. His father was an officer in the French service, and he himself obtained a lieutenant's commission in the regiment of Alsace. He afterwards went to Spain, and gained the favour of Cardinal Alberoni, who gave him the rank of colonel in the Spanish service. In Spain he married a lady of honour of the queen, whom he deserted, and carried off her jewels. He then travelled through various countries under different names and titles, Sweden, Holland, Italy, and at last was put in prison for debt at Leghorn. On coming out of prison, he met with several Corsican leaders, among the rest with the canon Orticoni, who had known him at Genoa in 1732, and he proposed to undertake the cause of the Corsicans, who were then at war with the Genoese; he spoke of his high connections and his means of being useful in various ways. The Corsicans were then in the predicament of drowning men catching at straws. Orticoni believed or seemed to believe the adventurer, and promised to use his influence to have him named king of Corsica, on condition that he should first bring substantial assistance to his countrymen. Neuhoff upon this sailed for Tunis, where he succeeded in persuading the Bey to lend him arms and ammunition, promising him in return the exclusive trade of the island and a station there for his piratical vessels. The Bey entered into his views, and gave him ten pieces of cannon, four thousand muskets, with ammunition, shoes, corn, and about ten thousand gold sequins. It is a subject of astonishment how Theodor contrived to get so much from the Moorish chief, but the fact is authentic. He sailed from Tunis on board an English vessel with his cargo and a retinue of sixteen persons, including two French officers, and several Turks, and arrived on the 12th of March, 1736, in the roads of Alesia, on the eastern coast of Corsica. In the following April the general assembly of Corsicans elected Theodor for their king, and he swore to the draft of a constitution for the new kingdom which was then proclaimed. (Botta, *Storia d'Italia*, b. 42.) The rest of the story is briefly told under CORSICA. After many vicissitudes, Theodor died in London, in December, 1756, and was buried in St. Ann's churchyard, Westminster, where the epitaph on his tombstone records the singular events of his life.

NEUILLY. [SEINE.]

NEUKIRCH, BENJAMIN, a German poet of the seventeenth century, was born at Reinke, a village in Silesia, March 27, 1665. His earlier productions partake of the bad taste which stamps that period of German literature; yet although he greatly improved after his literary acquaintance with Canitz at Berlin, and was considered a reformer in poetry during his own day, he possessed few of the requisites that recommend a writer to posterity. Hence, though deserving a notice in literary history, it is chiefly on account of having contributed to bring a new mode of writing into vogue. His poetical translation of Fénélon's 'Telemachus' may be classed with the Russian one of Trediakovsky, a work of most unenviable celebrity in the language to which it belongs. His best productions are his satires and poetical epistles. He died at Anspach, August 15, 1729, in his fifty-sixth year.

NEUKIRCHEN is a town in the Saxon Voigtland, with a population of 1200 inhabitants, among whom there are 90 manufacturers of violins and violoncellos, 40 makers of wooden and 36 of brass wind-instruments, above 30 manufacturers of catgut-strings, and 45 makers of violin bows, besides many other persons also employed in making pegs, bridges, finger-boards, &c. They have made in one year (including the village of Adorf) 6220 bundles of violin and violoncello strings, 241 dozen of stringed instruments, 177 dozen of violin bows, 109 dozen of violoncello-bows, 316 clarionets, 46 oboes, 522 flutes, 46 bassoons, 96 octave flutes, 12 piccolo flutes, 13 basset-horns, 290 French horns, 172 trumpets, 17 pair of kettle-drums, and 214 post and bugle horns.

NEURA'LGIA, a word of modern origin (derived from νεῦρον, a 'nerve,' and ἄλγος, 'pain'), first employed by Chaussier to designate a certain class of diseases of which the characteristic symptom is a most acute pain following the course of a nerve in one or more of its ramifications, subject to paroxysms and intermissions, in most cases unattended by either heat, redness, or swelling, and often without any apparent lesion at all.

Although from the nature and causes of the affection we have every reason to believe that neuralgia must have existed in all ages, still (historically speaking) it may be called a modern disease, as the first distinct description of it that we possess is that published by André, a surgeon of Versailles, in 1756, in his 'Observ. Prat. sur les Maladies de l'Urèthre.' He however had only met with one species, viz., *Neuralgia Faciei*, which he called 'Tic Douloureux*,' a name which, in popular language, it still retains; but since his time the same disease (subject only to certain local modifications) has been observed in various other parts of the body, and it is probable that almost every organ is liable to be affected by it. Chaussier has enumerated nine species (of which the three first are merely varieties of the Neuralgia Faciei), viz.. 1, *Neuralgia Frontalis*, which is seated in the frontal division of the first or ophthalmic branch of the fifth pair of cerebral nerves. The pain begins at the supra-orbital foramen, and extends to the forehead, the upper eyelid, the eyebrow, the caruncula lachrymalis, the inner canthus of the eye, and sometimes to the whole of that side of the face. 2, *Neuralgia Suborbitalis*, which occupies the superior maxillary nerve, or second division of the fifth pair. The pain begins at the infra-orbital foramen, and extends to the cheek, the upper lip, the alæ nasi, the lower eyelid, and the teeth of the upper jaw. 3, *Neuralgia Maxillaris*, which is seated in the inferior maxillary nerve, or third division of the fifth pair. The pain commences at the mental foramen, and either extends to the chin and lip, or else to the teeth of the lower jaw, the tongue, and the temple. 4, *Neuralgia Ilio-Scrotalis*, which occupies the ilio-scrotal nerve, or external division of the musculo-cutaneous branches given off by the lumbar plexus, and derived from the first lumbar nerve. The pain commences at the crista ilii, follows the spermatic cord, and extends to the scrotum and the testicle. 5, *Neuralgia Femoro-Poplitealis*, which is seated in the great sciatic nerve. The pain begins over the sacrum, or about the great trochanter, follows the course of the nerve down the posterior part of the thigh to the popliteal space, and thence extends along the peroneal nerve, or external division of the great sciatic, to the outside of the foot. 6, *Neuralgia Femoro-Prætibialis*, which occupies the crural nerve, given off by the lumbar plexus, and derived from the second, third, and fourth lumbar nerves. The pain commences at the crural arch, extends along the anterior and internal part of the thigh, and sometimes follows the course of the internal saphenous nerve, one of the *deep-seated* branches of the crural, to the inner ankle and the dorsum of the foot. 7, *Neuralgia Plantaris*, which is seated in the external and internal plantar branches of the posterior tibial nerve, or internal division of the great sciatic. The pain begins at the heel, shoots across the sole of the foot, and extends sometimes up the calf of the leg towards the knee. 8, *Neuralgia Cubito-Digitalis*, which occupies the ulnar nerve, given off by the brachial plexus, and derived from the fifth, sixth, seventh, and eighth cervical nerves. The pain sometimes commences at the upper part of the arm, and follows the course of the nerve along the ulnar border of the fore-arm to its termination in the inside of the middle, the ring, and the little fingers; sometimes only part of the nerve is affected, and the pain is confined to the humerus, or commences at the elbow. 9, '*Névralgies Anomales:* douleurs ordinairement chroniques, dont le siège varie à l'infini.' Several of these have been particularly described, and constitute so many additional distinct species:—1, *Otalgia* (described by M. Itard), which is seated in the chorda tympani, a portion of the vidian nerve, or posterior branch of Meckel's ganglion; and which is characterised by an acute pain following the course of this nerve. 2, *Neuralgia Cervicalis* is of rare occurrence: M. Bosquillon has observed two cases after opening the external jugular vein, in consequence of wounding the superficial branches of the cervical plexus formed by the anterior branches of the second, third, and fourth cervical nerves; and M. Jolly has met with another after the application of leeches to the side of the neck. 3, *Neuralgia Intercostalis* (first described by Siebold, and afterwards by Corvisart) occupies either a portion or the whole of one of the intercostal nerves, generally in the lower part of the thorax. 4, *Neuralgia Cervico-Brachialis* (first noticed by Professor Fulci of Catana) is seated in the internal cutaneous nerve, a branch furnished by the brachial plexus. The pain begins at the anterior and internal part of the shoulder, and descends along the inner side of the arm and fore-arm to the wrist. Sometimes it extends not only to all the branches of the internal cutaneous nerve, but also to those of the external, and then becomes confounded with the following species. 5, *Neuralgia Musculo-Cutanealis* was first described by M. Martinet, and occupies the external cutaneous (or *musculo-cutaneous*) nerve, another branch derived from the brachial plexus. The pain commences at the shoulder, descends along the anterior external surface of the arm and fore-arm as far as the wrist. 6, *Neuralgia Supra-Scapularis* was also first described by M. Martinet, and is seated in the suprascapular nerve, another branch given off from the brachial plexus. The pain begins at the inferior angle of the scapula, passes along its posterior surface, and sometimes descends along the radial border of the fore-arm to the thumb and fore-finger. 7, *Neuralgia Mammæ*, first described by Dr. Good as consisting of 'sharp, lancinating pains, divaricating from a fixed point in the breast, and shooting equally down the course of the ribs and of the arm to the elbow; the breast retaining its natural size, complexion, and softness.' 8, and last, *Neuralgia of the facial nerve, or portio dura of the seventh pair*, about the existence of which there is great room for doubt; for as this is a nerve of *motion* and not of *sensation*, it is not easy to understand how it should be liable to be effected by a disease which is in general simply and purely painful. However it is still more difficult to deny the fact; numerous instances have occurred in which the disease has (to all appearance) been seated in this nerve, and several wherein the pain has not only followed its ramifications with great exactness, but has also been attended by convulsive twitchings of the facial muscles, and even by their paralysis. Dr. Elliotson (*Cyclop. of Pract. Med.*, art. 'Neuralgia') admits without scruple the possibility of the portio dura being affected; Mr. Cooper (*Dict. of Pract. Surg.*) inserts this species as the fourth division of the Tic Douloureux; and Dr. Good (*Study of Med.*) says that the nerve in question 'is more frequently the seat of affection than any of the branches of the fifth pair seem to be.' But Dr. Rowland (*Treat. on Neuralgia*, 1838) is still inclined to 'doubt whether this nerve is capable of being affected with neuralgia,' and rests his opinion partly on 'a case mentioned by Thouret (*Hist. de la Soc. Roy. de Méd.*, t. ii.), where the pains apparently followed the ramifications of the portio dura, commencing at the stylo-mastoid foramen, and spreading over the cheek. With the hope of effecting a cure, the facial nerve was divided at its exit from the cranium, but no mitigation of the sufferings followed; and the only result of the operation was paralysis of the muscles of that side of the face.' This must be admitted to be a very important fact, but there are others equally strong in direct contradiction as to the result, especially that most interesting case related at length by Dr. Darwin in the second part of his 'Zoonomia,' where three branches of the facial nerve were successively divided, and each operation was attended with great relief. Upon the whole, if the possibility of this nerve being affected with neuralgia be admitted, the apparent contradiction involved is probably one of those of which, in the present state of science, a perfectly satisfactory explanation cannot be given.

But besides these external forms of neuralgia, the disease has sometimes been found to attack various internal organs. This was first suggested by Dr. John Fothergill in 1773, who says (in vol. v. of the 'Med. Observ. and Enquiries' 'There are few physicians, I believe, who may not in reviewing many cases, which have occurred to them, of anomalous pains in different parts of the body, so as sometimes to counterfeit gouty, bilious, and other internal affections of the stomach and bowels, perceive some analogy between them and the complaint here pointed out;' but it is only lately that pathologists have begun to enumerate these 'anomaleous pains,' and class them as so many distinct species of neuralgia. Sometimes the central mass of the nervous system is affected, and we find the terms 'Cerebralgia' and 'Myelalgia' employed by some modern French authors to designate neuralgia of the brain and of the spinal chord. (Raciborski, *Précis du Diagnostic*, 1837.) Sometimes, instead of the branches of a nerve, the extreme filaments only are diseased, as would appear to be the case in many of those kinds of pain commonly called 'rheumatic' (MM. Jolly and Piorry, quoted in Raciborski). To these have been added torticollis, lumbago, angina pectoris, neuralgia of the arteries, gastralgia, enteralgia, hepatalgia, nephralgia, hysteralgia, neuralgia of the heart, testicle, bladder, urethra, diaphragm, &c. (Raciborski, Rowland, Elliotson, &c.) It may perhaps be rather fanciful to give the name 'neuralgia' to all these cases, and it would take up too much space to describe each separately; but they are all more or less characterised by the same peculiar sort of pain, coming on and leaving off suddenly, extremely acute while the paroxysm lasts, and subject to intervals of complete cessation.

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* The meaning of the term '*Tic Douloureux*' appears to be rather doubtful. In the 'Dictionnaire de Trévoux,' the word '*Tic*' is said to mean, first, a vicious trick that horses have of biting the manger; and secondly, 'a sort of convulsive movement to which some persons are subject.' These twitchings not being accompanied with pain, the epithet 'douloureux' was added to distinguish those in neuralgia from every other sort. Dr. Good however considers the word '*tic*' to be 'an onomatopy, or sound expressive of the action it imparts.' The 'Tic Douloureux' is called 'Dolor crucians Faciei,' by Fothergill; 'Trismus Maxillaris,' and 'Trismus Dolorificus,' by Sauvages; 'Prosopalgia,' by Swediaur; 'Neuralgia Faciei,' by Good; 'Autalgia Dolorosa,' by Young.

Of the remote or predisposing causes of neuralgia very little is known, but it has been supposed to attack females more frequently than males, the rich than the poor; those that live in towns rather than the inhabitants of the country. It is also most common among persons of a nervous temperament, and both infancy and old age are comparatively safe from its attacks. The immediate or exciting causes are very numerous, and sometimes extremely obscure. Among the most common may be mentioned, exposure to wet and cold, mental excitement and agitation in persons of an irritable temperament, and a deranged state of the digestive organs, though with respect to this last it should be noticed that some eminent pathologists seem inclined to think that this is seldom if ever the case. Local injuries of various kinds are another very frequent cause of the disease; such as the lodgement of any foreign body in the branch of a nerve, wounds, contusions, cicatrices, the too great distension of a nerve, carious teeth, &c. Sir Henry Halford has published in his 'Essays' five cases showing that sometimes 'the disease is connected with some preternatural growth of bone, or a deposition of bone in a part of the animal economy where it is not usually found in a sound and healthy condition of it, or with a diseased bone;' and Sir Benjamin Brodie, in his 'Lectures on Local Nervous Affections,' mentions several where the pain was occasioned by the pressure of an aneurysmal or other tumour. Several other causes are enumerated by Dr. Rowland in his treatise on neuralgia, viz. diseases of the urinary organs, disorder of the heart and large vessels, uterine disorders, spinal irritation, organic diseases of the brain and spinal marrow, malignant diseases, chronic inflammation, malaria, and anæmia. In many cases however no exciting cause whatever can be discovered either during life or after death.

With regard to the seat of neuralgia, there can be little doubt but that it is in the nerve itself; but it is equally certain that the part where pain is felt is not always the part diseased. The pathology of the disease is extremely obscure and uncertain, chiefly from the difficulty of deciding the question of its supposed identity with neuritis; and this difficulty is much increased by an examination of the contradictory evidence brought forward on each side, by the men most eminent for talents and experience. Larrey ('On the Use of the Moxa') speaking of tic douloureux, describes it as 'a chronic and inflammatory turgescence of the neurilema, which envelopes the nerves of the part affected;' Sir Astley Cooper on the other hand, in his 'Lectures on Surgery,' admits that it is difficult to say what is the real nature of the disease, but goes on to declare that 'the nerves are not in an inflamed state most certainly, for under the most horrid suffering they are found of a natural colour; they are not increased either in their usual size, but on the contrary are found to be rather diminished.' Upon the whole, the truth seems to be that, in general, no signs of inflammation are found either during life or after death; but at the same time we cannot refuse to believe the positive evidence brought forward to show that in some cases the nerve has been found larger than usual and of a deeper colour, and the neurilema unnaturally thick and distended by serous infiltration. (See the instances collected by Dr. Rowland, *Treat. on Neur.*) Where these morbid appearances have been occasioned by acute neuritis, the course of the disease is so different from that of neuralgia, that the two affections can hardly be considered to be identical; where the case has been one of chronic inflammation, it may still be doubted whether we should not consider this to be one of the causes of neuralgia, rather than the disease itself to be of an inflammatory nature.

The diagnosis of neuralgia is not in general very difficult, for even when it does not follow the course of a nerve, it may commonly be distinguished from every other disease by the peculiar character of the pain, its excessive violence during the paroxysm, and the absence of all symptoms of fever and inflammation. It may sometimes be difficult at first sight to distinguish neuralgia from neuritis, inasmuch as the two diseases resemble each other in some of their most prominent symptoms; but by observing the following diagnostic signs (derived from the general character of inflammation in all parts of the body), the danger of confounding them may be avoided. In neuritis the pain is continual, as is the case in all inflammations; in neuralgia it is never constant, but is subject to paroxysms and intermissions. In neuritis the pain is aggravated by the slightest pressure; in neuralgia, on the contrary, it is sometimes alleviated by it. To these it may be added that in neuritis we shall find the usual attendants of inflammation, viz. heat, redness, and swelling; while in neuralgia (as noticed above) these are rarely if ever present.

The prognosis will of course depend very much on the nature of the exciting cause of the disease, but still as a general rule it is extremely uncertain. Sometimes, when every remedy has been tried in vain, a cure will be effected by time alone, for it seems that all the sensitive part of the nervous system is liable to become dull and lose its powers by a long series of irritation; yet even this hope cannot be depended on, as there are some cases on record (quoted by Dr. Rowland) where the disease has continued even to the age of eighty-five.

With regard to the treatment of neuralgia, it would appear quite superfluous to say that it must be regulated by the circumstances of each particular case, if it were not notorious that no disease has been treated more blindly and empirically. The favourite remedy at present is the sesquioxide of iron, which was first brought into notice by Mr. Hutchinson of Nottingham ('Cases of Neuralgia Spasmodica, &c.,' Lond., 1820), and which now occupies a place in public favour that has been successively held for a longer or shorter period by almost every active and powerful substance in the 'Pharmacopœia.' Yet every practitioner will readily be able to imagine cases, even if he has not met with them in his own practice, where the exhibition of this medicine must be entirely useless, and in no disease is there more truth in the maxim 'sublatâ causâ tollitur effectus.' When any foreign body presses upon the nerve, or when the pain can be distinctly traced to a carious tooth, the removal of the source of irritation will commonly be sufficient to cure the disease; though the practitioner should be especially warned against the danger of confounding neuralgia with the tooth-ache, an error that is not unlikely to occur in some cases of tic douloureux, and one that has often occasioned the loss of several teeth to the patient without any good effect. When (as is sometimes the case) the disease appears to be occasioned by the irritation arising from an old cicatrix, it will be expedient to try the effect of applications to the cicatrix itself, viz. either the nitrate of silver, or the actual cautery, or a blister, or a crucial incision over the part, or even its removal by the knife. And in the same way, when it can be distinctly referred to any other of the exciting causes enumerated above, the removal of that will probably be followed by the disappearance of the disease. But, as already observed, it very frequently happens that the exciting cause cannot be discovered, and in these cases the treatment must necessarily be in a great degree empirical. When the paroxysms are irregular in their duration and recurrence, perhaps the sesquioxide of iron is the best remedy at present known: it may be given in doses of half a drachm three times a day in twice its weight of treacle. When the pain recurs after certain regular intervals, those medicines which are found to be most efficacious in the treatment of ague may be exhibited with advantage. The disulphate of quina may be given in doses of four or five grains three times a day, though this medicine has sometimes been given in much larger quantities, and Sir Benjamin Brodie mentions one case where the patient took as much as half a drachm daily. (*Local Nervous Affections*, p. 28.) The liquor potassæ arsenitis is another excellent medicine which may be employed in this form of the disease; the dose is at the commencement four or five minims three times a day, which may gradually and cautiously be increased to eighteen or twenty. When there are any signs of inflammation present, that the disease may seem rather to deserve the name of neuritis than of neuralgia, it must be treated accordingly, and the usual antiphlogistic remedies, both external and internal, may be employed. In almost every case of neuralgia it will be advisable to exhibit some preparation of opium, both to relieve the pain, and also in order to procure the patient some sleep at night, at which time the paroxysms are often much aggravated; and especial care must also be taken not only to prevent the constipation caused by this drug, but also to keep up a free evacuation of the bowels, as in some cases the disease appears to have been cured by purgative medicines alone. A very interesting lecture on a case of neuralgia was delivered at St. Thomas's Hospital, Nov. 26, 1832, by Dr. Elliotson, which affords an example of the amount to which the doses of several powerful medicines may be carried in this disease. The sesquioxide of iron was increased to an ounce every three hours, to which was gradually added fifteen grains of the sulphate of iron. From this treatment the patient received some degree of benefit, but it was only temporary. In the same case strychnia was given to the amount of three-fifths of a grain three times a day, eight grains of the hydrochlorate of morphia twice a day, and nine minims of hydrocyanic acid three times a day, to prevent the sickness occasioned by doses of twenty minims of the liquor potassæ arsenitis. After remaining in the hospital more than six months, the patient went out nearly as bad as when he first came in. (*The Lancet*, No. 484.)

Among local applications may be mentioned the unguentum veratri, emplastrum opii, and empl. belladonnæ, or a lotion (recommended by Dr. Bennett, of Charleston in America), composed of four ounces of the aqua laurocerasi and one ounce of sulphuric æther, either alone or with half or one drachm of the extract of belladonna. (*British and Foreign Medical Review*, vol. i., p. 263.) Counter-irritants have often proved very efficacious, particularly the application of a common blister, and, after the cuticle has been removed, the sprinkling over the denuded surface a quarter or half a grain of the acetate or hydrochlorate of morphia. Moxas and issues have also been tried with success.

After all other remedies, both internal and external, have failed, the patient's last resource is the operation either of dividing the nerve or removing the limb; and even this will very often fail also. When the disease depends on some local irritation or resides in the extremity of the nerve, the operation is frequently successful; but when it proceeds from constitutional causes, or exists either in the brain itself or nearer to it than the point where the nerve can be divided, in this case it is manifest that, as no benefit can reasonably be expected from the operation, the experiment ought never to be tried but at the earnest request of the patient. Sometimes the nerve is simply divided, but in these cases the pain very often returns as soon as the two extremities are reunited; sometimes a portion of the nerve is removed, but even this appears only to obtain for the patient rather a longer respite. Latterly, after part of the nerve has been cut away, the two ends have been touched either with nitrate of silver or the actual cautery, and in some instances this plan appears to have succeeded where the simple section of the nerve had failed. When the operation of dividing the nerve in facial neuralgia is to be performed, the following are the directions given by Sir Astley Cooper, in his 'Surgical Lectures:'—'If it should be deemed requisite to divide the suborbitar nerve, it should be done a quarter of an inch below the orbit: the nerve passes out of the foramen half an inch below; so that you are to divide it midway between the foramen and the edge of the orbit: if you divide it lower than this, you will leave some branches which will still continue the disease. The proper mode to adopt for dividing it is to introduce a sharp-pointed bistoury at the distance from the orbit already stated, and, carrying the point of the instrument close upon the bone, you hook up the nerve on its edge; then press upon the skin over the edge with your finger, and at the same time withdraw the knife through the opening by which it entered; in this way, as you take out the knife, the nerve will be divided. You ought to ask the patient if he feels a numbness of the upper lip, and if he should not, your operation will be incomplete. When necessary, the supra-orbitar branch is to be divided in a similar manner by introducing the knife under the integuments of the superciliary ridge; cut through the nerve immediately as it emerges from the supra-orbitar foramen, carrying the point of the knife from the nose outwards. When the submental nerve requires division, you need not make any incision through the integuments, but may perform the operation by placing the knife within the mouth, and directing its point downwards to the mental foramen, where the nerve passes out, and by gliding the knife along the bone at that part, the nerve is sure to be divided. In performing this operation, you may direct your knife by the bicuspidati teeth, the anterior maxillary foramina being just below them.'

(Cooper's *Dictionary of Practical Surgery*; Good's *Study of Medicine*; Dr. Elliotson, in the *Cyclopædia of Practical Medicine*; Franck, *Praxeos Medicæ Universæ Præcepta*, t. iv.; M. Jolly, *Dictionnaire de Médecine et de Chirurgie Practiques*, t. xii.; Sir Benjamin Brodie, *On Local Nervous Affections*, 8vo., Lond., 1837; and Dr. Rowland's *Treatise on Neuralgia*, 8vo., Lond., 1838, which last is probably the most complete and valuable work that has been written on the subject.)

NEURI'TIS. [NEURALGIA.]

NEURO'PTERA (from νεῦρον, a nerve, and πτερόν, a wing), one of the orders into which the class *Insecta* is divided. The insects composing this order may be distinguished by the following characters:—wings, four in number, membranous, generally naked, and more or less transparent, but sometimes hairy; the mouth is usually fitted for mastication, or furnished with mandibles and maxillæ; the larvæ are provided with six legs and are active, their metamorphosis is variable, but is usually semi-complete. The character which gave rise to the name, viz. the minute reticulation of the nervures of the wing, will also in most instances serve to distinguish the insects of the present order from others. The May-fly and dragon-fly afford familiar examples.

The order *Neuroptera* is divided by Latreille into three sections, to which he applies the names SUBULICORNES, PLANIPENNES, and PLICIPENNES, under which heads the characters of these sections are described.

NEUSOHL. [HUNGARY.]

NEUSS, a Prussian town in the government of Düsseldorf, is situated in 51° 18′ N. lat. and 6° 45′ E. long., at the commencement of the canal which is to unite the Rhine and the Meuse, and at the influx of the Kruse into the Erft, which latter river has been made navigable, for vessels of moderate burthen, from this town to its junction with the Rhine, over which there is, near this junction, a bridge of boats to Düsseldorf. The Rhine flowed in the thirteenth century close under the walls of the town, from which it is now half a league distant. Neuss is still partly fortified with gates and towers, but the ramparts have been converted into public walks and gardens. There are two Roman Catholic churches, of which that dedicated to St. Quirinus is a fine Gothic edifice, one Protestant church, a synagogue, an orphan asylum, a lunatic asylum, an hospital, and a handsome town-hall. The inhabitants now amount to 8000, most of whom are Roman Catholics, there being only 150 Lutherans, 100 Calvinists, and 50 Jews. Neuss is a flourishing town, and has manufactures of woollen cloths, kerseymere, baize, flannel, cotton, cotton-yarn, worsted, handkerchiefs, tape, and hats; likewise a manufactory of cotton-cards, one of starch, an establishment for dyeing Turkish-red, and a quill and pen manufactory, in which 200,000 quills are clarified every week. There are also vinegar-makers, soapboilers, four oil-mills, and one fulling-mill. The inhabitants of the town and circle are also extensively engaged in agriculture and breeding of cattle, and have a great trade in corn, mill-stones, stone for building, square timber, planks, slates, and coals.

The town is said to have been built by Drusus, brother of Tiberius, who had thrown a bridge over the Rhine; one of the gates of the town is still called Drusus-gate. In the thirteenth century Neuss joined the Hanseatic league, and is celebrated for its brave resistance, in 1475, to Charles the Bold, duke of Burgundy, who besieged it for nine months. To reward the townsmen, many important privileges were granted to the city by the emperor Frederick III., who came to its relief. The bronze statue of Frederick stands in the market-place. It was here that the allied armies passed the Rhine, on their march to Paris, in 1815.

NEUSTADT, commonly called *Wiener-* or *Wienerisch-Neustadt*, in 47° 50′ N. lat. and 16° 15′ E. long., is situated on the extensive plain of the Steinfeld, on the navigable canal to Vienna, and at the junction of the Kehrbach and the Little Fischa, not far from the frontiers of Hungary. Next to Vienna, it is the most considerable town in Lower Austria, containing, together with the suburb Leopoldstadt, 10,000 inhabitants, besides the military and the students of the academy. The town is pretty regularly built, nearly in the form of a parallelogram, with four gates; it is surrounded with a wall with towers, and a broad and deep moat. It is divided into four quarters, and has in the centre a large and handsome square, surrounded with arcades. The principal building is the antient archducal palace, built in 1186 by Leopold the Virtuous, and assigned in 1762 by the empress Maria Theresa to the imperial military academy. It is a strong square edifice with a tower, and surrounded with ditches, which however are now dry, and have been converted into kitchen-gardens and plantations of fruit-trees. This academy has 36 professors and 500 pupils. The beautiful Gothic chapel of St. George, allotted to the academy, contains, among other monuments, that of the emperor Maximilian I., and some good paintings on glass of the fifteenth century. The academy has a good library, a collection of philosophical instruments, a school for drawing, an artillery-hall, containing a complete model of a fortress, a hall for gymnastic exercises, a manege, a winter bath, a refectory, with the portraits of distinguished Austrian generals, and a walled garden, 1400 yards long and 1200 broad, which was formerly a park, and is still so called. The church of Our Lady, formerly the cathedral while the place was a bishop's see, is a large stone edifice of the thirteenth century, with two lofty towers; it contains some good paintings, and, among other grave-stones, those of counts Zriny and Frangipani, who were beheaded for high-treason in 1671. Two other churches have been converted into warehouses. Of the other buildings, the chief are, a Cistercian abbey, which has a library of 20,000 volumes and a beautiful collection of minerals and shells; a military hospital, a civil hospital, and a gymnasium. There are manufactories of velvet, silk, cotton yarn, earthenware, and paper. Neustadt, being so advantageously situated on the high road from Vienna to Styria, and likewise an entrepôt for the commerce between Hungary and Italy, carries on a very brisk trade by water with Vienna, and by land with all the provinces of the Austrian empire. This place was built by Leopold the Virtuous between 1192 and 1194, and on account of its fidelity to its prince, which was particularly manifested under Frederic the Valiant in 1236, and Frederic IV., 1452, and in the siege by the Turks in 1529, has received the honourable appellation of 'Always Faithful.'

This flourishing town was nearly destroyed by a dreadful conflagration on the 8th September, 1834, which in a few hours burnt 500 houses and several public buildings. This calamity was fortunately followed by a mild autumn and winter, so that the rebuilding of the houses was not stopped. The emperor Francis, besides a very large sum from his privy purse, assigned 100,000 florins from the public treasury: all the members of the imperial family contributed amply, and immense contributions flowed in, not only from every part of the Austrian empire, but from foreign countries, both in money and clothing, provisions, &c., which, added to the sums paid by the insurance offices, enabled the inhabitants entirely to rebuild the town and to resume their usual occupations.[*]

NEUTER. [GENDER.]

NEUTRAL SALTS. Formerly this term included such salts as did not obviously contain an excess either of acid or alkali, and this was determined by their action upon vegetable colours. Such for example as had an alkaline or earthy base, and reddened litmus paper, were termed super or acidulous salts, and they had generally an acid taste; such a compound is that called cream of tartar, now termed bitartrate of potash: on the other hand, potash and soda, when combined with the smaller portion of carbonic acid which they are capable of uniting with, were called subcarbonates, because they render turmeric paper of a yellowish-brown colour, thus evincing an alkaline property.

At present the term neutral salt includes such compounds, whatever may be their action on coloured tests, and whatever may be their taste, as are composed of one equivalent of each of their constituents; thus the subcarbonates of potash and of soda are now termed carbonates, notwithstanding their alkaline reaction, because they consist of one equivalent of acid and one of base.

NEUTRALIZATION is a term generally applied to the decomposition of the alkaline carbonates, as of potash and soda, by the gradual addition of some acid more powerful than the carbonic, and which of course expels it from the alkaline bases with effervescence. The process of neutralization by means of sulphuric acid is extensively adopted in the process of *alkalimetry*, or of determining the quantity of real alkali which samples of carbonate of potash or soda contain, by means of the quantity of sulphuric acid required to render them neutral to test-papers.

NEUWIED, situated in 50° 25′ N. lat. and 7° 30′ E. long., on the left bank of Rhine, was formerly the capital of a small principality which retained its independence till 1806, when it was mediatised, and assigned to Nassau. In 1814 it was transferred to Prussia, to which the sovereignty now belongs; it is in the province of the Rhine and government of Coblenz. Neuwied is a very regular well-built town with broad straight streets, and houses all of equal height. It contains 5500 inhabitants, consisting of Roman Catholics, Lutherans, Calvinists, Anabaptists, Moravians, Mennonites, Quakers, and Jews, and among the Protestants a few (about 40) who call themselves 'The Inspired,' and believe in the continued operation of the Holy Ghost: all these sects have their own places of worship. It is the capital of the circle and of the principality, and the residence of the Prince Augustus of Wied-Neuwied, who has a very fine palace with extensive gardens. The palace contains a good library, and an interesting collection of Roman coins, statues, &c. found in the neighbourhood, this having been the site of the standing Roman frontier camp against the Germans. There is likewise the collection of natural history make in Brazil by Prince Maximilian of Wied, and that which he brought from his travels in North America, especially among the Indian tribes of the Missouri and the Rocky Mountains. Among the public institutions there are a seminary for schoolmasters, a progymnasium, a school for mechanics, a society for the education of destitute children, several infirmaries and other establishments for the poor, a house of the Moravian Brethren with a boarding-school for boys and another for girls; five Protestant churches, of which that of the Moravians and that of the Calvinists are the most worthy of notice, a synagogue, and many manufactures. It is the seat of the government of the principality and of many public offices both of the king and the prince. The inhabitants are very active and industrious, and have manufactures of silk, cotton, wool, lace, thread, hats, carpets, leather, tobacco, stockings, and tape; a considerable manufactory of tin culinary utensils, stoves, and also a manufactory of musical clocks. There are breweries, distilleries, vinegar manufactories, and many others. The inhabitants carry on a profitable trade in their own manufactures, and in the products of the country, such as pipe-clay, timber, potash, iron, lead, corn, and wine. A league from the town and close to the Rhine are the ruins of the antient castle of Fredericks-stein, called by the watermen the Devil's Castle. (Stein, Hassel, and Müller's *Handbuch*, 1836.)

NEVA, River. [PETERSBURG.]

NEVA'DA, LA SIERRA (the Snowy Chain), is a chain of mountains in the kingdom of Granada, in Spain, running due east and west, between 37° and 37° 15′ N. lat., and between 3° and 4° W. long. Its length is about 50 miles, and its greatest breadth about fifteen. It attains its greatest altitude in the centre, in the peaks of Mulahacen and Picacho de Veleta, the former being 11,658 feet and the latter 11,382 feet above the level of the Mediterranean. Maladeta, the highest peak in the Pyrenees, being 11,424 feet in height, the Sierra Nevada is, among European mountains, second only to the Alps in altitude. This chain is perpetually covered with snow above the line of 9500 feet. At its base, about 25 miles north-west of the Picacho de Veleta, lies the city of Granada.

The geological composition of the Sierra Nevada has not yet been thoroughly investigated. According to Colonel Silvertop (*Geol. Proceedings*, 1830), this chain consists of a central axis of gneiss and mica schist, with successively overlying zones, on each flank, of transition and secondary rocks, which on the south and along the shores of the Mediterranean are here and there covered with patches of tertiary marine deposits, containing subapennine shells;

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[*] The above account is taken from the 'Austrian National Encyclopedia,' published at Vienna in 1839: as this was between three and four years after the fire, and several public buildings are specified as having been destroyed (which we have therefure not noticed), it may be presumed that article referred to describes Neustadt as it now is.

whilst on the northern flank of the chain, or toward the interior of Spain, the secondary rocks are succeeded by formations of lacustrine origin. The marbles quarried in the Sierra are much varied in colour, and are esteemed the best in Spain. The most celebrated are those of Lanjarron. On the southern side, in several spots, there are remains of Roman mines, none of which are now worked.

The base of the Sierra is partially clothed with wood on the north, but more abundantly on the south, where the lower slopes are adorned with orange and olive groves, and the vegetation peculiar to the south of Europe. Higher up, the mountains are either bare or scantily clothed with grass and low shrubs, though in a few of the most sheltered valleys are patches of trees and corn-land, surrounding cortijos, or farms. Above the line of perpetual snow, vegetation, with the exception of a few mosses, ceases entirely. The botany of the Sierra is said to consist chiefly of the artemisia glacialis, antirrhinum origanifolium, arenaria tetraquetra, saxifraga tridactylites, festuca ovina, and jasione montana: it is however but imperfectly known; for though Roxas de San Clemente, an eminent native naturalist, spent many years in investigating it, he unfortunately died before he could lay the result of his researches before the world.

The Sierra Nevada is almost uninhabited. The farms before mentioned are very few; they are the abode of the peasants, who tend the horned cattle and goats, which find pasturage in the glens that are watered by the streams of melted snow.

Bears formerly infested these mountains, but they have long been extirpated: wolves still abound: the ibex is said to have been seen, but the fact is doubtful. Game, particularly hares and rabbits, is very plentiful. Eagles, vultures, and ravens, with finches in great variety and abundance, are found in this Sierra.

The vast fields of snow on the summits of these mountains give rise, by their melting, to numerous streams, which impart fertility to the surrounding country. The principal of these is the Xenil, the Singilis of the Romans, which traverses the plain of Granada, and falls into the Guadalquivir at Palma. The snow also not only serves to temper the intense heat of the summer, but yields to the neighbouring cities an inexhaustible supply of ices.

Mulahacen, the higest peak, is inaccessible. The view from the summit of the Veleta is magnificent, embracing the greater part of the province of Andalucia, with parts of Murcia, Valencia, and Castile; the Mediterranean is to the south, bounded by the mountainous coast of Africa at the distance of 180 miles.

The above account is principally the fruit of personal observation.

(Miñano, *Diccionario Geografico-Estadistico de España y Portugal;* Antillon, *Geografia de España y Portugal;* Laborde, *Itinéraire Descriptif de l'Espagne;* Cook's *Sketches in Spain;* Semple's *Journey through Spain; Nuevos Paseos por Granada y sus Contornos.*)

NEVERS, a town in France, capital of the department of Nièvre, situated on the Loire, at the junction of the little river Nièvre, in 47° N. lat. and 3° 10′ E. long., 133 miles in a direct line south by east of Paris, or 140 by the road through Fontainebleau, Montargis, and Cosne.

This town existed in the time of the Romans, and appears to have been known to them by the name of Noviodunum, and afterwards of Nivernum, or Nevirnum, from the river Niveris, or Neveris (Nièvre), on which it is situated. It was of little importance until the reign of Clovis, in whose time it belonged to the Burgundians. It afterwards came into the hands of the Franks, and was taken and burnt by Hugues le Grand in his quarrels with Louis d'Outremer. It suffered much in the wars of the English under Henry V. and VI., and in the disputes of the dukes of Bourgogne with the kings of France. In the middle ages it was the capital of the county of Nevers, which was raised by François I. to the rank of a duchy (A.D. 1539). The duchy was sold by Charles III. de Gonzague (Gonzaga), the last duke, to Cardinal Mazarin, and was, a few years afterwards (A.D. 1665), united to the crown of France. It constituted the province of Nivernois.

Nevers is situated on a slope on the banks of the Loire. This situation gives the town a fine appearance from a distance, but renders the streets inconveniently steep: they are also crooked and ill-paved. The houses are irregularly built, but there are some good ones. There are some remains of the old walls and towers of the city. The chief public buildings are the cathedral, which owes more to its situation on the crown of the hill whereon the city is built, than to its architecture. The tower, which is square, and richly adorned with statues and sculpture, is the finest feature of the building. The old castle of the dukes of Nevers is also in the upper part of the city. There are barracks, an arsenal, and an ex-episcopal palace, now occupied by the prefect of the department. There is a public walk attached to the ducal castle, and a triumphal arch at the entrance of the town from Paris, bearing a pompous inscription.

The population of Nevers in 1826 was 15,782 for the commune; in 1831, 11,868 for the town, or 15,085 for the whole commune; in 1836 it was 16,967 for the commune. The inhabitants of the town and neighbourhood manufacture iron-wares of massive character, cannon and shot, chain-cables, anchors, chains for suspension bridges, &c. Some of the iron-works belong to government. The principal forges are at Guerigny, on the Nièvre, seven or eight miles from the town: they furnish employment to 400 or 500 workmen. Besides these larger wares, agricultural implements, files, and other tools are made; also earthenware, porcelain, enamel, cordage, violin-strings, glue, &c. There are dye-houses, glass-houses for bottles, and tan-yards. There is a commodious port for the river craft at the mouth of the Nièvre, and considerable trade is carried on in iron and steel, wood, coal, wines, leather, cattle, and manufactured goods. There are nine yearly fairs. There are at Nevers two seminaries for the priesthood, a high school, a school of linear drawing, a school of geometry and mechanics applied to the arts, a free-school for the arts, a public library of 7000 volumes, several hospitals, and a theatre.

Nevers is the seat of a bishopric; the diocese includes the department of Nièvre, and the bishop is a suffragan of the archbishop of Sens and Auxerre.

The arrondissement has an area of 875 square miles, and comprehends ninety-nine communes: it is divided into eight cantons or divisions, each under a justice of the peace. The population, in 1831, was 86,847; in 1836, 94,382.

NEVIS, one of the Lesser Antilles, in 17° 14′ N. lat. and 63° 3′ W. long., is separated from the south side of the island of St. Christopher by a channel about two miles wide, called the Narrows, which is navigable only by small boats owing to the numerous shoals in it. Nevis consists of a single conical mountain, of volcanic origin, rising at first with a gentle ascent from the sea-shore, and having its summit perpetually covered with clouds. The circumference of the island is about 24 miles, and its greatest elevation 2500 feet above the sea. The soil is for the most part a tenacious marl, and is very fertile. On the western side are two small streams. The sides of the mountain are covered with plantations, but the higher parts are rocky and sterile. The town, Charlestown, stands near the south-west end of the island, and has a tolerable roadstead, but it is somewhat difficult of approach on account of a shoal which stretches off the shore to the distance of half a mile. There has been no census of the population for a great number of years. The estimated number of inhabitants in 1836 was 9250, only a small proportion of whom were whites. The number of slaves on the island on 1st August, 1834, was 8815, for whom compensation was paid to their owners out of the parliamentary grant to the amount of 151,006*l.*, being at the rate of 17*l.* 2*s.* 7*d.* per head. Of this number, 5123 were attached to plantations, 176 were mechanics employed in the country, 1207 were domestic servants, 719 were mechanics employed in the town, 1261 were children under six years of age, and 329 were aged and diseased persons.

The exportable produce of Nevis consists almost wholly of sugar, molasses, and rum. The quantity of each of these articles exported in 1836 was 2,724,836 lbs. sugar, 37,120 gallons molasses, and 12,290 gallons of rum. The total value of the exports in that year was 34,885*l.*, and that of the imports—consisting chiefly of plantation stores, was 32,511*l.* The shipping by means of which this trade was conducted, and the countries from and to which the vessels proceeded, were as follows:—

	Inwards.			Outwards.		
Countries.	Ships.	Tons.	Men.	Ships.	Tons.	Men.
Great Britain . .	6	1372	..	6	1435	..
British Colonies .	158	4857	..	180	5322	..
United States of America . .	6	698	..	6	698	..
Foreign States .	75	1560	..	58	1291	..
Total	245	8487	1034	250	8746	1134

The island is divided into five parishes. It has a local legislature, consisting of a council, of eleven, and a House of Assembly, of fifteen members. Nevis was first colonised by the English in 1628; it has always followed the political fortune of the island of St. Christopher.

NEW BEDFORD. [Massachusetts.]

NEW BRANDENBURG is a pretty town in the grand-duchy of Mecklenburg-Strelitz. It is built nearly in the form of a circle, with broad straight streets, and stands in a pleasant country on the banks of a small river near the lake called the Tollensee. The grand-duke has a palace in this town, which also contains a gymnasium and several schools. The inhabitants, above 6000 in number, live partly by agriculture, partly by trade and manufactures. There are many brandy distilleries, manufactories of woollen cloths, playing-cards, paper, snuff and tobacco, and chemicals. Calico-printing is carried on to some extent. The Mecklenburg insurance-offices of household furniture against fire, and of the standing crop against damage done by hail, are in New Brandenburg. In each of these property to the amount of a million sterling is insured. There is a well attended annual wool-fair, and celebrated horse-races, which attract a great concourse of the lovers of those sports. Considerable quantities of tobacco and hops are grown in the surrounding country. About two miles from the town the grand-duke has a handsome country seat called the Belvedere, with grounds laid out in the English style.

NEW BRITAIN is a large island in the Pacific, situated between 5° and 7° 30′ S. lat. and 148° and 153° E. long. Up to the year 1700 it was considered a part of New Guinea, or Papua; but in that year Dampier discovered the strait which separates both islands, and is still called after his name. This strait is about 40 miles wide. New Britain is separated by St. George's Channel from the island of New Ireland. New Britain is of a very irregular figure, and its southern shores have a coast-line of more than 350 miles. The surface is estimated at 24,000 square miles, or nearly half the extent of England. The interior of the island contains mountains of great elevation, as may be inferred from their being seen from sea at a great distance. Carteret observed smoke to rise from the highest summit. In several places the mountains come close to the sea, as at Cape Gloucester. Along the shores there are several plains of considerable extent, and also some good harbours. The declivities of the mountains are generally covered with trees. The island is fertile, and produces the cocoa-nut, sago, and other kinds of palms; also bananas, yams, ginger, sugar-cane, the bread-tree, bamboo, and many other plants and trees. Dogs, pigs, turtles, and fish abound. The inhabitants, who appear to be rather numerous, belong to the race of the Australian negroes, but rather resemble the inhabitants of Papua, or New Guinea, than those of Australia or Tasmania. They are stout and well made, of a very dark colour, with curly hair, and go naked. They are courageous and fond of war.

(Dampier's *Voyages and Travels;* Carteret's, D'Entrecasteaux's, and Dumont d'Urville's *Voyages round the World.*)

NEW BRUNSWICK, a British colony in North America, lies between 45° and 48° 5′ N. lat. and 63° 48′ and 67° 53′ W. long. It is bounded on the north by the Bay of Chaleurs, and by the river Ristigouche, which in its whole course from its source to its æstuary in the Bay of Chaleurs separates this country from Lower Canada. On the east it borders on the Gulf of St. Lawrence, Northumberland Strait dividing it from Prince Edward Island; and on Nova Scotia, with which it is connected by the isthmus of Chignecto, which separates Northumberland Strait from Chignecto Bay, and is only ten miles wide. On the south it is washed by the Bay of Fundy. On the west it borders on the state of Maine, from which it is separated by a line beginning at Passamaquoddy Bay, and running along the course of the St. Croix river to the mouth of the Scodie river, whence it continues along the course of the Chiputnaticook and the lakes, in which the last-mentioned river originates. The remainder of the western boundary is formed by an imaginary line extending along the meridian of 67° 53′ W. long., and separating New Brunswick from the northern part of Maine and Lower Canada. Its surface is estimated at 25,324 square miles, or about half the area of England, without Wales.

Surface and Soil.—New Brunswick may be divided into three regions, the Southern, Central, and Northern region. The *Southern* region comprehends the country along the Bay of Fundy, and from 40 to 50 miles inland, and is divided from the Central region by a line drawn from the lakes of Chiputnaticook eastward to Bear Lake and the St John river, which it intersects at the outlet of Washademoak Lake, and then continues along that lake and the river of the same name to the sources of the river Petcoudiac; it follows the course of this river to its mouth in Shepody Bay, a branch of Chignecto Bay. This region is divided into two unequal portions by the St. John river. The western section contains the greatest part of Passamaquoddy Bay, an extensive sheet of water, branching out into several inlets, and forming harbours for vessels of considerable size. It receives many rivers, of which the St. Croix is the most important, being navigable for large vessels to St. Stephen's, above which place it is interrupted by falls, yet timber is floated down. Passamaquoddy Bay contains several islands: Campobello, ten miles long and two wide, is separated by a narrow deep channel from Maine; and Deer Island is nearly seven miles long and three miles broad in the widest part. Before the bay lies Grand Manan Island, about fourteen miles long and six or seven wide. The coast of this section is everywhere rocky, but it does not rise to any considerable height. The surface is much broken, but as the rocks which constitute the substratum of the soil are generally covered with a deep layer of earth, it is clothed with high forest trees, and when cultivated yields good crops of grain. The most elevated part of this tract is intersected by several lakes, some of considerable extent, and probably 600 or 700 feet above the sea-level. That part of the Southern region which lies east of the St. John river is rather rocky and sterile. The rocky and elevated coast runs off in an almost continuous line, without any considerable break, so that the inlets along it may rather be called coves than harbours. At the back of this iron-bound coast the country rises with a rather steep ascent, and then extends in an uneven and broken plain, on which several hills rise to some elevation. The soil of this tract is very stony, and generally shallow. In its natural state it is chiefly covered with low trees, which do not supply timber. When cultivated it produces moderate crops of rye, barley, oats, and potatoes, but not wheat. There are however in this tract several depressions, extending in a longitudinal direction, and constituting valleys, in which the rivers flow, mostly to the St. John river. The lower part of these valleys is occupied by lakes, as Kenebekasis, Belleisle, and Washademoak. In the inner recesses of these lakes fine valleys begin, and extend many miles upwards along the rivers. These valleys are covered with large timber-trees, and when cultivated produce excellent crops of grain. In climate this tract differs from the country farther northward, being somewhat less cold, but much more humid, and exposed to thick and frequent fogs when the winds blow from the Atlantic. This circumstance, added to the strong tides in the Bay of Fundy [Fundy], and the rocky iron-bound coast, renders the navigation very perilous, which disadvantages are hardly compensated by the harbours of this coast, especially those in Passamaquoddy Bay, being less encumbered with ice in winter than those of New England, and being accessible nearly all the year round.

The *Central* is divided from the Northern region by a line beginning on the west on the banks of the St. John river at Presqueisle, and running thence in a north-eastern direction to the mouth of the Little Nipisighet river in the Bay of Chaleurs. The shores of this region are low, and the rivers have sand-bars across their entrance, though there is usually a considerable depth of water on them. In many places the shores are fringed with sandy ridges or small islands, which produce only bent-grass, and within these islands are lagunes with shallow entrances. There are no deep harbours except at the mouths of the rivers. The level country, which extends several miles inland, has a sandy soil, and is clothed with dwarf spruce and birch trees, but it makes pretty good pasture-ground. The country begins to rise at from twelve to twenty miles from the shores, and continues to rise till about sixty miles, where it begins to descend rather rapidly towards the St. John river at a distance of about thirty miles from its banks. This more elevated tract has an uneven surface, extending in long broad-backed ridges, most of which run east and west. Hills occur in several places, but they do not attain a great elevation, and have generally gentle slopes. Their whole surface is still covered with a continuous forest of heavy timber, the vigorous growth of which indicates a fertile soil. Along the banks of the St. John river extends a flat country, which on the east begins at the mouth of the Washademoak, and extends westward to Meductic, and thence northward to Presqueisle. The eastern portion is nearly a level, and contains the most fertile and best settled part of the colony; from Meductic northward its surface is undulating and even hilly, and though the soil seems not so good, it is covered in most parts with heavy timber.

The *Northern* region is very hilly, and even mountainous, especially on the banks of the river Ristigouche, and in that tract where the rivers Tobique and Nipisighet originate. The latter seems to form an elevated tableland, thickly studded with lakes. The interior of this region is very little known, with the exception of the tracts bordering on the river Tobique, which are covered with the finest forests of red pine, and furnish nearly all the timber which is exported from St. John. No settlements have yet been established, except on the Bay of Chaleurs, and the inhabitants live almost entirely on the produce of their fishing.

Rivers.—The largest river is the Looshtook, or St. John river, which rises far in the west, and flows for above 200 miles through Lower Canada. [CANADA.] It enters New Brunswick near 47° N. lat., and soon afterwards forms the Great Falls. By the most northern fall the river descends from 45 to 50 feet perpendicular. This is followed by some smaller falls, so that in half a mile the water descends 75 feet. Up to the foot of these falls the river is ascended by flat-bottomed boats of 20 tons burden. Below the falls the river often runs between abrupt banks, and its rugged bed renders navigation dangerous in many places. Several rapids occur, of which the most difficult are the rapids called Meductic Falls, situated where the river begins to run eastward. The last of these rapids occurs 6 or 7 miles above Fredericktown, at Saraye Islands. Where the river bends again to the south it is connected, by narrow channels, with several lakes, among which the largest is Grand Lake, whose channel joins it opposite Gagetown. This lake is 30 miles long and about three miles wide. The other lakes, Washademoak, Belleisle, and Kenebekasis, are somewhat smaller. All of them are navigable for sloops, as well as the rivers which fall into them. Sloops can ascend the St. John river to Fredericktown. About a mile above the town of St. John are the Rugged Narrows, where the river is interrupted by huge rocks, over and among which the waters roll and foam, and which render the navigation, except for four short diurnal periods, impracticable. The great rise of tide, which here attains from 25 to 30 feet, so far overflows these rapids that when the flood rises 12 feet at the foot of the town, sloops and schooners pass in safety for about 20 minutes, and for the same time when the tide ebbs to 12 feet. At Fredericktown the tide rises from 6 to 10 inches, and it is perceptible as high as the mouth of Keswick river. The whole course of the St. John river exceeds 400 miles, of which 220 lie within this colony.

The Petcoudiac, which falls into Shepody Bay, the western branch of Chignecto Bay, is about 70 miles long, and the tide flows up 40 miles. Ships occasionally proceed as far as Dorchester for timber; but the impetuous tides of the Bay of Fundy render the navigation difficult. The Miramichi, the most important river next to the St. John, drains the centre of the Central region with its numerous upper branches, and falls into the Gulf of St. Lawrence, after a course of more than 100 miles; it is navigable for large ships for about 40 miles. There is a sand-bar across its entrance, but the channel over it is broad, and has water for ships of from 600 to 700 tons. The Nipisighet river, which drains the Northern region, and runs nearly 100 miles, is much broken by falls and rapids, and does not appear to be navigable for any extent.

Climate.—The climate of this colony rather resembles that of the countries along the southern shores of the Baltic, than that of England. The spring is short, lasting only from the middle of April to the middle of May, and is characterised by raw weather. About the middle of May the summer sets in, and continues to the beginning or middle of September. The weather is warm, and rain not frequent, except during the thunder-storms, which are frequent. In September and October the weather is fine and pleasant, but in the two following months raw, and rain is very frequent. At the end of December or beginning of January, the frost, which frequently is felt before, but only at intervals, becomes continual, and lasts to the end of March or the middle of April. The rivers generally break up about that time, so that the winter may be considered as lasting four months. The winter is colder and the summer hotter than under the same parallels of latitude in Europe; the daily variations of temperature are also greater, but the transitions from dry to wet weather are by no means so sudden as in England. The winds are subject to sudden and frequent variations, and as the temperature of the air depends on them, the variations of the atmosphere are as sudden. Northern and southern winds are rare. South-west winds prevail in summer and autumn. Westerly winds are, throughout the whole year, more frequent than any other. North-westerly winds are cold and dry; the winds from the north-east and east bring on snow-storms in winter, sleet and wet weather in spring, and heavy rains in summer and autumn. In July the thermometer rarely rises above 90° and in January it rarely sinks below 10° of Fahrenheit.

Productions.—The great commercial wealth of this country consists in its extensive forests, which are composed of pine, fir, spruce, hemlock, birch, beech, maple, ash, elm, and poplar; oak is also found, but it is not common. Pine is by far the most valuable for commercial purposes. Wheat, rye, oats, barley, beans, peas, buckwheat, and flax are cultivated with success, and Indian corn in the southern districts. Potatoes and the common esculent roots and vegetables are also grown. On the alluvial grounds which occur along the banks of the numerous rivers there are fine meadows and pasture-grounds. Apples, plums, and cherries grow well, but not the other fruit-trees of England.

Wild animals are by no means numerous, though there are still bears, wolves, foxes, racoons, minks, squirrels, and beavers: the moose deer is nearly extinct. Wild geese, ducks, partridges, and pigeons are the most common game. The rivers abound with salmon, eel, trout, perch, &c., and the sea near the shores with cod, haddock, mackerel, and herrings. A large number of families, settled in the country north of the mouth of the Miramichi river, gain their livelihood by fishing cod, mackerel, and herrings; the cod is sent to Spain and Italy.

The mineral riches are imperfectly known. Marble abounds on the banks of the lake Kenebekasis, and coal on those of Grand Lake, where it is worked. Iron-ore is said to be abundant. Gypsum occurs in large quantities all along the shores of the Bay of Fundy, and is exported to the United States, as well as grindstones, which are quarried in the vicinity of Shepody Bay.

Inhabitants.—The number of natives or Indians is very small. A few families belonging to the Mic-mac are found in the neighbourhood of the Bay of Chaleurs, and a somewhat larger number of Etchemins live in the forests and on the banks of the rivers above the Great Falls of the St. John river. It is curious that in a country so newly settled, and of which so small a portion is under cultivation, the aborigines should be so few. It appears indeed that they have never been numerous. These natives do not cultivate the ground; they live on the produce of their fishing and hunting, and pass continually from one river or lake to another. A number of families, settled mostly on the shores of the Bay of Chaleurs, are of French origin, or Acadians; the remainder are of British origin.

Towns.—Fredericktown, the capital, is built on the banks of the St. John river, 85 miles from its mouth, on a flat, surrounded by the river on two sides. Vessels of 50 tons burden may ascend to this town. The streets are regular, but the houses chiefly of wood. It contains a good government-house, and several other public buildings. The population is about 3000. St. John, the principal trading-place, has above 10,000 inhabitants; it is situated near the mouth of the St. John river, on the southern declivity of a peninsula, and on rocky and very irregular ground. It contains several good public buildings. St. Andrew's, a thriving place at the mouth of the St. Croix river, in Passamaquoddy Bay, has 3000 inhabitants. Newcastle, on the banks of the Miramichi, about 20 miles from its mouth, is a thriving place, well situated for the exportation of timber. (M'Gregor's *British America;* Bouchette's *British Dominions in North America.*)

The population of the colony, according to the latest census, taken in 1834, was as follows:—

District or County.	Sq. Miles.	Males.	Females.	Total.	Families.	Houses.
York	3,440	5,437	5,041	10,478	1,698	1,502
Carleton	4,050	4,984	4,509	9,493	1,542	1,419
St. John	646	10,389	10,279	20,668	3,630	2,138
King's County . .	1,828	6,305	5,890	12,195	1,926	1,849
Queen's County . .	2,502	3,727	3,477	7,204	1,175	1,056
Sunbury	1,224	2,061	1,777	3,838	595	505
Westmoreland . .	2,050	7,323	6,882	14,205	2,272	2,017
Northumberland .	5,000	6,008	5,162	11,170	1,777	1,560
Kent	1,260	3,202	2,829	6,031	971	884
Gloucester . . .	3,600	4,706	3,617	8,323	1,316	1,155
Charlotte . . .	1,224	8,371	7,481	15,852	2,443	2,349
Total	25,324	63,513	56,944	119,457	19,345	16,434

In collecting the above numbers distinction was made between males and females who were above or under the age of 16, from which it appeared that there were—

	Males.	Females.	Total.
Above 16 .	32,845	28,291	61,136
Under 16 .	29,381	28,403	57,784
Age not ascertained	287	250	537
	62,513	56,944	119,457

The number of emigrants that arrived in the colony in each year, from 1832 to 1836, was as follows:—

1832 .	6929
1833 .	3952
1834 .	77[illegible]7
1835 .	3307
1836 .	5886

The militia returns of 1836 comprise 51 field-officers, 300 captains, 580 subalterns, 471 serjeants, 26 drummers, and 19,260 rank and file; in all 20,688.

The home government and the local legislature have been alike mindful of the subject of education. King's College in Fredericktown is endowed by royal charter, and receives out of the crown revenues the yearly sum of 1000*l*., in addition to 990*l*. from the provincial treasury, and 180*l*. arising from rent of lands with which the college has been endowed. There are no late returns of the number of students. In connection with the college and supported out of its funds is a grammar-school, conducted on the same plan as the school of Eton College, in which 61 scholars are taught. By an act of the provincial legislature, 90*l*. per annum are appropriated to the support of a grammar-school in each county of the province, on condition that the inhabitants subscribe 45*l*. per annum in addition. Under this act eight grammar-schools are supported in as many of the counties. Carleton and Gloucester are the only counties in the province without a grammar-school. Another act of the provincial legislature provides for the support of parish schools to the number of seven in a parish, by the grant of 20*l*. colonial currency per annum to each school, provided the inhabitants subscribe an equal sum and erect a school-house. Under this act there were, in 1836, throughout the province 480 schools, in which 6424 boys and 5078 girls received instruction. In addition to the schools thus established and endowed by the legislature there are numerous private schools, but no returns respecting them have been made.

For the religious instruction of the inhabitants there are appointed 24 rectors and 6 curates belonging to the Church of England; 10 clergymen in connection with the Church of Scotland; 14 preachers, who officiate by turns in 28 chapels belonging to the Wesleyan Methodists, besides Baptists, Independents, and Roman Catholic preachers.

The exports of the province are almost wholly confined to the produce of the forests and the fisheries. Out of 547,720*l*., the total value of exports in 1836, the forests supplied to the amount of 475,431*l*., and the fisheries 35,943*l*., the remaining value being made up of coals, gypsum, corn, and provisions, and sundry articles re-exported. The value of imports during the same year was 863,783*l*., of which grain and salt provisions amounted to 146,045*l*.; articles of apparel and woven goods to 314,334*l*.; metals and hardwares, 91,052*l*.; cordage, glassware, earthenwares, and other British manufactures, 87,937*l*.; colonial produce, 88,374*l*.; and the residue was made up of articles of foreign growth and production. The imports into the province are always to a larger amount than the exports, which must partly arise from the capital conveyed to it by settlers from the mother-country. The excess of imports during the five years from 1832 to 1836 was 577,087*l*., which is somewhat more than 20*l*. for each emigrant that landed.

The shipping that entered and cleared during 1836 was as follows:—

	Inwards.			Outwards.		
	Ships.	Tonnage.	Men.	Ships.	Tonnage.	Men.
From and to—						
Great Britain	512	157,862	..	688	219,259	..
Brit. colonies	1918	118,394	..	1789	108,435	..
United States	543	56,626	..	318	18,670	..
Foreign states	19	4,178	..	6	671	..
Total	2992	337,060	16,462	2801	347,035	16,059

Ship-building forms a considerable branch of industry in the province; and as many of the vessels constructed there are sold after discharging their first cargoes in British ports, their value in part makes up for the excess of imports as above described, but to what extent this kind of remittance is made there are no means of knowing. The number of ships built, with their tonnage, in the five years from 1832 to 1836, was as follows:—

Years.	Ships.	Tons.
1832 .	55 .	17,465
1833 .	97 .	17,837
1834 .	92 .	24,140
1835 .	94 .	23,058
1836 .	89 .	27,826

The amount of shipping that belonged to the province in 1836 was 587 vessels, of 84,425 tons, navigated by 3658 men.

The administration of the government of New Brunswick is confided to a lieutenant-governor (who is subordinate to the governor-general of the British provinces in North America), an executive and legislative council, of 12, and a House of Assembly, of 28 members. For the dispensing of justice there is a supreme court, with a chief-justice and three puisne judges. There are also a court of chancery, a vice-admiralty court, and a court for the probates of wills and granting of administration to intestates.

The public revenue of the province in 1836 amounted to 58,627*l*., and was derived from the following sources:—

Specific duties on spirits, sugar, coffee, dried fruits, cattle, and ad valorem duties on the importation of manufactured goods .	£49,728
Duties on sales by auction . .	1,545
Hawkers' and pedlars' licences . .	103
Customs' duties, levied under acts of the imperial parliament, transferred to the local treasury	7,251
	£58,627

The provincial expenditure during the same year was 52,414*l*., under the following heads:—

Collection of revenue . . .	£3,227
Allowances to members of the legislature and expenses of legislative bodies . .	5,017
Dispensation of justice . . .	484
For purposes of education . . .	9,940
Bounties	232
Construction and repairs of roads and bridges	21,534
Construction and repairs of public buildings	3,535
Expenses of militia . . .	910
Post-office charges . . .	324
Relief of emigrants and other charitable objects	1,117
Miscellaneous charges . . .	6,094
	£52,414

In addition to the foregoing, various expenses are defrayed by Great Britain. The sums thus paid, in 1836, were:—

For the civil and ecclesiastical establishments	£9,054
For the judicial establishment . .	3,835
Miscellaneous expenditure . .	150
	£13,039

NEW CALEDONIA, an extensive island in the Pacific, is situated between 17° 57′ and 23° S. lat., and between 163° and 168° E. long. This island extends from north-west to south-east more than 400 miles, but is of inconsiderable width. In the broadest part it is hardly 60 miles wide. On all sides it is enclosed by coral-reefs, which connect innumerable small sandy islands or cliffs. These reefs extend in some places more than 50 miles from the shores, but they generally occur at a distance of from 4 to 10 miles from the coast. Hitherto only two openings have been found in these reefs by which the island can be approached by vessels. There are only two harbours in which large vessels can anchor with security; on the north-eastern shores, Port Balade, and on the south-western, Port St. Vincent. From the shores the country gradually rises inland to a mountain-range which traverses the island in all its length, and rises in some parts to 2000 or 3000 feet above the sea. This island is less fertile than most other islands of the Pacific. The declivities of the hills are partly bare and partly covered with coarse grass and low trees. Some flats along the shores are swampy; but others, as well as the valleys, have a fertile soil. The inhabitants live mostly on yams and fish. The sugar-cane and banana are cultivated to some extent. Cocoa-nut palms, bread-fruit-trees, and mango-trees abound on the shores. Among other minerals, a kind of steatite is found, which is eaten by the inhabitants, who belong to the race of the Austral negroes. They are stoutly made, have black and curly hair, and a very dark colour. They eat their enemies. Cook, who discovered this island in 1774, found them good-natured and friendly; but the French give a different account of their character. They speak a language which differs from that of the neighbouring islands, but it is supposed that it will be found to be only a dialect of the language spoken in Papua and New Britain.

(Cook's and D'Entrecasteaux's *Voyages*, and Krusenstern's *Mémoires*.)

NEW COLLEGE, Oxford, was founded in 1386, by William of Wykeham, bishop of Winchester and lord-high-chancellor of England, for a warden, seventy fellows and scholars, ten chaplains, an organist, three clerks, and sixteen choristers. The fellows and scholars are elected from the college of Winchester, where an election is held annually by the wardens of both colleges, two fellows of New College, and the sub-warden and head-master of Winchester College, to supply the vacancies which may happen in the course of the ensuing year at New College. The founder's kindred are actual fellows on their first admission, the others are scholars on probation till the expiration of two years. The visitor is the bishop of Winchester. The election from the college of Winchester usually takes place in the second week of July.

Of the benefactors to New College after its establishment, one only appeared during the founder's lifetime, John de Buckingham, bishop of Lincoln, who gave to the society the advowson of Swalcliffe church and some lands adjoining. Thomas Beckington, bishop of Bath and Wells, in 1440, Thomas Jane, bishop of Norwich, in 1494, and archbishop Warham, in 1509, were also contributors of landed property. John White, bishop of Winchester, was a benefactor in 1558.

The rectories of Akeley, Hardwick, Harwood Magna, Newton Longville, Radclive, and Tingewick, and the vicarage of Whaddon, in Bucks; the vicarage of Steeple-Morden in Cambridgeshire; the rectory of Abbotstoke in Dorset; the rectories of Birchanger and New Stampford, with the vicarage of Writtle with Roxwell chapel, and the chapelry of Rumford, in Essex; the vicarage of Marshfield in Gloucestershire; the vicarage of Hackfield with the chapelry of Mattingley in Hants; the rectories of Saham Tony, All Saints Stratton, St. John Madder-market in Norwich, and Weston Longville, and the vicarage of Witchingham, in Norfolk; the rectory of Paulespury in Northamptonshire; the rectories of Bucknell, Heyford Warren, Stanton St. John, and Wootton, with the vicarages of Adderbury and Chesterton, and the vicarage of Swalcliffe with Epwell chapelry, in Oxfordshire; the rectory of Worthingham with the chapelry of Wolston in Shropshire; the rectory of Long Ditton in Surrey; the rectory of Stockton in Warwickshire; and the rectories of Alton Barnes, St. John Berwick, Colerne, and Donhead St. Mary's, in Wilts, form the list of preferments in the college patronage.

Among the prelates educated in New College are Chichele and Warham, archbishops of Canterbury; bishop Beckington, already mentioned; Kenn, bishop of Bath and Wells; and bishop Lowth. Among the other scholars educated in the college may be named—Philpot, one of the first martyrs in Queen Mary's reign; Nicholas Harpesfield; Sir Henry Sidney, the father of Sir Philip; Pits, the biographer; Herbert, earl of Pembroke; Wood, the author of the 'Institutes of the Laws of England;' Somerville, the poet; Smith, the translator of Thucydides and Dr. Robert Holmes, the collator of the 'Septuagint.'

Most of the buildings of the founder in this college, after a lapse of more than four centuries, remain substantially entire. His whole design may be still traced throughout and the hall, chapel, cloisters, groined gateways, and even the original doors and windows, in many instances, remain undisturbed. The chapel was restored by Wyatt in 1789, and is rich both in antient and modern painted glass: the west window, painted by Jervais from finished cartoons furnished by Sir Joshua Reynolds, and begun in 1777, is considered one of the finest works of art in Oxford: the other windows of the antechapel exhibit the original glass of the founder's time. The tower of this college, a pattern of massive strength, and one of the great features in the general view of Oxford, stands on the site of one of the bastions of the old city wall. The more recent buildings in what is called the garden court of the college were finished in 1684.

Among the curiosities preserved in this college is the superb and costly crozier of the founder, of silver, gilt and enamelled. Some of the ornaments of his mitre, his gloves, and ring, are also preserved in the muniment-room.

On the 31st December, 1839, there were 169 members upon the books of this college. (Gutch's *Colleges and Halls of Oxford*; Chalmers's *Hist. of the Colleges and Halls*; Ingram's *Memorials of Oxford*; *The Oxford Univ. Calendar*, 1839.)

NEW ENGLAND. [ENGLAND, NEW.]

NEW FOREST, situate in that part of Hampshire which is bounded on the east by Southampton river, and on the south by the British Channel, is the only forest belonging to the crown of which the origin is known. Domesday Book contains a distinct account of its afforestation, and the formation of it has added much to the load of reproaches laid on the memory of William the Conqueror. Our historians concur in accusing him of laying waste the country in Hampshire to a very large extent, of expelling the inhabitants from their houses, seizing their property, and even destroying churches, without giving the sufferers any compensation. Knyghton, who makes William Rufus a partner in the devastation with his father, represents opinion to have varied as to the number of churches destroyed, from twenty-two, beside dependent chapels, to fifty-two. (Twysd., *Script. Decem.*, col. 2354, 2373.) The fact of the destruction is allowed by the Conqueror's own chaplain, William of Jumieges, who, speaking of the deaths of William Rufus and his brother Richard, in the forest, says, 'Ferunt autem multi, quod ideo hi duo filii Willielmi Regis in illa silva judicio Dei perierunt; quoniam multas villas et ecclesias, propter eandem Forestam amplificandam, in circuitu ipsius destruxerat.' (*Hist. Norm. Script.*, fol., par. 1619, p. 296.)

Gough, in his edition of Camden, and Warner, in his 'Topographical Remarks relating to the South-Western parts of Hampshire' (8vo. London, 1793, vol. i., p. 182-189), gave, each, a tabular estimate of the amount of injury which William was supposed really to have occasioned to the population and agriculture of this part of England by the afforestation, abstracting the quantity of land in hides, virgates, and acres, with the respective values of the different allotments of property in the Confessor's and the Conqueror's reigns; A third tabular arrangement was made by the late Rev. William Bingley, among his preparations for a history of Hampshire. As a resident in the forest, Mr. Bingley had better opportunities than either Gough or Warner for comparing the text of the record of Domesday with the face of the county; and it appears from his tables that at least a hundred and forty hides had been afforested between the time of Edward the Confessor and that of the survey. These, reckoning four virgates in each hide, and thirty acres to make a virgate, amount to nearly seventeen thousand acres. Gough's table was the least extensive of the three already mentioned; it took in only that part of the survey which in itself purported to relate immediately to the New Forest and its environs, and omitted all the other parts of the survey of the county in which lands are stated to have been afforested: thus reducing the quantity of land really added by the Conqueror almost one half.

In justice to the Conqueror's memory however it should be stated that an anterior forest certainly existed here, and is mentioned by several writers under the name of Ytene. The Conqueror enlarged its circuit to the extent stated, and gave it a fresh name, thus ensuring to himself a lasting reproach. Domesday Book is the earliest record which designates this tract as the *New Forest.* The destruction of numerous habitable places within its limits is evident from the names of many of them terminating in *ham* and *ton* or *tune:* as Truham, Greteham, Adlingeham, Wolnetune, Bermintune, and others, all indicating former villages or hamlets. Mr. William Stewart Rose, in the notes to his Romance of 'The Red King,' enumerates others, and refers to different spots within the present circuit of the forest where the ridges and inequalities of surface, and the fragments of building materials found upon digging within them, show marks of former foundations.

The oldest perambulation of this forest now preserved is in the Chapter-house at Westminster, of the 8th Edward I., the boundaries described in which include all the country from Southampton river on the east to the Avon on the west, following the sea-coast as the southern boundary between those rivers, and extending northwards as far as North Chardeford, or North Charford, on the west, and to Wade and Orebrugge, or Owerbridge, on the east. Another perambulation was made in the 29th Edward I., which leaves out a great part of the country contained in the former. This perambulation is preserved among the records in the Tower, and confines the forest to limits which appear to have been followed in the 22nd Charles II., when the forest was again perambulated. By the Charta de Foresta, all lands not belonging to the crown which had been afforested by Henry II., Richard I., or King John, were to be disafforested; but as no provision was made for the reduction of the more antient afforestations, it is not easy to account for the great diminution of this forest in the reign of Edward I., who was not a prince likely to submit to any encroachment on his rights.

The perambulation of the 22nd Charles II. is the last on record, and contains the present legal bounds of the forest. According to this perambulation the forest extends from Godshill on the north-west, to the sea on the south-east, about twenty miles; and from Hardley on the east to Ringwood on the west, about fifteen miles; and contains within those limits about 92,365 acres statute measure. The whole of that quantity however is not forest land, or now the property of the crown; there are several manors and other considerable freehold estates within the perambulation belonging to individuals, to the amount of 24,797 acres; about 625 acres are copyhold, or customary lands, belonging to her majesty's manor of Lyndhurst: about 1004 acres are leasehold, under the crown, granted for certain terms of years, and forming part of the demised land revenue, under the management of the office of woods and works; about 901 acres are purprestures, or encroachments on the forest; about 1193 acres more are enclosed lands, held by the master-keepers and groom-keepers, with their respective lodges; and the remainder, being about 63,845 acres, are the woods and waste lands of the forest.

In each species of the property above mentioned the crown has different rights or interests.

By an act passed in the 9th and 10th Will. III., for improvement of this forest, certain rights of common, of pasture, pannage, and fuel, claimed by the proprietors of estates within or adjacent to the forest, under certain limitations, were saved and reserved to them, and the rights of the crown were defined and ascertained.

By that act the crown was empowered to enclose two thousand acres of the waste lands of the forest; one thousand acres forthwith, and the remaining thousand immediately after the first session of parliament after the year 1699; and also two hundred acres more yearly for twenty years following, making in all six thousand acres, 'to remain in severalty in the actual possession of the crown for ever, freed and discharged from all manner of right, title, and pretence whatsoever, and to be called, made, and kept a nursery for wood and timber only;' and the crown was likewise empowered, so soon as the trees in all or any part of such enclosures should be past danger of being hurt by cattle or deer, to throw open the same, and in lieu thereof to enclose an equal quantity in any other part of the forest; keeping in this way six thousand acres constantly enclosed as a nursery for timber. The crown has also a right to keep deer on the unenclosed part of the forest at all times, without any limitation or number.

By the same act it was provided 'that all persons having any right of pasture or pannage, or any privileges within the forest, should hold and enjoy the same; that is to say, their right of pannage between the 14th of September and the 11th of November yearly (old style), and their right of common of pasture in and through the waste grounds of the forest, at such time and times as the same should not be enclosed, the time of the fence-month (that is to say, fifteen days before and fifteen days after Midsummer, yearly), and the time of winter haining (that is to say, from the 11th of November to the 23rd of April yearly, old style), excepted, under and subject to the forest laws; saving also to the several adjacent inhabitants their antient right of fuel, provided that such inhabitants should not sell or otherwise dispose of any part thereof, nor that any person or persons presume to receive or take the same in other manner than they ought, nor by reason of any claim or pretence of any right that was not allowed, according to the laws of the forest before the 27th year of queen Elizabeth.'

The right to fuel-wood is limited and ascertained by a decree of the Court of Exchequer, dated the 19th of June (26th Eliz.), by which it was ordered 'that no inhabitant of any house newly built, since the beginning of the queen's reign, should be allowed any wood in the said forest to be spent in any such new-built house.' This has ever since been held to be the rule for judging whether the inhabitant of any house claiming fuel-wood is entitled to it or not; and the claims for fuel-wood, with every other claim on the forest, are to be found in the Records of the Proceedings of the last Justice Seat for this forest, begun at Lyndhurst, and adjourned from thence to Winchester, the 29th of September, 1670, before the earl of Oxford, lord chief-justice in Eyre; in which claims are also set forth the small rents payable to the crown by the claimants for pasture and fuel, together with the rates payable annually for the pannage of swine.

For local purposes the New Forest is divided into nine bailiwicks, viz. Burley, Fritham, Godshill, Lynwood, Battramsley, South East, the Nodes, Inn, and North. These bailiwicks are subdivided into fifteen walks, viz. Burley, Holmsley, Bolderwood, Eyeworth, Ashley, Broomy, Rhinefield, Wilverley, Whitley Ridge, Lady Cross, Denny and the Nodes, Ashurst, Ironshill, Castle Malwood, and Bramblehill.

Its officers are a lord-warden, lieutenant, riding-forester, bowbearer, two rangers, woodward, under-woodward, four verderers, high-steward, under-steward, twelve regarders, nine foresters or master-keepers, being one to each bailiwick, and usually fifteen under-foresters or groom-keepers; but at times a smaller number.

The lord-warden is appointed by letters patent under the great seal, during the royal pleasure. This officer has a general superintendence and command over the forest in all matters relative to vert and venison; and appoints the bowbearers, rangers, steward, and all the master-keepers and groom-keepers, to continue during his pleasure, except for the bailiwick of Burley, which has been in grant to the Bolton family for more than a century, by letters patent, renewed from time to time; and the walks of Bolderwood and Ironshill, of which grants were made for the lives of prince William and princess Sophia, the son and daughter of his royal highness the duke of Gloucester, brother of king George III. The lord-warden, by his patent, has the manor of Lyndhurst and hundred of Redbridge, or New Forest hundred, and the office of keeper of the decoy-ponds, with the herbage and pannage, and rents of free tenants. He has also possession of the king's house at Lyndhurst, with an allowance of 70*l.* per annum for repairs. The emoluments arising to the lord-warden amount to 214*l.*, and to his steward 48*l.*, besides the 70*l.* before mentioned.

The riding-forester (a place which has been abolished, we believe, during the present year) is, or rather was, also an appointment by letters patent, during the royal pleasure. His office was to ride before the king when he went into the forest. The salary 500*l.* per annum, with a fee buck and doe yearly.

The bow-bearers' duty is to attend the sovereign with a bow and arrow when in the forest. Salary 40*s.* per annum, with a fee buck and doe yearly.

The rangers are to drive the deer which stray into the purlieus back again into the forest. Salary 2*l.* 13*s.* 4*d.* per annum; 4*l.* per annum in lieu of wood formerly allowed; and one fee buck and doe yearly to each ranger.

The woodward is appointed by letters patent from the crown, during pleasure. He has 200*l.* per annum for himself, besides the salary of the deputy. He has also certain perquisites, arising chiefly from the timber, and an assignment of four loads of fuel-wood.

The verderers and regarders are chosen by the freeholders of Hampshire. The verderers have no salary, emolument, or perquisite, besides a fee buck and fee doe yearly. The regarders, who attend the marking of all trees to be felled, value the timber for sale, and attend the sales, are paid by a fee of 2*s.* 6*d.* per day when on actual duty.

The master-keepers' and groom-keepers' duty is to preserve the vert and venison in their respective bailiwicks and walks; to prevent any destruction of either, and all encroachments on the forest. The master-keepers have neither salary nor emoluments except a fee buck and doe each annually; while the under-keepers have small salaries, and, now, limited perquisites.

Another act for the improvement and regulation of this forest was passed in 1800, the enactments of which have not only effected the correction of various minor abuses committed within its limits, but are calculated to make it a permanent benefit to the country, by furnishing an abundant, and not as formerly, a very scanty supply of timber for our navy. The quantity of timber actually delivered for naval purposes, from the year 1761 to 1786, was 23,000 loads of oak and 7003 loads of beech, as appears by the Commissioners' Reports in 1789

(*Reports of the Commissioners on the Woods, Forests, and Land Revenues of the Crown*, fol., Lond., 1787-1792; Gough's edit. of Camden's *Britannia*, fol., 1804, vol. i., p. 179-187; Ellis's *Introd. to Domesday Book*, vol. i., p. 105-110.)

A Plan of the New Forest, laid down from the surveys taken by Thomas Richardson, William King, and Abraham and William Driver, by order of the Commissioners of the Land Revenue, was published by Faden, in 1789, ten sheets, folio.

NEW GEORGIA ARCHIPELAGO, also called *Solomon's Islands*, constitutes one of the most extensive groups of islands in the Pacific. They extend from north-west to south-east, between 5° and 10° 50′ S. lat., and between 154° 35′ and 162° 25′ E. long. They were discovered by the Spanish seaman Mendana, in 1567; visited for the second time by Carteret, and afterwards by several French and English navigators. Many parts of these islands have not yet been seen by any navigator. The most northern island is Winchelsea or Anson, and the most southern Rennell. The largest islands from north to south are—Bougainville's Island, which is about 60 miles long; Choiseul, which is perhaps as long; S. Isabella, perhaps the largest of the group; Georgia, which extends 40 miles from east to west; Guadalcanar, which is 70 miles long; and San Cristoval, which is about the same size. Besides these there are several islands of less extent, and a great number of small islands. The shores are mostly very steep, and rise to a considerable height. The interior is rugged, and frequently mountainous. Mount Lammor, on the island of Guadalcanar, is compared in elevation with the Peak of Teneriffe. The hills and mountains are generally covered with lofty trees, and the valleys are generally well cultivated and very fertile. Bananas, yams, sugar-cane, and ginger are extensively cultivated. The most common fruit-trees are the bread-fruit, cocoa-palms, cabbage-tree, a kind of almonds, and Indian kale (Caladium esculentum). The clove-tree is also found here. Fowls abound, as well as several wild birds. The inhabitants belong to the Australian negroes, and seem to have made some progress in civilization; but they are cannibals.

(Carteret's *Voyage round the World*, and Krusenstern's *Mémoires*.)

NEW HAMPSHIRE, one of the United States of North America, is situated between 42° 41′ and 45° 11′ N. lat., and between 70° 45′ and 72° 30′ W. long. On the east it is washed by the Atlantic for about 20 miles; the remainder of the eastern boundary-line is contiguous to Maine, and about 150 miles in length. On the north it borders on Lower Canada for about fifty miles. It is separated by the river Connecticut on the west from Vermont, for about 170 miles. The boundary between it and Massachusetts, which lies south of it, is about 80 miles. The length of this state is about 174 miles. Its breadth varies: along 43° N. lat. it is 90 miles wide, but farther north it grows narrower, so that on the parallel of 45° it hardly measures more than 25 miles. Its mean breadth is about 50 miles, and its area is about 8700 square miles. According to some authorities the area is nearly 9500 square miles.

Surface and Soil.—The shores are rather low, and the country along them, to the distance of 20 or 30 miles inland, is in general level; but the land rises imperceptibly, so as to arrest the tides within 20 miles from the sea, though they rise to about 18 feet. This flat tract has a sandy soil of inferior fertility. At the back of it the surface becomes broken and hilly, and the hills gradually rise in elevation as they proceed farther inland, until, at a distance of about 10 miles from the banks of Connecticut river, they constitute a continuous range, running nearly due south and north. Some of the summits attain a considerable elevation. Mount Monadnoc, about 10 miles from the boundary of Massachusetts, rises to the height of 3254 feet, and Moosehillock, farther north, to 4636 feet. On approaching 44° N. lat. the chain expands into an extensive mountain-group, which projects considerably towards the east, and is known by the name of the White Mountains. The highest summit of this group, Mount Washington, is the highest mountain in the United States east of the Rocky Mountains, and attains a height of 6234 feet above the sea-level. Several other summits rise to between 4000 and 6000 feet; as Mount Adams, 5328 feet, Mount Jefferson, 5058 feet, Mount Madison, 4866 feet, Mount Franklin, 4711 feet, and Mount Monroe, 4356 feet. From the northern side of the White Mountains the chain continues on both sides of the Androscoggin river, but it does not attain a great elevation. The country between this northern portion of the chain and the Connecticut river is hilly, rocky, and very thinly settled, on account of the severity of the climate owing to its elevation above the sea, and also an account of the barrenness of the soil. But south of the White Mountains the soil on the declivities of the lower hills and in the valleys between them is good, and that along the banks of the rivers, which is subject to be overflowed annually, is of excellent quality: but in general this state is better calculated for pasturage than for tillage.

Rivers and Lakes.—The Connecticut rises near the northern border of the state, in Lower Canada, in several small branches, but soon begins to form the boundary-line between New Hampshire and Vermont. Though its current is considerably obstructed by falls, rapids, and shoals, the navigation has been so much improved by dams, locks, and short canals, that boats of considerable tonnage may ascend it to Haverhill, near 44° N. lat., a distance of nearly 200 miles from its mouth in a straight line, and even to Fifteen-Mile Falls above Haverhill. [MASSACHUSETTS.] The Merrimack, which rises in the White Mountains and traverses the central districts of the state by a southern course, has also many falls and rapids, but the navigation of this river also has received great improvements, so that it is navigable from its mouth to Concord. The advantages which arise from this circumstance are still increased by the Middlesex Canal. [MASSACHUSETTS.] The Piscataqua, which for about 40 miles forms the boundary between this state and Maine, rises near the southern declivity of the White Mountains in a small lake, and runs south-south-east about 60 miles in a straight line. As a navigable river, it is of small importance, as its course is very rapid, and the tide ascends it only a short distance from the sea; but it forms the fine harbour of Portsmouth.

This state contains several lakes. The largest is Lake Winnepisseogee, which is 25 miles in length, and from one to 10 miles wide. Squam Lake, north-west of the former, is five miles long and four wide. In the northern districts is Umbagog Lake, through which the boundary-line between New Hampshire and Maine passes.

Climate.—The climate of the lower districts may be compared with that of the countries along the eastern shores of the Baltic. Frost occurs sometimes towards the end of September and usually in October, but it is slight. In November the weather is variable, and the frost moderate and not continuous. In December it begins to be intense and lasting. In January a thaw of several days sometimes occurs, but otherwise in this month, as well as in February, the frost is severe. Snow falls to the depth of from two to four feet, and does not disappear before April. In winter the prevailing wind is from the north-west, which rarely blows in summer. From the middle of November to the middle of May the cattle must be kept in stables. The winter does not last longer in the hilly and mountainous districts, but it is more severe. At Keene, in the south-western part of the state, the thermometer has sunk to 24° below zero, Fahr. In these districts night-frosts are often experienced in June and August, so that July is the only month quite free from frost. This is also the case in the mountainous districts of Sweden, near 60° N. lat. In New Hampshire these districts are probably more than 1000 feet above the sea-level. The heat in summer is great, but we have not found any exact observations on the temperature.

Productions.—The low lands along the rivers yield rich crops of wheat and rye, also flax, hemp, and culinary plants. Barley, oats, peas, and beans are also grown. The uplands produce only moderate crops. Each farmer has an orchard of apple and pear trees, and good cider is made. In most districts Indian corn is grown, but it is sometimes destroyed by the night-frosts in June and August. Horned cattle are abundant, and the dairies very good. The cattle are of a large size. Sheep and pigs are also common; but horses are not numerous, and they are of a small size.

The hills and mountains are still almost entirely covered with extensive forests, consisting of pine, fir, oak, cedar, hemlock, beech, maple, balsam, poplar, birch, hickory, spruce, chesnut, and larch. The most valuable is the white pine. for masts, yards, and planks of vessels. The most common animals in the forests are the black bear, the wolf, fox, wild cats, racoons, and grey, striped, and flying squirrels; but the moose deer, the beaver, and black squirrel have become rare. Several kinds of birds abound; the wild turkey has become rare. The bays and rivers abound with halibut, cod, salmon, shad, eels, and trout. This state is rich in minerals, among which are iron, copper, galena, and plumbago.

Inhabitants.—The natives, who formerly seem to have been numerous and frequently were at war with the settlers, have long since disappeared. The present population consists of the descendants of British who have settled here during the two last centuries. There are a few free coloured people among them. In 1820 the population amounted to 244,155 individuals, among whom were 786 free coloured people. The census of 1830 gave the number at 269,328, or about 30 individuals to each square mile. They are mostly occupied with agriculture, but a considerable number are employed in preparing timber for market. There are manufactures of cotton, broadcloths, and carpets in several towns, particularly Somersworth and Dover.

Political division.—New Hampshire is divided into eight counties. The capital of the state is Concord, situated on the river Merrimack, where it begins to be navigable. It is a small place, which in 1830 contained 3727 inhabitants. Portsmouth is on the æstuary of the Piscataqua, which forms an excellent and spacious harbour, deep enough for vessels of the largest size. Owing to the great rise of the tides, it is rarely impeded by ice, and never freezes over. The town, which is about three miles from the mouth of the river, carries on a considerable commerce, and contains about 8000 inhabitants. Many vessels are built here. The general government has a navy-yard on an island in the harbour. Dover, not far from the Piscataqua, has more than 5000 inhabitants, and some commerce. There are a few other towns with from 2000 to 3000 inhabitants. Dartmouth College, at Hanover, is a respectable institution. The common schools, which are above 1500 in number, are supported by an annual tax.

Commerce.—The foreign commerce of the state is concentrated in the harbour of Portsmouth. From the 1st of October, 1832, to the 30th of September, 1833, the imports amounted to the sum of 167,754 dollars, and the exports to 155,258; of the latter, the goods of foreign produce amounted only to 9903 dollars. Only American vessels were employed in it. The vessels which entered the port amounted to 10,347 tons, and those which departed to 6002 tons. Formerly the commerce with the West Indies was considerable, but it has much declined since 1812. The state has from 60 to 70 vessels employed in the fisheries.

History.—New Hampshire was first settled in 1623, and the progress of the colony in the beginning was very slow. It had to sustain many distressing wars with the natives who inhabited its present territory. From the middle of the last century its progress was more rapid. In 1775 the provincial convention declared the royal government dissolved, with the view of separating entirely from Great Britain. This took place before the declaration of independence. In 1776 the first provincial congress was established, under the name of a House of Representatives, but the present constitution dates from the year 1792. The legislature, called the *General Court*, is composed of two bodies, the Senate and House of Representatives. The senators, twelve in number, are elected annually by the citizens who pay taxes. The number of representatives depends on the population, and is at present 234. The executive power is vested in the governor, who is annually elected by the citizens of twenty-one years of age. This state sends two members to the Senate and six to the House of Representatives at Washington.

(Darby's *View of the United States;* Warden's *View of the United States of America;* Pitkin's *Statistical View of the Commerce of the United States of America; American Almanac for* 1839.)

NEW HANOVER. [NEW IRELAND.]

NEW HEBRIDES is an extensive group of islands in the Pacific, situated, if Banks's Islands are included among them, between 13° 15′ and 20° 5′ S. lat. and between 166° 40′ and 170° E. long. Banks's Islands, the most northern group of the New Hebrides, were discovered by Captain Bligh in 1789; they consist of five small islands and one larger island which is more than 20 miles in circumference. South-west of these islands is the largest of the whole group, Tierra del Espiritu Santo, which was discovered by Quiros in 1605. It extends more than 70 miles from north-north-west to south-south-east, with an average width of 25 miles. It contains a wide bay with good anchorage on its eastern side. Farther south is Mallicolo, which is more than 60 miles long, and about 28 wide, and has a good harbour called Port Sandwich, on the east side near its southern extremity. The islands l'Isle des Lepreux, Aurora, Pentecôte, Ambrym, Paoom, and Apee, which are situated east of Tierra del Espiritu Santo and Mallicolo, are not so large. Farther south is the large island Erromango, which is more than 80 miles in circumference, and the smaller island of Tanna, which is about 20 miles long. Besides these eleven larger islands there is a considerable number of smaller ones, which lie dispersed between and about them. These islands, or at least some of them, are of volcanic origin. An active volcano exists on the island of Tanna. These islands consist mostly of hills of moderate elevation, which however in some of them rise to the height of mountains. The valleys between these hills and also the level tracts along the coasts are very fertile. The uncultivated declivities of the hills are covered with trees. These islands are very rich in vegetable productions. It is said that more than forty different kinds of plants and trees are cultivated. The banana, sugar-cane, yam, arum, batata, and curcuma are grown in regularly divided fields, and with great care. The cocoa-nut, bread-fruit, the cabbage-tree, a kind of figs, almonds, and oranges are common. Bamboos, pepper, and mastic are abundant, and the nutmeg-tree occurs likewise. The domestic animals are hogs, pigs, and fowls. The inhabitants eat their enemies who fall in battle. They belong to the race of the Australian negroes, but have made greater advances in civilization than most of the other tribes of that race, as the state of their agriculture evinces. It seems that they do not speak one language, it being said that on the island of Tanna three different languages are used. This island is the best known, since Cook remained there some time, when he discovered most of these islands in 1774. (Cook's *Voyages;* and Krusenstern's *Mémoires.*)

NEW HOLLAND. [AUSTRALIA.]

NEW IRELAND is an island in the Pacific, situated between 2° 40′ and 4° 52′ S. lat. and 150° 30′ and 152° 50′ E. long. It is more than 170 miles long from south-east to north-west, but on an average not much more than 12 miles wide. It was considered as a part of New Guinea by its discoverers Schouten and Le Maire; and after Dampier, in 1700, had discovered Dampier's Strait, which separates New Britain from New Guinea, it was thought to be a portion of New Britain, until, in 1767, Carteret discovered the strait which separates both islands. Dampier had taken it for a bay, and called it St. George's Bay, a name which Carteret changed into St. George's Channel. The strait which divides it from New Hanover was called by Carteret, Byron's Strait. Near the southern extremity, Cape St. George, there is a good harbour, called Port Praslin. The island has a hilly surface, and some summits rise into mountains, but all of them are covered with wood. The lower tracts are well cultivated, and produce bananas, sugar-cane, batatas, ginger, yams, bread-fruit, cocoa-nuts, sago, figs, bamboos, and many other plants and trees. Dogs, pigs, and turtles are abundant. The inhabitants belong to the Australian negroes, and resemble in every respect their neighbours the inhabitants of New Britain. New Hanover is situated farther west, and is about 30 miles long from east to west; it is likewise very hilly, and even mountainous, but contains many cultivated tracts. (Carteret's *Voyage round the World;* and Krusenstern's *Mémoires*.)

NEW LONDON. [CONNECTICUT.]

NEW MEXICO. [MEXICAN STATES.]

NEW RIVER. [MIDDLETON, SIR HUGH.]

NEW SIBERIA. [SIBERIA.]

NEW SOUTH SHETLAND is a group of islands situated south-south-east of and about 600 miles from Cape Horn, between 61° and 63° 30′ S. lat. and 53° and 63° W. long. They extend from east-north-east to south-south-west, over a space of nearly 300 miles, and consist of twelve islands of moderate extent, and a great number of rocks and cliffs. They were discovered in 1819 by Captain Smith, and have frequently been visited since that time for the purpose of taking fur-seals and sea-elephants, with which the shores abound. The largest of the islands from east to west are Clarence, Elephant, King George, Strachan, Mitchell, Sartorius, Livingston, Low, and Smith. The interior of these islands consists of high hills or mountains. A mountain on Smith's Island attains the height of 6600 feet above the sea. They are almost entirely covered with snow all the year round, and only after Midsummer (in January) a few tracts, which are free from snow, are overgrown with lichens and mosses, in some places intercepted with a sort of straggling grass. The only inhabitants of these cold regions are numerous sea-fowls, as the albatross, penguin, &c., and the animals above mentioned. The surrounding sea abounds in whales and fish. Most, if not all, of these islands are of volcanic origin. Captain Weddel observed smoke issuing from the rocks of Bridgman Island, and the Island of Deception has the form of a horse-shoe, resembling in that respect the islands of the Pacific, which are formed by madrepores. The deep depression in the middle of Deception Island, which is 97 fathoms deep and makes an excellent harbour (Port Foster), is doubtless a crater, and this island may, as to form, be compared with the island of Nisita in the Bay of Naples. The high rocks which enclose this crater are volcanic, rise to more than 800 feet above the sea, and are partly covered with ice. South of these islands is a wide strait, called Bransfield Strait: the coasts which constitute the southern shores of this strait appear to form an extensive country, which has lately attracted the attention of navigators. [SOUTH POLAR COUNTRIES.] (Weddel's *Voyage* and Foster's *Voyage*.)

NEW TESTAMENT. [GRIESBACH; TESTAMENT.]

NEW-YEAR'S-DAY. Of the customs formerly practised at the opening of the new-year, none appear to have been so universal as feasting and sending presents, both of which the moderns appear to have derived from the Romans. Suetonius (*August.*, § 57, edit. varior., 8vo., 1647, p. 198) alludes to the practice among the Romans of bringing presents to the Capitol on new-year's-day, whether the emperor was present or absent; and Tacitus speaks of an order of Tiberius, forbidding the giving or demanding of new-year's-gifts unless it were on the calends of January. The early Fathers of the church condemned this practice as superstitious, because the gifts were considered as omens of success for the ensuing year.

New-year's-day with us, like many others, in modern times, has lost much of the ceremonials of its observance. In a volume of 'Miscellanies,' printed in Queen Anne's time, we read,—'January. On the first day of this month will be given many more gifts than will be kindly received or gratefully rewarded. Children, to their inexpressible joy, will be drest up in their best bibs and aprons, and may be seen handed along streets, some bearing Kentish pippins, others oranges stuck with cloves, in order to gain a blessing of their godfathers and godmothers.'

Gifts at new-year's-tide formed a charge of no small amount in the privy-purse expenses of royalty, from very early times to the time of Charles II.: they were mostly made in plate.

Moresin, who published his 'Papatus' in the time of James I., tells that in Scotland it was then the custom to *send* new-year's-gifts on new-year's-eve; and on new-year's day they wished each other a happy day, and *asked* a new-year's-gift. When Brand wrote his 'Popular Antiquities,' it was still usual in Northumberland for persons to ask for a new-year's-gift on that day.

The modern Jews, on the first day of the month Tisri, which may be considered as their new-year's-day, usually have a splendid entertainment, and wish each other a happy new-year

Hospinian says, that at Rome on new-year's-day (he speaks of modern practices) no one would suffer a neighbour to take fire out of his house, or anything of iron, or lend anything. (Brand's *Popular Antiq.*, vol. i., p. 8-18, &c.)

NEW YORK is one of the largest and the most important of the states which compose the North American Union. It is situated between 40° 40′ and 45° N. lat., and between 73° and 80° W. long. It extends in length from south to north more than 300 miles, and in width, along the parallel of 42° N. lat., 340 miles. Its surface is estimated at more than 46,000 square miles, or about 4000 miles less than that of England without Wales. To the north and west of New York lie the Canadas, from which it is separated by the parallel of 45°, called the Canadian Line, and by the river St. Lawrence, Lake Ontario, Niagara river, and Lake Erie. On the south it is bounded by the states of Pennsylvania and New Jersey, and the Atlantic Ocean; the Delaware river forms the boundary-line between it and Pennsylvania for 65 miles. On the east it borders on Connecticut, Massachusetts, and Vermont. Lake Champlain constitutes the boundary-line for 105 miles between New York and Vermont.

Surface and Soil.—None of the United States presents a greater variety of surface than New York, a circumstance owing to its including portions of two large mountain-systems, the Appalachian and Acadian Mountains, and to its containing also a mountain-system of its own, the Essex Mountains. These three mountain-systems are divided from one another by wide valleys, mostly of a peculiar description and from the lakes Erie and Ontario by a plain of considerable extent.

The Appalachian Mountains in Virginia, in 39° N. lat., occupy, with their numerous parallel ridges, hardly more than 100 miles in width. But near 40° N. lat. they begin to widen, and at 41° N. lat. they are above 200 miles in width. This extension is produced by the eastern and central ridges turning to the east and east-north-east, whilst the western ridges (the Laurel Hills and Chesnut Ridge) continue in the general direction of the system north-north-east. These western ridges grow lower and less distinct as they approach 42° N. lat., and north of that parallel they are lost in an elevated plain or table-land, which has a hilly surface. The eastern ridges continue as distinct mountain-masses eastward to 74° 40′, or a distance of from twenty-five to thirty miles from the banks of the river Hudson, where they may be said to terminate; but their extremities are here united by a mountain-ridge whose general direction is north and south. This ridge forms a continuous range between 41° and 42° N. lat. Its southern extremity, which lies within the state of New Jersey, is known by the name of the Kittatinny Mountains, but the whole has not yet been designated by a name. We should propose the appellation of Tuscarora Mountains, to perpetuate the name of that tribe of the Six Nations, to whose memory no geographical monument exists. This Tuscarora range continues beyond the union of the ranges northward to 43° N. lat., where it turns westward, and after extending in that direction nearly fifty miles, terminates at the eastern extremity of the table-land on which the western ranges of the Appalachian Mountains are lost. But all the eastern chains of the Appalachian Mountains do not unite with the Tuscarora Mountains. The most southern, known in New Jersey under the name of the Blue Ridge, is divided from them by the valley in which the Pawling and Wallkill rivers flow south-west and north-east. This last-mentioned ridge continues in a north-eastern direction to the very banks of the Hudson river, where it terminates with the Mattewan Mountains or Highlands, between West Point and Newburg.

Opposite the Highlands and east of the Hudson river rise the Fishkill hills, which constitute the south-western extremity of that extensive mountain-region which occupies a considerable portion of New England, and extends through Lower Canada to the very mouth of the St. Lawrence river.

Though commonly considered as a portion of the Appalachian Mountains, it claims a distinct consideration, and ought to be designated by a particular name, for which we propose that of Acadian Mountains, as the greatest part of this mountain-region was formerly known by the name of Acadia. The Fishkill hills run from the banks of the Hudson north-east and north through New York, until they arrive at its eastern boundary-line, where the states of Connecticut and Massachusetts meet, and where they take the name of Taghkanic range. From this point, continuing to the east of north, they constitute the boundary between Massachusetts and New York, until, by declining more to the east, they enter the first-named state, and proceed into Vermont, where they are called the Green Mountains. Between them and the Tuscarora range extends the valley of the middle Hudson.

The Essex Mountains are situated entirely within the limits of New York, and have only lately and partially been explored. They occupy the country between 43° 20′ and 44° 30′ N. lat., enclose Lake George, extend along the western shores of Lake Champlain, and reach westward probably to 74° 30′ W. long., so that they extend about fifty miles in width. West of them is an elevated table-land, which seems to run to 75° 40′ W. long., and which on the south terminates in the valley of the Mohawk river, which valley separates it from the Tuscarora range, where this range runs east and west.

New York contains seven regions, different in configuration of surface and in fertility, and to a considerable degree also in climate—the hilly region of the Susquehanna and Delaware rivers, the elevated table-land, the declivity of the table-land towards Lake Ontario, the northern region, the valley of the Mohawk river, the valley of Lake Champlain, and the vale of the Hudson river, to which the island of Long Island and Staten Island are to be added.

The region of the Susquehanna and Delaware rivers comprises the country which is surrounded on the east and north by the Tuscarora range, and is drained by the upper branches of the Delaware and those of the eastern branch of the Susquehanna; it extends westward to about 76° W. long. The mountain-range which surrounds it probably in no part exceeds in absolute elevation 2000 feet. The valleys which descend from the Tuscarora range, chiefly in a south-western direction, contain rather wide and extensive bottoms of great fertility, which in their natural state are overgrown with forests of sugar-maple, black walnut, elm, beech, and other trees, indicating a strong soil. The declivities of the mountains are rather steep, and their soil of inferior quality; they are mostly overgrown with pine, among which oak, chesnut, and hemlock are intermixed. The valleys, when cultivated, yield rich crops, and hence this region is comparatively well settled.

West of this region, along the boundary-line of Pennsylvania, lies the elevated table-land on which the western ridges of the Appalachian Mountains terminate, and the western branch of the Susquehanna, the Alleghany river, an affluent of the Ohio, and the Genessee river originate. It is from 20 to 30 miles wide, terminating on the north at the southern extremity of the lakes Cayuga and Seneca. Its surface is broken and hilly, but the hills are scattered over the country, and not disposed in ridges. Towards the western extremity, two short ranges, the Cattaraugus and Chatauque hills, rise to a considerable elevation. At the eastern extremity the table-land seems not to exceed 1000 feet in elevation, but at the sources of the Genessee and Alleghany it probably rises to 1300 feet, or more than 800 feet above Lake Erie. The deepest depression seems to occur between Lake Seneca and the village of Elmira on the Tioga, an affluent of the western branch of the Susquehanna, and in this direction the summit level does not exceed 885 feet, but it lies in a valley. The country is almost entirely covered with wood, mostly pine, and is at present very thinly settled. Some sheltered tracts between the hills exhibit a considerable degree of fertility.

From this table-land the country slopes towards Lake Ontario; but it can hardly be called a slope, as there is a rise, though not a considerable one, towards the shores of the lake. Between the table-land and this rise there is a slight depression extending in the form of a trough east and west: it is called the Lake Country. At the eastern extremity of this depression, between Lake Erie and the river Genessee, the country seems gradually to descend from 1000 feet and upwards to 565 feet, which is the Erie level of the Grand Canal. Where the country descends from the table-land, there are numerous lakes, of which the most considerable are Canandaigua (685 feet), Crooked Lake (700 feet), Seneca (440 feet), and Cayuga (400 feet). These numbers, indicating the elevation of the lakes above the sea, show that the depression lowers in its course from west to east. The surface of this depression is generally either level or undulating, and rarely hilly, but the lakes lie deep under the general surface in wide chasms, and the beds of the rivers are likewise much depressed. In its natural state this country is covered with high forest trees, and, when cultivated, yields most abundant crops. It is the most fertile portion of the state, and as it is contiguous to the Grand Canal, cultivation is extending rapidly, and the population has, in the last twenty years, probably doubled twice. The central portion of the canal passes through the depression, but the western part passes over the higher grounds which separate it from Lake Ontario.

The higher ground, which occurs north of this region, and about ten or twelve miles from the shores of Lake Ontario, does not appear to be much more elevated than the Lake Country. Its surface is uneven and broken, and the soil partly stoney and gravelly, and in general of indifferent quality. From this higher ground the country descends uniformly and gradually to Lake Ontario, except that, between Niagara and Genessee rivers, a distance of 80 miles, it is traversed in its whole length by what is called the Ridge Road or Alluvial Way. This elevated tract is composed of common beach sand and gravel stones, apparently worn smooth by the action of water, and the whole is intermixed with small shells. Its general altitude above the neighbouring land is 30 feet, and its width varies considerably. At the Niagara and Genessee rivers it is found to be about 120 or 130 feet above their level, and thus it appears that it is about 150 feet above Lake Ontario, from which it is 6 or 10 miles distant. It is conjectured that it once constituted the shores of that lake, which by some change in its outlet has sunk about 150 feet below its antient level. As the country on both sides of this extraordinary ridge is thickly wooded, but the ridge itself without vegetation, the first settlers chose it as the line of road, whence it derives its name. We find no mention of a similar elevation east of the river Genessee. The country traversed by the Alluvial Way seems to be of indifferent quality.

The northern region comprehends the country lying north of Lake Oneida and of the valley in which the Mohawk river flows, as far east as the mouth of the East Canada creek. Farther east its southern boundary is formed by a line drawn from the last-mentioned place to Glens Falls on the Hudson river, which occur where the river flows from west to east. It is separated from Lake Champlain by the deep depression in which that lake lies. Northward it extends to the Canadian line, the St. Lawrence, and westward to Lake Ontario. It comprehends the Essex Mountains, as well as an elevated and extensive table-land lying to the west of the mountains, and the declivities with which the mountains and table-land descend to the south, west, and north. It comprehends about one-third of the surface of the state, and a great portion of it, perhaps one-half, is uninhabited. The mountains occupy the eastern part of the region: they begin on the south, between Glens Falls on the Hudson river and the southern extremity of Lake George. A lower ridge separates that lake from Lake Champlain, but the more elevated portion of the mountains extends along the western shores of Lake George northward. In its southern parts this range does not appear to rise to a great elevation; but north of 44° N. lat., and especially between 44° 5′ and 44° 10′, some of its summits rise above the line of trees. The most elevated, called the High Peak of Essex, or Giants' Mountain, attains an elevation of 5467 feet, or above 1800 feet more than Mount Catskill, the most elevated summit of the Appalachian Mountains whose height has been determined, and only about 800 feet less than Mount Washington, the highest summit of the White Mountains in New Hampshire. Mount MacIntyre, west-north-west of the Giant Mountain, attains 5183 feet, and several other peaks rise to between 4000 and 5000 feet. The snow does not disappear from the summit of the Giants' Mountain till after the middle of July. The valleys embosomed between these higher ranges are from 2000 to 3800 feet above the sea-level, and of course uninhabited and uninhabitable. In the Alps, valleys of such an elevation are only inhabited during some weeks in the summer. The valleys are however covered with pine, spruce, and birch trees.

Towards the summit of the mountains, these trees become dwarfish, and are interwoven with each other by their numerous horizontal branches. On the highest summits however the trees disappear entirely, and are replaced by mosses, lichens, and small alpine plants.

The climate of this elevated region is so cold, that ice is formed during the night in the beginning of August. Towards the south the valleys are much lower, and a few settlements have been made. It is not exactly known how far the mountains extend westward, but probably they reach to 74° 30′ W. long., enclosing the numerous upper branches of the Hudson river. West of this mountain-region lies a table-land of an uneven surface: as no settlements have been formed here, it is little known, except that it does not contain ridges of high mountains, that a portion of it is covered with swamps, and a still greater part intersected with lakes. As the numerous rivers which originate on it descend by a succession of rapids and cataracts, its elevation above the sea must be considerable and the climate extremely severe, a circumstance which will account for the entire want of settlements east of 75° 30′, and northward only at a distance of from 20 to 25 miles from the banks of the river St. Lawrence. On the south this elevated region is bounded by a range of hills, which constitutes the northern border of the valley of the river Mohawk, and separates it from the upper course of Black River, of Lake Ontario, and of the Sacondago river. It extends between 74° 15′ and 75° 30′ W. long., from east by north to west by south, and is called the Sacondago Hills. According to a vague estimate of Darby, these hills rise from 1200 to 1500 feet above the sea-level, but they are probably higher. The declivity of this elevated region seems to begin on the west about 20 or 30 miles from the shores of Lake Ontario and the St. Lawrence river, where the settlements commence. In the valley of Black River they extend to a greater distance, probably because the bottoms of this river are more sheltered and more extensive than those of the other rivers. These settlements however occur at great distances and only on the banks of the rivers, the remainder of the region being entirely covered with woods. The climate of these declivities is very severe, as they are exposed to the prevailing cold winds which blow from the north-west.

This region is divided from the Tuscarora range by the valley of the river Mohawk. This valley may be said to begin at Rome, to which place this rapid river runs in a ravine from north to south. From Rome the river flows south of east, and the valley along its banks may be said to extend about 60 miles to Amsterdam, where it opens upon the vale of the Hudson river. The valley is in general from three to six miles wide; but at 75° W. long. it is traversed by a ridge of rocks which connect the Tuscarora Mountains with the Sacondago Hills, and running across the river cause it to form some cataracts, which are called the Little Falls. The bed of the river above the falls is more than 400 feet higher than the sea, but below the falls it is 40 feet less. The country which separates the Mohawk from Lake Oneida does not attain a height of more than 431 feet above the sea. That portion of the valley which lies above the falls is very fertile, and in this respect resembles the Lake Country. The Herkimer and German Flats, which are contiguous to the rocks forming the falls, are an alluvial tract noted for fertility. The lands below the falls are more hilly and less fertile, but still fertile enough to repay the labour bestowed on their cultivation. The whole valley is well settled, and the Grand Canal traverses it in its length.

Lake Champlain lies along the foot of the Essex Mountains on their eastern side, and on the east of the lake are the Green Mountains of Vermont, but they are at a much greater distance from the lake. The higher parts of both ranges are from 25 to 30 miles apart. Two-thirds of this space belong to Vermont, and the remainder is occupied by the lake and a very hilly country which lies between it and the Essex Mountains. The valleys and flats between the hills and on the borders of the lake are not distinguished by fertility, but give good crops when cultivated with care. From the southern extremity of Lake Champlain a glen extends between the hills which cover the country to the Hudson river below Glens Falls. The highest level of this glen is only 140 feet above the tide-water in the Hudson river, and 50 feet above the level of Lake Champlain. Through this glen the Champlain Canal has been made, which unites the river to the lake. As the outlet of the lake, the river Chambly, falls into the St. Lawrence river, a water communication has thus been opened between the St. Lawrence and the Hudson.

The vale of the Middle Hudson begins near 43° 20′ N. lat., where the river, after issuing from the Essex Mountains, forms Glens Falls, and begins its southern course. It extends, with a width of from 60 to 80 miles, between the Taghkanic Range on the east and the Tuscarora range on the west to the Fishkill Hills and the Mattewan Mountains, a distance of nearly 150 miles. The mountain-ranges which enclose it do not appear in any part to rise to much more than 2000 feet above the sea-level. The slope on the east of the river is rapid but regular. The surface frequently rises into hills, but they do not attain a great elevation, and their declivities generally admit cultivation. The soil possesses a considerable degree of fertility, and to this circumstance, united to the advantages offered by a river navigable for large vessels, must be ascribed the fact that this portion of New York is one of the most populous and best cultivated. That portion of the vale which lies west of the river presents a greater variety in surface and fertility. At two places it is traversed by offsets from the Tuscarora range. North of 42° N. lat. are the Catskill Mountains, three ranges which lie east and west, and extend from 10 to 25 miles from the Tuscarora Mountains eastward. The most northern and shortest rises, in the Roundtop, to 3804 feet, and the southern and longest, which properly is called Mount Catskill, to 3486 feet. These summits are the most elevated in the Appalachian Mountains, with the exception perhaps of the Peak of Otter in Virginia, whose elevation is estimated at 4000 feet. Farther south, near 41° 20′ N. lat., another ridge branches off from the southern extremity of the Tuscarora Mountains, and advances to within 10 miles from the river in a north-eastern direction. It is properly the prolongation of the Kitatinny Mountains of New Jersey, but in New York bears the name of the Shawangunk Range. It probably does not attain the height of 2000 feet. On the western, as on the eastern side of the Hudson, only a few alluvial tracts occur on the banks of the river, and they are of very small extent. The country generally rises from the west banks with a rather rapid ascent to 200 feet and more, and then extends in a broken and hilly surface to the base of the mountains, though flat tracts occur in some places. The soil is in many places stoney, but it generally possesses a considerable degree of fertility, though it is somewhat inferior to that on the east side of the river. At the most south-western extremity of this region, between the Shawangunk Range and the Mattewan Mountains, in the valley of the river Wallkill, is a tract of exuberant fertility, called the Drowned Lands. Its southern extremity lies within the county of Sussex in New Jersey, but the greater portion is in Orange County in New York. It is from 35 to 40 miles in length and from 5 to 7 wide, and seems to have been a lake. It is flat and marshy, and some small lakes are scattered over it. In spring it is subject to inundation.

The vale of the Lower Hudson extends from the Mattewan Mountains and Fishkill Hills to the very mouth of the river, a distance of about 60 miles. The Fishkill Hills rise to a considerable elevation, Beacon Hill attaining 1471 feet, and New Beacon, or Grand Sachen, 1685 feet above the sea-level. The Mattewan Mountains west of the river, though high, do not attain so great an elevation. Both ridges terminate on the banks of the river in high rocks, which extend on each side for about 20 miles. The prevailing character of the surface and soil of this region is rocky, especially on the west of the river. The Mattewan Mountains terminate on the banks of the river with very high and precipitous rocks, which from Newburg extend to West Point, and even south of the last place. The higher lands recede to a distance from the river, and slope to the banks with a rather gentle declivity. This gentle slope continues along Tappan Bay; but from Tappan to a distance of about 8 miles from the town of New York, the Palisadoes, as they are called, extend along the river: they consist of enormous masses of rocks, from 20 to 500 feet in height. In some places they rise almost perpendicularly from the shore, forming for many miles a solid wall of rock, diversified only by an occasional fishing-hut on the beach at their base, and sometimes by an interval of a few acres of arable land, affording an opening for a landing-place, and a steep road leading to their top. The highest part of the rocks lies contiguous to the river, from which they descend towards the interior of the country. The whole tract south of the Mattewan Mountains has a very rocky soil, and the cultivable land is only a small portion of it. The country east of the river also rises with a bold and broken shore, but it is less high and precipitous, and the surface of the country farther back is varied by ascents and descents. It contains a much larger portion of cultivated land, but the soil is rocky and of inferior quality, so that the country is rather thinly settled, notwithstanding the neighbourhood of the populous city of New York.

Long Island is about 115 miles long from west to east, and on an average between 9 and 10 miles wide: in some places it is 20 miles across. At the eastern extremity a shallow inlet, called Peconic Bay and Gardner's Bay, separates it into two peninsulas, of which the southern extends farthest east, and terminates with Montauk Point. A ridge of low hills extends along the northern shores of the island, and from their base to the southern shores there is an alluvial margin from one to five or six miles wide. Along the southern shores, and from one to two miles from it, extend long, narrow, low, and sandy islands. The intermediate space between these islands and the shores is occupied by shallow sounds. The soil is everywhere sandy and light, but within the hilly tract, especially at the western extremity, and from 20 to 30 miles eastward, it is of considerable fertility. The largest portion of the eastern districts is still covered with pine. The level tract along the southern shores is generally sterile and in some parts not worth cultivation. The area of Long Island is about 1200 square miles.

Staten Island is separated from Long Island by the strait called the Narrows, which forms the entrance into New York Bay. Staten Island is about 14 miles long and 8 wide, with an area of 77 square miles.

Rivers, Lakes, and Long Island Sound.—On the elevated table-land which extends along the northern boundary of Pennsylvania all the large rivers rise which fall into the Atlantic west of the mouth of the Hudson and east of the innermost recess of Chesapeake Bay. This region contains the sources of the Delaware [DELAWARE] and Susquehanna [PENNSYLVANIA], and also those of the Alleghany, one of the principal branches of the Ohio. On the same table-land, and probably in the most elevated portion of it, between the upper branches of the Alleghany and Susquehanna, and within the limits of Pennsylvania, rises the Genessee, which runs in a general northern direction about 125 miles, measured along its course. In its middle course, which lies in the Lake Country, it traverses a deep and wide valley of great fertility, and forms at Rochester, 5 miles from its mouth, a cataract 95 feet high. But above this impediment the river is navigable about 70 miles for boats.

Not far from the eastern banks of the Genessee river commences that remarkable series of lakes, which extend nearly 100 miles farther eastward, and are from 20 to 30 miles distant from Lake Ontario. These lakes extend in length from south to north, or rather, lines drawn from their most northern extremity, in the direction of their length, to Lake Ontario, cut the shores of that lake at right angles. The most considerable of these lakes, from west to east, are, Lake Canandaigua, which is 14 miles long, and from one to two wide; Crooked Lake is 18 miles long, and about 1½ miles wide; Seneca Lake is 35 miles long and from 2 to 4 miles wide; Cayuga Lake is 38 miles long and from 1 to 4 miles wide; Skeneatiles Lake is 15 miles long and from ½ to 1½ mile wide; and Oneida Lake, the most eastern, is 20 miles and 4 miles wide. Onondaga Lake, which lies between Skeneatiles and Oneida lakes, is 6 miles long and two wide, and remarkable for the copious and strong salt springs, which occur at a distance of a mile from its eastern banks. All these lakes, except the most western, that of Canandaigua, discharge their water by one river, the Seneca. This river issues from the northern extremity of Lake Seneca, which receives the waters of Crooked Lake by a narrow channel, and winds with numerous bends through the Lake Country, running in a general north-eastern direction. Each lake discharges its waters by a separate channel into its bed. In approaching the western extremity of Oneida Lake it is met by the channel issuing from that lake, and after their union the river is called Oneida or Onondaga River.

Black River rises on the western declivities of the Essex mountains, and descends from the table-land of the northern region first by a south-western and afterwards by a north-western course. About 36 miles from its mouth it turns west, and discharges its waters into Sackets Harbour, a small bay on Lake Ontario. This river runs about 120 miles, but in many parts of its course it consists of a series of cataracts and rapids. The lower falls, which are 7 or 8 feet in perpendicular height, occur at Brownville, eight miles, measured along the channel, above Sachets Harbour.

The table-land west of the Essex Mountains contains many lakes, and some of considerable extent, but our information respecting this region is still very scanty. The most eastern ridges of the Essex Mountains contain Lake George, which extends from south-south-west to north-north-east 33 miles, with a width varying between 1 and 7 miles. It is enclosed on all sides by high rocks, and contains many small rocky islands. It is 200 feet above Lake Champlain, into which it discharges its water by a channel at Ticonderoga. Lake Champlain extends northward into Lower Canada. [CHAMPLAIN.]

The largest river of New York, and perhaps the most important river of the United States, next to the Mississippi, is the Hudson. It is formed by two branches. The eastern branch rises, according to the most recent information, between 44° 5′ and 44° 10′ N. lat., on the northern declivity of Giants' Mountain, 4747 feet above the sea-level, and enters by a western course a wide valley which is 3711 feet above the sea. After some windings in the mountain-valleys, it takes a regular course to the west of south, until it turns a little to the west and meets the western branch. The western branch rises in the western ridges of the Essex Mountains, and runs south and east of south until it meets the eastern branch near 43° 30′ N. lat. As both branches descend from a very elevated region, their current is very rapid, and frequently interrupted by rapids and cataracts. The united river runs southward for some distance, and where it begins to turn to the east, it is precipitated over a ledge of rocks, and forms the Great Falls. Twenty miles lower down are Glens Falls, where the river turns again to the south, which direction it maintains with slight deviations to its mouth. Below Glens Falls the river becomes navigable, though the current continues to be rapid to the mouth of the Mohawk river. The tide ascends the river as far as the mouth of the Mohawk, and below this point the river is wide, but still its mean breadth does not amount to a mile. In some places it widens considerably and appears like a lake, as above Newburg, and still more above Tappan. The latter enlargement, called Tappan Bay, is from two to five miles wide, and continues for eight miles. About 30 miles from its mouth, which is between Sandy Hook in New Jersey and the western extremity of Long Island, the river divides into two arms, which enclose the island of Manhattan. The eastern and more narrow arm is called Haerlem River, and after it has united to Long Island Sound, East River. Where the river meets Long Island Sound is a dangerous strait in which it forms whirlpools and eddies; this pass is called Hell-gate, or Hurlgate. At the city of New York the East River unites again with the West River or proper Hudson, and the spacious bay of New York is formed. But before the river enters the sea, it sends off another arm to the westward, which surrounds Staten Island, under the names of Newark Bay, the Kills, and Amboy Bay. The Hudson is navigable for ships to Albany, 120 miles from its mouth, and to Troy, 36 miles farther up for sloops. It may be ascended by boats to Glens Falls, but this navigation is now superseded by the Champlain Canal, which extends along its western banks. The whole course of the river probably exceeds 350 miles. After issuing from the mountain-region the Hudson is not joined by any considerable tributary, except the Mohawk river, which rises on the table-land west of the Essex range, near 75° 30′ W. long., and runs southward. About 14 miles north of Utica it forms the Trenton Falls, by which the river descends 387 feet in a space of less than 5 miles. Some miles below these falls the Mohawk turns to the south-east. Below the village of Herkimer are the Little Falls, by which the river descends more than 30 feet in the distance of a mile. A mile above its mouth are the Cohoes Falls, 40 feet in perpendicular height. The tide ascends to the last-mentioned falls. At Waterford the Mohawk joins the Hudson, after a course of about 120 miles.

Long Island Sound, or the strait which divides Long Island from the continent, is about 120 miles long, with a varying width. The eastern portion, extending as far west as Stamford in Connecticut, and Lloyd's Neck on the island, has an elliptical form, widening from about 8 miles at each extremity to about 20 miles in the middle. West of Lloyd's Neck it gradually contracts, and at its western extremity varies between half a mile and 2 miles for a distance of eight miles, until it joins East river. In the western and more narrow portion of the strait, the channel is rocky and much interrupted by small islands and projecting points. But the strait has, in general, depth sufficient for the largest vessels.

Climate.—The mean annual temperature of the city of New York is between 52° and 53°, which is only 2° or 3° higher than that of London, though it is more than 10° nearer to the equator. But this city has a milder climate than any other part of the state except Long Island. The vale of the Hudson river is much colder than any part of Great Britain. In December the cold increases gradually, and the winter lasts to the end of March. In January and February the thermometer sometimes sinks to 2° Fahr. Snow lies on the ground several feet deep, and the river is passed on the ice. The ice usually does not break up before the end of March. The spring months are raw, chilly, and damp. In summer the thermometer ranges, in general, between 60° and 80°: it sometimes rises to 85° and for a few days to 90°, but rarely higher. In September the weather is fine, but there are a few severe storms about the equinox. In October and November the weather is dry and clear, but some night-frosts occur, and towards the end of the latter month snow begins to fall. But the temperature is subject to great and sudden variations, even in the same day. These variations sometimes amount to 20° and even 30° of Fahrenheit. Such is in general the climate of the vale; but the cold is much more severe towards its northern portion in the vicinity of the mouth of the Mohawk river, which is ascribed to the prevalence of the north-western winds, which blow with considerable force through the valley of the Mohawk. The same winds render the climate of the valley of the last-mentioned river colder than the countries farther east or west. The Lake Country, on the contrary, enjoys a milder climate, its temperature being generally at least three degrees higher than that of the valley of the Mohawk. But it is subject to dense fogs, and is considered the most unhealthy portion of the state. In summer south-western winds prevail in this country. The northern region has very severe winters, so that during six months the country is covered with snow and the rivers frozen. In the high valleys of the Essex Mountains it freezes even in August.

Productions.—The cultivated cerealia are maize, wheat, rye, barley, oats, and buck-wheat. Artificial grasses are cultivated in some parts, especially in the neighbourhood of New York. Potatoes and turnips are generally cultivated. Immense quantities of melons are raised. Peas and beans succeed very well. Apples, peaches, and cherries are plentiful, but pears and plums are not so abundant. Currants and strawberries are cultivated near New York. In some parts flax and hemp are grown, especially in the Lake Country. All the domestic animals of England are reared in New York with success.

A considerable part of the state is still covered with forests, which consist of oak of different species, ash, walnut, pine, maple, beech, chesnut, birch, poplar, elm, cedar, hemlock, and hickory. The most extensive forests occur in the northern region.

The panther is rare, except in the Essex Mountains, which also contain the moose-deer. Deer are still frequent in the western districts and northern region. Other wild animals are, wolves, bears, grey and red foxes, racoons, skunks, minks, beavers, otters, squirrels, and hares. The musk-rat and marten have nearly disappeared. The wild turkey has become rare, even in the western districts, but swans, wild geese, ducks, and pigeons are abundant. The sea and the lakes abound in fish.

Several minerals occur in abundance, but only iron, salt, limestone, and marble are worked. Coal does not exist, at least not in such quantity as to be worked; and it is imported from various places, especially from Nova Scotia.

Political Divisions and Towns.—The state of New York is divided into fifty-six counties, having an aggregate area of about 46,085 square miles.

There are nine incorporated cities, viz. New York, Albany, Troy, Hudson, Schenectady, Utica, Buffalo, Rochester, and Brooklyn. Their relative importance may be inferred from the amount of their population severally at the last census, viz.:—

New York	202,589	Buffalo	8,653
Albany	24,209	Utica	8,323
Brooklyn	15,396	Hudson	5,392
Troy	11,605	Schenectady	4,258
Rochester	10,885		

There are also 124 incorporated villages,* many of which contain from 3000 to 5000 inhabitants.

Brooklyn, on the East River, on Long Island, is opposite to New York, and may be considered as a suburb of that city. The two places are three-quarters of a mile distant, and communication is kept up between them by steam and horse-ferry boats. The population of Brooklyn is now 15,396. [BROOKLYN.]

There are many flourishing towns and villages on both sides of the Hudson river. Newburg, on the west side of the river, is 61 miles north of New York, and has a population of 6424. Poughkeepsie, on the east side of the Hudson, 74 miles from New York, has a population of 7222. Catskill, on the west side of the river, and near the Catskill Mountains, about 108 miles from New York, has a population of 4860. Hudson, on the east side of the Hudson, nearly opposite to Catskill, is a large manufacturing town, and has about twelve ships engaged in the whale fishery: the population is 5392. Albany, on the west side of the Hudson, and the seat of government, is the second city in the state. Next to James-town in Virginia, it is the oldest settlement in the United States. Since the completion of the Erie and Champlain canals, its growth has been very rapid. [ALBANY.] Six miles above Albany, on the opposite bank of the river, is the town of Troy, which is at the head of the sloop navigation, and has a considerable trade, with a population of 11,605.

The following are the principal towns on the Mohawk and the Erie canal:—Schenectady, on the south bank of the river, 15 miles north-west of Albany, is the seat of Union College, and has a handsome covered bridge over the Mohawk, 1000 feet in length: the population is 4258. Utica, on the south bank of the same river, 94 miles west of Albany, has a population of 8323. At this point, the Mohawk river, the Erie canal, and the great western road meet. Syracuse, 133 miles from Albany, is extensively engaged in the manufacture of salt. Canandaigua, on the lake of the name, has a population of 6162. Rochester is on the Genessee river and on the Grand Canal, which passes over a noble aqueduct of stone at this town. It is 236 miles from Albany, 7 miles from Lake Ontario, and has a ship navigation within two miles of the town. Owing to the falls of the Genessee river, this place enjoys the advantage of abundant water-power for putting mills in motion and other purposes. Rochester was founded in 1812, and in 1830 it contained 10,885 inhabitants. Buffalo is at the north-eastern corner of Lake Erie, at the termination of the Grand Canal, and at the head of Niagara river. It carries on a considerable trade on the lake. [BUFFALO.] In the western part of the state there are numerous towns equal in magnitude to some of those which have been mentioned. They are all in a thriving condition, and owe their prosperity mainly to the Erie canal. In this district the traveller meets with numerous well-built villages, only a few years old, in a country which, not long since, was an uninhabited wilderness. The numerous lakes in this part of the state contribute to the beauty and variety of the landscape. Plattsburg, on the west side of Lake Champlain, has a population of 4913. Sackett's Harbour, near the mouth of Black River, at the east end of Lake Ontario, is considered to be the best harbour in that lake: the population is about 2938.

Population.—The population of the state of New York at each enumeration since the acknowledgement of American independence was as follows:—

	Free.	Slaves.	Total.	Increase per cent.
1790	340,120	21,324	361,444	
1800	586,756	20,343	607,099	67·96
1810	959,949	15,017	974,966	60·59
1820	1,372,812	10,088	1,382,900	41·84
1830	1,918,608	75	1,918,683	38·74

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* Incorporated villages are governed by a president and trustees, who are annually chosen by the people. They differ from cities only in having more limited powers and jurisdiction. The term 'town,' in the New York law, is synonymous with 'township.'

The increase, comparing 1830 with 1790, has been 433¾ per cent., or at the rate of 10¾ per cent. annually.

At the last census, in 1830, the population was ascertained in classes, as under:—

Free white population:—

	Males.	Females.	Total.
Under 5 years old ..	158,077	151,868	309,945
From 5 to 10 years ..	137,071	133,084	270,155
„ 10 15 „ ..	118,523	115,166	233,689
„ 15 20 „ ..	101,712	105,196	206,908
„ 20 30 „ ..	176,754	168,897	345,651
„ 30 40 „ ..	113,136	104,522	217,658
„ 40 50 „ ..	68,871	64,315	133,186
„ 50 60 „ ..	40,503	38,344	78,847
„ 60 70 „ ..	23,909	22,589	46,498
„ 70 80 „ ..	10,044	9,645	19,689
„ 80 90 „ ..	2,561	2,673	5,234
„ 90 100 „ ..	255	304	559
Over 100 . ..	35	17	52

Free coloured population:—

Under 10 years old ..	5,643	5,509	11,152
From 10 to 21 years ..	6,094	6,843	12,937
„ 21 36 „ ..	4,860	5,504	10,364
„ 36 55 „ ..	3,492	3,780	7,272
„ 55 100 „ ..	1,358	1,714	3,072
Over 100 . ..	19	54	73

Slaves:—

Under 10 years old ..	5	23	28
From 10 to 21 years ..	6	12	18
„ 21 36 „ ..	..	17	17
„ 36 55 „ ..	1	3	4
„ 55 100 „ ..	..	6	6
Over 100 . ..	1	1	2
Ages not ascertained . .	.	.	5,667
			1,918,683

Constitution, &c.—The present constitution of the state of New York was adopted in 1821. The executive administration is entrusted to a governor and a lieutenant-governor, who are elected by the people for two years. The legislature consists of a senate, of 32 members, who are chosen for four years; and an assembly, of 128 members, elected annually. The lieutenant-governor acts as president of the senate. For the election of senators the state is divided into eight districts, each of which sends four members, one of whom is elected every year. The members of the House of Assembly are elected by counties, in numbers proportioned to their population. The elections must be held in October or November, and the legislature must meet for business at Albany on the first Tuesday of January in every year.

The right of suffrage in the election of public officers belongs to every white male citizen of twenty-one years of age and upwards who has been an inhabitant of the state for one year and of the county for which he offers his vote for six months next preceding the election. Free men of colour, at least twenty-one years old, may vote if possessed of an unincumbered freehold estate worth 250 dollars.

For the administration of justice there are:—a chancellor and vice-chancellor; a supreme court, with a chief-justice and two associate-justices; and eight circuit-courts, one for each of the eight senatorial districts, with a judge for each. The judges are all appointed by the governor with the consent of the senate: they hold their offices during good behaviour, and until they shall be sixty years of age. Courts of common pleas are likewise held in each county in the state, for which purpose a first judge and four assistant-justices are appointed, each of whom holds office during five years.

With the exception of certain judicial and civil functionaries, ministers of religion, teachers in schools and colleges, and students, all able-bodied free white male citizens, between the ages of eighteen and forty-five, are subject to the performance of military duty in the militia. The number enrolled in the militia of the state at the beginning of 1839 was 176,115 men.

Inland Communication.—Great exertions have continually been made to extend the means of internal communication through the state, for which purpose the public money has been freely expended, and loans have been raised on the credit of the state. In the Report of the Canal Board, made to the legislature in 1837, it is stated that the length of canals, the property of the state, then finished and in operation, was 655 miles, the cost of which was 11,962,711 dollars. The state legislature began about twenty years ago this system of internal improvements, which has been carried on extensively and with great success. The first both in point of time and importance of its undertakings was the Erie Canal, which was begun in 1817 and finished in 1825. This canal, which connects the Hudson river with Lake Erie, is 360 miles in length, in the course of which an aggregate rise and fall of 662 feet is overcome by means of 81 locks: the difference of level between the Hudson and Lake Erie is 564 feet, the ascent of the canal to its summit-level being 613 feet, and the descent only 49 feet. The canal is throughout made 40 feet wide at the surface, 28 feet wide at the bottom, and 4 feet deep. Its course is as follows:—Beginning at Albany on the Hudson, it runs to the north along the west bank of that river to near the mouth of the Mohawk river, along the south bank of which it passes to the west through the counties of Albany, Schenectady, Montgomery, Herkimer, and Oneida to Rome; it then takes a south-west direction into Madison county, turns to the west, and passes through Onondaga county to within a mile of the Onondaga or Salt Lake, enters Seneca county, and crosses the Seneca river at Montezuma. Proceeding still to the west, it passes Lyons and Palmyra, and crosses the Genessee river at Rochester: its course is still to the west for 60 miles, when, turning to the south, it joins Tonnewanta Creek, 11 miles from the river Niagara. The Tonnewanta is used for 11 miles, when the canal leaves it and takes a southerly direction along the east bank of the Niagara to the termination of the canal at Buffalo on Lake Erie; thus connecting New York with the western states of the Union. New York is mainly indebted for this great work to Governor Clinton. [CLINTON.] The Champlain Canal joins the Erie Canal where its westerly course begins, near the confluence of the Hudson and Mohawk rivers; its course is nearly due north to Lake Champlain, comprising 48¾ miles of cutting and 15¼ miles of natural channel rendered navigable. The cost of these two works was 9,123,000 dollars, which occasioned a debt by the state of 7,771,000 dollars. The tolls in the first year after they were opened amounted to half a million of dollars, and have since progressively increased, until, in 1838, they reached 1,518,300 dollars. There were at the time the Report of the Canal Board was made (1837) in progress towards completion other canals 168 miles long, the estimated cost of which was more than 3,000,000 dollars; and beyond this an enlargement of the Erie Canal had been authorised by the state legislature at an estimated expense of fifteen millions of dollars. There were also private canals finished to the extent of 122 miles, and in progress 28 miles. Of railroads finished, in progress, and authorised, belonging to private companies, there were, in 1838—

	Miles.	Cost.
Finished . .	218	5,065,000 dollars
In progress . .	938	16,000,000 „
Authorised . .	1704	31,064,000 „

The state derives a considerable and constantly increasing yearly revenue from its canals. The surplus tolls of the Erie and Champlain canals, after defraying all expenses, were, in 1829, 478,694 dollars, and in 1838, 901,999 dollars: the average annual profit of the ten years was 806,704 dollars.

Property.—The value of real and personal estate within the state, as assessed for taxation, was, in 1838—

Real estate . .	502,864,006 dollars
Personal . .	126,680,778 „
Total .	629,544,784 „

and the amount of taxes levied upon the same for general and county expenditure was 2,860,476 dollars. This was a little short of one-half per cent. on the assessed value, and considered with reference to the population, not quite a dollar and a half (6*s.* 3*d.* sterling) for each individual.

Education.—The subject of education has long received the greatest attention on the part of the state legislature. For this purpose the state is divided into 10,583 school districts, which are required to make yearly returns of the number of scholars and the various expenses attending the same. In the year ending 30th of September, 1838, returns were made, by which it is shown that of 539,747 children between 5 and 16 years old, residing in those districts, there were taught in schools 528,913, or 48 in every 49. The amount of public money appropriated to the schools in that year was 335.882 dollars, or equal to 70,000*l.*

There are in the state several public institutions for the purpose of education, in addition to those established in the city of New York. Among these the following are the most important:—

Union College, at Schenectady, was incorporated in 1794, and derives its name from the circumstance of several religious denominations having combined for its establishment. The buildings are two brick edifices, each 200 feet long and four stories high. Each building has two wings 150 feet wide. This college is liberally endowed. It has a library of nearly 6000 volumes, besides the students' library of 9000 volumes. The number of students is usually between 200 and 250.

Hamilton College, at Clinton, 9 miles from Utica, was erected in 1812. It is a large building four stories high, with a library of 6000 volumes. The number of students is about 100.

Geneva College, situated at the town of that name, was founded in 1825. The number of students is 44.

Hamilton Literary and Theological Seminary, situated in Madison county, 25 miles south-west of Utica, was founded by the Baptists, and incorporated in 1819. This building is of stone, four stories high, 100 feet long by 60 feet deep. The number of students is about 100.

The Theological Seminary at Auburn was founded by the Presbyterians in 1821. It has 54 students and a library of 4500 volumes.

The Hartwig Theological Seminary was founded under the will of the Rev. J. C. Hartwig, a Lutheran minister, who bequeathed a large estate in land for that purpose. It contains 90 students and has a library of 1000 volumes.

The United States Military Academy, at West Point on the Hudson, was established in 1802, on a tract of 250 acres of land ceded by the legislature of New York to the United States. The staff, including the superintendent and commandant, professors and teachers, comprises 40 persons, and the number of cadets is limited to 250. The regular course of studies occupies four years. Each cadet is appointed by the president of the United States.

Prisons, &c.—The prison discipline adopted in this state has attracted considerable notice on the part of foreign governments, many of which have sent commissioners to the United States for the purpose of acquiring information upon the subject. [AUBURN.]

Asylums for the insane poor have been founded in the state, one of which, the State Lunatic Asylum at Utica, is calculated for the accommodation of 1000 patients.

Paupers are supported by a tax on the inhabitants of the counties to which they respectively belong, and are placed under the care of superintendents specially appointed for the purpose. The several counties are provided with poor-houses, to which a farm is attached, and in which the paupers are collected. The whole number of paupers relieved or supported during the year 1836 was 37,959, of whom 20,554 belonged to the city of New York. The sum expended for their relief was 396,100 dollars (82,520*l.*), one-tenth part of which was repaid by the produce of their labour. Among the number just stated, there were 6874 foreigners, 786 lunatics, 271 idiots, and 77 deaf and dumb. The number who were in the poor-houses on the 1st of December, 1836, was—males 3714, females 3294; together 7008.

Public Debt.—The public debt of the state of New York, as it stood in June, 1838, amounted to 18,262,406 dollars, nearly the whole of which has been incurred for the promotion of public works, chiefly canals and rail-roads. The revenue derived from the state canals has been sufficient during the last six years to defray all expenses of repairs, to pay interest on the whole amount of the state debt, and to provide towards its extinction an average surplus of 610,000 dollars. About four millions and a half of dollars have been thus paid off since 1825.

(Darby's *View of the United States;* Warden's *Account of the United States of North America;* Fowler's *Journal of a Tour in the State of New York;* Redfield's 'Account of two Visits to the Mountains in Essex County,' in *Journal of Science and Arts,* vol. xxxiii.; *American Almanac for* 1839; *Official Papers and Reports.*)

NEW YORK, the largest city in the state of New York, and the commercial capital of the United States of America, is built on the point of Manhattan Island, at the confluence of the Hudson and East rivers, in 40° 41′ N. lat. and 74° 1′ W. long. It was founded in 1609, by a party of Dutch merchants, to whom the states-general of Holland had granted a patent for the exclusive trade to Hudson's river, then called by the Indians the Manhattan; the same name was also then given to the island of New York. In 1621 an extensive but undefined territory on both sides of the Hudson was granted to the Dutch West India Company, and the city of New Amsterdam was built on the site of the former settlement. In 1664 a charter was executed by Charles II., conveying to the Duke of York the whole territory, from the eastern shore of the Delaware to the western bank of the Connecticut, and an armament was sent without delay from England to take possession of the country. At this time the Dutch and English were at peace, and this proceeding was justified on the ground that the whole territory of right belonged to the crown of England, having been discovered by the Cabots in the previous century, and that the Dutch settlers were intruders. After fruitless remonstrances on the part of the Dutch governor of New Amsterdam, Stuyvesant, the English obtained possession of the city and territory, and immediately changed the name of both to New York. The town at this time is said to have been handsome and well built, and to have contained 3000 inhabitants. Holland made no attempt at the time nor during the subsequent war to regain possession of the settlement, and at the peace of Breda it was formally ceded to England. In 1673, when England was again at war with Holland, the town was taken by a small Dutch squadron, not without suspicion of treachery, and without a shot being fired on either side. Peace being concluded in the following year, New York was restored to England. In 1682, the inhabitants having petitioned the Duke of York to give them some share in the management of their affairs, the same form of government was given to them as was already enjoyed by the other British plantations; a council was appointed by the proprietor, consisting of ten members; and a House of Assembly, composed of eighteen members, was chosen by the inhabitants, but the laws passed by these two bodies were to have no force until confirmed by the proprietor.

The citizens of New York early took part in the troubles that ended in the separation of the American plantations from England, and sent delegates to attend the general congress at Philadelphia, in September, 1774. In the summer of 1776 the English fleet under Admiral Howe, and the army under General Sir William Howe, having defeated the Americans under General Washington on Long Island, took possession of New York and retained it until the acknowledgement of American independence. The city was evacuated by the English on the 25th November, 1783, and was occupied by an American garrison the same day.

The island upon which New York stands is 15 miles long and from one mile to three miles broad. The city occupies the south part of the island; it extends along the Hudson about two miles, and along the East River, which divides it from Long Island, about four miles. The south-west part of the town, which was the earliest built, is ill-arranged, but the more modern parts are laid out with much regularity, and are well paved and lighted. Broadway, the principal street, which runs through the centre of the town, is three miles long and eighty feet wide. It contains several handsome churches, many of the principal hotels, and a great variety of elegant shops. Wall Street, which branches off from Broadway, contains the Exchange and most of the city banks, as well as the greater part of the merchants' and brokers' counting-houses, and the insurance offices. The City Hall, the front of which is of white marble, is 216 feet long, 105 feet wide, and 60 feet high. It contains the courts of law and the places of meeting for the municipal bodies. The building was begun in 1803, and finished in 1812, at the cost of half a million of dollars. The Merchants' Exchange, which was destroyed by the great fire that occurred on the 16th December, 1835, was also built of white marble; its front in Wall Street was 114 feet wide, and it extended in depth 150 feet; the basement was occupied by the Post-office. The Exchange which occupied the centre of the building, was of an oval form, 85 feet long, 55 feet wide, and 45 feet high, surmounted by a dome, through which light was admitted. The building was begun in 1824 and finished in 1827. The fire by which it was destroyed began near Wall Street; the number of buildings demolished was 529, valued at four millions of dollars, and the merchandise and other moveable property destroyed was valued at more than thirteen millions of dollars.

The population of the city in the years 1820, 1830, and 1835, as given in Williams's 'State Register,' was as follows:—

1820	123,706
1830	202,589
1835	270,089

	Dollars.
The value of the real estate assessed for taxation in 1835 was	143,732,425
And of the personal estate	74,991,278
Together	218,723,703

The amount of taxes levied in that year for public and municipal expenses was 1,095,994 dollars. This is equal to one half per cent. on the value, and to four dollars on each individual of the population.

It appears from the bills of mortality printed in the city, that the deaths in proportion to the population were, in 1835, one in 38; and in 1836, one in 34. The ages at which the deaths occurred in 1836, were,

Under 1 year (including 506 still-born)	2292
1 and under 2 years	1014
2 „ 5	841
5 „ 10	315
10 „ 20	303
20 „ 30	927
30 „ 40	945
40 „ 50	551
50 „ 60	309
60 „ 70	233
70 „ 80	148
80 „ 90	75
90 „ 100	16
	7969

Of this number 4352 were males, and 3617 were females. The deaths in the first six months amounted to $\frac{7}{16}$, and in the last six months to $\frac{9}{16}$ of the number. Among the deaths 1514 were caused by consumption, 506 were still-born, 142 were the direct result of intemperance, 262 arose from accidents and violence, 33 were suicides, and only 131 are attributed to old age.

The mortality of the city would be lessened by the construction of sewers to carry off the filth which accumulates in all populous places. Some parts of the town are better cleansed and ventilated than others, and it has been remarked that the fever by which New York is sometimes visited always first shows itself in the most confined and dirtiest parts of the town. The situation of the town is by nature favourable to healthiness. The constant ebb and flow of the tide prevent all stagnation of the air, and while it is sufficiently protected from the occasional violence of the sea breezes, they are not prevented from visiting the town. The strength of the tide would greatly facilitate the removal of all noxious matters. The city is very ill supplied with water, but measures are in progress for remedying this deficiency.

The situation of New York as a commercial port is admirable. New York Bay, which is completely land-locked, is about 8 miles long and from 1½ to 5 miles wide, and affords a perfectly safe anchorage. It is easy of approach, and is very rarely closed by ice. The entrance between Long Island and Staten Island, by a channel called the Narrows, is protected by forts, while the approach to it is facilitated by lighthouses, one of which is placed on a long tongue of land on the New Jersey shore called Sandy Hook; two others are erected about four miles south from Sandy Hook, and their lights, being 250 feet above the level of the sea, can be seen in fair weather at 40 or 50 miles distance. A fourth light-house is placed on Staten Island, at the narrowest part of the entrance to the harbour. The bay contains several small islands, which have been surrendered to the general government as sites for fortifications. There is sufficient depth of water, both in the Hudson and East rivers, for ships of large burthen to load and unload at the wharfs. The commercial intercourse with the interior and with the western states of the Union is secured by means of the Hudson and the system of canals which has already been noticed.

The tonnage of vessels that entered and cleared in each of the ten years from 1827 to 1836, was as follows:—

	Entered.			Cleared.		
	American.	Foreign.	Total.	American.	Foreign	Total
1827	261,301	39,242	300,543	239,968	33,375	273,343
1828	256,750	44,505	301,255	217,113	42,373	259,486
1829	259,382	30,219	289,601	219,674	32,855	252,529
1830	298,434	35,344	333,778	229,341	36,574	265,915
1831	315,972	77,719	393,691	254,331	72,444	326,775
1832	329,842	116,481	446,323	242,749	101,967	344,716
1833	454,218	161,949	616,167	384,175	153,566	537,741
1834	451,259	243,633	694,892	361,606	238,650	600,256
1835	676,173	357,575	1,033,748	589,855	343,078	932,933
1836	595,390	367,436	962,826	477,524	355,591	833,115

The value of imports and exports (stated in dollars) during the same period was as follows:—

	Imports.	Exports.		
	Foreign Goods.	American.	Foreign.	Total.
1827	38,719,644	13,920,627	9,913,510	23,834,137
1828	41,927,792	12,362,015	10,415,634	22,777,649
1829	34,743,307	12,036,561	8,082,450	20,119,011
1830	35,624,070	13,618,278	6,079,705	19,697,983
1831	57,077,417	15,726,118	9,909,026	25,535,144
1832	53,214,402	15,057,250	10,943,695	26,000,945
1833	55,918,449	15,411,296	9,983,821	25,395,117
1834	73,188,594	13,849,469	11,662,545	25,512,014
1835	88,191,305	21,707,867	8,637,397	30,345,264
1836	118,253,416	19,816,520	9,104,118	28,920,638

The disparity between the value of the imports and exports here exhibited is compensated by disparity in the opposite direction, in the commercial dealings of other parts of the American Union. A great part of the returns from foreign countries for the produce of Louisiana, Alabama, Georgia, Carolina, and Virginia, which is shipped direct from the ports of those states, is made through New York.

There are in the city of New York 21 banks, with capitals amounting in the aggregate to 18,111,200 dollars. Three have severally a capital of 2 millions of dollars; two have each 1½ millions; two have 1 million each, and the remaining 14 have each capitals from 750,000 to 200,000 dollars. The liabilities of the whole in the month of December, 1837, including their capitals, amounted, according to a report made by commissioners to Congress, to 55,620,834 dollars. There are also 28 fire-insurance companies, with capitals amounting in the aggregate to 10,250,000 dollars, and 13 marine insurance companies, whose united capitals amount to 4,550,000 dollars.

New York contains several learned and scientific societies. Among these are,—

The New York Historical Society, founded in	1804
New York Literary and Philosophical Society	
American Academy of Fine Arts, founded in	1808
National Academy of Design, founded in	1826
American Lyceum, founded in	1831
Medical Society of New York	

The University of New York, incorporated in 1831, has a capital of 120,000 dollars, raised in shares of 25 dollars. It is governed by a council, consisting of the mayor of the city, 4 members of the common council, and 32 persons elected by the shareholders from among their own body. The University comprehends two departments, one of which embraces the higher branches of literature and science, and the other provides instruction in classical, philosophical, and mathematical knowledge, with a course of study in English literature. There were in 1837, in the two departments, 17 professors and 226 students.

Columbia College, which is an institution for general literary instruction, in the city of New York, was founded in 1754, under the name of King's College. There are also the College of Physicians and Surgeons, the Theological Institution belonging to the Episcopal Church, and the New York Theological Seminary.

The earliest newspaper published in New York, the 'New York Gazette,' appeared first in 1725 (some accounts say 1733), and was issued weekly. There are now fifty-three newspapers published in the city, eleven of which appear daily, ten twice a week, twenty-six are published weekly, six semi-monthly, and one monthly. The number of sheets printed annually is estimated at 9,536,000. A list was given in 1834 of fifty-one weekly, monthly, and quarterly journals, magazines, and reviews, devoted to science and literature, which were published in the city of New York; many of these have no doubt been discontinued, and others may have since supplied their places.

NEW ZEALAND. [ZEALAND, NEW.]

NEWARK-UPON-TRENT, a town in Nottinghamshire, having a separate jurisdiction, though locally in the southern division of the wapentake of Newark, on an arm of the Trent 19¼ miles north-east of Nottingham, and 124 from London, by Biggleswade, Norman Cross, Stamford, and Grantham.

Newark was considered by Dr. Stukely to have been a Roman town; but the correctness of this opinion is doubtful, though many Roman antiquities have been discovered here. The Dr. considered it to have been the Sidnacester of the Saxons, which others place elsewhere. The first undoubted mention of it is in the time of Edward the Confessor, when it had already acquired the name of New-erk, or New Work, in contradistinction to some town or building of older date in the neighbourhood. The manor at an early period belonged to the see of Lincoln, and Alexander, bishop of that see, built or perhaps enlarged and strengthened the castle of Newark in the early part of the twelfth century. The castle came, a short time after, into the possession of the crown, and in the time of king John was besieged by the barons in the interest of Louis the Dauphin. John, coming to its relief, died at Newark, A.D. 1216. On the conclusion of the treaty between Henry III. (son and successor of John) and the Dauphin, some of the English adherents of the latter, fearing punishment, seized the castle of Newark, where they were besieged by the king's guardian, the earl of Pembroke, and obliged to surrender. The castle was subsequently restored to the see of Lincoln, and, with the exception of a short interval in the reign of Edward III., appears to have continued in its possession until the reign of Edward VI., by whom the town was incorporated. It was at Stoke, near Newark, that Henry VII. defeated Lambert Simnel and his supporters, A.D. 1487. In the civil war of Charles I. the townsmen zealously supported the king, and received a garrison from the forces of the marquis of Newcastle, of from 4000 to 5000 foot and above 500 horse: there were plenty of cannon on the walls. The incidents of that war are noticed elsewhere. [NOTTINGHAMSHIRE.]

The town is seated on the right bank of a stream, which is usually regarded as an arm of the Trent, but ought rather to be considered as belonging to its tributary the Devon. Two small islands, with water-mills on them, opposite the town, are in the borough limits.

The borough comprehended, in 1831, the parish of Newark and a very small portion of the adjacent parish of East Stoke, viz. the site of the castle, and the islands with the mills. It had an area of 2080 acres, with 2022 houses, inhabited by 2087 families; the population was 9557, a very small portion agricultural. The commissioners for regulating the boundaries of municipal corporations have recommended a new boundary-line, excluding a rural district comprehended within the former limits, but for parliamentary purposes the former boundary remains unaltered.

Newark is irregularly laid out, and consists of several streets, with a market-place near the centre of the town. It extends in length about a mile along the bank of the river, and in some parts about half a mile in breadth from the bank inland. It is well paved, and lighted with gas, under the provisions of local acts, and is well supplied with water. The houses built of late years have been mostly of an inferior class.

The church is one of the largest and most elegant in the kingdom: it was in great part rebuilt in the time of Henry VI. and Henry VII.; but there are in it some remains of a previous edifice of Norman character. It is a cross church, and consists of nave and chancel, with large aisles, transepts, and some chapels, with a tower at the west end, surmounted with a lofty and elegant spire. The general appearance of the exterior is of perpendicular character; some portions however rather partake of the decorated character. The length of the church is 218 feet, the breadth of the nave and of the chancel, with their respective aisles, 77 feet, and the breadth between the extremities of the transepts 117 feet. The height to the summit of the steeple is 240 feet. The interior has some good wood screen-work, some antient stained glass, and some brasses and other antient monuments.

The antient castle stood near the bank of the river: the south-western angle, the western wall washed by the river, a considerable part of a tower at the north-western angle, and parts of the north side of the building, remain. The western wall exhibits three distinct stories or tiers of apartments. The architecture varies with the period of erection of the various parts: some of it is Norman, but other portions were probably erected just before the civil wars of Charles I. Part of the inner area of the castle is used as a bowling-green, and the remaining portion has been recently converted into a large and commodious cattle-market. Just below the castle is a neat bridge of seven semicircular arches over the river, built of brick and faced with stone. The approach to Newark from the north is by a causeway a mile and a half long, carried over the flat island formed by the main channel of the Trent and the Newark branch, and leading to the bridge: in this causeway are several bridges and arches, to give free passage to the waters when the floods are out.

There are a court house, where the quarter-sessions for the division are held; a handsome town-hall, for the corporation business, the borough sessions, and assemblies; several dissenting meeting-houses and schools, &c., and St. Leonard's hospital or almshouses, built about the time of Charles I. There are some walls of an antient Augustine friary, now converted into a dwelling-house. The chapel of the antient hospital of the Knights Templars, converted into a dwelling-house, is yet standing.

The principal trade of Newark is in corn, malt, flour, coal, cattle, and wool. The market, which is on Wednesday, is well supplied with butcher's meat, fish, and poultry, and is one of the principal corn-markets in that part of the kingdom. There are six considerable yearly cattle-fairs. Large quantities of gypsum and lime-stone are obtained in the neighbourhood: the gypsum is burnt and pulverised for the use of plasterers and sculptors, and sent by water-carriage to London. Seventy men and boys are employed in plaster-pits and stone-quarries. Bricks and tiles are also made, and there are two large iron and brass foundries in the town. The arm of the Trent which passes by Newark is navigable: there is a lock in it close to the town.

The corporation, under the Municipal Reform Act, consists of 6 aldermen and 18 counsellors; the borough, by the same act, was divided into three wards, the previous boundaries of the borough being retained; but the municipal boundary commissioners recommend narrower limits, and have proposed a new division into two wards. The corporation have no property of their own. There are valuable charity estates, from which the church is kept in repair, and the salaries of the church officers, including the organist and singing-boys, are paid. Out of these funds also the town is lighted and paved, a dispensary is partly maintained, and the grammar-school, including two exhibitions to one of the universities, besides the national schools for boys and girls, and an almshouse, containing 12 men and 12 women, are supported. The town returns two members to parliament. The right of voting, before the Reform Act, was in the inhabitants paying scot and lot: 1362 voters polled in 1830. The number of 10*l.* houses is above 500, and the number of registered electors in the year 1835-6, including 10*l.* householders and the remaining scot and lot voters, was 1293.

Borough sessions are held every quarter, and petty sessions twice every week; there is a court of record for civil suits under 300*l.*, and a court of requests, obtained in the last session of parliament, for the recovery of debts under 5*l.* The borough gaol is small and very defective in its arrangement. Its abolition has been recommended by the inspectors of prisons.

The court of election for the southern division of the county is held at Newark, which is also a polling-station.

The living of Newark is a vicarage in the archdeaconry of Nottingham, formerly in the diocese of York, but now in that of Lincoln, of the clear yearly value of 325*l.*, with a glebe-house. It is in the gift of the crown.

There were in 1833 one dame-school with 13 children; the endowed grammar-school with 37 boys; two national schools, one each for boys and girls, with 246 scholars; and nineteen other day or boarding and day schools with 760 to 780 children; one day and Sunday school held at the workhouse, with about 12 to 15 children in the week and 25 on Sundays; and five Sunday-schools, with 1157 children.

(Dickinson's *Newark; Parliamentary Papers; Communication from Newark.*)

NEWBURG. [NEW YORK.]

NEWBURY, a corporate town and parish in the hundred of Faircross and county of Berks, is seated on the right bank of the river Kennet, 16 miles west by south from Reading, and 50 west by south from London, direct distances. The town is antient, being supposed to have originated from the Roman station Spinæ, which name is still preserved in that of Speenhamland, a hamlet in the parish of Speen, and contiguous to the town of Newbury. As early

At the time of William the Conqueror it was called Newbir or Newbyrig, and under that name was granted by the Conqueror to Ernulph de Hesdin. The principal streets are broad and well paved, and the town is lighted with gas. The church is a plain stone building, erected in the reign of Henry VII. There are several large malthouses and corn-mills, and there were formerly some woollen manufactories of importance; but they have long since disappeared.

In the great council convened at Westminster in the reign of Edward III., concerning trade and manufactures, Newbury had three representatives.

The average annual export of flour, malt, and unmanufactured grain is estimated at 7000 tons. The corn-market is held on Thursday. The fairs are held five times in the year. That in October is a statute fair for hiring servants. (Lysons.) The Kennet and Avon Canal passes through the town.

The police of the town was described in 1835 as insufficient, and considerable inconvenience was said to arise from the circumstance of the hamlet of Speenhamland forming part of the town without being subject to the jurisdiction of the corporate magistrates. The earliest charter of incorporation extant is that of 28 Elizabeth; the charter under which the corporation acted previously to the Municipal Reform Act is dated in the first year of the reign of James II. The revenue of the corporation, derived chiefly from the manor of Newbury, is only 120*l.* Prior to 1818 the corporation derived a considerable income from a toll upon all grain which passed through the town; but this was contested in the above year, and has not since been paid.

The population of the parish in 1831 was 5959. The parish is in the diocese of Salisbury. The living is a rectory, in the gift of the crown, and valued at 455*l.* per annum.

The 'corporation school,' as it is called, originated from a bequest of Mr. John Kindrick, in 1624, of the sum of 4000*l.*, to be applied by the corporation in furnishing employment to the poor of Newbury. Part of the revenue thence arising was first appropriated to the education and clothing of 20 boys in 1706. The funds of this charity were augmented in 1715 by certain landed property named in the will of Mr. Richard Cowslade, the rental of which in 1819 amounted to 97*l.*, and the number of boys clothed and educated was in consequence increased to 28. In 1790 there was a further bequest, by James Kimber, of funded property, yielding an annual dividend of 531*l.*, which he directed should be employed in the education, clothing, and apprenticing of ten boys. The boys on these three foundations form what is called the Newbury Blue-coat School. They meet in a room adjoining the church, and are taught by the same master reading, writing, and arithmetic. It is to be regretted that so little good should have been effected with such ample means. In 1819 none of the boys had been apprenticed; the master, who had held his situation for many years, was complained of as being neglectful of his duties. The annual expenditure on account of the charity had not exceeded 150*l.*, and the appropriation of the residue could not be satisfactorily accounted for in consequence of the funds of the charity not having been kept distinct from those of the corporation. For the other charities of Newbury, which include several almshouses, the reader is referred to the 'First Report of the Commissioners on Charities,' page 41.

In the reign of Edward I. Newbury returned two members to parliament. (Lysons' *Magna Brit.*, i., p. 319, given by him on the authority of Willis's *Notitia Parliamentaria.*) At what period it was disenfranchised does not appear. It is here that the Easter quarter-session for the county is held. The vicinity of Newbury is remarkable for the battles fought there in 1643 and 1644, between Charles and the parliamentary forces. (*Beauties of England; Parliamentary Papers*, &c.)

NEWBURY, PORT. [Massachusetts.]

NEWCASTLE, distinguished from other places of the same name as *Newcastle-upon-Tyne*, is locally in Castle Ward, in the county of Northumberland, of which county it is the assize-town. It is 274 miles from London, by Hatfield, Baldock, Stamford, Newark, Doncaster, Boroughbridge, Darlington, and Durham.

Newcastle appears to have derived its origin from Pons Ælii, the second station from the eastern extremity of the Roman wall. Several Roman remains furnish decisive proofs that it occupies the site of a station. Many coins were found in the piers of the old bridge thrown down by a flood in 1771, and the remains of a Roman well, two altars, fragments of walls, and large quantities of pottery, in digging the foundations of the new county court-house, A.D. 1810. Previous to the Conquest the place went by the name of Monkchester, from the number of monastic institutions. The town was also the resort of numerous pilgrims who came to visit the holy well of Jesus' Mount, now Jesmond, a mile north-east of the town. One of the principal streets in Newcastle is still called Pilgrim Street. There are considerable remains of the Black or Dominican Friary near Low Friar Lane. Another antient town, called Pampedon, appears to have been included in the limits of the modern Newcastle: this place was in the manor of Byker; its name is retained, though in a somewhat altered form, in the modern Pandon Hall, Pandon Bank, Pandon Dean, &c. It was from a fortress built by Robert, eldest son of William the Conqueror (A.D. 1079 to 1082), on his return from an expedition into Scotland, to which, in contrast to some more antient erection, the name of the *New Castle* was given, that the town derived its present name. In the rebellion of Mowbray, earl of Northumberland, against William Rufus, this fortress was taken by the king (A.D. 1095). In the reign of Stephen it came into the hands of the Scots, but in the reign of Henry II. (A.D. 1174), and John (A.D. 1213), it was repaired and strengthened. In the reign of Edward I., John Baliol did homage at Newcastle for his crown of Scotland. The town had been early incorporated, probably by William Rufus, but the first mayor was appointed in the reign of Henry III. (A.D. 1251). Edward I. gave the lands and tenements of Pampeden to the burgesses (A.D. 1299). The walls of the town, which had been erected perhaps in Rufus's time, were rebuilt on the eastern side, and it is likely that a portion of the old Roman wall of the station Pons Ælii was incorporated with them. Several of the early Anglo-Norman kings coined money at Newcastle.

In the reign of Edward III. the town was attacked, but without success, by David Bruce (A.D. 1342), in his invasion of England. At the siege of Calais (A.D. 1346) Newcastle furnished 17 ships and 314 mariners, a greater force than any other northern port except Yarmouth. In the wars with Scotland, Newcastle was a frequent place of rendezvous to the English forces, and it was the scene of several diplomatic meetings. In 1636 above 5000 persons died of the plague at Newcastle, an indication of the extent and population of the town. In 1640 it was deserted by the king's forces and occupied by the Scots, who had invaded England. In 1641 the Scots quitted the town, which in the ensuing civil war supported the king with great zeal. In 1644 it was besieged by the Scots, who had come to the support of the Parliamentarians, and taken by storm. In 1646 King Charles was brought hither from Newark by the Scots, to whom he had surrendered himself. In the Rebellion of 1715 the townsmen armed for the support of the government, and the place was occupied by a body of troops under General Carpenter. In 1740 a serious riot took place on account of the dearness of provisions. In the Rebellion of 1745-6 the town was occupied by the militia of the county, and by a regular military force under Marshal Wade.

The town has been more than doubled in size, and nearly so in population, during the present century. It is situated on the summit and declivities of three lofty eminences, rising from the north bank of the Tyne, and ten miles from its mouth. It extends about two miles along the bank. The town of Gateshead, in the county of Durham, occupies the opposite bank, and may be regarded as a sort of suburb of Newcastle. [Gateshead.] The limits of the municipal borough formerly included the town and county of the town of Newcastle, having an area of 2000 acres. The Boundary Act added to this, for parliamentary purposes, the townships of Elswick, Westgate, Jesmond, Heaton, and Byker; and these townships have been since added to the municipal borough, making the total area 4936 acres. The population, in 1831, was as follows:—County of the town of Newcastle, 42,760; townships of Elswick, 787; Westgate, 2996; Byker, 5176; Heaton, 501; Jesmond, 1393: total, 53,613. The population of Gateshead at the same time was 15,177: making a total of 68,790. At present, taking into account the rapid increase of buildings the population of Newcastle and Gateshead, with the adjacent villages, comprising a dense population, chiefly of colliers, may be estimated at 100,000.

In the central part of the town, which is the oldest, the streets are inconveniently narrow, and lined with old houses. Considerable improvements have however been made, and new streets have been opened in this part. In the upper and more modern parts of the town are spacious streets and squares, with regular ranges of elegant buildings. The most splendid of these streets, superior indeed to most streets in other provincial towns, is Grey Street, so named in honour of Earl Grey. The whole is well paved, and lighted with gas; the paving and lighting, which are described in the Municipal Commissioners Reports as indifferent, in many parts have been much improved since their visit. (*Municipal Commissioners' Reports.*) The principal improvements have been on the northern side of the town, where the corporation have erected a new market-house, and entire streets have been built of shops and houses of a superior description. A group of entirely new and uniform buildings, called Brandling Place or Village, has been erected in Jesmond township, north of Newcastle; and there is another assemblage of new and respectable houses on Rye Hill, in Westgate and Elswick townships, west of the town. The additions to the town eastward, along the bank of the river, are chiefly for commercial or manufacturing purposes. The improvements effected within the last five years have been very great, and many of them, as well as of preceding improvements, owe their origin to the skill and enterprise of a single individual, Mr. Grainger, a builder of Newcastle. The town is connected with Gateshead by an elegant stone bridge of nine elliptic arches, erected (A.D. 1776-1781) in place of a former bridge destroyed (A.D. 1771) by a great land-flood. It was widened in A.D. 1801. There are two streams running into the Tyne, one of which, the Pandon Burn, flows on the north side of the town, and is crossed by the high north road at Barras Bridge, and then, turning south, runs through or rather under one part of the town (for it is arched over) into the Tyne, about a quarter of a mile below the Tyne bridge; the other, the Ouse Burn, runs on the east side of the town, dividing the township of Jesmond from those of Heaton and Byker, and is crossed in several places by bridges over which roads lead from Newcastle to the places adjacent. It joins the Tyne half a mile below the Pandon Burn. A handsome bridge of three arches, built A.D. 1812, spans the deep and narrow valley of Pandon Dean.

Newcastle is adorned by a variety of public buildings. The church of St. Nicholas, in the centre of the town, is a large and handsome cross-church, 245 feet in length: it is chiefly of decorated English character. The steeple, which is at the west end, 201 feet high, is the most beautiful feature in the building, and is of late perpendicular. At the corners of the tower are bold buttresses, crowned by octagonal turrets with crocketted pinnacles: from the base of these turrets spring four flying buttresses, crocketted and peculiarly graceful in their forms; and on the intersection of these is placed a lantern crowned with a crocketted spire, and four crocketted pinnacles at the corners. This steeple has been imitated in those of St. Giles at Edinburgh, and St. Dunstan's in the East in London, and in other places; but the imitations fall far short of the original. The choir of the church, 110 feet long and 64 feet wide, is enclosed for service; the nave, 110 feet long and 74 feet wide, is without seats; the interior is adorned by a painted east window representing Christ bearing the cross, an altar-piece of the Last Supper, and several monuments. St. Andrew's church, on the north-west side of the town, is a very antient structure, part of it being of Norman architecture, but it has undergone repeated alterations and repairs. St. John's, near the west gate, is a large cross-church, chiefly of early English character, with a square embattled tower. It contains an antient font and several antient monuments. All Saints church, near the centre of the town, is a modern edifice of Grecian architecture, with a steeple 202 feet high. The interior is an ellipse 80 feet by 60. St. Ann's chapel is a plain building, with a light steeple, on the east side of the town, near the Ouse Burn. St. Thomas's chapel, lately erected in the Magdalene Meadows, near Barras Bridge, on the north road, in place of a chapel near the Tyne Bridge, now pulled down, is a beautiful building in the early English style, with a lofty tower. There are a number of dissenting places of worship, but none of them have any architectural claims to notice. The Guildhall, Exchange, and Merchants' Court, or hall of the incorporated company of hoastmen, form an extensive range of buildings, erected, altered, and enlarged at various periods: they contain several portraits of historical interest. The Mansion-house, a commodious brick building, near the river Tyne, is now disused as the residence of the mayor, and let for a warehouse. The town and county gaol is a massive stone building of modern erection, large and commodious, and admitting the requisite classification. The moot-hall, or County Court-house, erected in part of the precincts of the antient castle, is a building of elegant proportions, adorned with a fine portico of six Doric columns on the south front, and a similar portico of four columns on the north front. The architectural details are from the temple of Theseus at Athens. Much of the old castle, which was formerly used as a county prison and for holding the assizes, is yet standing; many alterations have been made in it within the last twenty or thirty years, but by no means in harmony with the original architecture of the building, which is Norman. The walls have a thickness varying from 14½ to 17 feet.

The Infirmary is a commodious and handsome building in the Westgate township: the institution is well managed, and all requisite accommodations for the patients are provided. The in-door patients average about 800; the out-patients about 700. There are a dispensary, a small lying-in hospital, a lunatic asylum under good management and well provided with accommodations, several ranges of almshouses, and other charitable institutions: the keelmen's hospital, for poor keelmen; Jesus' hospital, for decayed freemen, their widows and children; the Trinity almshouses; and the Westgate hospital (the last founded in commemoration of the peace of 1814), are the principal of these. The Literary and Philosophical Society, instituted A.D. 1793, occupies a handsome building of Doric architecture, comprehending a museum, a library, and other apartments. This society owes its origin chiefly to the Rev. Wm. Turner, a dissenting minister in the town. It was established in 1793; and the present building was erected 1822-25. Adjoining the library of the Literary and Philosophical Society are the rooms and museums of the Natural History Society of Northumberland, Durham, and Newcastle, and of the Antiquarian Society of Newcastle. There are a handsome theatre, assembly-rooms, and a riding-school, formerly a circus; public baths near the head of Northumberland Street, and a stand upon the race-course north of the town. There are extensive barracks, enclosed within a stone wall, north-west of the town. The royal arcade, an extensive pile of building, lately erected, is occupied by shops and offices. Two public cemeteries have been formed of late years near the suburbs of the town.

The commercial importance of Newcastle arises from its situation on a river navigable thus far by sea-borne vessels of 400 tons. The Tyne forms the haven, and is under the care of the corporation. The river side is lined with warehouses and extensive quays. The chief business is in the shipment of coals, the produce of the surrounding coal-pits. The coals are brought down the river in broad vessels called keels. The boatmen are called keelmen. The yearly export of coal in the ten years ending with 1832 averaged above 700,000 chaldrons sent coastwise, about half to London; the export over sea to the different countries of the Continent rose from about 45,000 to above 70,000 chaldrons in the same period. In 1833 the quantity sent coastwise was 1,921,848 tons; in 1834, 2,017,462 tons; in 1835, 2,261,401 tons; in 1836 2,280,713 tons; in 1837, 2,392,494 tons; and in 1838, 2,450,778 tons; the exports to foreign parts in the same years were 230,434, 227,444, 309,536, 415,849, 476,157, and 554,175 tons respectively. The other chief articles of export are lead, the trade in which has much increased; cast and wrought iron; glass and pottery; copperas and other chemical productions; soap, colours, grindstones, salt, and pickled salmon. The imports are wine, spirituous liquors, and fruit from the south of Europe; corn, timber, flax, tallow, and hides from the Baltic; and tobacco and various other articles from North America. The gross receipts at the custom-house for the years ending 5th January, 1836 to 1838, were 307,274*l* 19*s*. 3*d*., 413,796*l*. 17*s*. 6*d*., and 379,360*l*. 19*s*. 8*d*. respectively; the net receipts of the same years were 293,087*l*. 7*s*. 7*d*., 396,533*l*. 2*s*. 6*d*., and 361,311*l*. 8*s*. 8*d*. These receipts were not exceeded by those of any other ports in Great Britain, except London, Liverpool, Bristol, and Hull, in England; and by Greenock, Leith, and Glasgow, in Scotland. The number of ships which entered the port in the years 1832-8 was as follows:—

	British.		Foreign.		Total.	
Years.	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
1832	432	68,975	323	33,402	755	102,377
1833	506	80,285	261	31,804	767	112,089
1834	425	69,293	445	45,458	870	114,751
1835	466	75,352	348	37,159	814	112,511
1836	702	113,992	585	58,703	1207	172,695
1837	921	140,704	688	76,404	1609	217,108
1838	944	145,940	891	96,064	1835	242,004

Three or four vessels are sent every year to engage in the Davis's Straits whale-fishery. The salmon-fishery on the river has much declined. A number of steam-boats ply between Newcastle and Shields.

The chief manufactures are of glass-bottles and plate and crown glass, chiefly carried on in the township of Byker; this manufacture employed, in 1831, 350 men. The manufacture of steam-engines, mill-work, and other machinery employed from 130 to 140 men in 1831; and the different branches of the manufacture of leather, about 200 men. A number of persons were engaged in ship and boat building, block, mast, and sail making, flax-dressing, rope-making, coach-building, &c. There are several malt-houses, breweries, flour-mills, cooperages, printing-offices, and iron and lead-works, and chemical works. The lofty chimneys of these last, rising from 150 to 300 feet, form a striking feature of the town, and from the flatness of the surrounding country are seen at a great distance. (*Pop. Returns for* 1831.) Fire-bricks, coal-tar, and brown paper are made. Thirty years ago, the bricklayers' and slaters' labourers were chiefly females.

The inland trade of the town is considerable: there are two weekly markets, Tuesday and Saturday: the corn-market is a very important one; the market for wheat and rye, and that for oats, are held in different places; there is a handsome and commodious fish-market under the merchants' court, and large and commodious markets for butcher's meat and vegetables have been lately erected. There are several yearly fairs for woollen cloth, hardwares, leather, horses, and cattle. There are rail-roads from Newcastle to Carlisle, to North Shields, and to South Shields and Sunderland. Parliamentary sanction has been obtained for a railway from Newcastle to York. A Chamber of Commerce has been established for many years.

By the Municipal Reform Act, the borough was directed to be divided into seven wards; the corporation to consist of fourteen aldermen and forty-two councillors; by the revising barristers, agreeably to the permission given in the act, the number of wards was fixed at eight, but the alteration was not approved by the king in council. The revenue of the corporation averages from 30,000*l.* to 35,000*l.* per annum: the principal sources are rents (about 9000*l.*), a duty on coals and other goods exported (about 11,000*l.* of which 7000*l.* is coal duty), payments for liberty to deposit ballast (8000*l.*), tolls (nearly 2000*l.*), &c. The chief expenditure is for port and harbour charges (8000*l.* to 9000*l.*), repairing and cleansing the streets (4500*l.* to 5000*l.*), annuities and interest (about 8000*l.*), and charges on hospitals, schools, clergy, &c. (about 2500*l.*), the mayor's salary and expenses (above 3000*l.*), other salaries (about 3500*l.*), general repairs and improvements (above 2500*l.*), &c. (*Rep. of Municip. Commissioners.*)

Newcastle-upon-Tyne is a town and county; the assizes and the Epiphany quarter-sessions for the county of Northumberland are held in the Moothall, which is built on a piece of ground in the jurisdiction of Northumberland, though surrounded by the buildings of Newcastle. Assizes and quarter-sessions for the borough are held in the Guildhall at the usual periods; the recorder presides. There are a mayor's court and a sheriff's court, which have jurisdiction in suits of unlimited amount; a court of conscience for small debts under 40*s.*; and a court of conservancy for the river. There is a police force of 7 serjeants-at-mace and 80 constables, and a night-watch.

St. Nicholas is the mother-church of Newcastle: the benefice is a vicarage (united with the curacy of Gosforth) of the clear yearly value of 753*l.* with a glebe-house; and the vicar has the right of presentation to the perpetual curacies of All Saints (clear yearly value 330*l.*), St. Andrew (227*l.*), St. Ann (110*l.*), St. John, and St. James (244*l.*).

Besides the Philosophical Society and Antiquarian Society, there are a literary, scientific, and mechanical institution, an institution for the promotion of the fine arts, a Botanic and Horticultural Society, a Law Society, a Natural History Society, and a Philharmonic and Choral Society. There are several libraries connected with various public bodies, beside subscription news-rooms.

The total number of the day-schools of all classes (including boarding-schools) in the town and county of the town, in 1833, was ninety-six; of Sunday-schools twenty-one; in the added townships there were twenty-seven day-schools and nine Sunday-schools: making a total of one hundred and twenty-three day-schools and thirty Sunday-schools. The free grammar-school (in which the late lords Eldon, Stowell, and Collingwood, the poet Akenside, and other eminent persons received the earlier part of their education) was founded by Thomas Horsley, who was mayor of Newcastle in 1525. The Jubilee school is a Lancasterian school, established on occasion of the Jubilee, A.D. 1809, and supported by subscription, with a handsome school-house and a good library: the clergy Jubilee school, built to commemorate the fiftieth year of the prelacy of Dr. Shute Barrington, bishop of Durham, is a national school supported by an endowment and by subscription. There are several endowed schools and schools supported by subscription, including three infant-schools. There are a number of other benevolent societies.

(Brand's *History of Newcastle; Guide to Newcastle and its Environs*, by T. Sopwith, 1838; *Historical and Descriptive View of Northumberland*, Newcastle, 1811; Rickmans' *Gothic Architecture; Parliamentary Papers.*)

NEWCASTLE-UNDER-LYME,[*] a borough, market-town, and parish of Staffordshire, in the hundred of Pirehill, 150 miles from London on the road by Daventry, Coventry, and Lichfield, to Liverpool.

This place is of considerable antiquity, and was a corporate town as early as the reign of Henry II. It is referred to as such in a charter granted in that reign to Preston in Lancashire. The earliest extant charter to Newcastle is dated 19 Henry III., 1235. At a later period of the same reign a castle was built (or probably rebuilt) here by Edmund earl of Lancaster, the king's second son. The records of the borough are extant from 1386.

The town is situated about two miles from the right or west bank of the Trent, not far from the source of that river, and consists of several streets irregularly laid out, but well paved, and lighted with gas. It is supplied with good water. The houses are mostly old, but not deficient in neatness or uniformity. High-street along the Liverpool road is tolerably spacious. The town has two churches. One was rebuilt early in the last century, but has a lofty square tower of much greater antiquity, built of red-sandstone. The other church was built a few years since. There is a Catholic chapel, built in 1834, which is a Gothic building, constructed of ornamental bricks; and there are meeting-houses for Independents, Baptists, Unitarians, and several branches of the Methodists. There are a guildhall, having a clock with an illuminated dial, and a public office for the mayor and magistrates. There is a range of alms-houses for twenty alms-women, founded by Christopher Monk, duke of Albermarle, son of the famous George Monk. There are no vestiges of the antient castle except only a portion of the mound on which it was built, the rest having been levelled into the moat for purposes of cultivation.

The population of the borough, which is coextensive with the parish, was, in 1831, 8192; at present it is probably about 10,000. In 1831, 784 men were engaged in manufactures. The chief manufacture is that of hats. There are three silk-mills, a cotton and a paper-mill, the latter chiefly for the manufacture of a tissue-paper used in the potteries for printing the ware. A small portion of the inhabitants are engaged in the potteries. Markets are held on Monday and Saturday in the High-street. Besides the five annual fairs there are now five additional moveable cattle-markets held during the year. The town was formerly regarded as the capital of the pottery district, which is immediately adjacent; but this connection has been gradually diminishing of late years, much to the detriment of Newcastle. A still more serious loss to the town has arisen from travellers being now nearly altogether diverted from it to the Grand Junction Railway.

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[*] Old records point to an antient forest, or woodlands, originally separating Cheshire from the rest of England called *Lime*, probably from its standing on the *limes*, or border. It has been conjectured, with much probability, that a number of places situated on or near the tract formerly occupied by these lime woodlands have derived the addition of lyme (which is the most antient and authentic form), lyne, or line, to their names from such proximity.

Besides Newcastle-under-Lyme we have Ashton-under-Lyme, now under-Line, Burslem, antiently Burr-wardes-lime (the Saxon word *Bur* signifying a bower, cottage, or dwelling; *Wardes*, towards; and *lime*, the woodland tract). Madely-under-Lyme, Whitmore-under-Lyme, Norton in Salop (described in the Cartulary of St. Peter's Abbey, Shrewsbury, as Juxta nemus quod Lima dicitur), Helton-under-Lyme, and Audlem (Old Lyme).

There is a branch canal from this town to the Grand Trunk (or Trent and Mersey) Canal, which passes through the neighbourhood; and a canal from the coal-mines in Apedale, which affords a supply of coals to the town at a cheap rate.

The corporation, under the Municipal Reform Act, consists of six aldermen and eighteen councillors. The borough, by the same act, was divided into two wards, and the municipal boundaries were made coextensive with the parliamentary boundaries, which had been somewhat enlarged by the Boundary Act. The borough has a commission of the peace, and a good police: quarter-sessions and petty-sessions are regularly held. The corporation revenues are about 600*l.* per annum, a sum which is inadequate to meet the annual expenditure of salaries, rent charges in satisfaction of charitable bequests, &c.

Newcastle has returned members to parliament from 27 Edward III., and probably from an earlier date. The constituency, previous to the Reform Act, consisted of the resident freemen; the number was about 800. The number of houses, in 1831, assessed at 10*l.* annual value, was 267; the number estimated to be of that value was 360. Amongst other privileges, the burgesses have an exclusive right of pasturage on about 205 acres of fertile land, divided into four large fields, which were allotted to them under the Enclosure Act of 1816, in lieu of their antient right to one-third of the pasturage of about 600 acres, called the Town Fields. At the same time five acres, bordering the town on its eastern side, were set apart for public walks, together with funds for their support, and are now planted and laid out in an ornamental manner, to the great advantage of the inhabitants.

The living is a rectory, of the clear yearly value of 285*l.*, with a glebe-house, built in 1698.

There were, in 1833, in the borough, an infant-school, with 100 children; an endowed free grammar-school; four other schools, partly supported by endowment, with 118 children; nineteen other day-schools, with 499 children; one boarding-school, with 43 children; one national day and Sunday school, partly supported by endowment and partly by subscription, with 408 children in the week, and 625 on Sunday; and five Sunday-schools, with 1106 children. A Lancasterian school has been opened since these returns were made. There are a theatre; a permanent Book Society, established in 1815, having a library of upwards of 1500 volumes; and a Literary and Scientific Institution, founded in 1836, which also possesses a library. (*Communication from Newcastle-under-Lyme.*)

NEWCOME, WILLIAM, born 1729, died 1800, one of the eminent divines of the eighteenth century belonging to what was called the Liberal school, to which such men as Law, Paley, and many others belonged. The scene of his labours lay for the most part of the active period of life in Ireland, where he attained the highest dignity in the Church, being appointed archbishop of Armagh during the short administration of Earl Fitzwilliam in 1795.

His father was a clergyman at Abingdon, and he was educated at the grammar-school in that town, from whence he passed to the university of Oxford, where he became in due time a Fellow and tutor of Hertford College, where he had Charles James Fox for one of his pupils. In 1765 he became Doctor in Divinity, and in that year accompanied his patron, the earl of Hertford, when he went lord-lieutenant to Ireland. He went as chaplain, and a bishopric in that country soon falling vacant, he was placed in it: it was the see of Dromore. Entering the episcopal order thus early in life, it is not extraordinary that he had several translations, which were first to Ossory, then to Waterford, and finally to Armagh. A writer of some account of his life assures us that he 'diligently and faithfully discharged the duties of his episcopal office, and secured the respect of all parties and of all religious persuasions by the affability, prudence, candour, and moderation which were the invariable guides of his conduct.'

But the best praise of this eminent prelate is, that he was during the whole of his life a most assiduous biblical student, and that he did not suffer those studies to end in themselves, but laid before the world results which ensued upon them. He did not begin to lay these results before the public till he had maturely considered them, for he was nearly fifty before he printed any considerable work; but when he had begun, he showed that it was his great object to promote the knowledge and study of the Scriptures. His first work was 'The Harmony of the Gospels,' a work the title of which affords but an inadequate idea of its nature and contents, as, besides containing the results of his inquiries on a very difficult and important point of sacred history, it contains a great mass of valuable criticism and useful information. Out of this work arose a controversy with an acute antagonist, Dr. Priestley, on the duration of the ministry of our Savour; Bishop Newcome contending for three years, and Dr. Priestley limiting the time to one year. In 1782 he published his 'Observations on our Lord's Conduct as a Divine Instructor, and on the Excellence of his Moral Character,' a work of great beauty; and in 1785 a new version, with critical remarks, of the Twelve Minor Prophets. This was followed in 1788 by a similar work on the prophet Ezekiel. In 1792 he published his 'Review of the Chief Difficulties in the Gospel History relating to our Lord's Resurrection;' and in the same year, 'An Historical View of the English Biblical Translations.' This was his latest publication, except an Episcopal Charge; but after his death there was given to the world a very important work, which he had himself caused to be printed four years before his decease, entitled, 'An Attempt towards revising our English Translation of the Greek Scriptures,' in which he set the example of taking the benefit in an English version of those changes in the Greek text which the critical examination of existing manuscripts has shown to be expedient and necessary.

NEWFOUNDLAND, an island belonging to the British, is situated in the Atlantic Ocean, not far from the eastern shores of North America, between 46° 40′ and 51° 37′ N. lat. and 52° 25′ and 59° 15′ W. long. It is nearer to Europe than any of the islands, or any part of the continent, of America, the distance between St. John's and the harbour of Valencia in Ireland being only 1656 sea-miles. On the north-east, east, and south it is surrounded by the Atlantic Ocean. On the west of it lies the Gulf of St. Lawrence, which communicates at the northern extremity of the island with the Atlantic by the strait of Belle Isle, which is about 60 miles long and 12 broad, and deep and safe as a passage to and from the Gulf of St. Lawrence. Cape Rays, the south-western point of the island, is about 70 miles from North Point in Cape Breton; and this wide expanse of water unites the Gulf of St. Lawrence to the Atlantic on the south side of the island. The surface of Newfoundland is estimated at nearly 60,000 square miles, or something more than the area of England and Wales together. Its form approaches to that of a triangle.

The shores are rocky and high, and indented by broad and deep bays, which enter from 40 to 60 miles into the body of the island. The lands adjacent to the sea are bleak, rugged, and nearly destitute of trees or bushes; but at the heads of the bays and near the mouths of the rivers there are flats of some extent covered with trees. The interior of the island is nearly unknown: it seems to be diversified by hills, rivers, and numerous lakes. Towards the eastern coast the hills are low, and there are many trees of small growth; but towards the western coast it is more rugged, and the hills frequently rise to the height of mountains, and have little wood until within a few miles of the coast. The most elevated part is the northern peninsula, which lies along the Strait of Belle Isle. Towards the centre of the island there are flats of considerable extent, swampy, and mostly covered with peat. The hills and mountains do not generally form ridges, but each elevation seems to have its own peculiar base.

The climate of Newfoundland is influenced by its geographical position, by its exposure to the atmosphere of the Atlantic, and by the large fields of ice which, during the months of March, April, and May, are on their way from the northern shores towards the south, and cover the sea adjoining the island to a great distance. Great humidity prevails whenever the wind blows from the sea; and though the cold during the winter is severe, the harbours are not frozen so long as the most southerly of those within the Gulf of St. Lawrence. The cold is rather greater on the western coast and in the interior, but the atmosphere is generally clear and pure. During the summer months the days and nights are, with few exceptions, very pleasant.

At mid-day it is frequently very hot, and even oppressive; but in the mornings and evenings, and at night, the air is exceedingly agreeable. The most disagreeable periods are the setting-in and the breaking-up of the winter, and especially when the great islands of ice appear off the coast.

The climate is not too severe to allow cultivation, but it has hitherto been attempted only on a moderate scale. At the heads of the bays and along the lower course of the rivers there are many tracts of alluvial soil, which, with some outlay, could be converted into meadows, and if drained of the water which covers them when the snow dissolves, would yield good barley, oats, and potatoes. In many parts there is rich pasturage. Trees of any considerable size are only found within the bays, near the water, and along the rivers. On the Atlantic coast there is little wood of any value, except for fuel and the building of small boats. Spruce, birch, and larch compose the woods. Pine is rare and of small growth: mountain-ash is still less common. On the high unwooded grounds wortleberry-bushes predominate.

Deer are numerous, but beavers are not so common as they were formerly. Foxes are still numerous along the rivers and sea-coast. Fishing is at present almost the only occupation of the inhabitants: they take seals on the floating ice-fields in the spring, and cod in the summer along the eastern and southern coasts of the island, the coast of Labrador, and the Great Bank. The salmon, herring, and mackerel are also taken.

Coal, gypsum, and limestone are found in several districts, especially on the western coast, near St. George's Bay.

In the interior of the southern districts there is still a native tribe, the Mic-mac, who also occupy the peninsula of Gaspe, in Lower Canada, and extend into New Brunswick. The northern districts were formerly occupied by another tribe, called the Red Indians; but notwithstanding the careful search which was made some years ago to find out some individuals belonging to this tribe, none have been found, and it seems that the tribe is entirely extinct. The European settlers, all of whom are employed in the fisheries, are established on the coast, and especially on the peninsula of Avalon, which is united to the main body of the island by a low isthmus little more than three miles wide. This isthmus separates Trinity Bay from the bay of Placentia. The settlements on the other coasts are few and at a considerable distance from one another.

The port and town of St. John's is on the east side of the island. The entrance of the harbour is so narrow, that two large ships can hardly pass abreast with safety. There are twelve feet water in the middle of the channel. The harbour is spacious, and sheltered on all sides by high rocks: its fortifications are rather strong than extensive. The town runs along nearly the whole of the north side of the port, but there can scarcely be said to be more than one street, the others being irregular lanes. A few of the houses are of stone or brick, and some of the buildings are handsome, but the greater part are of wood. The public and government buildings are tolerably extensive. The population in summer hardly exceeds 10,000, but on the return of the fishermen it is increased to 15,000. Harbour Grace, the next town in importance, has a population of 5000; it is situated on the western shores of Conception Bay, and the harbour is safe, but rather intricate. The other settlements are small, and chiefly consist of a few wooden houses.

The Great Bank of Newfoundland is the most extensive submarine elevation that is known to exist in any ocean. It is about 600 miles long, and in some places 200 broad. The soundings on it are from 25 to 95 fathoms. The whole appears to be a mass of solid rock; its edges are abrupt, and deepen suddenly from 25 to 95 fathoms. The shallowest parts are the Cape Race, or Virgin Rocks; although there is about four fathoms on the shoalest parts, yet during a heavy sea a ship would be immediately dashed to pieces on them. The best fishing-grounds on this bank are between 42° and 46° N. lat. The Outer Bank seems to be a continuation of the Great Bank at a lower elevation. It lies between 44° 15′ and 45° 24′ W. long. and 44° 10′ and 47° 30′ N. lat. The soundings on it vary from 100 to 160 fathoms. Between the Outer and Great Bank the soundings vary from 120 to 218 fathoms. From the Great Bank to Nova Scotia there is a continuation of banks. The temperature of the water on the Great Bank is from 10 to 12 degrees colder than that of the surrounding sea; and when it comes into contact with the warm waters of the Gulf-stream, at its southern extremity, the difference amounts to 16 or 18 degrees. It is supposed that the fogs which generally hang over the banks, and hover along the coasts of Nova Scotia, Cape Breton, and Newfoundland, are produced by the vapours which arise from the meeting of the warm waters of the Gulf-stream with those which are brought down from the polar regions by the prevailing north-eastern winds. [FISHERIES.]

The first discovery of Newfoundland is due to some Norwegians, who, before the year 1000, sailed on a voyage of discovery from Greenland, and visited various parts of North America. Indeed it seems pretty well established that during the tenth and eleventh centuries the Northmen discovered and visited a great part of the eastern coast of America. (*London Geog. Journal*, vol. 8.) The existence of Newfoundland however seems to have been forgotten until its re-discovery, on the 24th June, 1497, by John Cabot, then in the service of England. The name Newfoundland was given by Cabot to the whole of the territories discovered by him. The continent and other islands have since received other specific names, while that of Newfoundland has been confined to this island.

Cabot, on his return to England, having reported the great abundance of fish discovered on the coasts of Newfoundland, many private adventurers shortly after proceeded to the spot; and it appears that so early as the year 1500, 'the fishery was carried on by Portuguese, French, Biscayans, and other nations, on the banks or shallows, and on the coast to the east and south of the island of Newfoundland.' At that time the island contained great numbers of bears, beavers, otters, red foxes, martens, and hares, and a profitable trade was carried on with the Indians for the skins of these animals, which were shipped to Europe. No attempt was made to form a settlement on the island until 1536, when a London merchant, Mr. Hoare, attempted, together with the crew of his ship, to pass the winter there, but, after undergoing great hardships, they returned to England before the winter was over. The next attempt was made in 1583, when Sir Humfrey Gilbert, half-brother of Sir Walter Raleigh, having obtained from Queen Elizabeth a grant of 200 leagues round any point on the island where he might choose to settle, proceeded there with 200 people in five small vessels. He formed his settlement in the Bay of St. John, but some of his people became dissatisfied and returned to England, and the remainder having embarked with him on an exploring expedition to the south part of the island, more than 100 of them were lost in one of the ships in a storm. Upon this, with the rest of his followers, he was proceeding towards England, when another storm overtook them, and their vessel foundered. Several attempts to form settlements were afterwards made and successively abandoned, until in 1623 Sir George Calvert, afterwards Lord Baltimore, formed a colony in the south-eastern part of the island, which he called Avalon, and appointed his son the governor. The nature of Sir George Calvert's title does not appear. Soon after the formation of the colony, he proceeded thither, in order that he might freely enjoy the profession of the Roman Catholic religion. Ten years later, a colony was sent from Ireland by Lord Falkland, then lord-lieutenant of that part of the kingdom; and in 1654 Sir David Kirk went there with a few settlers, under the authority of a parliamentary grant. In the meanwhile the French had established a colony in Placentia Bay, and constant disputes arose between them and the English settlers. The permission of the French colony was confessedly a matter of favour on the part of the English government, to which the French fishermen for some time paid a tribute of five per cent. on the value of the fish taken. This payment was relinquished by Charles II. in 1675, and the French fishery thereupon increased rapidly. In the declaration of war against France issued by William III. shortly after he was called to the throne of England, it was stated as one cause of that measure, 'that it was not long since the French took licences from the governor of Newfoundland to fish upon that coast, and paid a tribute for such licences, as an acknowledgement of the sole right of the crown of England to that island; but of late, the encroachments of the French upon that island and his majesty's subjects, trade, and fishery there, had been more like the invasion of an enemy than becoming friends who enjoyed the advantages of that trade only by permission.'

During this war, and in that which followed, considerable damage was done by the French and English forces to the settlements of their respective countrymen on Newfoundland. In 1708 the French attacked and nearly destroyed the town of Saint John, and succeeded in obtaining possession of nearly every settlement; but at the treaty of Utrecht the island was declared to belong wholly to England, the French being allowed to fish under certain regulations, and to occupy the small islands of St. Pierre and Miquelon at the entrance of Placentia Bay, but a garrison of only 50 men was allowed to be kept in each. The subject of fishery rights on the shores and banks of Newfoundland has since been the cause of some disagreement between the English and French governments, and at this time (1839) is far from being placed on a satisfactory footing; but the sovereignty of the island as settled by the treaty of Utrecht has remained undisputed.

The population of Newfoundland has always been very fluctuating. The sole inducement to settlers is offered by the fisheries, for the prosecution of which many persons take up their abode on the island only during the fishing season, and leave it during the winter. By a census taken in 1763 it appeared that the number of inhabitants was then 13,112 of both sexes and all ages. The population in 1806 was estimated at 26,500. A census has since been taken in each of the years 1823, 1828, and 1836, showing the following results:—

	Males.	Females.	Total.
1823 . .	31,746	20,411	52,157
1828 . .	34,617	23,471	58,088
1836 . .	41,467	32,238	73,705

The population in the several districts in 1836 was as follows:—

Districts.	Males.	Females.	Total.
Saint John	10,239	8,687	18,926
Conception Bay . .	12,842	10,373	23,215
Trinity Bay	3,751	3,052	6,803
Bonavista Bay . . .	2,898	2,285	5,183
Fogo	2,131	1,366	3,497
Ferryland	3,330	1,781	5,111
Placentia and St. Mary	2,644	2,057	4,701
Burin	1,775	1,365	3,140
Fortune Bay . . .	1,857	1,272	3,129
Total . . .	41,467	32,238	73,705

The produce of the fisheries at different periods will show the increasing importance of this colony. In 1763 there were taken and cured 386,274 quintals of codfish and 694 tierces of salmon. There were further exported 1598 tuns of train-oil, and furs to the value of about 2000*l.* In 1795 the fishery employed 400 sail of ships, of the aggregate burthen of 38,000 tons. The produce was 500,000 quintals of codfish, 3700 frails of salmon, 1000 barrels of herrings, 3300 tuns of cod and seal oil, and 4900 seal skins. There were also employed 2000 boats. In 1836 there were produced 860,354 quintals of codfish, 1534 barrels of herrings, 1847 tierces of salmon, 384,321 seal skins, and 9485 tuns of cod, seal, and whale oil, the value of the whole being 808,066*l.*

The inhabitants are in a great degree dependent for provisions upon importation. Salt provisions are sent from Ireland and Germany; large quantities of biscuit are also sent from Germany, flour is imported from the United States of America and from the north of Europe, and Indian corn meal from the United States. The agricultural return for 1836 states the number of acres in cultivation to be 11,062, and their produce 10,300 bushels of oats, 1,168,127 bushels of potatoes, and 6,975 tons of hay. The number of horses in that year was 1551, of horned cattle 5835, and of sheep 3103. The number of shipping that arrived at and departed from the colony in that year was as follows:—

	Inwards.		Outwards	
Countries.	Ships.	Tons.	Ships.	Tons.
Great Britain .	186	26,646	145	18,546
British Colonies	323	29,718	376	42,144
United States .	39	5,720	18	2,157
Foreign States .	252	36,746	246	32,710
Total .	800	98,880	785	95,557

The total value of imports in 1836 was 579,799*l.*, and of exports 787,099*l.*

(MacGregor's *British America*; Bouchette's *British Dominions in North America*; Chappell's *Voyage to Newfoundland*, 1818.)

NEWFOUNDLAND DOG, a well-known and fine variety of the dog, seldom seen in a state of purity, when it is comparatively small, but very muscular and strong, and generally black. The large, and, it must be confessed, handsome dogs, which are so often seen in this country, and pass for Newfoundland Dogs—"Dogs"—it is Col. Hawker, if we recollect right, who so designates them—'as big as a jackass and as hairy as a bear'—are very different from the compact and moderate-sized animals which, in their native country, are employed in drawing sledges and little carriages laden with wood, fish, or other commodities. Some of these true Newfoundland Dogs we have seen, and they make admirable retrievers. We have also seen the great and less pure *English* Newfoundland Dogs, so to speak, employed in the field for the same purpose with great success. One of the leading qualities of both, when so broken in, is the gallant manner in which they will face and penetrate cover, however thick and rough, in pursuit of the lost object. Whether it be furze, bramble, or blackthorn, in they dash, and almost always persevere till they have recovered the lost piece of game. As water-dogs they are above all praise. Their zeal, their devotedness, their entire abandonment of self when they rush to the rescue of some drowning wretch, are admirable; to be sure, in their eagerness to save, they sometimes encumber those with help who do not need it; and there have been instances where they have nearly destroyed the swimmer by their kindness. Directly they see anybody, or indeed any animal whatsoever, struggling in the water, in they jump, and seem to think that it is their duty never to leave them till they have got them out. They have been employed most successfully in wrecks, and will work against the most heavy sea; not always with success however. There is a case on record where the compact frame and indomitable courage of a bull-dog succeeded in carrying him through breakers which proved fatal to the Newfoundland breed. During a heavy gale a ship had struck on a rock near the land. The only chance of escape for the shipwrecked was to get a rope ashore, for it was impossible for any boat to live in the sea then running. There were two Newfoundland Dogs and a Bull-dog on board. One of the Newfoundland Dogs was thrown overboard with a rope tied round him, and perished in the waves. The second shared a similar fate; but the Bull-dog fought his way through that terrible sea; and arriving safe on shore, rope and all, became the saviour of the anxious people on the wreck.

The Newfoundland Dog is confiding, very sagacious, and capable of the warmest attachment to his master. The attacks of little dogs are generally either coolly looked down upon, as if hardly understood, or treated with marked contempt; but there are exceptions to this lofty behaviour: we saw a harmless and very affectionate pug receive his mortal hurt from one of these dogs, and that without the slightest provocation on the part of the poor little pug. This however was a bad-tempered exception to the general rule; and the Newfoundland Dog may, notwithstanding, be pronounced to be as generous as he is brave.

NEWHAVEN. [SUSSEX.]

NEWHAVEN. [CONNECTICUT.]

NEWMARKET is a market-town, situated principally in the county of Suffolk, though some part, including the whole of the race-course, is in Cambridgeshire. Its direct distance from London is 55 miles north-north-east, and from the town of Cambridge 12 miles west. The main street is long and wide, well lighted, but only partially paved. There is a filthy watercourse running directly through the heart of the town. The houses for the most part are modern and well built. The greater part of the town was destroyed by fire in 1623, and again in the early part of the last century. The destruction of property on the former occasion was estimated at 20,000*l.* Horse-racing does not appear to have been introduced here till about the close of the sixteenth century, when some of the horses which had escaped from the wrecks of the Spanish Armada are said to have been exhibited here, and to have astonished the spectators by their extraordinary swiftness. Soon after the accession of James I. to the English throne horse-racing became a fashionable diversion, and a house was erected at Newmarket for the accommodation of him and his court. This house having been much injured during the civil war, instructions to rebuild it were given by Charles II., who was a distinguished patron of the turf. Part is still standing, the rest having been pulled down: adjoining are the extensive stables formerly used for the royal stud. The race-course is on the western side of the town. It extends four miles in length, and is considered the finest in the world. The prosperity of the place is mainly dependent upon the company which the races never fail to attract, and the training of horses, many of which are exported or otherwise disposed of at high prices. The training-ground is on a gentle acclivity on the southern side of the town, and for its purpose is even superior to the race-course, preference being given to it for training horses destined to run in the most distant parts of England. The weekly consumption of oats by the horses, which are here during the greater part of the year, is estimated at 500 quarters. The races which take place during the year are seven in number, namely, the Craven meeting, on Easter-Monday; the two Spring meetings, which follow with one week's interval between each; the July meeting; and the three meetings in October, the last of which is the Houghton. The accommodations afforded by the hotels, inns, and coffee-houses is of the first class. Three plates are annually given by the king, and one under very curious conditions by the will of a Mr. Perram. The market-day is Tuesday. The fairs are held on Whit-Tuesday and on the 8th of November.

Newmarket consists of two parishes, All Saints and St. Mary's. The former is in Cambridgeshire, and in 1831 its population was 714; the latter is in Suffolk, and its population in the same year was 2134: making a total of 2848 persons. The living of All Saints is a perpetual curacy of 37*l.* per annum; that of St. Mary is a rectory, consolidated with the vicarage of Wood Ditton, which are together valued at 375*l.*, and are in the gift of the duke of Rutland. Both are in the diocese of Norwich.

The sum of 25*l.* was formerly paid annually by the Exchequer to the parochial authorities, under a donation, as it is understood, of Queen Anne, for the support of charity-schools at Newmarket, but it was withdrawn about three years ago. After deducting 8*l.* 15*s.* for office-fees, the residue was equally divided between the master and mistress of the national school, who are appointed by the rector of St. Mary's, and whose duty it was to afford gratuitous instruction to 21 boys and the like number of girls. The school is now supported by voluntary contributions, and 72 boys and 53 girls are educated according to the principles of the established church; the number on Sunday being increased to 91 boys and 85 girls.

The other charities of Newmarket, which are numerous, though of small amount, are mentioned in the 'Twenty-second Report of the Charity Commissioners,' pp. 173-5.

(*Beauties of England; Population Returns.*)

NEWPORT. [MONMOUTHSHIRE; WIGHT, ISLE OF.]

NEWPORT PAGNELL, a market-town in the parish of Newport Pagnell, hundred of Newport, and county of Buckingham, 12 miles north-east by east from the town of Buckingham, and 45 miles north-west by north from London (direct distances). It is seated near the junction of the rivers Ouse and Ousel, by the latter of which it is divided into two unequal parts, and over which there is an elegant iron bridge, erected in 1810. The streets are ill paved, and only occasionally lighted with gas. The water for the use of the inhabitants, till within the last fifty years, was supplied by means of machinery from the Ouse, but is now derived from a town pump situate in the High-street. The parish church has lately undergone thorough repair. It is a spacious building of considerable antiquity, dedicated to St. Peter and St. Paul, and stands upon an eminence from which there is a fine view of the surrounding country. The living is a vicarage in the diocese of Lincoln, and in the gift of the crown, with a net annual income of 230*l.* There are in the town three other places of worship; the Independent Chapel was found by John Gibbs, who was ejected from the vicarage, and in which the Rev. Wm. Bull, the 'Delphic Oracle' of Cowper, preached for half a century. It is not a little singular that there are four private burial-grounds in this parish, only one of which is consecrated, namely, the one situated in the gardens of Tickford Abbey. The only manufacture of the town is that of bone lace, which, though not carried on to so great an extent as formerly, still forms a staple trade. There is a market every Saturday, and seven fairs are held in the year, four of which are supposed to have been chartered by Alfred the Great.

About the time of the Norman Conquest the manor of Newport was in the possession of William Fitzansculf, a powerful baron and ancestor of the Paganells, from whom the name Pagnell is derived. During the civil war the town was garrisoned by Prince Rupert, but was subsequently taken by the parliament, and retained by them during the remainder of the war. Sir Samuel Luke, conjectured to be the prototype of Hudibras, was its governor in the year 1645. (Lysons, i. 612.)

There are four schools, a national and a Lancasterian school, a girls', and an infant school, which are supported by voluntary donations. There is also a foundation for teaching twenty girls to read, write, and work, endowed by Dr. Atterbury with 10*l.* per annum; and a charity school for girls, supported by Mrs. Van Hagen. There is a Mechanics' Institution; and an academy, supported by the dissenters, for the education of young men for the Christian ministry. The principal charities of the place are Revis's almshouses and Queen Ann's hospital, so called from Ann, consort of James I., by whom it was refounded. The revenue of the former, 164*l.* per annum, is partly applied to the support and clothing of the seven aged persons appointed by the trustees to be the occupants of the almshouses, and partly towards defraying the expense of certain weekly stipends and distributions of bread, &c. The annual income of the hospital is 261*l.*, and is appropriated to the support of a master and six poor men and women, and an allowance of 20*l.* per annum to the vicar as master thereof.

The entire parish of Newport Pagnell, in the year 1831, contained a population of 3385 persons.

(Lysons' *Magna Britannia; Beauties of England and Wales; Twenty-seventh Report of the Commissioners on Charities*, pp. 148-175, &c.; *Communication from Newport Pagnell.*)

NEWRY, a town in Ireland, partly in the lordship of Newry in the county of Down, partly in the barony of Upper Orior, in the county of Armagh. It is on the Newry Water, which divides it into two parts, 38 English miles south-south-west of Belfast, and about 64 north of Dublin by Drogheda and Dundalk. The Newry Water flows into Carlingford Bay.

There was in antient times a monastery here, and a castle built by Sir John de Courcy, one of the early Anglo-Norman conquerors of Ulster; which castle was destroyed by the Scotch in their invasion of Ireland under Bruce. Being rebuilt, it was again destroyed in the rebellion of Shane O'Neal; but was a second time restored by Bagnal, Marshal of Ulster, who also rebuilt the town and repeopled it with Protestant settlers. Newry suffered in the civil war of 1641, and was destroyed by the army of James II. in their retreat from the north in 1689, only the castle and six houses being left standing.

The greater part of the town is on the eastern bank of the Newry Water in the county of Down, and is connected with the remaining part in the county of Armagh by several bridges over the Newry river or the Newry canal. The borough limits include a considerable rural district: there were, in 1831, 1992 houses, inhabited by 2566 families; the population was 13,065: the entire parish, which also extends into O'Neilland West barony in the county of Armagh, had a population of 25,117: nearly 400 men were employed in manufactures. The town is well built in the modern part, and is lighted with gas; it is increasing in wealth and extent. The main street consists of good houses: four of the bridges are of stone; there are spacious assembly-rooms; a neat and commodious custom-house; a church of Gothic architecture, built twenty years since at a cost of more than 12,000*l.*, with a tower and spire 190 feet high; a chapel-of-ease, formerly the parish church; two Catholic chapels, one of which is considered to be the diocesan chapel of the Catholic bishop of Dromore; a friary, which is also a seminary preparatory to the college of Maynooth; two Presbyterian meeting-houses, one of them large and elegant; some other dissenting places of worship; a barrack for 700 men; and an hospital capable of accommodating 30 or 40 patients.

There are at Newry iron-foundries on an extensive scale, and forges for making shovels, spades, and other iron goods; flint-glass and cordage are manufactured, and there are in and about the town a distillery and several flour or oatmeal mills. The trade of the town is great, and it has lately much increased, especially in the export of grain and the import of timber; it communicates with Carlingford Bay five miles distant, by a ship canal, and with Lough Neagh by a boat canal, both parallel or nearly so to the river in that part of their course which is near the town. Lower down the ship canal opens into the river, by the bed of which it communicates with the bay; and the boat canal unites with the river Bann, by the bed of which it enters Lough Neagh. On the east side of the canal is a line of quays with warehouses; and northward from them is a dock for boats to take in or discharge their cargoes. The gross receipts of duties at the custom-house were in 1836 more than 58,000*l.* The chief trade of the port is with Great Britain. Irish produce, especially corn and cattle, and Irish manufactures, are sent to Liverpool and Glasgow; the imports are timber, coal from Lancashire and Scotland, tea, sugar, salt, British hardware, and other manufactured goods. The chief foreign trade is with the United States and British North America, the Mediterranean, Odessa, the Baltic, and Archangel. There is communication by steam-packets with Liverpool and Glasgow. The steam-boats do not go up to Newry, but to Warren Point, about six miles below, where also the larger trading vessels discharge their cargoes. A great number of labourers embark at Newry for the harvest in England, and few come back without 6*l.* or 7*l.* earned by their labour in England. There are markets on Tuesday, Thursday, and Saturday; the first is for grain, the last is for meat. There are two yearly fairs.

Newry was incorporated 10th James I. The corporation has however become extinct, but the town retained the privilege of returning two members to parliament up to the Union, when the number was reduced to one. It was, before the Reform Act, a scot and lot borough. The number of voters, 5*l.* (Irish) and 10*l.* householders, registered in 1832, 1833, and 1834, was 1156; but the former class of voters will be allowed to become extinct on the death or removal of those who at present possess the suffrage. The seneschal of the manor of Newry is the returning officer.

There is a manorial court held by the seneschal of the manor, having jurisdiction in suits under 100 marks. The quarter-sessions for the Newry division of the county of Down are held here twice in the year; quarter-sessions for the county of Armagh are also held twice in the year in that part of the town which is in Armagh county. Petty sessions are held weekly. The police force consists of detachments of the constabulary of the two counties. The parish of St. Mary, Newry, is a donative in the gift of the Earl of Kilmorey, who is impropriator of the tithes, and exercises (as lay abbot, or representative of the former abbots of a Cistercian abbey, which existed in the town prior to the Reformation), episcopal jurisdiction, holding ecclesiastical courts, and granting probates of wills and licences for marriage, subject only to the metropolitan jurisdiction of the archbishop of Armagh. The vicarage is endowed by the Earl of Kilmorey with 400*l.* per annum, but the net revenue is diminished to one half by the payment of curates' salaries. There is no glebe-house. The church and chapel-of-ease are attended by about 1000 to 1100 persons, chiefly in the morning. Three Catholic chapels in the parish are attended, chiefly in the afternoon, by about 3600 or 3700 persons; the various Presbyterian meeting-houses by nearly 2000 persons; and the other congregations by about 700 persons, chiefly in the evening. There are several schools, most of which are aided or supported by endowments or donations.

NEWSPAPERS. Some persons are of opinion that the origin of newspapers may be traced to the 'Acta Diurna' of the Romans. [ACTA DIURNA.] However this may be, it was not till the sixteenth century that anything at all approaching to the nature even of the 'Acta Diurna' existed in modern times. The war which the Republic of Venice waged against the Turks in Dalmatia gave rise, in 1563, to the custom in Venice of communicating military and commercial news by written sheets, which were read in a particular place to those desirous to hear them, and who paid for this privilege in a coin no longer in use, called *gazzetta*, a name which, by degrees, was transferred to the newspaper itself in Italy and France, and passed over into England. The Venetian government eventually gave these announcements in a regular manner once a month; but they were too jealous to allow them to be printed. Only a few written copies were transmitted to various places, and read to those who paid to hear. Many volumes of these manuscript newspapers exist in the Magliabecchian library at Florence.

It is to England, or rather to Lord Burghley, the able minister of Queen Elizabeth, that the honour of commencing printed sheets of public intelligence is now generally ascribed. The earliest of those which remain (copies are preserved among Dr. Birch's Historical Collections in the British Museum, No. 4106) relate to the descent of the Spanish Armada upon the English coasts; but as they are numbered 50, 51, and 54, in the corner of their upper margins, it has been not improbably concluded that a similar mode of publishing news had been resorted to considerably earlier than the date of that event, though, as far as we know, none of the papers have been preserved. 'The English Mercurie, published by authoritie for the contradiction of false reports,' was the title of these papers, and the last number contains an account of the queen's thanksgiving at St. Paul's for the victory she had gained over the enemies of England. It is probable that when the great alarm of the Armada had subsided, no more numbers were published. It must not however be concealed that doubt is entertained of the genuineness of these papers. Two of them are not of the time, but printed in modern type; and no originals are known: the third is in manuscript of the eighteenth century, altered and interpolated with changes in old language such only as an author would make.

From the time that 'The English Mercurie' (if genuine) was given up, we find no continued vehicle for political intelligence with a fixed title in England for many years. In the reign of James I., packets of news were published in the shape of small quarto pamphlets occasionally. The earliest we have met with, preserved in the second volume of the series of newspapers purchased with Dr. Burney's library (also in the British Museum), is entitled 'News out of Holland,' published in 1619 for N. Newbery, followed by other papers of news from different countries in 1620, 1621, and 1622. There can be no doubt of the genuineness of these. In 1622, when the Thirty Years' War and the exploits of Gustavus Adolphus excited curiosity, these occasional pamphlets were converted into a regular weekly publication, entitled 'The News of the Present Week,' edited by Nathaniel Butler. This seems to have been the first weekly newspaper in England.[*]

About this period newspapers began also to be established on the Continent. Their originator at Paris is said to have been one Renaudot, a physician, who had found that it was conducive to success in his profession to be able to tell his patients the news. Seasons were not always sickly, but his taste for collecting news was always the same, and he began to think that there might be some advantage in printing his intelligence periodically. His scheme succeeded, and he obtained a privilege for publishing news in 1632. It would appear that not long after this time there were more newspapers than one in England.

Upon the breaking out of the civil war in Charles the First's time, great numbers of newspapers, which had hitherto been chiefly confined to foreign intelligence, were spread abroad by the different parties into which the state was then divided, under the titles of 'Diurnals,' 'Special Passages,' 'Intelligencers,' 'Mercuries,' &c., mostly in the size of small quarto, and treating of domestic matters. Nearly a score are said to have come out in 1643, when the war was at its height. Heylin, in the address prefixed to his 'Cosmographie,' enjoins the reader not to think himself unsatisfied in his expectation, if he find not in it 'the situation and affairs of each town of war or the quartering-place of every company or troop of soldiers, which are presented to him in the weekly news-books.' Hence we find some papers entitled 'News from Hull,' 'News from the North,' 'The Last-printed News from Chichester, Windsor, Winchester, Chester,' &c., and others too numerous to mention. We also find 'The Scots Dove' opposed to 'The Parliament Kite,' or 'The Secret Owl.' Keener animosities, as D'Israeli remarks, produced keener titles: 'Heraclitus Ridens' was met by 'Democritus Ridens,' and 'The Weekly Discoverer' was shortly met by 'The Discoverer Stript Naked.' 'Mercurius Britannicus' was grappled by 'Mercurius Mastix faithfully lashing all Scouts, Mercuries, Posts, Spies, and others.' Mercurius was the favourite name, with another word to indicate the character of the party from which it emanated. Whenever any title however grew popular, it was stolen by the antagonist, who thus conveyed his opinions to those who would not have received them had he not worn the appearance of a friend.

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[*] Before the introduction of printed newspapers, it appears that great families had a sort of gazetteers in London, who transmitted to them the news of the day in written letters. This custom accounts for the following memorandum preserved in the Clifford family: 'To Captain Robinson, by my lord's commands for writing letters of news to his lordship for half a year, five pounds.' (Whitaker's *Hist. of Craven.*)

D'Israeli, in his 'Curiosities of Literature,' gives an account of the two principal persons who were at this time concerned in the newspaper press, Marchant Needham and Sir John Berkenhout. 'Marchant Needham,' he says, 'the great patriarch of newspaper writers, was a man of versatile talents and more versatile politics, a bold adventurer, and most successful because the most profligate of his tribe. From college he came to London; was an usher in Merchant Taylors' school; then an under-clerk in Gray's Inn; at length studied physic and practised chemistry; and finally he was a captain, and, in the words of honest Antony à Wood, 'siding with the rout and scum of the people, he made them weekly sport by railing at all that was noble in his intelligence, called Mercurius Britannicus, wherein his endeavours were to sacrifice the fame of some lord, or any person of quality, and of the king himself, to the beast with many heads.' He soon became popular, and was known under the name of Captain Needham of Gray's Inn; and whatever he now wrote was deemed oracular. But whether from a slight imprisonment for aspersing Charles I., or some pique with his own party, he requested an audience on his knees with the king, reconciled himself to his majesty, and showed himself a violent royalist in his 'Mercurius Pragmaticus,' and galled the Presbyterians with his wit and quips. Some time after, when the popular party prevailed, he was still further enlightened, and was got over by President Bradshaw as easily as by Charles I. Our Mercurial writer became once more a virulent Presbyterian, and lashed the royalists outrageously in his 'Mercurius Politicus:' at length, on the return of Charles II., being now conscious, says our friend Antony, that he might be in danger of the halter, once more he is said to have fled into Holland, waiting for an act of oblivion. For money given to a hungry courtier, Needham obtained his pardon under the great seal. He latterly practised as a physician among his party, but lived universally hated by the royalists, and now only committed harmless treasons with the College of Physicians, on whom he poured all that gall and vinegar which the government had suppressed from flowing through its natural channel.' In buffoonery, keenness, and boldness, Sir John Berkenhout, the other principal news-writer of the day, was not inferior, nor was he at times less an adventurer than Needham. His 'Mercurius Aulicus' was devoted to the court, then at Oxford. Beside newspapers, he was the author of numerous small political pamphlets abounding in wit and satire.

In 1662 the 'Kingdom's Intelligencer' was commenced in London, which contained a greater variety of useful information than any of its predecessors. It had a sort of obituary, notices of proceedings in parliament and in the law courts, &c. Some curious advertisements also appear in its columns. In 1663 another paper, called 'The Intelligencer, published for the satisfaction and information of the people,' was started by Roger (afterwards Sir Roger) L'Estrange, who warmly espoused the cause of the crown on all occasions, and infused into his newspapers more information, more entertainment, and more advertisements of importance than were contained in any succeeding paper whatever previous to the reign of Anne. L'Estrange continued his journal for two years, but dropped it upon the appearance of the 'London Gazette,' first called the 'Oxford Gazette,' owing to the earlier numbers being issued at Oxford, where the court was then holding and the parliament sitting, on account of the plague being in London. The first number of what has still continued to the present time, as the 'London Gazette,' was published at Oxford, February 4th, 1665. So numerous did these little *books of news*, as they were called, become at this time, that between the years 1661 and 1668 no less than seventy of them were published under various titles.

On the 12th of May, 1680, L'Estrange, who had then started a second paper, called the 'Observator,' first exercised his authority as licenser of the press, by procuring to be issued a 'proclamation for suppressing the printing and publishing unlicensed news-books and pamphlets of news, because it has become a common practice for evil disposed persons to vend to his majesty's people all the idle and malicious reports that they could collect or invent, contrary to law; the continuance whereof would in a short time endanger the peace of the kingdom; the same manifestly tending thereto, as has been declared by all his majesty's subjects unanimously.' The charge for inserting advertisements (then untaxed) at this period, we learn from the *Jockey's Intelligencer*, 1683, to be 'a shilling for a horse or coach, for notification, and sixpence for renewing;' also in the 'Observator Reformed' it is announced that advertisements of eight lines are inserted for one shilling; and Morphew's 'Country Gentleman's Courant,' two years afterwards, says, that 'seeing promotion of trade is a matter that ought to be encouraged, the price of advertisements is advanced to two pence per line.' The publishers at this time however were sometimes puzzled for news to fill their sheets, small as they were; but a few of them got over the difficulty in a sufficiently ingenious manner. The 'Flying Post,' in 1695, announces, that 'if any gentleman has a mind to oblige his country friend or correspondent with this account of public affairs, he may have it for two-pence of J. Salisbury, at the Rising Sun in Cornhill, on a sheet of fine paper, *half of which being blank*, he may thereon write his own private business, or the material news of the day.' Again, 'Dawker's News-Letter:' 'This Letter will be done upon good writing-paper, and blank space left, that any gentleman may write his own private business. It will be useful to improve the younger sort in writing a curious hand.' Another publisher had recourse to an expedient for filling his sheet, curious enough; wherever there was a dearth of news, he filled up the blank part with a sufficient proportion from the Bible.

It was not until the reign of Anne that the Londoners enjoyed the luxury of a newspaper every day. The first was issued in 1709, and called 'The Daily Courant,' being published every day but Sunday. There were at this time seventeen others published thrice a week, and one twice. Among them was the 'British Apollo,' the 'General Postscript,' the 'London Gazette,' the 'Postman,' the 'Evening Post,' and the 'City Intelligencer.'

It was about this time that a new species of publication came out, which, although it would scarcely be regarded as belonging to the family of newspapers now, was held to be so then; and in fact, for a considerable time after it was commenced, it included articles of news along with its other matter. We allude to those admirable publications, the 'Tatler,' 'Spectator,' 'Guardian,' &c., which formed the models of so many subsequent publications of the same kind. The first number of the 'Tatler' was published on the 23rd of April, new style, 1709; the last on the 2nd of January, 1711. Much space was occupied in each by advertisements, and the price of each number was a penny. The publication of the 'Spectator' began March 1, 1711, at the same price; but upon the imposition of the halfpenny stamp-duty, which began August 1, 1712, the price was raised to two-pence. The halfpenny tax is conjectured to have been the cause of the 'Spectator' being stopped in the beginning of 1713. It was however immediately followed by the 'Guardian,' the first number of which appeared on March 2nd, 1713. This paper soon dropped, and was succeeded by the 'Englishman' in October the same year (professedly political). The 'Englishman' lasted for two years, and was in its turn supplanted by the 'Freeholder,' on December 23rd, 1715; the latter work being almost the sole production of Addison.

It may be sufficient to notice in few words two or three of the more remarkable journals only which have since succeeded. The 'Public Advertiser' was first printed under the title of the 'London Daily Post and General Advertiser,' so far back as 1726, and assumed its later name only in 1752. This paper was the vehicle through which 'Junius's Letters' were given to the world. The 'St. James's Chronicle' is another of our oldest papers; at its first publication it was an amalgamation of two papers (the 'St. James's Post' and the 'St. James's Evening Post'), both of which begun in 1715. The 'North Briton,' edited by Wilkes, first appeared in 1762; and in the same year the 'Englishman' was established. The 'Englishman' attracted much notice about 1766, on account of the insertion of several satirical articles in it by Burke.

The following account of the origin of the newspaper stamp is given by Cooke, in his 'Life of Bolingbroke.' 'Queen Anne, in one of her messages to parliament, declared that, by seditious papers and factious rumours, designing men had been able to sink credit, and that the innocent had suffered; and she recommended the House to find a remedy equal to the mischief. In obedience to the Queen's desire, and at the instance of her secretary, the parliament passed a bill, in 1712, imposing a stamp duty upon pamphlets and publications. At its origin the amount of this stamp was a halfpenny; and it is curious to observe what an effect this trifling impost had upon the circulation of the most favourite papers. Many were entirely discontinued, and several of those which survived were generally united into one publication.' The act which imposed this duty is 10 Anne, c. xix. It is to this act that Swift alludes in his Journal to Stella, under August 7, 1712: 'Do you know that all Grub Street is dead and gone last week?'

By the 6th and 7th Wm. IV., c. 76, the stamp-duty on newspapers, which had been gradually raised to 4*d.* (with a discount of 20 per cent.), was reduced to 1*d.* (without any discount), a discount of 25 per cent. being allowed for Ireland. The quantity of letter-press on a sheet of paper bearing a stamp of 1*d.* is limited to 1530 square inches on one side. If it exceeds 1530 square inches, but does not exceed 2295, the stamp is 1½*d.*; above 2295, it is 2*d.* A supplement not exceeding 765 square inches of print on one side published with any newspaper, is chargeable with a duty of ½*d.* The title of every newspaper is now printed on its stamp, it having been found that in the returns the stamps entered as used by one paper were frequently used by another; and the stamp returns may now be relied upon as shewing the actual circulation of each newspaper.

In 1836, when the stamp-duty was 4*d.*, the total number of stamps issued for the United Kingdom was 35,576,000.

In 1838 the total number of 1*d.* stamps issued was, in round numbers, as follows:—

London	28,500,000
English provincial papers . .	15,500,000
Welsh papers	350,000
England and Wales . . .	44,350,000
Scotland	5,117,000
Ireland	5,225,000
Total . .	54,692,000

From the 5th July, 1833, the duty on advertisements was reduced from 3*s.* 6*d.* to 1*s.* 6*d.* in Great Britain, and to 1*s.* in Ireland. The following statement of the total number of advertisements, and total amount received therefrom, will show the results of this reduction:—

	England and Wales.		Ireland.		Scotland.	
Year.	Advts. No.	Duty. £.	Advts. No.	Duty. £.	Advts. No.	Duty. £.
1832	783,557	137,122	121,991	15,248	104,447	18,278
1838	1,315,580	98,668	178,200	8,910	176,411	13,230

The London newspapers are now divided into three classes: the daily, the twice or thrice a week, and the weekly; the daily are again divided into morning and evening papers. The expense attending the establishing and carrying on of a London daily newspaper is very great. To establish a morning paper requires a capital of from 50,000*l.* to 60,000*l.*; and the risk is so great that a single individual would hardly venture on such a speculation. It is assumed that capital to the amount of 500,000*l.* at least is invested in the daily press of London, of which two-thirds, or nearly so, may be represented by the morning papers.

Previous to the reduction of the newspaper stamp-duty at the end of 1836, the general price of the London daily papers was 7*d.*: it is now 5*d.* Previous to the reduction of the advertisement duty in July, 1833, the lowest price of an advertisement in a London daily paper was 7*s.*: it is now 5*s.*

The 'Times,' the largest of the London newspapers, since the reduction of the newspaper stamp-duty at the end of 1836 has issued daily a double paper, that is, eight pages of six columns each. The printed area of the whole paper (both sides) is more than 19½ square feet, or a space of nearly 5 feet by 4. On a rough estimate it contains about 113,000 words, which is equal to about 70 pages of the 'Penny Cyclopædia.' Compared with an 8vo. volume having a page of print of 3½ by 6¼ inches, the area of the 'Times' is equal to more than 120 of the 8vo. pages; and, allowing for difference of size in the type, to perhaps 200 of the printed 8vo. pages.

The 'Times' is printed by a machine worked by steam-power, which is capable of printing 2500 in an hour *perfect*, that is, on both sides; so that an impression of 12,500 can be completed in five hours. The paper is generally put to press at five in the morning, at half-past six publication commences, and at ten the whole impression is ready to be issued to the public. Mr. Babbage, after describing the manner in which eight and forty columns are formed into eight pages and placed on the platform of the printing-machine, says, 'Ink is rapidly supplied to the moving types by the most perfect mechanism: four attendants incessantly introduce the edges of large sheets of white paper to the junction of two great rollers, which seem to devour them with unsated appetite; other rollers convey them to the type already inked, and having brought them into rapid and successive contact, redeliver them to four other assistants, completely printed by the almost momentary touch.'

Fifteen or sixteen gentlemen are employed by the 'Times' for the purpose of reporting the debates in parliament, others are engaged to report the trials in the courts of law, and examinations and convictions before police magistrates, and to furnish accounts of all public meetings of any interest or importance both in London and in the provinces. To show the manner in which the parliamentary proceedings are reported, let us suppose that an important debate is expected in each house of parliament, and that four reporters are engaged for the Lords and four for the Commons, the process of reporting being the same in each house. The first reporter takes notes for an hour, before the end of which time the second reporter is by his side and ready to succeed him. The first then hastens to the 'Times' office to write out his notes at length for the compositors; the second remains for an hour, and then hurries away like the former, while the third is taking notes for another hour, and he is followed in the same manner by the fourth. The first reporter is now ready to succeed the fourth; he takes notes for an hour, and is followed by the second, and so on till the house breaks up. The time of taking notes is frequently limited to three-quarters of an hour or even less. By this process the whole of a series of debates which began at four or five in the afternoon and continued till three or four in the morning, is issued to the public within a few hours of the time when the debate terminated. Reporters on all turns after the first are allowed cab or coach hire. The distance between the houses of parliament and the printing-office has been calculated to cost the newspapers about two reporters each; that is, the time occupied in going backwards and forwards is equal to the employment of two reporters on each paper. Short-hand is not much used in parliamentary reporting; indeed some of the best reporters never use it, the notes being used rather as an assistance to the memory in giving an abstract of the speeches than in reporting them as they were spoken. All the other London daily papers have an establishment of reporters similar to that of the 'Times,' but on a somewhat smaller scale, and extra reporters are engaged during the session of parliament.

The lowest price charged for an advertisement in the 'Times' is 5*s.*, with the exception of servants wanting places, which are only 4*s.* If it exceeds four lines, 6*d.* is charged for every additional line till it reaches the length of about 20 lines. When it exceeds this length, the rate of charge is increased, the longest advertisements being charged at the highest rate.

One hundred persons at least are employed on the establishment of the 'Times.' There are three editors, fifteen or sixteen reporters, at a very liberal annual salary, three or four readers, three or four clerks, twelve attendants on the machinery, about fifty compositors, besides foreign correspondents, news-collectors, and agents.

We subjoin a list of the London newspapers, showing the sale of each publication and the number of advertisements contained in it, formed on an average of the whole of the year 1838, and drawn from accounts furnished by the Stamp-office, and printed by order of the House of Commons:—

LONDON NEWSPAPERS.

Daily Morning.

	Sale.	Advertisements.
Morning Advertiser . .	5,000	164
Morning Chronicle . .	6,630	197
Morning Herald . .	6,150	204
Morning Post . .	2,800	136
Times . . .	11,660	478
Public Ledger . .	334	46
	32,574	1225

Daily Evening.		Sale.	Adverts.
Courier		1,273	40
Globe		2,940	50
Standard		3,435	52
Sun		4,294	40
Shipping Gazette		1,014	29
		12,956	211
Three Times a Week.			
English Chronicle		808	3
Evening Chronicle		1,513	6
Evening Mail		1,760	5
St. James's Chronicle		4,536	31
		8,617	45
Twice a Week.			
London Gazette		1,538	66
Patriot		2,293	34
Record		2,910	70
		6,741	170
Weekly.			
Age		2,317	72
Atlas		2,692	62
Bell's Weekly Messenger		17,274	80
Bell's New Weekly Messenger		3,116	36
Bell's Life in London		20,000	49
Champion and Weekly Herald		575	3
County Chronicle		1,567	53
County Herald		894	27
Court Journal		1,663	65
Court Gazette		1,577	13
Era		2,442	10
Essex, Herts, and Kent Mercury		1,277	35
Examiner		5,153	80
Gardener's Gazette		2,711	32
John Bull		4,346	115
London Dispatch		4,980	33
Magnet		4,317	10
Mark Lane Express		3,476	45
Metropolitan Conservative Journal		2,182	35
Mining Journal		1,365	38
Naval and Military Gazette		1,474	64
News		1,942	60
Observer		5,288	95
Planet		4,692	7
Railway Times		1,786	25
Satirist		2,971	86
Spectator		3,038	61
Sunday Times		13,365	114
United Service Gazette		1,457	62
Watchman		2,637	43
Weekly Chronicle		32,327	93
Weekly Dispatch		51,570	138
Weekly True Sun		6,336	64
		212,807	1,805
6 daily morning	total	32,574	1,225
5 daily evening	do.	12,956	211
4 three times a week	do.	8,617	45
3 twice a week	do.	6,741	170
33 weekly		212,807	1805
	Total	273,696	3,456

Besides these there are a few weekly journals of a purely literary character, the princial of which are the *Athenæum* and the *Literary Gazette.*

The four papers which are published three times a week are made up from the columns of four of the daily papers, the advertisements being omitted and a selection made of the most interesting matter. The *English Chronicle* belongs to the *Morning Herald;* the *Evening Chronicle* to the *Morning Chronicle;* the *Evening Mail* to the *Times;* and the *St. James's Chronicle* to the *Standard.*

The earliest local provincial newspaper in England is said to have been the 'Norwich Postman,' published in 1706, at the charge of a penny, but 'a halfpenny not refused;' followed by the 'Norwich Courant, or Weekly Packet,' in 1714, price three half-pence. Previous to 1720 the 'York Mercury' appeared, followed in that year by the 'York Courant,' which still exists. In this year also a 'Leeds Mercury' was established; and about the same time a 'Gloucester Journal.' In 1730 a 'Manchester Gazette' was published. The 'Oxford Journal' began in 1740; a 'Preston Journal' in 1745, and 'Billinge's Liverpool Advertiser' in 1765.

In the year 1838 the total number of English provincial newspapers was 240, and of Welsh 10, with a sale of about 15,500,000 for the whole year. They are all weekly papers, with the exception of two or three, which are published twice and three times a week. Some of them are very large, and have an extensive circulation and a great number of advertisements. The 'Leeds Mercury,' for instance, is as large as the 'Times,' has a weekly sale of 9000, and an average weekly number of 245 advertisements. The 'Liverpool Mercury' has a weekly sale of 6400, and averages about 280 advertisements.

In Scotland the newspaper-press was first introduced during the civil wars in the seventeenth century. When a party of Cromwell's troops arrived at Leith in 1652, for the purpose of garrisoning the citadel, they brought a printer, named Christopher Higgins, to reprint a London diurnal, called 'Mercurius Politicus,' for their amusement and information. The first number was issued on the 26th October, 1653; and in November the following year, the establishment was transferred to Edinburgh, where this reprinting system was continued till the 11th April, 1660. On the 31st December, 1660, appeared at Edinburgh 'The Mercurius Caledonius,' purporting to comprise 'the affairs in agitation in Scotland, with a survey of foreign intelligence.' It was a small quarto of eight pages. The last number was dated March 22 to March 28, 1661. It was succeeded by 'The Kingdom's Intelligencer.' In 1669 an 'Edinburgh Gazette' was published by authority, followed in 1705 by the 'Edinburgh Courant.' 'The Caledonian Mercury,' which still exists, was first published on April 28, 1720. After Edinburgh, the next place at which the publication of a newspaper was attempted in Scotland was Glasgow, where the first number of the 'Glasgow Courant' appeared November 11, 1715. 'The Glasgow Journal,' begun in 1729, still exists. An 'Aberdeen Journal, or North British Magazine,' began in 1746; the first number gave an account of the battle of Culloden; this paper still continues. The 'Dumfries Journal' commenced in 1750. The 'Kelso Mail' was established in 1797; the 'Dundee Courier,' in 1800; the 'Dundee Advertiser,' 1801; followed by the 'Dundee Chronicle;' the 'Ayr Advertiser,' and the 'Greenock Advertiser,' in 1802; an 'Inverness Journal,' in 1807; and the 'Perth Advertiser,' in 1808; in 1811 the 'Montrose, Arbroath, and Brechin Review' was established. Somewhat subsequent to this the 'Fife Herald' was established, and in 1833, the 'Fifeshire Journal.' In 1820 a 'Stirling Journal' was instituted, followed by a 'Stirling Advertiser,' but both have been since united in one paper. Scotland has also three other country newspapers, viz. the 'Elgin Courier,' the 'Paisley Advertiser,' and the 'Western Independent.' In 1838 there were 64 newspapers circulated in Scotland, of which 16 belonged to Edinburgh. There were no daily papers. The total sale was 5,117,000.

In Ireland, as in England and Scotland, newspaper intelligence originated during civil commotion. As far back as 1641, at the breaking out of the Rebellion of that year, there was printed a news sheet called 'Warranted Tidings from Ireland;' but from that time to the beginning of the eighteenth century, we have no notice of any other print of the kind, although it is not improbable that there may have been some. About the year 1700, a newspaper called 'Pue's Occurrences,' named after the proprietor, was established in Dublin, and maintained itself for more than half a century. This was the first newspaper published in the Irish capital. The next Dublin print was 'Falkener's Journal,' established in 1728—both were daily papers. Waterford appears to have followed Dublin in publishing news, by the establishment of a paper in 1729, entitled 'The Waterford Flying Post.' In November, 1766, the 'Waterford Journal' came out; and 'Ramsay's 'Waterford Chronicle' about the same time. The present 'Waterford Mirror' was started in 1801. The oldest existing newspaper in Ireland is the 'Belfast News Letter,' started in 1737. Among the other existing Dublin papers may be mentioned the 'Evening Post,' which has now existed about sixty years. In 1838 there were 84 newspapers circulated in Ireland, of which 26 belonged to Dublin. The total sale was 5,225,000. There are five daily papers in Dublin.

The newspapers of Great Britain have much improved within the last twenty or thirty years. Before that time, few of them contained any original articles or essays beyond occasional or local paragraphs. But all the English newspapers are still too exclusively devoted to the support of some particular political party, or to some particular object; and it is not easy to find in any one of them a full and impartial discussion of any great question affecting the general interest, free from party bias and direct abuse or oblique censure of individuals whose views differ from those of the newspaper writer. In the comprehensiveness of their views, their just estimation of the value of general principles, and in their sober and critical application of them to the solution of political questions which affect the interest of the community, the best French newspapers have a decided superiority over the English. Some of the French provincial newspapers occasionally contain articles which deserve to find a place among a collection of political essays.

Newspapers are now as common in the British dominions abroad as in England; and in British India six gazettes are published in the Bengal language. In Van-Diemen's Land no fewer than six papers are published at Hobart's Town, namely, the 'Hobart Town Gazette,' the 'Hobart Town Courier,' 'True Colonist,' the 'Tasmanian and Austral-Asiatic Review,' 'Colonial Times,' and 'Bent's News and Tasmanian Threepenny Register;' and two at Launceston, the 'Cornwall Chronicle' and the 'Launceston Advertiser.' In New South Wales there are five newspapers, published at Sidney. At Perth in Western Australia there is now a weekly paper. The 'South Australian Gazette' is published at Adelaide; the first number was printed in England, and carried out, with printing materials, to Australia. It has been followed by another, the 'South Australian;' and a newspaper has been commenced this year (1839) at Port Lincoln. Two newspapers have also been commenced within the present year at Melbourne, in the newly-explored territory of Australia Felix. The first New Zealand Colony, which sailed in September, 1839, carried out the materials for printing a newspaper, of which the first number was printed in England.

In Germany newspapers originated in the 'Relations,' as they were termed, which sprung up at Augsburg and Vienna in 1524, at Ratisbon in 1528, at Dillingen in 1569, and at Nürnberg in 1571, and which appeared in the form of letters printed, but without date, place, or number. The first German newspaper in numbered sheets was printed in 1612. Of the Italian journals, the 'Gazzetta di Milano,' 'Gazzetta di Venezia,' and 'Giornale del Regno delle due Sicilie' are daily; the 'Diario di Roma,' 'Gazzetta di Firenze,' 'Giornale di Commercio di Livorno,' 'Gazzetta di Bologna,' 'Gazzetta Piemontese,' 'Gazzetta di Genova,' 'Voce della Verita' of Modena, 'Gazzetta di Parma,' 'Gazzetta di Lucca,' 'Osservatore Veneziano,' and some others, appear two or three times a week, and a much greater number weekly. The whole number of journals in Italy, including all periodicals, political, literary, and scientific, exceeds two hundred. Madrid has its 'Gaçeta;' and Lisbon has also a paper for the publication of official documents and communications. In Belgium and Holland there are, in French and Dutch respectively, a considerable number of daily and weekly papers. In 1830 Switzerland had twenty-four weekly papers, and five others which appeared once a fortnight: the number is since increased. Most of them are written in German. Some are in French, one or two in Italian, and one in the Romansh or Grisons language. The first Russian paper was published in 1703, under Peter I. In 1829 the number of papers and periodicals published in the Russian empire was seventy-three; but the only important political journals are the 'Gazette de St. Petersburg' and the 'Journal de St. Petersburg.' In Sweden the newspapers are not much devoted to political discussion. Denmark has about eighty journals, of which twenty-three are devoted to politics and twenty-five to the sciences. The Greeks have several newspapers in their own language. A journal is published at Corfu, one at Athens, and another at Smyrna. The 'Moniteur Ottoman' is published at Constantinople, in French, under the sanction of the sultan, and the viceroy of Egypt has his official paper printed in the same language, at Boulak near Cairo.

In the United States the increase of newspapers has been more rapid than in England. In the year 1704, the first Anglo-American newspaper, called the 'Boston News Letter,' was published at Boston. In 1719 the first newspaper was published in Pennsylvania; and in 1733 the first newspapers were published in New York and Rhode Island. Now there is hardly a petty town in any of the twenty-six states without its newspaper, and in the large cities, such as New York, several are published daily. In Pennsylvania a considerable number of newspapers are printed in the German language and distributed among the numerous German settlers in that state. One German newspaper at least is also published in Maryland, and perhaps more. In Louisiana, some papers are printed both in French and English.

The largest collection of newspapers in England is in the British Museum. This collection was commenced by a considerable number being sent there, at the time when the Museum was established, with the library of Sir Hans Sloane Another collection, of itself valued at 1000*l.*, was purchased in 1813 with the library of the late Dr. Charles Burney. At the end of two years from the time of publication the commissioners of stamps now transfer to the British Museum, for public use, copies of all the stamped newspapers, both of town and country.

The newspapers of 1837 delivered to the British Museum from the Stamp-office were, London papers 89, country papers 201, British Islands 15, Scotch papers 52, Irish 67.

(Chalmers's *Life of Ruddiman*, 8vo., London, 1794, pp. 106-124, with his Appendix, No. 6, pp. 404-441; Nichols's *Literary Anecdotes of the Eighteenth Century*, vol. i., p 312; vol. iv., pp. 33-97; vol. viii., pp. 495-499; *Encyclopædia Americana*, vol. ix., 8vo., Philad., 1832, pp. 253-263; Chambers's *Edinburgh Journal*, vol. iii., fol., London, 1835, articles in pp. 113, 130, 146, 193, 242, 306, 322, 389; see also various articles in the *Companion to the Newspaper*, fol., 1833-1836.)

NEWTON, ISAAC, was born 25th December, 1642, old style, at Woolsthorpe, a hamlet in the parish of Colsterworth and county of Lincoln, eight miles south of Grantham. From the pedigree registered upon oath in the Herald's office, by Newton himself, in the year 1705, it appears that he was descended from a family of that name, which was resident at Westby in Lincolnshire until about the year 1370 ('Biog. Brit.'), when it became possessed of the manor of Woolsthorpe. His father, Isaac Newton, married the daughter of James Ayscough of Market Overton in Rutlandshire, and the subject of this article was their only child. The mother was left a widow during her pregnancy, and appears to have given premature birth to her child, which was of extremely diminutive size. Mrs. Newton, whose income was little more than 80*l.* per annum, soon contracted a second marriage with the Rev. Barnabas Smith, rector of North Witham, whereupon young Isaac, then about three years old, was confided to the care of his maternal grandmother, by whom he was sent to two day-schools at Skillington and Stoke, until he attained the age of twelve years, when he was admitted into the free grammar-school of Grantham. While here he evinced considerable aptitude for mechanical contrivances, and among other things he constructed a windmill and water-clock, but in the prosecution of his regular scholastic studies he for some time took little interest, and accordingly stood very low in the school. At length however 'the boy who was above him, having one day given him a severe kick upon the stomach, from which he suffered great pain, Isaac laboured incessantly till he got above him in the school, and from that time he continued to rise until he was the head boy.' (Brewster's *Life.*) The decease of Mrs. Newton's second husband, in 1656, induced her to return to the manor of Woolsthorpe, and in that year Isaac was taken from school to assist in the management of the farm. Accordingly on market-days he was sent to Grantham, accompanied by an aged domestic, either to dispose of farm produce, or to purchase such things as were needed by the family. But on these occasions it more frequently happened that Isaac stopped by the way-side, watching the motions of a water-wheel or some other piece of machinery, or if he reached the town of Grantham it was only to resort to the apothecary's garret in which he had resided while he attended the grammar-school, and where a few old books afforded him ample entertainment until his trusty companion summoned him to return home. These and other instances having shown the inutility of thwarting his studious disposition, he was shortly after sent back to Grantham school. How long he remained at school this second time does not appear, but when he had attained his seventeenth year it was determined to send him to Trinity College, Cambridge, at the recommendation of his uncle, the Rev. W. Ayscough, who had been himself educated there. His matriculation took place 5th June, 1660, the year in which Dr. Barrow was appointed to the Greek professorship.

It is a matter of regret that no definite information exists as to the order in which Newton pursued his mathematical studies before entering the university. Biot gives an unauthenticated although very probable anecdote to the effect that while Newton was yet a lad 'one of his uncles found him beneath a hedge, wholly absorbed in the solution of a mathematical problem;' but we find no mention of any mathematical work which had occupied his attention, with the exception of the 'Elements' of Euclid. It has been asserted that a glance at the fundamental propositions was immediately followed by a knowledge of the numerous consequences which may thence be deduced. But the fame of Newton is not enhanced by stating as true what is in the highest degree improbable. There is no doubt that he had read the 'Elements,' though not perhaps with that attention which he afterwards acknowledged their importance deserved. As to his knowledge of natural philosophy, his water-clock, windmill, and sundials may be considered as evidence of his early acquaintance with the principles of mechanics and with the doctrine of the sphere, for it is difficult to suppose that a mind such as his, so ardent in the pursuit of truth, could have contented itself with following a few rules of authority without understanding the reasons upon which they were based. But if these considerations be not thought conclusive, we have only to look to the nature of his discoveries during the first six years of his residence at Cambridge, that is, before the completion of his twenty-fourth year, in order to be convinced that he must either have pushed his studies to a very considerable extent before entering the university, or that his subsequent progress was perfectly unparalleled; for in this period of six years he invented his Binomial Theorem, established the fundamental principles of his doctrine of Fluxions, and demonstrated the law of the force in virtue of which the planets gravitate towards the sun, although, in consequence of the erroneous measurement of the earth then in use, it was not till afterwards that he was able to show that the same law holds with respect to the moon, and that the force manifested at the earth's surface in the fall of a pebble is identical, as to its nature, with that which pervades the whole planetary system.

Descartes had already laid open a vast field of research by the successful application of algebra to geometry, and his writings, both mathematical and speculative, were then much read at Cambridge. After the perusal of Saunderson's 'Logic' and the 'Optics' of Kepler, the attention of Newton was directed to the 'Geometria' of Descartes, a work which, doubtless, exercised considerable influence over his subsequent pursuits, by furnishing him with general methods of direct investigation, such as, till the time of Descartes, were totally unknown. Upon the whole however he was much less indebted to the analytical writings of Descartes than he was to those of his countryman Wallis. He seldom read without making comments upon the text or marginal notes of such parts as appeared to him susceptible of extension or improvement. In this way he completed the perusal of Descartes's 'Geometry,' after which he passed on to the 'Arithmetica Infinitorum' of Wallis. In this work the author had suggested a method of obtaining the quadrature of the circle, the practicability of which depended upon an interpolation. Newton set about effecting this, notwithstanding the discouraging declaration of Wallis, that he believed it to be impracticable. The attempt however proved not merely successful, but in the course of his inquiry he was led (1663-4) to a discovery of greater moment, the history of which is given under Binomial Theorem. This theorem, combined with the previous labours of Wallis and others, supplied Newton with a method of determining the area and rectification of curves, the surface and content of the solids formed by their revolution, and the position of their centre of gravity; and by similar means he solved with comparative ease a number of problems which had hitherto baffled the attempts of mathematicians, or of which solutions had been obtained only under particular circumstances, whereby the real difficulty had been rather evaded than overcome. The almost indefinite application which he continued to make of this method, computing even the numerical values of the formulæ to which his investigations gave rise, as if he regarded the occupation rather as a source of amusement than of labour, may possibly have been suggested by the view, as novel as it was important, which he took of the mode whereby magnitudes of every kind may be conceived to be generated, and by the notion he early entertained of the possibility of deducing the definite value of a variable magnitude from the velocity of its increase or diminution.

The fluxionary calculus to which this opinion gave rise was invented by Newton in or before the year 1665. Its history is given in the article Fluxions. The following year he composed his 'Analysis per Equationes Numero Terminorum Infinitas,' a tract which afterwards caused much discussion as to the extent to which it contained the method of fluxions. For some reason which it is now difficult to assign, he thought proper to conceal the substance of this tract from the public and even from his friends. However on the appearance of Mercator's 'Logarithmotechnia' in 1668, in which work Newton having recognised two of the many results to which his binomial theorem had previously conducted him, namely, the development of log $(1+x)$ and the determination of the quadrature of the hyperbola, he communicated the tract above mentioned to his friend Dr. Barrow This was not till the month of June, 1669. The 31st July following, Barrow, with Newton's permission, transmitted the MS. to Mr. Collins, at the same time acquainting him that it was the production of a young friend of his who possessed a fine genius for such inquiries. Collins took a copy of the MS. and returned the original to Dr. Barrow The copy was afterwards found among Collins's papers, and attested the year in which the original treatise had been composed. It was first formally published in 1712, but long previous to that its contents must have been pretty widely diffused through Collins's correspondence with many of the principal mathematicians of the day, both in England and upon the Continent.

Newton was admitted sub-sizar in 1661, became scholar in 1664, and took his degree of B.A. in 1665. In 1664-5 he was a candidate with Mr. Robert Uvedale for the law-fellowship of Trinity College; when Barrow, having found the candidates on an equality as regarded attainments, conferred the appointment on Mr. Uvedale, he being the elder. In 1667 he became junior fellow, took the degree of M.A., and became senior fellow in 1668. He succeeded Dr. Barrow as Lucasian professor of mathematics in 1669.

The raging of the plague, in 1665-6, induced Newton to quit Cambridge and retire to Woolsthorpe. Here it was that he began to reflect more particularly upon the nature of the force by which bodies at the earth's surface are drawn towards its centre, and to conjecture that the same force might possibly extend to the moon, and there be of sufficient intensity to counteract the centrifugal force of that satellite, and thereby retain it in its orbit about the earth. To compare this hypothesis with observation, it was necessary to determine the law according to which the intensity of such a force would vary with the distance from the earth's centre; for although no sensible variation can be detected within the narrow limits of direct observation, namely, the summit of the highest mountains or the bottom of the deepest mines, it was reasonable to presume that some variation would be appreciable at the distance of the moon, and in such case only could the force be just sufficient to counteract the centrifugal tendency of the revolving satellite. To a mind so habituated to generalise, it was a natural extension of his hypothesis to suppose that the same kind of force which incessantly deflects the moon from a rectilinear path might likewise act upon the planets so as to retain them in their orbits about the sun. Now the assumption of an attractive force emanating from the sun was at this time far from being a novelty, and it had even been asserted by Bouillaud that if such a force really existed, its intensity would vary inversely as the square of the distance from the attracting body; but neither Bouillaud nor those who entertained similar opinions had given any proof, either empirically or otherwise, of what they had asserted; and certainly none appear to have attempted to establish that the forces which retain the planets in their orbs were identical, as to their nature, with that which draws a stone, when let fall, to the surface of the earth. Newton showed that the law of the inverse square of the distance is that which really exists in nature; and further, that this law was a necessary consequence of the analogy already discovered by Kepler between the periodic times and the mean distances of the planets. The following will convey a notion of the line of reasoning by which Newton arrived at this result. The intensity of the force, whatever may be its nature, which counteracts the centrifugal force of a planet, is proportional to the versed sine of the arc described in a given time; so that if the time be small, the force will be proportional to the square of the arc divided by the planet's mean distance, or to the square of the linear velocity by the distance. If therefore for the velocity we substitute the ratio of the mean distance to the periodic time, which is proportional to it, we shall find that the force varies as the distance by the square of the periodic time, that is, by Kepler's law, as the distance by the cube of the distance, that is, inversely as the square of the distance. Having thus established the law whereby the planets gravitate towards the sun, he proceeded to examine whether the same law regulated the gravitation of the moon towards the earth. At this point it is that Newton's reasoning first rests upon conjecture, namely, that the force manifested at the earth's surface in the fall of a stone, is identical with that which is constantly deflecting the moon towards the centre of the earth, and that the law of its variation was the same as that which he had determined for the planets. If such were the case, the distance fallen through by the moon in one second of time ought to bear the same ratio to the distance fallen through by a body at the surface of the earth in one second, which the square of the earth's radius bears to the square of the moon's mean distance. The length of the earth's radius, which, entered as a necessary element in the verification of his conjecture, was at that time very imperfectly known (a degree of latitude being estimated at only 60 miles instead of 69½ miles, its more correct length); the consequence of which was, that the result of his calculation indicated a force at the distance of the moon greater, by nearly one-sixth, than that deduced from direct observation. This difference, which many would have considered sufficiently small to establish the correctness of the hypothesis, was regarded by Newton rather as a direct refutation of its truth. He therefore laid aside further consideration of the subject, suspecting, says Whiston ('Memoirs' of himself), that some unknown cause, perhaps similar to the vortices of Descartes, modified, in the case of the moon, the law which he had satisfactorily established with regard to the planets.

In 1666, the plague having subsided, he returned to Cambridge, but without mentioning to any of his friends the interesting inquiry which, during his absence, had occupied so much of his attention. In this way the discarded hypothesis lay dormant for sixteen years. In 1682, when attending a meeting of the Royal Society, he casually heard of the measurement of an arc of the meridian which had been executed by Picard three years before. Having taken a note of the result, and thence deduced the length of the earth's radius, he resumed his former calculation; but in the course of the work, observing that the conclusion he had formerly anticipated was about to be realised, his ardour is said to have brought on a state of excitement and nervous irritability which precluded his further progress, so that the completion of the calculation was confided to a friend. The following year he transmitted to London a few propositions on the motion of bodies acted on by centripetal forces, which were shortly after communicated to the Royal Society, and constitute the leading propositions of the 'Principia.' The manuscript of this work, entitled 'Philosophiæ Naturalis Principia Mathematica,' was presented to the Royal Society by Dr. Vincent in 1686. Its perusal gave rise to many remarks from Dr. Hooke respecting the deduction of the law of the inverse square of the distance from the second law of Kepler, to which he laid claim. Hooke's pretensions upon this head were never made out; and from the known mediocrity of his mathematical attainments, as well as his general disposition to appropriate every new discovery to himself, they are looked upon as very doubtful. Newton however having apparently replied to his remarks with more warmth than discretion, he (Newton) afterwards expressed a willingness to compromise the dispute by the insertion of a scholium (lib. i., prop. iv., cor. 6), wherein the controverted deduction is attributed independently to Sir Christopher Wren, Hooke, and Halley. The printing of the 'Principia' was superintended by Dr. Halley, and the expense defrayed by the Royal Society. It appeared in 1687, London, 4to. For an account of this memorable work, the reader is referred to PRINCIPIA.

The theory of universal gravitation advanced by Newton, wherein each particle of matter is supposed to attract all other matter in the direct proportion of its mass, and inversely as the square of the distance, is, from its nature, insusceptible of direct demonstration, and could only be established by showing that the phenomena of nature were in no instance opposed to such a supposition, and that it was sufficient to the explanation of those phenomena. Newton did much towards this; but the completion of the proof required the labours of many succeeding mathematicians and astronomers, and this may, in some measure, account for the qualified reception which the theory met with at the hands of Huyghens, who, though he acknowledged the mutual gravitation of the masses of matter, refused his assent to the assumed attraction between their ultimate particles. The opposition to the theory made by Leibnitz, the erroneous and unphilosophical principles which he endeavoured to substitute in its stead, and the meanness with which he sought to injure the reputation of Newton by designating the theory subversive of true religion, are equally prejudicial to his scientific and moral fame. The long interval that elapsed before the writings of Newton began to be generally understood and his doctrines appreciated, is attributable exclusively, as regards England, to their inherent abstruseness. On the Continent they had further to contend with established prejudices in favour of the doctrines of Descartes.

The latter half of the seventeenth century is not less remarkable for its optical discoveries than for the zeal with which the physical sciences generally were prosecuted. The proportionality of the sines of the angles of incidence and refraction, which furnishes an easy explanation of all the circumstances attending the simple refraction of homogeneous light, had been discovered, and the discovery attributed to Descartes, though now known, on the authority of Vossius and Huyghens, to have been due to Snell, a Dutch physician, who died in 1626. From this law Descartes had been able to explain the theory of the refracting telescope, but had fallen into error by attributing the defects of such instruments solely to the spherical aberration of the lenses employed in their construction. Had such been the case, it is obvious that the whole of the aberration might have been removed by merely varying the form of the lenticular surface. Descartes accordingly, in his 'Dioptrice,' published in 1629, and James Gregory, in his 'Optica Promota,' published in 1663, had investigated the forms which they believed it would be necessary and sufficient to give to the lenses, in order that parallel rays transmitted through them should converge to a point or focus with mathematical accuracy. The aberration of sphericity was however but a trifling impediment to the perfection of dioptrical instruments, compared with what is now designated chromatic aberration, or the aberration of refrangibility, which arises from the then undiscovered fact that light is not a homogeneous substance, but composed of rays, some of which are more susceptible of refraction than others. In the year 1666 we learn ('Letter of Newton to Oldenburg,' *Phil. Trans.*) that Newton, in common with many other philosophers at that time, occupied himself in the attempt to grind object-glasses in conformity with the precepts of Descartes and Gregory, and while thus occupied he seems to have conjectured that the defects of refracting telescopes might arise from some other cause than that which had hitherto been exclusively assigned. Either this conjecture or accident led him to consider the phenomenon of the prismatic spectrum (vol. ix., p. 20), which was then well known to philosophers, although it had been explained by none. In doing so he remarked that the angle subtended at the aperture of his shutter by the length of the spectrum was considerably greater than that subtended by the sun's diameter, though, according to the received law of refraction, these angles ought to have been sensibly equal. After modifying the experiment in various ways, and assuring himself that this discrepance did not arise from any irregularity in his prism, the thought fortunately suggested itself of trying the separate effect of the prism upon each of the coloured lights of the spectrum. Accordingly, having transmitted them successively through a second prism at the same angle of incidence, he found—1, that the colour was in no degree affected by this second refraction; 2, that the spectrum formed by each colour occupied a distinct position on the screen, so that the deviation from the direction of the primitive ray was different in all, being greatest in the violet and least in the red. He therefore came to the important conclusion 'that light was not homogeneous, but composed of rays, some of which were more refrangible than others.' This discovery must have been made subsequent to the publication of Wallis's optical lectures, which appeared in 1669, for otherwise it is improbable that Newton, to whom the revisal of the MS. was confided, and who receives the author's acknowledgements for having 'corrected several oversights, and made some important corrections,' would have permitted his friend to promulgate views so erroneous.

In the above year however Newton began to deliver a course of lectures on optics at Cambridge, and the composition of white light formed part of the course. Seeking the complete development of the consequences of his discovery, 'he was conducted,' says M. Biot, 'to a multitude of observations no less admirable for their novelty and importance, than for the sagacity, address, and method with which he contrived, executed, and linked them one with the other. He thence composed his system of optics, wherein the fundamental properties of light were for the first time unveiled and established, and classed according to pure experience alone, without the slightest intermixture of hypothesis; a method of procedure which was then as surprising and as little heard of as the properties themselves:....both the physical and natural sciences were at this time so mixed up with mere opinions, that few persons were capable of discriminating between a vague conjecture and a precise idea, between a physical hypothesis and a law of nature rigourously demonstrated.'

Although Newton had been thus successful in his optical inquiries, and had detected the principal source of indistinctness in refracting telescopes, he not only did not see how this indistinctness might be removed, but even designated all attempt as 'desperate' (*Optics*, lib. i., prop. 7); and the long interval which elapsed before the discovery of the achromatic telescope may be attributed to the unmerited reliance which in this instance was placed in his decision. He regarded as a self-evident truth, which it therefore needed neither reason nor observation to confirm, that the spectra formed by different refracting media were always of equal length whenever the refraction of the mean ray was the same; in other words, that the dispersive powers of different media were the same where their indices of refraction corresponding to the mean ray were equal; and although the fact was controverted by some of the more respectable continental philosophers who assailed his doctrines, the circumstance appears to have neither shaken his belief, nor to have suggested the propriety of convincing his opponents by an appeal to experiment. An apparent analogy also between the lengths of the colours of the spectrum and the divisions of the harmonic chord, led him to suppose that the refractive indices of any medium corresponding to the different coloured rays might be deduced from a knowledge of the index of refraction corresponding to the mean. Had he happened to have repeated his experiments with different refracting substances, he could scarcely have failed to recognise the difference of their dispersive powers even when the refraction of the mean ray is the same. Many of his experiments he did repeat with a prism of water, but in this instance he mixed with the water 'a little sugar of lead' (Brewster), his object being merely to increase the refractive power of the water; but he thereby unknowingly also increased its dispersive power, and probably rendered it sensibly equal to the dispersion of the glass prism previously employed. By these mistakes he was induced to forego all attempts to perfect the refracting telescope, and directed his attention to the construction of reflecting telescopes on the principles pointed out by James Gregory, in his 'Optica Promota.'

In 1668-9 he had succeeded; and in 1671 he executed a second telescope 'with his own hands,' which is still carefully preserved in the library of the Royal Society. For the investigations of Newton relative to the colours of thin transparent substances the reader is referred to THIN PLATES. It was in order to explain the phenomena exhibited by such substances, and the partial reflexion and transmission of light incident upon diaphanous surfaces, that Newton devised his theory of 'fits of easy reflexion and transmission.' [LIGHT.] Speaking of Newton's theory of colour, Sir John Herschel remarks, 'It is a theory of extraordinary boldness and subtlety, in which great difficulties are evaded by elegant refinements, and the appeal to our ignorance on some points is so dexterously backed by the weight of our knowledge on others, as to silence if not refute objections which at first sight appear conclusive against it.' (*Encyc. Metrop.*, art. 'Light.')

In 1672 Newton was elected member of the Royal Society. In 1675 he received a dispensation from Charles II. to continue in his fellowship without taking orders. About the year 1687 he was appointed one of the delegates to defend the privileges of the university of Cambridge against the attacks of James II. In 1688 he took his seat in parliament as one of the representatives of the university, and was resident in London until the dissolution of parliament, which took place the following year. He was again returned in 1703, but lost his election in 1705. On no occasion does he appear to have taken any conspicuous part in the debates of the house. Prior to the year 1695, when he was appointed warden of the mint, with a salary of from 500*l.* to 600*l.* per annum, his pecuniary circumstances are said to have been rather straightened, and whatever may have been his own expectations, his friends seem to have reckoned upon some token of liberality from Charles II. and his successor. The profligate reign of the former, and the opposition which Newton had given to the wishes of James, sufficiently account for their expectations having been disappointed. His sole income is stated to have been derived from his Lucasian professorship, and from the produce of the manor of Woolsthorpe, the amount of which, though aided by habits remarkably temperate and abstemious, ill accorded with the natural generosity of his disposition and the frequent occasions which he probably had of relieving the necessities of his poorer relations. His fellowship however must have been an additional source of income, though we find no mention of its amount, and the notion of his having been in narrow circumstances most probably arose from the fact that in the Journal of the Royal Society there is entered an order in council, dated January 28, 1674-5, whereby he is excused from making the customary payment of one shilling a week 'on account of his low circumstances, as he represented.' (Birch, *Hist. of Royal Society*, iii., p. 179.) Four years after receiving the appointment of warden of the mint, he was promoted to the mastership of that establishment with a salary of from 1200*l.* to 1500*l.*, and at his death his personal estate was valued at 32,000*l.*

About the year 1676, Leibnitz having heard of many new results obtained by Newton by means of an infinite series (the Binomial Theorem), he expressed to Oldenburg his wish to be made acquainted with it. This led to a correspondence between Newton and Leibnitz, wherein the former also communicated many beautiful theorems on the quadrature, rectification, &c. of curves, to which he had been led by the aid of his method of fluxions, but at the same time withheld all information concerning the principles of that method except in the form of anagrams, which were very unlikely to be deciphered. The letters of Leibnitz in reply showed that he was already in possession of a method analogous to that of fluxions, and equally extensive in its applicability. An account of the dispute which afterwards arose between the English and foreign mathematicians, relative to the claims of Leibnitz as an independent inventor of the calculus, and the part which Newton himself took in the controversy, will be found in the article FLUXIONS (vol. x., pp. 331-2), and in COMMERCIUM EPISTOLICUM (vol. vii., p. 399).

The five years preceding Newton's appointment to the wardenship of the mint were passed chiefly at Cambridge. During parts of the years 1692 and 1693 he suffered under temporary mental aberration, although it was between December, 1692, and February, 1693, that he wrote his four celebrated letters on the existence of the Deity, at the express request of Dr. Bentley.

Mr. Van Swinden, while examining the MSS. and autograph letters of Huyghens, met with a small journal in the hand-writing of the latter. It is deposited in the library of Leyden, and contains the following note, communicated by Mr. Van Swinden to M. Biot, and first published by the latter in the 'Biographie Universelle.' '29th May, 1694. Mr. Colin, a Scotchman, informs me that the illustrious geometer Isaac Newton has been insane for the last eighteen months, either from excess of study, or from the grief occasioned by the destruction of his chemical laboratory, together with many important MSS., by fire. Mr

Colin adds, that when he came to the archbishop of Cambridge, his conversation indicating an alienation of mind, he was immediately taken care of by his friends, confined to his room, and remedies applied, by means of which he has now so far recovered as to again be able to comprehend the Principia.' Huyghens having mentioned this circumstance to Leibnitz, the latter, in his reply, dated 23rd June, 1694, expresses his gladness at receiving the account of Newton's convalescence at the same time that he received that of his illness, and adds, 'It is to men like you and him, Sir, that I wish a long life.' Sir David Brewster has been at considerable pains to determine how far the foregoing statement is consistent with fact, and has succeeded in bringing to light many interesting documents which bear immediately upon this and other points. Among these is a manuscript diary of Mr. Pryme, a student at Cambridge, at the time that Newton was fellow of Trinity, which manuscript is now in the possession of his collateral descendant George Pryme, Esq., professor of political economy at Cambridge. It commences in the year 1685, and under 3rd February, 1692, the writer mentions having that day heard of the destruction of Newton's MSS. on the theory of colours, 'established upon thousands of experiments which he had been twenty years of making, and which had cost him many hundred of pounds,' and he goes on to say that it took place on a winter's morning while Newton was at chapel, adding that 'when Newton had come back and seen what was done, every one thought he would have run mad; he was so troubled thereat, that he was not himself for a month after.' Another version of the story is, that Newton left in his study a favourite dog, which overturned a lighted taper upon his papers, and on his return, finding the extent of his loss, he exclaimed, 'Oh, Diamond, Diamond, little do you know the mischief you have done me!' The above extract from the diary of Mr. Pryme, while it in some degree corroborates the statement in the Journal of Huyghens, seems to show that the indisposition of Newton was neither so intense nor of so long continuance as has been supposed, and that 'insanity' was inapplicable in the strict sense of that word, although there certainly existed some doubt as to what state of mind he was really in. This view is supported by letters in the hand-writing of Newton, of Mr. Pepys (secretary of the Admiralty), and of Mr. Millington (of Magdalen College, Cambridge), which have also been published by Sir David Brewster from the originals in the possession of Lord Braybroke. Among these is the following from Newton to Pepys, excusing himself from fulfilling a promise he had made to see the latter when next in London. Pepys entertained a very high esteem of Newton, and appears to have been very anxious for his health and longevity. 'September 13, 1693. Sir,—Some time after Mr. Millington had delivered your message, he pressed me to see you the next time I went to London. I was averse; but upon his pressing consented, before I considered what I did, for I am extremely troubled with the embroilment I am in, and have neither ate nor slept well this twelvemonth, nor have my former consistency of mind. I never designed to get anything by your interest, nor by King James's favour, but am now sensible that I must withdraw from your acquaintance, and see neither you nor the rest of my friends any more, if I may but leave them quietly, &c.,—Isaac Newton.' The wording of this letter excited in Mr. Pepys the suspicion that Newton was suffering from 'discomposure of head or mind, or both,' and he in consequence addressed himself for explanation to Millington, who in reply says, '. . . . . he (Newton) told me of his own accord that he had writt to you a very odd letter, at which he was much concerned; added that it was a distemper that much seized his mind, which he desired I would represent to you and beg your pardon, he being very much ashamed he should be so rude to a person for whom he hath so great an honour. He is now very well, and though I fear he is under some degree of melancholy, yet I think there is no reason to suspect it has at all touched his understanding, and I hope never will.' While labouring under the same melancholy and nervous affection, he had characterised the writings of Locke as immoral, and designated their author a Hobbist. In a letter to Locke, dated 'At the Bull in Shoreditch, September 16, 1693,' he says, 'Being of opinion that you endeavoured to embroil me with women, I was so much affected by it, that when one told me you were sickly and would not live, I answered, "'twere better if you were dead."' He then asks forgiveness for this uncharitableness, and for the ill opinion he had entertained of his writings, and concludes, 'I beg your pardon also for saying or thinking that there was a design to sell me an office, and am your most humble and unfortunate servant, Is. Newton.' In 1694 he appears to have recovered his former tranquillity and strength of mind; for in that year we find him actively occupied in testing his lunar theory by the observations of Flamsteed, with whom he had hitherto been on the most intimate terms. The quarrel which subsequently took place between Newton and the astronomer royal is noticed under FLAMSTEED.

In 1699 Newton was chosen foreign associate of the Royal Academy of Sciences at Paris; in 1703 he was elected president of the Royal Society, to which office he was annually re-elected till his death; and in 1705 he was knighted by Queen Anne. In 1722 he became subject to a disorder of the bladder, accompanied with cough and gout. He presided for the last time at the Royal Society on the 28th of February, 1727, and died at Kensington on the 20th of March following, in the eighty-fifth year of his age. His body was interred in Westminster Abbey, the funeral being attended by several of the nobility and the principal members of the Society. In 1731 a magnificent monument, designed by Kent and sculptured by Rysbrack, was erected in the abbey at the expense of his relatives. It is situated immediately behind the organ, and bears an appropriate inscription ending with 'Sibi gratulentur mortales tale tantumque exstitisse humani generis decus.' It is not true that the binomial theorem is also engraven upon it, though it is so stated under 'Binomial Theorem,' on the authority of several writers. The same year a medal was struck at the Tower, bearing on one side the head of Newton, with the motto 'Felix cognoscere causas;' and on the reverse a personification of the mathematical sciences. In 1755 a full-length statue, by Roubilliac, was erected in Trinity College chapel, bearing the word Newtonus with the inscription from Lucretius, 'Qui genus humanum ingenio superavit.' There is also a bust of Newton in Trinity College library, by the same sculptor. Besides these memorials of Newton there exist several portraits of him by Vanderbank, Ritts, Sir Godfrey Kneller, and Sir Peter Lely: the last was taken when Newton was a B.A. The manor-house of Woolsthorpe, recently visited by the writer, is built of stone, and seated in a valley on the west side of the river Witham. It was repaired in 1798 by Mr. Turner, the late proprietor, by whom also a marble tablet was placed over the mantelpiece of the room in which Newton was born. It bears the inscription, 'Sir Isaac Newton, son of Isaac Newton, lord of the manor of Woolsthorpe, was born in this room on the 25th of December, 1642.' At foot are the lines from Pope,

> 'Nature and nature's laws lay hid in night;
> God said, "Let Newton be," and all was light.'

In a room on the same floor is preserved his oaken study, converted by the present occupant into a lumber closet. The two dials engraved upon the southern wall are still very distinct, but the styles of both are wanting. The larger dial is about a foot in diameter. The celebrated apple tree, the fall of one of the apples of which is said by Pemberton to have turned the thoughts of Newton to the subject of gravitation, was thrown down by the wind about five years since. A drawing has been preserved of it in its prostrate position, and another tree grafted on its stock.

In his person Newton was short, but well set, and inclined to corpulence. His hair was abundant, and white as silver, without baldness. His eye was bright and penetrating till within the last twenty years of his life; but his countenance, though thoughtful, seldom excited much expectation in those to whom he was unknown. In his conversation there appears to have been little either very remarkable or agreeable; but we have the testimony of Dr. Pemberton that 'neither his age nor his universal reputation had rendered him stiff in opinion, or in any degree elated.' Ascribing whatever he had accomplished to the effect of patient and continuous thought rather than to any peculiar genius with which nature had endowed him, he looked upon himself and his labours in a very different light from that in which both he and they were regarded by mankind. 'I know not,' he remarked, a short time before his death, 'what I may appear to the world; but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.' (Turner's *Collections relative to the Town of Grantham.*) But while he thus contrasted the littleness of human knowledge with the extent of human ignorance, he was fully conscious of the importance of his own labours, when compared with those of his predecessors and contemporaries, and evinced a natural readiness to assert and vindicate his rights whenever occasion might require. It were to be wished that, by an earlier publication of his discoveries, he had adopted the most eligible mode of establishing the undoubted priority of his claim. Such a course, by changing the current of events, would have left him less open to the charge of having disregarded the claims of others, or of having suffered their reputations to be prejudiced by his silent acquiescence in the acts of his colleagues. To judge of Newton from the life of him recently published by Sir David Brewster, we could only infer that his moral character had suffered from no one instance of human infirmity, and that every action had been dictated by feelings of benevolence and the love of truth. These were indeed the general motives by which he was actuated. The unrefuted disingenuousness of his behaviour towards Leibnitz, relative to the discovery of the calculus, and the yet more discreditable part which he took in the persecution of Flamsteed by the Royal Society, are exceptions. Sir David Brewster considers Leibnitz to have been the only aggressor, Newton the only sufferer. The MS. autobiography of Flamsteed was not discovered by Mr. Baily till the year following that in which Sir D. Brewster published his life of Newton.

The following is a list of the works of Newton, in the order of publication:—

1. 'Principia,' 1687, Lond., 4to.; 1713, Camb., 4to., edited by Cotes; 1726, Lond., 4to., edited by Pemberton; 1730, Lond., 2 vols. 8vo., illustrated by Donick; 1729, Lond., 2 vols. 8vo., Englished by Motte. Besides these, several editions have been published on the Continent. The best edition is that of MM. Le Seur et Jacquier, 1739-42, Genev., 4 vols. 4to., comprising a valuable running commentary on the text, and generally known as the 'Jesuits' edition.' The same, 1760, Colon. Allobrog.; the same, 1822, Glasgow, 4 vols. 8vo., edited by Wright. (Horsley, tom. ii. and iii.)

2. 'Optics,' Lond., 1704, 4to. To the first edition, written in English, were appended two Latin treatises, viz. 'De Quadratura Curvarum,' containing an exposition of his method of fluxions; and 'Enumeratio Linearum tertii Ordinis,' containing an elegant classification of seventy-two curves of the third order, with an account of their properties, but without any information as to the method whereby those properties had been investigated. These treatises, which had little connection with the principal work, were omitted in the subsequent editions. A Latin translation of the 'Optics,' by Dr. Clarke, appeared in 1706, Lond., 4to., for which Newton presented the doctor with 500*l.* The other editions are, in English, Lond., 1714, 1721, 1730; in Latin, Lond., 1719, 1721, 1728, Lausanne, 1740, Padua, 1773. (Horsley, tomes i. and iv.)

3. 'Arithmetica Universalis,' 1707, Camb., 8vo., comprising the algebraical lectures delivered by Newton at the university, printed under the inspection of Whiston, and, according to some authorities, without the author's consent. Translated by Raphson, 1728, Lond., 8vo. There are several later editions, both English and foreign. That by Castillon, Amst., 1760, is in 2 vols. 4to. (Horsley, tom. i.)

4. 'Analysis per Equationes Numero Terminorum Infinitas,' 1711, Lond., 4to. Translated by Stewart, 4to., Lond., 1745. This work was written by Newton, about the year 1672, and intended as an introduction to Kinckhuysen's 'Algebra,' of which he had undertaken to publish a new edition. Motives now unknown induced him to abandon this design. (Horsley, tome i.)

5. 'Methodus Differentialis,' a small tract on interpolation. (Horsley, tome i.)

6. 'De Mundi Systemate,' 1728, Lond., 4to. This is a popular account af the truths contained in the third book of the 'Principia.' An English translation from the original MS. had been published the previous year in 8vo. There are later editions. (Horsley, tome iii.)

7. 'The Chronology of Antient Kingdoms amended: to which is prefixed a Chronicle from the first memory of things in Europe to the conquest of Persia by Alexander the Great,' 1728, Lond., 4to. It had been surreptitiously translated and published at Paris, in 1725. The reader will find an able review of this work. by M. Daunon, appended to Biot's Life of Newton in the 'Biographie Universelle,' tome xxi., pp. 180-6. (Horsley, tome v.)

8. 'Table of Assays,' printed in Dr. Arbuthnot's 'Tables.'

9. 'Optical Lectures,' 1728, Lond., 8vo., comprising those delivered in the years 1669-70-71. Translated into Latin, 1729, Lond., 4to. (Horsley, tome iii.)

10. 'Observations on the Prophecies of Daniel and the Apocalypse of St. John,' 1733, Lond., 4to. (Horsley, tome v.)

11. 'A method of Fluxions and Analysis by Infinite Series,' translated into English from the original Latin by John Colson, to which is added a Commentary by the translator, 1736, Lond., 4to.

12. 'An Historical Account of two notable Corruptions of Scripture,' written prior to 1691, but first published in 1754, Lond., under the title of 'Two Letters from Sir Isaac Newton to M. Le Clerc.' (Horsley, tome v.) Newton contributed some papers to an edition of Varenius's 'Geography,' printed at Cambridge in 1672, 8vo.

The papers communicated by Newton to the Royal Society are comprised in vols. vii.-xi. of the 'Transactions.' The principal works of Newton were collected and published by Dr. Horsley, under the title of 'Newtoni Opera quæ extant omnia,' 1779-85, Lond., 5 vols. 4to. In the foregoing list, where a work had been reprinted in Horsley's edition, reference is made to the volume. The following were, with few exceptions, first printed in Horsley's edition:—Tome i., 'Excerpta quædam ex Epistolis Newtoni ad Series Fluxionesque pertinentia;' 'Artis Analyticæ Specimina, vel Geometria Analytica.' Tome iii., 'Theoria Lunæ.' Tome iv., 'Letters on various Subjects in Natural Philosophy, published from the Originals in the Archives of the Royal Society;' 'Letter to Mr. Boyle on the Cause of Gravitation;' 'Tabulæ duæ, Calorum altera, altera Refractionum;' 'De Problematibus Bernouillianis;' 'Propositions for determining the Motion of a Body urged by two Central Forces;' 'Four Letters to Dr. Bentley;' 'Commercium Epistolicum D. Johannis Collins, et aliorum, de Analysi Promota' (first published by the Royal Society in 1713: a new edition appeared in 1722); 'Additamenta Commercii Epistolici.' Tome v., 'A short Chronicle from a Manuscript, the property of the Rev. D. Ekins, dean of Carlisle.' The minor works of Newton have been collected and published under the title of 'Opuscula Mathematica, Philosophica, et Philologica; collegit partimque Latine vertit ac recensuit Joh. Castillioneus;' Laus. et Genev., 3 tomes 4to. After the death of Newton, Dr. Pellet was appointed by the executors to examine his manuscripts and papers, and to select such as he deemed adapted for publication. They are eighty-two in number, and consist of a great number of sheets. But many of those on theological subjects are mere copies over and over again, with very slight variations. Of these MSS., the only ones which Dr. Pellet deemed fit to be printed were 'The Chronology' and 'An Abstract of the Chronology,' the former in ninety-two, the latter in 12 half-sheets folio. At the same time he recommended for further consideration those entitled 'De Motu Corporum;' 'Paradoxical Questions concerning Athanasius;' 'History of the Prophecies;' and a bundle of loose mathematical papers. A catalogue of these MSS. was appended to a bond given by Mr. Conduit to the administrators of Newton, wherein he binds himself to account for any profit he may make by their publication. A list of them will be found in Hutton's 'Dictionary.' Those on theological subjects are at present, we believe, in the possession of the family of the earl of Portsmouth. In addition may be mentioned the valuable and hitherto unpublished collection of letters between Newton and Cotes, relative to the publication of the second edition of the 'Principia,' preserved in the library of Trinity College, Cambridge; the Correspondence of Newton with Mr. Pepys and Mr. Millington, in the possession of Lord Braybroke; and other MSS. in the Bodleian library, Oxford.

(Brewster's *Life of Newton*, Lond., 1831, 12mo.; Biot's *Life*, in the *Biog. Univers.*; Turner's *Collections for the Hist. of Grantham*, containing the Papers forwarded to Fontenelle by Conduit, the husband of Newton's niece, and Dr. Stukeley's Account of the Infancy of Newton, written in 1727; Fontenelle's 'Eloge de Newton,' *Œuvres diverses*, La Haye, 1729, 4to., tome iii.; *Biographia Britannica;* Birch's *Hist. of the Royal Society*, Lond., 1756-7, 4to., vol. iii. and iv.; *Heads of illustrious Persons of Great Britain, engraved by Houbraken and Vertue, with their*

Lives, by Birch, Lond., 1743, fol., tome i., p. 147. The reader may further consult Montucla, *Hist. des Mathem.*, tomes ii., iii., iv.; Pemberton's *Account of Newton's Philosophy;* Maclaurin's *Account of Newton's Discoveries;* Priestley's *History of Optics;* Laplace, *Exposition du Système du Monde*, chap. v.; Lord King's *Life and Correspondence of Locke; Life of Newton*, in the *Library of Useful Knowledge*, &c.)

NEWTON'S PRINCIPIA. [Principia.]

NEWTON, THOMAS, born 1704, died 1782, having been for the last twenty years of his life bishop of Bristol, and for the last fourteen dean of St. Paul's; a prelate of not very remarkable powers, natural or acquired, but a man without reproach, acceptable in the society of the great, and possessed of a certain amount of general and professional knowledge.

He is chiefly known by two works: an edition of the 'Paradise Lost,' with notes, first published in 1749, and his 'Dissertation on the Prophecies,' of which the first volume appeared in 1755. Both had a certain, perhaps a high, celebrity in their day, but we look in them in vain for much of either acuteness or learning. Both however may be perused by those who do not profess to be themselves critical scholars with advantage; and the critical scholar in English or in biblical literature may meet occasionally with useful suggestions. It is perhaps unfortunate for the bishop that a comparison is provoked between his work on Milton and the edition (a model of works of that class) of the minor poems by Warton.

Bishop Newton's course of life was very like that of other divines who have risen to the episcopal bench. He was the son of a person engaged in trade, was a pupil in the grammar-school at Lichfield, and afterwards at Westminster, from whence he removed to Trinity College, Cambridge; was for some years a city preacher, and tutor in the Tyrconnel family, and in 1744 presented by Pulteney earl of Bath, who was his great friend and patron, to the living of St. Mary-le-Bow. He next became lecturer at St. George's, Hanover Square, prebendary of Westminster, dean of Salisbury, sub-almoner, bishop of Bristol, and finally dean of St. Paul's.

NEWTOWN STEWART, a town in the parish of Ardstraw, barony of Strabane, county of Tyrone, and province of Ulster. It is seated on the left bank of the Moyle, or Mourne, 9 miles (English) north by west from Omagh, and 116 miles (English) north-west by north from Dublin (direct distances). It derives its name from Sir William Stewart, to whom the adjacent lands were granted by Charles I. Being surrounded by the mountains of Munterloney, and commanding the only pass in this mountainous district, it was formerly regarded as a place of some importance. In 1689 it was burnt by order of James II., and remained a mere heap of ruins till 1727, when it was restored by the Stewart family. The parish church, 'a handsome building,' was erected the same year, at the expense of Dr. Hall, the then vicar of Ardstraw, and subsequently bishop of Dromore. Young, in 1780, described this place as 'a row of neat stone and slate cabins.' It now consists of three streets, which are tolerably well built and paved, and contains one or two inns. Its population, in 1831, was 1737, that of the entire parish of Ardstraw being 18,617. Many of the inhabitants are employed in the neighbouring quarries. The market-day is Monday. The fairs are held on the last Monday in every month.

(Young's *Tour in Ireland*, Lond., 1780, 4to.; *Population Returns.*)

NEWTOWN. [Montgomeryshire.]

NEXT OF KIN. [Consanguinity; Intestacy.]

NIAGARA RIVER AND FALLS. The Niagara river unites lake Erie with lake Ontario, which is 334 feet lower than lake Erie. The river descends through this difference in level in the space of about 33 miles. Near the place where it issues from lake Erie the river runs through a level country, and its banks are not much elevated above the surface of the water. The current is gentle, hardly exceeding two miles and a half an hour. The width of the river is about one mile, and it preserves this width until it arrives at Grand Island, by which it is divided into two arms. About ten miles lower down, at Navy Island, both arms re-unite, and at this place the river is about two miles wide. A little lower down, at the mouth of the Welland or Chippeway river, it suddenly contracts to less than a mile, and its current rapidly increases from three to seven or eight miles an hour. The course of the river in this part is nearly due west, and its banks begin to rise first to ten or twelve feet, and soon to twenty, thirty, and fifty feet above the surface of the water. This rising of the banks is not the effect of a rise in the surrounding country, which in fact preserves its level in a continuous plain, but it is owing to the bed of the river descending on an inclined plane. The waters are borne down with great force against the Canadian side, and driven back by the high rocky banks, for at this point the river suddenly turns to a course which is east of north, and immediately afterwards the great volume of water is hurled down over a perpendicular height of 160 feet into a terrific gulf. Goat Island divides the cataract. This island is about 320 yards wide. The cataract between it and the American side is 320 yards wide, and 162 feet high; but between the island and the Canadian side it is 700 feet wide and 150 feet high. Both falls unite before they are lost in the gulf below. The American cataract descends nearly in a perpendicular line, and is divided into two cataracts by a small rock. The fall between this rock and Goat Island is only ten yards wide, and is called the cataract of Montmorenci. The Canadian cataract rolls over a precipice projecting about fifty feet beyond its base, and the falling water forms a curve, between which and the rock itself persons may safely proceed thirty or forty yards. This is called the Horse-Shoe Fall. To accommodate the travellers who visit the falls, a wooden bridge has been thrown across the American Fall to Goat Island, a few yards above the very crest of the cataract, and on the Canadian side a platform has been extended so far as to enable the traveller to look immediately over the awful abyss. Below the Falls the river flows with considerable rapidity between banks from 200 to 300 feet high. These banks are perpendicular for about half their descent, but towards the base they form a slope composed of the fragments which have fallen from above. Four miles below the Falls, in a semicircular basin, there is a terrific whirlpool formed by the water, which descends into the vortex with furious impetuosity, and rushes out between a narrow passage formed by perpendicular cliffs. Not far from this place the river passes the low ridge called Queenston Heights, and enters the level country which surrounds lake Ontario.

This enormous volume of water is thrown over a mass of limestone rock, which lies in horizontal strata: below the limestone there is a thicker mass of soft shale, which crumbles away rapidly; so that the limestone above overhangs it forty feet or more, and fragments of the superior rock fall down from time to time. Thus the cataracts are slowly changing their position, and moving nearer to lake Erie. The deep channel in which the river flows below the Falls seems to owe its origin to the same cause that is now in operation; and it is not improbable that the Falls were once at Queenston, which is now seven miles below the cataract. The high table-land extends from Queenston to lake Erie

The Niagara descends—

From lake Erie to the head of the Rapids above the Falls . . .	15 feet
By the Rapids above the Falls . .	51 „
By the Great Fall on the American side .	162 „
From the base of the Falls to Queenston .	104 „
From Queenston to lake Ontario . .	2 „
	334 feet

To obviate the interruption which the Falls of the Niagara cause to navigation, the Welland Canal has been made on the Canadian side. [Canada.]

(Basil Hall's *Travels through North America;* Mac Gregor's *British America;* Bouchette's *British Dominions in North America;* Darby's *View of the United States;* and Fowler's *Journal of a Tour in the State of New York;* Lyell's *Geology*, i. 275; Mr. Bakewell, jun., *On the Falls of Niagara*, in Loudon's *Mag. of Nat. Hist.*, xii.)

NIAS. [Sumatra.]

NICÆA. [Anatolia.]

NICANDER, a physician, poet, and grammarian, of whose life very few particulars are found in antient authors, and even those few are doubtful and contradictory. Upon the whole it seems most probable that his father's name was Damnæus (Eudociæ *Viol., ap. Villois. Anecd. Gr.*, vol. i., p. 308, and *Anonymi Scriptoris, 'Vita Nic.'*); that he lived about Ol. clxi., ii., 135 B.C., in the reign of Attalus III., the last king of Pergamus, to whom he dedicated one of his poems which is no longer extant (Suidas; Eudoc., *Viol.; Anon. Vita*); that he was a native of Claros (Nicandri *Theriaca*), a small town near Colophon, whence he is commonly called *Colophonius* (Cic., *De Orat.*, lib. i., cap. 16; Suidas, *Anthol. Gr.*); and that he succeeded his father as hereditary priest of Apollo Clarius (Eudoc., *Viol.; Anon. Vita*). He appears to have been rather a voluminous writer, as the titles of more than twenty of his works have been preserved; but of all these we possess at present only two in a perfect state, with a few fragments of some of the others.. The 'Theriaca' is a poem consisting of nearly 1000 lines in hexameter verse, on the wounds caused by different venomous animals, and the proper treatment of each: it is characterised by Haller (*Biblioth. Botan.*) as 'longa, incondita, et nullius fidei farrago.' It contains however several curious passages relating to natural history, of which the following may serve as a specimen. He mentions (v. 147, &c.) a species of serpent, called *σήψ*, which always assumes the colour of the ground over which it crawls.* He places (v. 183, &c.) the venom of serpents in a membrane surrounding the teeth, which is not very far from the truth. He describes the ichneumon (v. 190, &c.) and the asp, and the way in which the former fights with the latter and destroys its eggs; all of which is described in very nearly the same terms by Pliny (*Hist. Nat.*, lib. viii., cap. 35, 36), and in a great measure confirmed by modern naturalists. (See Cuvier's notes on the abovementioned chapters of Pliny, in the French translation, 20 vols. 8vo., Paris, 1829-33.) In speaking of the amphisbæna, he falls into the vulgar error of his day, and describes it as having two heads (v. 372, &c.). The same error is found in Pliny (*Hist. Nat.*, lib. viii., cap. 35). He divides scorpions into nine species, distinguishing them chiefly by their colour (v. 769, &c.), a mode of division probably taken from Apollodorus (Pliny, *Hist. Nat.*, lib. xi., cap. 30), and followed by Ælian (*De Nat. Anim.*, lib. vi., cap. 20). He is the first person who describes the moths that flutter about a candle at night, and calls them *φάλαιναι* (v. 759, &c.). He gives a fabulous account of the basilisk (v. 396, &c.), which is followed, as might be expected, by Pliny (*Hist. Nat.*, l. viii., cap. 33, and l. xxix., c. 19), and by Ælian (*De Nat. Anim.*, lib. ii., cap. 7), though it should be observed that the animal spoken of by them could not be the same that is called by that name by modern naturalists, which is found only in America. [BASILISK; COCKATRICE.] He declares the bite of the field-mouse to be poisonous (v. 815, &c.), and that the animal dies if it should fall into a wheel-rut; both which circumstances are repeated by Pliny (*Hist. Nat.*, lib. viii., cap. 83) and Ælian (*De Nat. Anim.*, lib. ii., cap. 37). He is one of the earliest writers who mentions the fable of the salamander (v. 817, &c.). See Pliny, *Hist. Nat.*, lib. x., c. 86, and Ælian, *De Nat. Anim.*, lib. ii., c. 31. He says that wasps (v. 738, &c.) are generated by the putrefaction of the carcass of a horse (comp. Pliny, *Hist. Nat.*, lib. xvii., cap. 18, and Ælian, *De Nat. Anim.*, lib. i., cap. 28), and bees by that of an ox (comp. Ælian, *De Nat. Anim.*, lib. ii., cap. 57).

The 'Alexipharmaca' is a rather shorter poem, written in the same metre, on poisons and their antidotes, and may be considered as a sort of continuation of the 'Theriaca.' Haller's judgment on this work is as severe as on the preceding. He says of it, 'Descriptio vix ulla, symptomata fusè recensentur, et magna farrago et incondita plantarum potissimum alexipharmacarum subjicitur.' Among the poisons of the animal kingdom he mentions (v. 115, &c.) the cantharis of the Greeks, which is not the *Lytta Vesicatoria*, but the *Meloe Chicorii;* the buprestis (v. 335, &c.), *Carabus Bucidon;* the blood of a bull (v. 312); the coagulated milk in the stomach of mammiferous animals (v. 364, &c.); a species of tetraodon (v. 465, &c.), *Tetraodon Lagocephalus;* the leach (v. 495, &c.), *Hirudo venenata;* and a species of gecko, *σαλαμάνδρα* (v. 550, &c.). Among the vegetable poisons we find the aconite (v. 12, &c.), 'Aconitum Lycoctonum;' the coriander (v. 157, &c.), which has sometimes been fatal in Egypt; the hemlock (v. 186, &c.), 'Conium;' the colchicum (v. 249, &c.), *ἐφήμερον*; the Lotos dorychnium (v. 376, &c.); the henbane (v. 415, &c.), 'Hyoscyamus;' opium (v. 433, &c.); and the different species of fungi (v. 521, &c.), the growth of which Nicander attributes to fermentation. Of mineral poisons he mentions only white lead, or carbonate of lead (v. 74, &c.), and litharge, or protoxide of lead (v. 607, &c.).

To counterbalance in some degree Haller's unfavourable opinion of Nicander's extant works, it ought in justice to be stated that his knowledge of natural history appears to be at least equal to that of other writers of his own or even of a later age, while on the subject of poisons he was long considered a great authority: Galen several times quotes him, and Dioscorides, Aëtius, and Johannes Actuarius have borrowed from him largely.

With respect to his merits as a poet, the most opposite opinions are to be found both in antient and modern writers. In the Greek anthology Colophon is congratulated for being the birth-place of Homer and Nicander (t. iii, p. 270, ep. 567, ed. Brunck.). Cicero (*De Orat.*, lib. i., cap 16), alluding to his 'Georgics' (a poem not now extant), praises the poetical manner in which he treats a subject of which he was entirely ignorant; while Plutarch (*De Aud. Poëtis*, cap. 2) says the 'Theriaca' only escapes being prose because it is put into metre, and will not allow it to be called a poem, because there is in it 'nothing of fable or falsehood.' This very point Julius Cæsar Scaliger thinks worthy of especial commendation, and says, 'Magna ei laus quod ne quid ineptum aut ineptè dicat.' (*Poëtices*, lib. v., cap. 15.) He goes on to praise the accuracy of his expressions and versification, and declares that among all the Greek authors a more polished poet is hardly to be found. M. Merian, on the other hand, in an essay 'Comment les Sciences influent dans la Poësie' (*Mém. de l'Acad. Roy. de Berlin, l'an* 1776, p. 423) mentions Nicander to show the antipathy that exists between the language of poetry and the subjects of which he treated. He calls him 'a grinder of antidotes, who sang of scorpions, toads, and spiders,' and considers his poems as fit only for the apothecaries. Probably his poetical genius has been a good deal cramped by the prosaic character of the subjects that he has chosen for his theme; and we may fairly say that his writings contain quite as much poetry as could be expected from such unpromising materials. As for his style and language, probably every one who has ever read half a dozen lines of either of his poems will agree with Bentley, who says that he studiously affected obsolete and antiquated words, and must have been an obscure writer even to his contemporaries. (*Cambridge Museum Crit.*, vol. i., p. 371.)

The 'Theriaca' and the 'Alexipharmaca' were first published in Greek, with the Scholia to both poems, by the elder Aldus, Venet., 1499, fol., at the end of his edition of Dioscorides. The last and best edition is Schneider's, who published the 'Alexipharmaca' in Greek and Latin, with the Scholia and copious notes, Halæ, 1792, 8vo. The 'Theriaca,' edited in the same manner, and containing also the fragments of Nicander's other poems, appeared in 8vo., Lips., 1816. The 'Theriaca' was published in the 'Cambridge Museum Criticum,' with Bentley's emendations, vol. i., p. 370, &c. There is extant a Greek paraphrase in prose of both poems (printed in Schneider's editions) by Eutechnius, of whom nothing is known, except that he has done the same to Oppian's 'Cynegetica' and 'Halieutica.'

NICANDER, KARL AUGUST, a recent Swedish poet of considerable celebrity, was born at Stregnäs, on the 20th March, 1799, and educated at the university of Upsala, where he made his literary début in 1820, first under the pseudonym 'August,' in the 'Kalender för Dame,' and almost immediately afterwards by his 'Runesvärdet, eller den förste Riddarn' (The Runic Sword, or the First Knight), a tragedy which manifested great power. His next production, which was illustrated with designs by his friend Baron von Hamilton, was that entitled 'Runor' (the Runes), a series of sixteen legendary 'romaunts,' among which that which has for its subject Erik Vasa is the most interesting. Another production of the same kind, though founded not upon northern but southern story,—namely, his 'Enzio,' an historical lyric in eleven romaunts, appeared in a collection of poems by him in 1825-6; and in each of those years he obtained a prize medal from the Swedish academy, the latter of which was for his poem on the 'Death of Tasso,'—a subject previously treated with great beauty and energy by the Russian poet Batiushkov. Admirable and touching as are the strains in which the tragic tale of 'King Enzio' are poured forth,—deep as is the pathos, rich as is the poetic colouring, pure and graceful as is the language, this piece did not become a favourite with the public. It was however translated into

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* Compare Pliny, 'Hist. Nat.,' lib. viii., cap. 35. The same account of the *σήψ* is found also in Aristotle (*De Mirab. Auscult.*, c. 178), and in Ælian (*De Nat Anim.*, l. xvi., c. 40).

German by Mohnike (1829), and the collection in which it appeared procured for its author the applause and patronage of the academy, which enabled him to travel and visit Italy in 1827. Of this journey the literary fruit was the poet's 'Minnen från Södern' (Recollections of the South, after a Tour through Denmark, Germany, Switzerland, and Italy). Its chief merit lies in the poetical pieces with which it is interspersed. Among his minor poetical compositions, that on 'Silence' is a piece of singular beauty and pathos. Nicander died February 7, 1839.

NICARAGUA. [CENTRAL AMERICA.]

NICCOLA DI PISA, or **PISA'NO**, is a celebrated name in the history of art. He was among the very earliest restorers of sculpture: he quitted the hard, dry, and mechanical manner of his predecessors, and introduced a style which, though it falls short of the antique, was based upon similar principles, and in which he displayed a vigorous mind and much feeling, if not always the most refined taste. None of his biographers have been able to ascertain the precise date either of his birth or death, but the former must have been very near the commencement of the thirteenth century, as he was greatly advanced in age, and became quite decrepid in the year 1273, after which date no certain mention of him can be traced. That he had attained to great skill in his profession in 1225 may be taken for granted, as he was in that year employed to execute the *arca* or tomb of San Domenico at Bologna, which he embellished with a series of bas-reliefs and figures truly admirable for that time. Several of these subjects are given by Cicognara, in his 'Storia della Scultura,' and many of the heads and countenances are finely expressed. This work clearly shows that Niccola had diligently studied the antique, and also that he must then have been almost in the maturity of his powers. For a description of and remarks on this masterly production, we refer to Cicognara and to Moronna's 'Pisa Illustrata.'

Niccola appears to have continued at Bologna till 1231, when he began the celebrated church of San Antonio, or Il Santo, at Padua, which acquired for him no less fame as an architect. He had previously given evidence of his skill in architecture by the church and convent of San Domenico at Bologna, which were designed by him during his residence in that city, and supposed to have been his first works of the kind. Immediately after completing the building at Padua, he was engaged to erect the church Dei Frari at Venice, and his reputation as an architect became so great that he was successively employed on many other buildings at Florence, Pistoja, Volterra, Naples, and in his native city. Among those which he executed at Florence, the most celebrated is the church and of monastery Santa Trinita, which edifice was extolled by Michel Agnolo as one of surpassing excellence for its simple grandeur and the nobleness of its proportions. He begun the cathedral of Pistoja in 1240, and likewise improved and embellished that at Volterra At Arezzo, the convent of S. Domenico,—at Viterbo, the church and convent of the Dominicans, where he did much in the way of repairs and restorations,—and at Naples, the church of Lorenzo, besides the magnificent abbey on the plain of Tagliacozzo, erected by Charles I. of Anjou (1268) in commemoration of his decisive victory over Corradino, and thence called Santa Maria della Vittoria,—testify to the repute in which his architectural talents were held and how extensively he was employed. Besides the Palazzo degli Anziani and S. Michele, among the edifices by him at Pisa the most noted is the campanile of S. Niccola, or the Augustines, which is an octangular structure externally, except at its upper story, which has sixteen sides, with as many arches springing from columns, and forming an open gallery around it, and above this is a lesser story crowned by a short spire, or rather a steep roof, where the octagonal form is resumed. The interior is circular, and forms an open well-staircase with arches resting upon columns, of which latter there are altogether four and twenty, fifteen of oriental granite, and the rest of various marbles. Moronna gives an elevation and section of this structure, but they are so wretchedly executed, that they cannot be relied upon for anything further than the general idea and shape of the design.

Another very celebrated work by him at Pisa, though of a different class, is the pulpit in the Baptistery, a hexagon supported on seven columns, there being one in the centre beneath it, besides those at the angles. It was executed by him in 1260; and in 1266 he was employed to make another for the cathedral at Sienna, which latter is considerably larger and richer, and octagonal in plan, so that instead of five, there are seven sides occupied with compartments in bas-relief, and likewise nine columns instead of seven. Had he produced nothing else, these two works alone (as to which Cicognara enters into a minute description), would suffice to establish Niccola's fame as a sculptor, and show the great perfection to which he advanced the art from what he found it in the hands of his immediate predecessors. Another work, of which the historian of Italian sculpture speaks at great length, is the representation of the Last Judgment and Inferno, in the façade of the Duomo of Orvieto, which has been generally attributed to Niccola, but is asserted by that critic to have been the production of

GIOVANNI DI PISA, the son and pupil of Niccola, who may have been born somewhere about 1235, as at the time of his death, in 1320, he is said to have been 'vecchissimo,' exceedingly old. We may at least suppose him to have been nearly twenty-five when he was invited to Perugia to erect a splendid monument to Urban IV., who died in that city in 1264. That work gave such satisfaction, that he was employed also upon the embellishments of the fountain in front of the Duomo, wherein he displayed extraordinary ability in the architecture, the sculpture, and the bronzes. Scarcely had he completed this work, when his father died, and he returned to Pisa in order to take possession of his patrimony. One of the first tasks committed to him by his fellow-citizens was that of adorning the small but celebrated church of S. Maria della Spina, one of the richest and most remarkable specimens of its peculiar Gothic style in Italy. For the façade and other parts of the exterior he executed a number of statues, bas-reliefs, and other ornaments of sculpture, and is said in one of the figures to have portrayed his father Niccola. What he there did however were merely the embellishments to a building, in which others shared with him; but it was not long before opportunity was afforded him of displaying his architectural ability on an ample scale, for in 1278 he began, and in 1783 completed, the renowned Campo Santo, or cemetery, one of the most remarkable monuments of its period, and that which, together with the adjacent cathedral, campanile, and baptistery, offers a most interesting group of studies to the architect. The edifice is of marble, and forms a cloister of sixty-two arches (five at each end and twenty-six on each side), inclosing the inner area or burial-ground; but neither this latter nor the exterior is a perfect parallelogram, the cloister being fifteen feet longer on one side than on the other, viz. 430 and 415 feet, and consequently the ends not at right angles to the sides. This defect would almost seem to have been occasioned by oversight, as it could not have been worth while to sacrifice regularity for the sake of a few feet.

After this, according to Vasari, he went to Sienna, where he made a model or design for the façade of the Duomo; this however is questionable. One of the first commissions he received after finishing the Campo Santo was from Charles I. of Anjou, who invited him to Naples, where he erected the Castel Nuovo, and built Santa Maria Novella. In 1286 he was employed to erect the high altar in the Duomo at Arezzo, an exceedingly sumptuous work, in the Tedesco style, with a profusion of figures and sculptures, all in marble. This work, and his Virgin and Child, on one side of the cathedral at Florence, are reckoned by Cicognara as his best productions; but another of great celebrity is the marble pulpit by him in the church of S. Andrea, at Pistoja, which, like that by Niccola in the Duomo at Pisa, is a hexagon supported by seven columns. He also executed many of the sculptures of the Duomo of Orvieto, where he employed various assistants and pupils, some of the latter of whom afterwards became celebrated, particularly Agostino and Agnolo di Sienna. At the instance of the Perugians, he returned to their city, and executed the mausoleum of Benedict XI. He was also invited by the citizens of Prato, in 1309, to build the Capella della Cintola, and to enlarge their Duomo. Loaded with honours and distinctions as well as years, he closed his life in his native city, and was there buried within that monument which he had himself constructed about forty years before, the Campo Santo, which for others was a burying-place, for himself a mausoleum.

NICE, the County of (*Contado di Nizza*), a province of the Sardinian dominions in Italy, is situated between the Maritime Alps and the sea, at the western extremity of the

Riviera of Genoa. It is separated on the west from France by the river Var, and on the north from the plains of Piedmont by the Col de Tende, 5887 feet above the sea, over which passes the carriage road from Nice to Turin. The river Roia, a rapid stream coming from the Col de Tende, crosses the eastern part of the county of Nice, near the borders of the former republic and now duchy of Genoa, and after a course of about 30 miles enters the sea near Ventimiglia. The greatest length of the county of Nice, from the sources of the Tinea, an affluent of the Var, in the lofty recesses of the Alps, to the sea-coast, is nearly 50 miles; and its breadth varies from 30 to 40 miles. The country appears like a section of a vast amphitheatre, the lower part of which consists of gentle hills and small valleys and plains, with a southern aspect. Being sheltered from the northern winds by the Alps, it enjoys a very genial climate, and is made productive by cultivation, especially of olives, figs, grapes, oranges, lemons, and other fruit. But the climate of Nice is not so mild in winter as that of Villafranca, Mentone, San Remo, Nervi, and other favoured spots on the Riviera of Genoa; and the lemon-tree, which in these last-mentioned places thrives in the open fields, is reared at Nice on espaliers against walls facing the south. (Foderé, *Voyage aux Alpes maritimes.*) The mountains, which are mostly barren and naked, occupy about two-thirds of the territory of Nice.

The principal articles of exportation are, oil, which is very fine, and in good years to the amount of 2,500,000 francs; silk, 160,000 francs; oranges and lemons, 75,000 francs; timber, 106,000 francs. Nice imports corn, wine, and cattle, and manufactures of various kinds. The population of the whole county is 104,000. The whole province is 'Porto franco,' that is to say, foreign goods are introduced without paying duty. (Bertolotti, *Viaggio nella Liguria marittima*, 1834.)

The principal towns are—NIZZA; Sospello, 3600 inhabitants; Villafranca, with a good harbour and docks for the Sardinian navy, and a strong castle on the hill above, and 2500 inhabitants; Saorgio, in a strong position, often mentioned in the last wars between the French and Sardinian troops, has 2200 inhabitants; Tenda, at the foot of the mountain of the same name, has 2000 inhabitants.

The county of Nice, although subject to the royal constitutions or legislative code of the Sardinian monarchy, still retains some local regulations and privileges, which date from the time of its former Anjou sovereigns. It has its own senate or supreme court of justice, independent of the senates of Genoa and Turin, and having under its jurisdiction the provinces of Oneglia and S. Remo. The county of Nice is divided into fourteen mandamenti, or administrative districts, and contains eighty-seven communes.

Nice in the twelfth century was a municipal commonwealth, and allied to Pisa; but the kings of Aragon, having become masters of Provence, established their supremacy over Nice, leaving to the town however its elective consuls and its other municipal franchises, A.D. 1188. But Provence having passed from the Aragonese to the dominion of the counts of Anjou, in consequence of the marriage of Beatrix, daughter of Raymond Berlinghier IV. of Aragon with Charles of Anjou, brother of Louis IX. of France, in 1246, the county of Nice became subject to the Anjou dynasty of Provence and Naples.

During the war of the disputed succession of queen Joanna I. of Naples, the people of Nice had recourse for protection to Amadeus VII. of Savoy; and in 1402 king Ladislaus of Naples, and soon after his competitors of the house of Anjou, renounced their claims upon Nice to Amadeus VIII., duke of Savoy and prince of Piedmont. The county of Nice has remained ever since, with brief interruptions of temporary conquest, subject to the house of Savoy, under which it has attained its present state of prosperity.

The county of Nice has produced several distinguished men, among others the amiable poet Passeroni, who died at Milan at the end of the eighteenth century; the painters Brea and Vanloo: Papon, author of a valuable 'Histoire Générale de Provence;' Marshal Massena, well known in the wars of Napoleon; and the naturalist and traveller Pacho, who wrote a description of Cyrenaica and Marmarica, and died at Paris in 1828, at an early age.

The language of Nice is a dialect of the Langue d'Oc, or Provençal, but through its vicinity to and connection with Italy, Italian terminations and words have in many instances superseded those of the old language of the troubadours. It has been used by several native poets. The following is a specimen, describing a sanctuary raised on the ruins of the antient town of Cemenelium:—

'Enfin, en acheu luec destruc e solitari
Un mortal suspirat bastisse un santuari;
Dou era Giupiter e sent dieu empuissant,
L'estendant de la crous s' eleva trionfant.'

The annual arrivals of vessels in the port of Nice are reckoned at about 2000, being chiefly small craft, and mostly French or Italian. (Serristori, *Saggio Statistico.*)

NICE (in Italian, *Nizza*), a town in Italy, formerly capital of an Italian county, subject to the duke of Savoy, now king of Sardinia, afterwards incorporated with the French empire, and now again subject to its former sovereign. It is on the coast of the Mediterranean, about 10 miles east of the Var, which separates Italy from France; and 92 miles south by west of Turin, and as far south-west of Genoa, in 43° 41′ N. lat. and 7° 16′ E. long.

Nice was founded by the Greeks of Massilia, and fortified by them to repress the neighbouring tribes and secure the navigation of the adjacent sea. Its name was written in Greek Νίκαια (Strabo, p. 184. Casaub.). It continued subject to the Massilians after the establishment of the Var as the boundary of Gaul and Italy, though it was within the boundary of Italy. In the middle ages it was a strong fortress. It was besieged, A.D. 1543, by the French, under François I., on the land side, and by the Turkish fleet, under Barbarossa, on the sea side. It was taken and plundered, except the citadel, which held out. The town was again taken by the French in 1691, 1706, and 1744. It was seized by the French, without resistance, in 1791, and annexed to the republic, being made the capital of the department of Alpes Maritimes. By the new arrangements of territory, in 1814-15, it reverted to Sardinia.

Nice is pleasantly situated, being bounded on the north by the Maritime Alps, and open on the south to the sea. The citadel of Mont-Albano, on a high and pointed rock, overhangs the town, and the Paglion, a mountain torrent, passes it on the west side, separating it from the suburb called La Croix de Marbre (the marble cross), or sometimes the English quarter, from the number of English who resort to it in time of peace. In this suburb the houses are painted externally in fresco, and surrounded with gardens containing standard orange and lemon trees. The town itself is divided into two parts, distinguished respectively as the old and new towns. The streets of the former are narrow; the latter is better laid out, and the houses are painted, like those of the English quarter. There are two squares, one of them surrounded with porticos, and very handsome. Adjacent to the other is a raised terrace, which serves for a defence of the town against the sea and for a public walk. On this terrace is a poorly-executed statue of Catherine Seguiran, a heroine, who assisted in the defence of Nice against the Turks. The ramparts of the town, on the land side, form another promenade. The cathedral or church of Santa Reparata is the chief public building.

The climate of Nice has been much celebrated for its mildness, but has been probably over-praised. The neighbourhood of the Alps, and the prevalence of the *Vent de Bise*, a keen searching wind, renders the air frequently very cold, and even frosty in winter and spring; and the heat in summer is excessive. It is however much resorted to by invalids and other strangers, especially English. The influx of visitors greatly augments the population of the place, which in 1824 consisted of 25,851 inhabitants (*Calendario Sardo*); but it appears to have increased considerably since, as Bertolotti (*Viaggio nella Liguria marittima*, 1834), reckons the population of Nizza at nearly 30,000. The walks and rides in the neighbourhood of the town are agreeable. There are many pleasant country-houses on the slope of the adjacent hills, and near the town are the ruins of the antient Cemenelium, now the hamlet of Cimiez. There are a theatre, baths, good inns, cafés, a public library, and agreeable society. Provisions (except game) are good and plentiful; the wine and oil are excellent. There are in the town some silk, cotton, and paper mills, a great number of oil mills, and a tobacco manufactory. Soap, liqueurs, essences, and perfumery are also made. The port, which is protected by a mole, is spacious and secure. Vessels of 300 tons can enter it. The chief trade is in silk, oranges and other fruit, and in the manufactures of the town. The roadstead would afford anchorage to a hundred vessels of the line. Nice is a bishop's see.

NICE, THE COUNCIL OF, was the first and most mportant œcumenical council held in the Christian church. It was convened by the emperor Constantine, for the purpose of settling the Arian controversy, after he had in vain attempted to reconcile Arius and Alexander, the leaders of the two opposing parties in that dispute. The council met at Nicæa in Bithynia, in the year 325 A.D., and sat probably about two months. It was attended by bishops from nearly every part of the East; but few came from Europe, and scarcely any from Africa, exclusive of Egypt. According to Eusebius, there were more than 250 bishops present, besides presbyters, deacons, and others. Some writers give a larger number. The account generally followed is that of Socrates, Theodoret, and Epiphanius, who state that 318 bishops attended the council. Some account of the bishops who composed this assembly is given by Socrates, Sozomen, and Theodoret. It is uncertain who presided, but it is generally supposed that the president was Hosius, bishop of Corduba (Cordova) in Spain. Constantine himself was present at its meetings.

The chief question debated in the council of Nice was the Arian heresy. Eusebius of Cæsarea proposed a creed which the Arian party would have been willing to sign, but it was rejected by the council, and another creed was adopted as embodying the orthodox faith. The most important feature of this creed is the application of the word *consubstantial* (ὁμοούσιος) to the Son, to indicate the nature of his union with the Father; this word had been purposely omitted in the creed proposed by Eusebius. The creed agreed upon by the council was signed by all the bishops present, except two, Secundus, bishop of Ptolemais, and Theonas, bishop of Marmarica. Three others hesitated for some time, but signed at last, namely, Eusebius of Nicomedia, Theognis of Nicæa, and Maris of Chalcedon. The council excommunicated Arius, who was immediately afterwards banished by the emperor. The decision of this council had not the effect of restoring tranquillity to the Eastern church, for the Arian controversy was still warmly carried on, but it has supplied that mode of stating the doctrine of the Trinity (as far as relates to the Father and the Son), in which it has ever since been received by the orthodox. [ARIUS.]

The time for the celebration of Easter was also fixed by this council, in favour of the practice of the Western church. [EASTER.] It also decided against the schism of Meletius.

The only documents which have been handed down to us from this council are its creed, its synodical epistle, and its twenty canons. These canons contain no catalogue of the books of the Bible.

The Second Council of Nice, held in the year 786, declared the worship of images to be lawful.

(Lardner's *Credibility*, pt. ii., chap. 71, and the authorities quoted by him; Mosheim's *Ecclesiastical History;* Neander's *Kirchengeschichte*.)

NICENE CREED, THE, is one of the three creeds received by the church of England. It consists of the creed drawn up by the first council of Nice, with the addition of that part which relates to the divinity of the Holy Ghost. It was adopted in its present shape at the second general council of Constantinople, A.D. 381.

NICE'PHORUS I., emperor of Constantinople, was Logotheta, or intendant of the finances of the empire, under the reign of the empress Irene and of her son Constantine VI., in the latter part of the eighth century. Irene, having deprived her son of his eyes, usurped the throne. After reigning alone for six years a conspiracy broke out against her, headed by Nicephorus, who was proclaimed emperor, and crowned at Santa Sophia, A.D. 802. He banished Irene to the island of Lesbos, where she lived and died in a state of destitution. The troops in Asia revolted against Nicephorus, who showed himself avaricious and cruel, and proclaimed the patrician Bardanes emperor, but Nicephorus defeated and seized Bardanes, confined him to a monastery, and deprived him of his sight. The empress Irene had consented to pay an annual tribute to the Saracens, in order to stop their incursions into the territories of the empire; but Nicephorus refused to continue the payment, and wrote a message of defiance to the caliph Harun al Rashid. The caliph collected a vast army, which devastated Asia Minor, and destroyed the city of Heraclea on the coast of the Euxine. Nicephorus was obliged to sue for peace and pay tribute to the caliph. In an attack which the emperor made on the Bulgarians he was utterly defeated by them and killed, July, 811. His son Stauracius succeeded him, but reigned only six months, and was succeeded by Michael Rhangabe, master of the palace.

NICEPHORUS II. (called Phocas, but who must not be confounded with the usurper Phocas, who reigned in the beginning of the seventh century) was descended of a noble Byzantine family, and distinguished himself as a commander in the field. After the death of Romanus II., A.D. 959, his widow Theophano, who was accused of having poisoned him, reigned as guardian to her infant son, but finding herself insecure on the throne, she invited Nicephorus to come to Constantinople, and promised him her hand. Nicephorus came, married Theophano, and assumed the title of Augustus, A.D. 963. He repeatedly attacked the Saracens, and drove them out of Cilicia and part of Syria. In 968, Otho I., emperor of Germany, sent an embassy to Nicephorus, who received it in an uncivil manner. [LIUTPRANDUS.] But his avarice made him unpopular, and his wife, the unprincipled Theophano, having formed an intrigue with John Zimisces, an Armenian officer, conspired with him against her husband. Zimisces, with other conspirators, was introduced at night into the bedchamber of the emperor, whom they murdered, A.D. 969.

NICEPHORUS III., called Botaniates, an old officer of some military reputation in the Byzantine army in Asia, revolted against the emperor Michael Ducas, A.D. 1078, and with a body of troops, chiefly composed of Turkish mercenaries, marched to Calchedon, upon which Michael resigned the purple, and Nicephorus was proclaimed emperor at Constantinople. Michael was sent to a monastery with the title of archbishop of Ephesus. Another aspirant to the throne, Nicephorus Bryennius, was defeated, taken prisoner, and deprived of his sight. A fresh insurrection, led by Basilacius, was likewise put down by the troops of Nicephorus under the command of Alexis Comnenus. Alexis himself, who had an hereditary claim to the throne, was soon afterwards proclaimed emperor by the soldiers. Having entered Constantinople by surprise, he seized Nicephorus and banished him to a monastery, where he died in a short time, A.D. 1081. [ALEXIS COMNENUS.]

NICEPHORUS, made patriarch of Constantinople in the year 806, warmly defended the worship of images against the Iconoclasts, and was consequently banished to a convent in Asia by the emperor Leo the Armenian, A.D. 816. He died in his retirement in the year 828, being seventy years of age. He wrote several historical and theological works: 1, 'Chronographia Brevis,' being a short chronicle of events from the beginning of the world to the time of the author's death, with the series of kings, emperors, patriarchs, bishops, &c. It was translated into Latin, and published with notes, by Father Goar, Paris, 1652. 2, 'Breviarium Historicum,' or historical abridgment from the end of Maurice's reign, A.D. 602, till the beginning of the reign of Irene and her son Constantine, A.D. 780. Father Petau published a Latin translation of it in 1616, and President Cousin has given a French translation of it in the third volume of his 'History of Constantinople.' Both the above works of Nicephorus form part of the collection of the 'Byzantine Historians.' 3, 'Stichometria Librorum Sacrorum,' or enumeration of the books of Scripture, with the number of verses in each; inserted in the eighth volume of the 'Critici Sacri.' 4, Several treatises against the Iconoclasts. 5, Seventeen canons inserted in the Collection of Councils and other 'Opuscula.' The Life of the patriarch Nicephorus, by Ignatius, a contemporary writer, has been translated into Latin, and inserted in the 'Acta Sanctorum.' Nicephorus is numbered among the saints both of the Greek and Roman church.

NICE'RATUS, a physician mentioned by Dioscorides (*Præf.*, lib. i., p. 2, ed. Spreng.) as one of the followers of Asclepiades, who attended particularly to materia medica. None of his writings remain, but his prescriptions are several times mentioned by Galen (*Opera*, ed. Kühn, t. xii., p. 634; t. xiii., pp. 87, 96, 98, 110, 180, 232, 233; t. xiv., p. 197) and once by Pliny (*Hist. Nat.*, l. xxxii., c. 31). We learn from Cælius Aurelianus (*Morb. Chron.*, l. ii., c. 5) that he wrote also on catalepsy. He flourished about the year 40 B.C.

NICE'TAS, a physician of Constantinople, supposed to have lived in the reign of Isaac Comnenus, about the middle of the eleventh century, of whom nothing is known, except that he formed the collection of surgical works that bears his name. It exists at present only in manuscript, of which there are three copies, one at Florence and two at Paris; but part of it was published at Florence, 1754, fol., with the title 'Græcorum Chirurgici Libri, Sorani unus de

Fracturarum Signis, Oribasii duo de Fractis et de Luxatis: e Collectione Nicetæ ab antiquissimo et optimo codice Florentino descripti, conversi, atque editi ab Antonio Cocchio, &c.' Perhaps he is the person to whom Theophylact's fifty-fifth letter is addressed, who is styled 'Physician to the King,' ἰατρὸς βασιλέως. (Fabr., *Bibl. Gr.*; Haller, *Bibl. Chirurg.*)

NICHE (from the Italian *nicchia*, signifying also a nook), a small recess, or concavity in the face of a wall for the purpose of containing a statue. The use of niches seems to have originated with the Romans, for scarcely any thing of the kind occurs in the architecture of the Greeks themselves, who rarely employed statues in any way as external decorations to their edifices, sculpture being so applied by them only as friezes or within pediments. In Italian architecture, on the contrary, niches are of very frequent occurrence, and often enter very largely into a design as principal features in the composition.

Niches are usually semicircular in plan, and round-headed, that is, covered by the quarter of a hollow sphere, owing to which the shadow within the concavity produces a highly beautiful curve. They are however occasionally made square in plan, in which case they are square-headed (as in the front of the National Gallery, London); but square-headed niches are sometimes made circular in plan, though round-headed ones are never made square. Niches exhibit still greater diversity in the modes of decorating them: in this country it has usually been the fashion to leave them quite plain, and, oftener than not, quite empty also; although a niche without a statue, vase, or some piece of sculpture in it, is rather a questionable feature, suggesting to the spectator the absence of the object which it is intended to receive; therefore, as has been remarked, not very much better than an empty picture-frame hung up in a room, the only thing which diminishes the impropriety being that though the frame can be hung up when the picture is provided for it, a niche must be provided first, and a statue can be placed in it afterwards at any time.

When niches are decorated they are usually placed within a square-headed panel, having architraves and other dressings like those of windows, and therefore admit of as much variety of design as windows themselves. Many Italian architects have given them columns, and thus converted them into small tabernacles (as in the upper order of the side elevations of St. Paul's), or have otherwise bestowed so much enrichment upon them that the statues within them are almost lost.

As to the relative size of niches, that must depend upon the circumstances of the design. When decorated like windows they are generally of the same dimensions as the windows themselves, if there are any in the composition; but cases may occur where it may be advisable to make a niche in the centre of a design a more important feature than any of the windows in it. On the other hand, small plain niches between windows, when the intervals between the latter are very considerable, may be employed with good effect, and so as to produce a pleasing degree of variety and contrast without confusion, and also afford the opportunity of introducing mezzanine windows over them; for instance, five windows in width below would give four such niches between those of the principal floor, and four attic or mezzanine windows above them, making nine in all for that story, which might therefore be divided off into small rooms.

NICHOLAS I., a deacon of Rome, was elected pope, mainly through the influence of the emperor Louis II., who was then at Rome, in April, A.D. 858, and was consecrated in St. Peter's church in presence of the emperor. The new pope sent legates to Constantinople to urge the emperor Michael III. to restore Ignatius to the patriarchal see, into which Photius had intruded himself, and at the same time to reclaim the dioceses of Illyricum, Apulia, Calabria, and Sicily, which the court of Constantinople had detached from the see of Rome during the schism of the Iconoclasts, and which, after that schism had been put down by the Eastern emperors, had not been restored. (Thomassin, *Discipline de l'Eglise*, vol. i.) The allegiance paid by the Roman pontiffs to Charlemagne and his successors as emperors of the West had greatly widened the breach between the Roman see and the Byzantines, and the schism of Photius completed the separation of the two churches. Nicholas excommunicated Photius, who in return, at a council assembled at Constantinople, anathematized Nicholas and his followers, asserting at the same time, that 'since the seat of the empire had been removed from Rome to Constantinople, the primacy and privileges enjoyed till then by the Roman see had become transferred unto that of the new capital.' The legates of Nicholas returned to Rome without effecting anything. In the year 865 Nicholas had the satisfaction of receiving into the bosom of the church Bogoris, king of the Bulgarians, with part of his nation. But on the other side he involved himself in a serious dispute with his former patron the emperor Louis, on account of Lotharius, king of Lorraine, having repudiated Theotberg his wife and married his concubine Waldrada. The pope had appointed the archbishops of Treves and Cologne as his legates to examine into the affair; but the legates, in a council held at Metz, A.D. 863, obtained a decision in favour of Lotharius, upon which Nicholas assembled a council at Rome, A.D. 864, in which the two archbishops were deposed, and Lotharius's divorce and marriage were declared null. The emperor Louis took the part of the archbishops, and marched with troops to Rome to oblige the pope to revoke the sentence. An affray took place in front of St. Peter's church between the soldiers of the emperor and the Pope's followers, but the emperor soon after consented to withdraw his troops. In the year 867, Basil the Macedonian, having murdered the emperor Michael, succeeded him on the throne, and shortly after restored Ignatius to the patriarchal see and banished Photius. Nicholas himself died at Rome in the same year, and was succeeded by Adrian II. Nicholas has left a number of letters upon questions of church doctrine and discipline, which are inserted in Coleti's 'Collection of Councils.'

NICHOLAS II., Gerard of Burgundy, succeeded Stephen IX. as pope, A.D. 1059. An opposite faction chose John bishop of Velletri, who took the name of Benedict X., but the council of Sutri disavowed him, and Benedict was obliged to resign his claim. Nicholas assembled a council at Rome, which passed a decree concerning the mode of electing the pope. This important decree is in the collection of councils, and also in Muratori's 'Rerum Italicarum Scriptores.' Nicholas entered into negotiations with the Normans, who had occupied Southern Italy, and bestowed on Robert Guiscard the duchy of Apulia and Calabria, as a fief of the Roman see. He died soon after, in 1061, and was succeeded by Alexander II.

NICHOLAS III., Giovanni Gaetani, of a noble Roman family, succeeded John XXI. in 1277. He prevailed on the emperor Rudolf of Habsburg, who was little acquainted with Italian affairs, to confirm the various grants of territory alleged to have been made to the see of Rome by former emperors, and the Exarchate of Ravenna among the rest. (Fontanini, *Del Dominio Temporale della Santa Chiesa*, and his controversy with Muratori on the subject.) Nicholas quarrelled with Charles of Anjou, king of Naples, and deprived him of the dignity of senator of Rome. He has been accused of nepotism, that is to say, of having enriched his nephews and other relatives. He died A.D. 1280, and was succeeded by Martin IV.

NICHOLAS IV., a Franciscan monk, and a native of Ascoli in the Marches, was raised to the papal see after the death of Honorius IV., A.D. 1288. He favoured the pretensions of Charles II. of Anjou upon the island of Sicily, and excommunicated James of Aragon and his partisans in that island. He received an embassy from a Tartar khan who promised to assist the Christians in the recovery of Palestine. Nicholas died in 1292, and was succeeded by Celestine V. Nicholas left several theological works.

NICHOLAS V., Tommaso da Sarzana, was elected pope after the death of Eugenius IV. in 1447. He soon after terminated the schism in the Western church by prevailing upon Felix V., who had been elected pope by the council of Basle in 1439, to abdicate in his favour, and thus restore peace to the Christian world: Felix did this with a good grace in the year 1449. [AMADEUS VIII.] At the same time, as if influenced by the example of the heads of the church, the sovereigns and states of Italy seemed to forget their feuds, at least for awhile, and Italy enjoyed several years of internal peace, a rare occurrence in the history of the middle ages. The pope, who was a patron of learning, availed himself of this period of repose to collect books and MSS., and to have translations made of the Greek classics and of the fathers of the Eastern church; he received and patronised learned men from various countries, and especially from Greece, at that time overpowered and devastated by the Turks; and he embellished Rome with sumptuous as well as useful buildings. He enlarged the university, restored the bridges as well as the aqueduct of the Acqua Vergine, and founded the Vatican library. In 1450 he proclaimed a jubilee, which drew a prodigious number of strangers to Rome. In March, 1452, Frederic III. of Germany came to Rome, where he was crowned by the pope with the crown of Lombardy; after the coronation he married Leonora of Portugal, and both Frederic and his consort received the imperial crown from the hands of the pontiff. In the following year, 1453, the news of the taking of Constantinople by the Turks deeply affected Nicholas, who had urged the Christian princes to succour the Byzantines, and who now impressed with great earnestness upon the Italian and other states the necessity of giving up their mutual jealousies and forming a league for their common defence against the Ottomans. He also corresponded with Mahomet II. [Montecasino.] Nicholas died in March, 1455, at 57 years of age. He is one of the most distinguished individuals who have filled the Papal chair, and he was free from the charge of nepotism. He was succeeded by Calixtus III.

NICHOLS, JOHN, the printer, born 1745, died 1826, one of the most respectable, valuable, and useful men of the age in which he lived.

He was born and educated at Islington, and originally intended for the navy, but the death of a relation led his friends to change their design, and when not quite thirteen he was placed with Bowyer, who has been called the last of the really learned printers of England. He soon gained the confidence of his master, and was intrusted by him with the management of his printing-office. In 1766 he was taken into partnership by Mr. Bowyer, and Mr. Bowyer dying, in 1777, the whole business fell into his hands.

From this period may be dated the commencement of that career of literary exertion which was pursued with an ardour that was unabating to the close of his life, for the few things which he had published in the life-time of Mr. Bowyer scarcely deserve a notice. It is not our intention to enumerate all the works of which he was the author or editor as well as printer (for according to his own enumeration they had amounted, in 1812, to fifty-seven), but only those which are more prominent and celebrated.

In 1782 he published a quarto volume, entitled 'Biographical and Literary Anecdotes of William Bowyer, Printer, F.S.A., and of many of his Learned Friends,' a work which, far more than any other work of his time, and far more than any work which had appeared since the 'Athenæ Oxonienses' of Anthony Wood, abounded in biographical information at once authentic and original. This work, many years after, was recast and greatly enlarged, appearing in six octavo volumes, entitled 'Literary Anecdotes of the Eighteenth Century,' in 1812, to which two supplementary volumes were added, and they have been followed at intervals by five large octavo volumes more, of of the same kind of material, with the new title, 'Illustrations of Literary History.' These works will be the great fund on which critics in time to come will draw for accounts of the men in the eighteenth and beginning of the nineteenth centuries, just as the 'Athenæ' is the fund of biographical knowledge for the men of the sixteenth and seventeenth centuries. But after all something more is wanted than both these works supply.

We regard this as the work on which Mr. Nichols's literary reputation will chiefly rest; and next to it may be placed his 'History of the County of Leicester,' which is in six large folio volumes. This was in the course of publication from 1795 to 1811. The faithfulness with which he corrected any mistakes into which he had been led is worthy of imitation. The work is in general very exact and accurate, and the chief defect seems to be that the worthy author seems not to have known so well what might be omitted in a work of that nature, as what ought to find a place in it. To the people of the county it must be invaluable.

In 1788 he published, in two volumes quarto, 'The Progresses and Processions of Queen Elizabeth,' an original and happy conception, affording an opportunity for the introduction of much minute historical information, and much that illustrates the manners of a period on which we always look with a peculiar kind of interest.

In 1797 he published 'Illustrations of the Manners and Expenses of Antient Times in England.'

Having mentioned these, we shall forbear to notice any works of which he is rather to be considered in the light of an editor than an author, or where a large share of the labour was borne by some of his many literary friends. Few men had more friends of this description or deserved them better.

It will be seen by what has been said that the turn of Mr. Nichols's mind was to that species of literature which is called antiquarian, but which is in fact minute or refined history, dealing with equal attention with things of modern and of antient date. The same turn of mind is perceptible in two other publications of Mr. Nichols's, for such they may be regarded. The first of these was entitled by him 'Bibliotheca Topographica Britannica.' It consists of tracts in English history and topography, printed by him from originals, and extends, when the set is complete, to eight or ten quarto volumes, bound variously; and there is a Supplement, which may or may not be regarded as part of the work. The other work, which was strictly periodical, is 'The Gentleman's Magazine,' which passed, in a great measure, into the hands of Mr. Nichols in 1778, and continued under his direction till the time of his death. He greatly raised the reputation of the work, and during the more vigorous period of his management it was remarkable for the value of some of the articles which it contained, and for the preservation of a multitude of minute pieces of information, which will be valuable to the future inquirer into the literary or political history of the period.

Mr. Nichols passed a life honourable as it was useful, and happy as it was industrious; experiencing only one calamity besides such as ordinarily fall to the lot of human nature, but that a severe one,—the destruction by fire of his printing-office and warehouses, with the whole of their contents, on the 8th of February, 1808.

NI′CIAS is the name commonly given to the physician of Pyrrhus, king of Epirus, who went to Fabricius, the Roman consul, offering for a certain reward to take off his master by poison, A.U.C. 474, B.C. 280. Fabricius not only rejected his offer with indignation, but immediately sent him back to the king with notice of his treachery; and Pyrrhus, upon receiving the information, is said to have cried out, 'This is that Fabricius whom it is harder to turn aside from justice and honour than to divert the sun from its course.' (Eutropius, lib. ii., cap. 14.) Zonaras adds (*Annal.*, tom. ii., p. 50, l. 10, ed. Basil., 1557) that Nicias was put to death, and his skin used to cover the seat of a chair.

Historians (as was hinted above) are not agreed as to the traitor's name. He is called Nicias by Claudius Quadrigarius (ap. Aul. Gell., lib. iii., cap. 8) and Zonaras (tom. ii., p. 48, l. 45), and Cineas by Ælian (*Var. Hist.*, lib. xii., cap. 33). But Ammianus Marcellinus (lib. xxx., cap. i.), Valerius Antias (ap. Aul. Gell., lib. iii., cap. 8), and Valerius Maximus (lib. vi., cap. 5, § 1) tell the story of one of the friends of Pyrrhus, whom the first-named author calls Demochares, and the two others Timochares.

NICIAS. [Syracuse.]

NICKEL. This metal was first described by Cronstedt in 1751. For nice purposes the metal may be obtained in a state of purity by the following process:—roast the native sulphuret of nickel to expel the sulphur and oxidize the metal; dissolve the residue in a mixture of four parts of sulphuric acid and one part of nitric acid moderately diluted with water; evaporate the clear solution till crystals are formed, which are sulphate of nickel, of a fine emerald green colour; redissolve these, and separate any copper they may contain by a plate of iron, and add excess of ammonia, which dissolves the oxide of nickel and any oxide of cobalt that may be mixed with it; to the clear solution add potash dissolved in water, which throws down hydrate of nickel of a green colour, and this, after washing and drying, is to be mixed with black flux, and reduced into the metallic state by a strong heat in a wind-furnace.

The properties of nickel are, that it has a white colour with a yellowish tint; its lustre is considerable, and it is both malleable and ductile. Like iron, it is attracted by the magnet, and may, like it, be rendered magnetic at common temperatures, but it loses this power when heated to 630° Fahrenheit. The specific gravity of fused nickel is about 8·28, and by hammering it is increased to almost 9·0. It is nearly as hard as iron.

Nickel suffers little or no change by exposure to the air and moisture at common temperatures; it is very difficult of fusion, but melts at a lower temperature than iron; at a red heat it absorbs oxygen gradually from the air, and also decomposes water at this temperature. Nitric acid is the only acid which readily acts upon nickel. Nickel occurs in meteoric iron and aërolites. [Aërolites.]

The uses of nickel are very limited, and until within a few years it was scarcely employed at all; but it is now very usefully employed, and to a considerable extent, in forming an alloy with copper and zinc, known by the name of German silver. Its oxides impart a green colour to glass and porcelain.

The ores of nickel are few in number:—

Sulphuret of Nickel. Capillary Nickel.—This occurs in regular hexagonal capillary crystals. Primary form a rhomboid; colour brass-yellow or greyish; lustre metallic; hardness, scratches mica, and is scratched by felspar. Opaque, brittle.

It is soluble in nitric acid, and before the blow-pipe, when strongly heated, gives a malleable and metallic button.

It occurs in Wales, Cornwall, Saxony, &c.

Analysis by Arfwedson:—

Sulphur	34·26
Nickel	64·35
	98·61

Arseniuret of Nickel. Copper Nickel.—Occurs crystalized, botryoidal, reniform, and amorphous. Primary form a right rhombic prism; structure compact, fibrous; fracture uneven, conchoidal, splintery; hardness 5·0 to 5·5; colour yellowish and greyish red; lustre metallic. Opaque. Specific gravity 7·655.

Before the blow-pipe on charcoal emits an alliaceous smell, and melts.

It is found in Cornwall, Saxony, Bohemia, &c., and also in South America.

Analysis by Pfaff:—

Nickel	48·90
Arsenic	46·42
Iron	0·34
Lead	0·56
Sulphur	0·80
	97·02

Sulpho-arseniuret of Nickel. Nickelglanz. Grey Nickel.—Occurs massive. Structure granular; fracture uneven. Easily frangible. Colour pale lead-grey. Opaque. Specific gravity 6·129.

Found in Sweden and in the Harz, &c.

Analysis of a specimen from Loos, in Nelsingland, by Berzelius, which was mixed with some mispickel:—

Nickel	29·9
Arsenic	43·4
Sulphur	19·3
Cobalt	0·9
Iron	4·1
	97·6

Silicate of Nickel. Pimelite.—Occurs massive, and investing other minerals. Colour apple or yellowish green. It is earthy, dull, opaque, soft and greasy to the feel. It is infusible before the blow-pipe, but becomes of a dark-grey colour.

It is found in Sweden and the Harz.

Analysis by Klaproth:—

Silica	35
Oxide of Nickel	15·62
Alumina	5·10
Lime	0·40
Magnesia	2·25
Water	37·91
	96·28

Arseniate of Nickel.—Occurs powdery on the surface of arseniuret of nickel, and massive. Colour greenish white and green. Opaque.

Found in Allemont, Hesse, &c.

Analysis by Stromeyer:—

Arsenic acid	36·97
Oxide of Nickel	37·35
Water	24·32
	98·64

We proceed now to the artificial compounds of nickel.

Oxygen and Nickel combine in two proportions, forming the protoxide and sesqui-oxide or peroxide.

Protoxide of Nickel may be obtained by adding potash or soda to a solution of any salt of nickel, by which a green hydrate is precipitated; this, heated to redness, loses water and becomes of a dark colour. It may also be procured by heating nitrate of nickel to redness. It is insoluble in water, readily dissolved by most acids, and yields green solutions. It is not reducible to the metallic state by heat alone, and is not attracted by the magnet. Oxide of nickel is insoluble in potash or soda, but readily dissolves in ammonia; the solution has a fine azure-blue colour, and is decomposed by potash or soda. It is the base of all the salts of nickel.

It is composed of

One equivalent of oxygen	8
One equivalent of nickel	28
Equivalent	36

Peroxide of Nickel may be obtained by adding a solution of chloride (or hypochlorite) of lime to one of nitrate of nickel, or by transmitting chlorine gas through water in which hydrate of nickel is suspended. The peroxide thus obtained is of a black colour, insoluble in dilute acids, potash, or soda. When added to a mixture of ammonia and its carbonate, azotic gas is evolved, and the peroxide, becoming protoxide, is dissolved. At a red heat it yields oxygen gas, and with hydrochloric acid gives out chlorine gas, and forms chloride of nickel.

It is composed of

One and a half equivalent of oxygen	12
One equivalent of nickel	28
Equivalent	40

Chloride of Nickel is formed by dissolving either the protoxide or peroxide of the metal in hydrochloric acid. Its colour is a fine emerald-green; and by evaporating the solution, green filamentous crystals containing water are formed. This salt deliquesces in a moist atmosphere. When deprived of water it has a yellow colour and a micaceous appearance; it is volatile, and may be sublimed at a high temperature. The solution is decomposed by the alkalis and their carbonates, but ammonia added in excess redissolves the precipitate at first formed.

Chloride of nickel is composed of

One equivalent of chlorine	
One equivalent of nickel	28
Equivalent	64

The fluoride, bromide, and iodide of nickel are not much known, and are of but little importance.

Sulphur and Nickel combine in two proportions, forming the sulphuret and disulphuret.

Sulphuret of Nickel is prepared either by heating metallic nickel or the oxide with sulphur; or it may be procured by adding a hydrosulphate to a solution of nickel, or to a certain extent by passing hydrosulphuric acid gas into a neutral solution of nickel. The precipitated sulphuret is nearly black, dissolves in hydrochloric acid with the evolution of hydrosulphuric acid gas; the sulphuret procured in the dry way is of a greyish-yellow colour, and requires aqua regia (or nascent chlorine) for solution.

Sulphuret of nickel consists of

One equivalent of sulphur	16
One equivalent of nickel	28
Equivalent	44

Disulphuret of Nickel may be prepared by transmitting hydrogen gas over sulphate of nickel at a red heat. Its colour is lighter, and it is more fusible than the sulphuret, and consists of

One equivalent of sulphur	16
Two equivalents of nickel	56
Equivalent	72

Phosphuret of Nickel is formed by the action of phosphorus upon nickel heated to redness; the resulting compound is whitish, brittle, and is decomposed when exposed to heat and air. It is more fusible than the metal, and, according to Pelletier, is composed of 17 phosphorus + 83 nickel; while Lampadius states its composition to be 13 phosphorus + 87 nickel.

Cyanide of Nickel is prepared by adding a soluble cyanide to a solution of nickel, or when hydrocyanic acid is mixed with acetate of nickel.

Ferrocyanide of Nickel is a greyish or greenish com pound, which is precipitated when ferrocyanide of potassium is added to the salts of nickel.

Alloys of Nickel.—*Arsenic* readily combines with *Nickel*, and the compound remains undecomposed at a very high temperature. It does not obey the magnet.

Potassium and Nickel combine by fusion.

Antimony and Nickel form an alloy of a lead-colour.

Zinc and Nickel form a white brittle alloy, which enters into the composition of the *packfong* of the Chinese.

Tin and Nickel give rise to a white brittle alloy, which burns at a high temperature.

Iron and Cobalt unite with nickel, but the resulting alloys are but little known.

Mercury and Nickel have not been combined.

Copper, Zinc, and Nickel form a white alloy, of late years much employed under the name of German silver.

The salts of oxide of nickel are of course numerous, but we shall describe only a few of them:—

Nitrate of Nickel may be prepared by dissolving either the metal or its oxide in dilute nitric acid. The solution is of a fine green colour, and by evaporation yields a deliquescent salt, which is not applied to any particular purpose. It probably consists of 1 equivalent of nitric acid 54 + 1 equivalent of oxide of nickel 36 = 90; the crystals however contain a considerable quantity of water, but chemists are not agreed as to the exact proportion.

Sulphate of Nickel is easily procured by dissolving the oxide or hydrate in dilute sulphuric acid; a green salt is obtained, which readily crystallizes, and in two different primary forms: the cause of the difference has not been ascertained. The crystals consist of nearly

One equivalent of sulphuric acid	40
One equivalent of oxide of nickel	36
Seven equivalents of water	63
Equivalent	139

Carbonate of nickel is an insoluble compound readily decomposed both by heat and acids.

Nickel forms double salts with potash and with ammonia.

The peculiar properties of the salts of nickel are, that they are decomposed by the alkaline carbonates, and the precipitate is redissolved by ammonia, forming a beautiful blue solution, which is decomposed by potash and soda, but not by their carbonates.

NICOBAR ISLANDS, THE, are situated in the Indian Ocean, between 6° 50′ and 9° 20′ N. lat. and 92° 50′ and 94° 10′ E. long. They consist of nine larger islands and some smaller ones, and are on that account called by the Malays Sambilang, that is, Nine Islands. The two most southern are called Great and Little Nicobar. Great Nicobar is more than twenty miles long, and eight miles across in the widest part. Little Nicobar is not half as large. Farther north are six smaller islands. The best known are Noncowry and Camorta or Nicovari, which are separated from one another by a strait, forming one of the safest harbours in India, in which ships of all sizes may ride with the greatest security, sheltered from all winds, about half a mile from shore. At its eastern entrance is the island of Trincutta. This harbour has the great advantage of two entrances from the east and west respectively, so that ships may get in and out either with a north-east or south-west monsoon. The other three islands are Katshall, Teressa, and Tillanjong. The most northern island is much farther to the north, and is called Car Nicobar. The surface of these islands is hilly, and the hills in some places are rather high. They are in general covered with wood, and only a few tracts along the shores are cultivated. The impenetrable forests with which the hills are covered are considered to be the cause of the great unhealthiness of these islands to Europeans. The soil is very fertile and capable of producing all the fruits and vegetables of intertropical countries. The islands abound in cocoa-nuts, papayas, bananas, limes, tamarinds, betel-nuts, and the *mellori*, a species of bread-fruit; yams and other roots are cultivated, but rice is unknown. The mangosteen-tree and the pine-apple grow wild in the woods (Colebrooke), but their fruits are delicious. The animals are hogs, dogs, and fowls. The woods contain timber in plenty, and some of it supplies excellent materials for building or repairing ships. The sea abounds with exquisite fish, shell-fish, and turtle. Ambergris and the edible bird-nest are common, and supply the only articles of exportation; the Chinese and Malays annually visit these islands to procure them. The inhabitants probably do not exceed 3000 or 4000: if we may form a judgment from their physical appearance, they belong to the Malay race, and the ground-work of their language confirms this opinion. They erect their houses along the shore upon piles, to the height of six or eight feet above the ground, and sometimes so near the margin of the water as to admit the tide to flow under them. In the interior of the island of Great Nicobar a tribe is said to exist which differs from the other inhabitants; they are probably the aborigines, and belong to the Australian Negroes, as these people are found in many of the islands of the Indian Archipelago and in the Andaman Islands. The Danes twice tried to form a settlement in the harbour of Noncowry, in 1756 and in 1678, but they abandoned it after a few years, on account of the unhealthiness of the climate. Some missionaries remained there till 1792, but as they did not succeed in the conversion of the natives, they returned to Tranquebar.

(Hamilton; Fontana; Colebrooke, in *Asiatic Researches*, vols. ii., iii., iv.)

NICOLAI, CHRISTOPHER FREDERICK, a writer to whom German literature is greatly indebted, not only on account of what he himself contributed to it from his own pen, but also what he did for it by establishing several critical journals, and exciting the talents of others. He was born at Berlin, March 18th, 1733, where his father was a bookseller. At the age of sixteen, just as he was beginning to make some proficiency in his studies, he was obliged to abandon them, being sent to Frankfort on the Oder for the purpose of learning the bookselling trade; yet such was his eagerness for information, his love of reading, and his perseverance, that he employed every moment of leisure, his evenings, and the early part of every morning, in study, and, without other assistance than that of books, made himself a proficient in Greek, Latin, and English, and likewise acquired a knowledge of some parts of mathematics and philosophy. He was an instance of what may be accomplished by self-instruction, which, great as may be the disadvantages it has to contend with, has that in its favour which all advantages can hardly make amends for, namely, willingness and resolution to learn; while at the same time, if it occasionally may lead astray, self-instruction leads also to numerous inquiries that never present themselves to those who merely proceed along the path chalked out for them.

On his return to Berlin, in 1752, his attention to business did not interrupt his self-imposed studies, of which both English and German poetry then formed a considerable share; and in 1755 he produced his 'Letters,' wherein he impartially discussed the pretensions of the two literary sects headed by Bodmer and Gottsched. This work excited considerable attention, and led to his intimacy with Lessing and Moses Mendelsohn. After the death of his father, he withdrew himself from the business, leaving it to his brother, and determined to content himself with his own slender means, in preference to the pecuniary advantages to be reaped by sacrificing his literary leisure and enjoyments. The unexpected death however of his elder brother, in 1758, put an end to this short interval of tranquil study, he being obliged to carry on the business for the benefit of the family in general. But while on the one hand this only increased his diligence and economy of time, it led, on the other, to entering upon literary plans which he had before projected. In conjunction with Mendelsohn, he had already commenced (1757) the 'Bibliothek der Schönen Wissenschaften,' one of the earliest and best belles-lettres journals in the language, which was afterwards continued, till the end of 1805, under the title of the 'Neue Bibliothek,' &c. With Lessing and Mendelsohn he established, in 1759, the 'Briefe der Neuesten Litteratur;' and in 1765 projected the 'Allgemeine Deutsche Bibliothek,' of which periodical he continued to be editor till it reached its 107th volume. He did not contribute much to it himself, but the management alone of such a periodical, so eminently useful in its day, shows him to have been most indefatigable, as in the meanwhile, notwithstanding all his other avocations, he produced many original works. Among them are his 'Anecdotes of Frederick the Great,' 1788; a most excellent and elaborate 'Description of Berlin and Potsdam,' 3 vols., 1786; the 'Life and Opinions of Sebaldus Nothanker,' 1793, a sort of novel, which went through many editions, and was translated into English, French, Dutch, Danish, and Swedish; 'Life and Opinions of Sempronius Gundibert,' 1793, intended to set the doctrines of Kant and his disciples in a ridiculous light. Besides these, his 'Essay on the Templars,' his 'Remarks on the History of the Rosicrucians and Freemasons,' his 'Tour through Germany,' &c., to say nothing of a number of smaller pieces contributed by him to different journals, prove the variety of his information and the activity of his mind. He died in 1811, at the age of 78.

NICOLA'ITANS, a sect of heretics, who arose in the first century, and are mentioned with strong disapprobation in *Rev.*, ii. 6, 15. They appear, from the statements of the early writers, to have held the doctrines of the Gnostics, and to have lived impurely. It is generally supposed that 'the doctrine of the Nicolaitans' (*Rev.* ii. 15) is the same as 'the doctrine of Balaam' (v. 14), namely, 'to eat things sacrificed to idols, and to commit fornication.' Indeed some critics suppose the name Νικόλαος in this passage to be merely translated from בִּלְעָם and used symbolically, deriving the former word from νικάω and λαὸς, and the latter from the synonymous Hebrew words בָּלַע and עָם. (Robinson's *Greek Lexicon to the New Testament.*) The early writers trace the origin of this sect to Nicolas the Deacon (*Acts*, vi. 5), but some of them acquit him of holding the sentiments of the Nicolaitans, and ascribe the rise of the heresy to an improper advantage taken of some incautious expressions which he had used.

(Mosheim's *Ecc. Hist.*; Winer's *Biblisches Realwörterbuch*; Neander's *Kirchengeschichte*.)

NICOLA'US MYREPSUS (Gr., ὁ μυρεψὸς, 'the ointment-maker'), author of a work, 'De Compositione Medicamentorum,' written in Greek, but of which hitherto only a Latin translation has been published. Very little is known of the events of his life, and of this little the greater part is to be gleaned from hints and expressions scattered up and down in his own work. He is generally considered to be the last of the Greek medical writers (if indeed, as Friend says, his barbarous language deserves to be called Greek), and his date can be ascertained with tolerable precision. His work was probably compiled towards the end of the thirteenth century, A.D., as he is quoted by Petrus de Abano, who died in 1316, and also by Matthæus Sylvaticus and Franciscus de Pede Montium, both of whom were physicians to Robert king of Naples, and wrote very early in his reign, which began in 1309. He himself mentions Mesue (sec. xxxii., cap. 117), who lived in the twelfth century; Michael Angelus, who is probably the first emperor of the Palæologi, and began to reign A.D. 1260 (sec. i., cap. 295); Pope Nicolas (sec. ii., cap. 9), who seems to be the third of that name, and who died A.D. 1280; and Joannes Actuarius (called *Dominus* Joannes, sec. x., cap. 103; and *Magister* Joannes, sec. xxxii., cap. 99), who is generally supposed to have flourished in the thirteenth century. He appears to have visited or lived at Nicæa (sec. xxiv., cap. 12) and Alexandria (sec. i., cap. 241; sec. xvii., cap. 17; sec. xxiv., cap. 85), whence he is sometimes called Nicolaus *Alexandrinus*; he afterwards settled at Constantinople, where he attained the dignity of Actuarius* (Georg. Acropol.). Several passages in his work prove that he practised as a physician (sec. i., cap. 66; sec. xvii., cap. 17, &c.), and Georgius Acropolita, his contemporary, mentions him (*Hist. Byz.*, ed. Paris, fol. 1651, cap. 39, p. 34) as eminent in his profession, but as very ignorant of natural philosophy.

He was evidently a person of great piety, as appears thoroughout the whole of his work, though in many places it deserves rather to be called the most absurd superstition. He orders the patient in some places (sec. i., cap. 419, and sec. i., cap. 405) to repeat three *Paters, Credos, and Aves;* he often prescribes the baptismal water (sec. vii., cap. 6; sec. xiv., cap. 8, &c.) as a powerful medicine; he directs a verse out of the Psalms (sec. i., cap. 405) to be 'written on paper on the first day of the week before sun-rise, and to be tied on the right arm,' as a remedy against menorrhagia; and many other examples of the like or even greater absurdity might be given (sec. xxxvii., caps. 66 and 67; sec. i., cap. 405, &c.). Though a great part of the work is sensible enough, yet upon the whole it is not of much value. It consists of an immense number of medical formulæ, arranged alphabetically, and divided into forty-eight sections; it is almost entirely a compilation from other works, especially from Nicolaus Præpositus; the names of the medicines are often very much corrupted, and the author now and then falls into great mistakes from ignorance of the language of the writers whom he quotes. It was translated from the Greek by Leonhardus Fuchsius, and first published, Basil., fol. 1549; it is inserted in the second volume of the 'Medicæ Artis Principes,' Paris, ap. H. Stephanum, fol. 1567; the best edition is that published, Norimb. 1658, 8vo.

NICOLAUS PRÆPO'SITUS, called also *Salernitanus*, was at the head of the famous medical school at Salerno about the beginning of the twelfth century, and has left behind him a treatise on the composition of medicines under the title of 'Antidotarium.' This has very often been confounded with a work on the same subject by Nicolaus Myrepsus, who indeed must either have copied a great portion of his book from Nicolaus Præpositus, or else they both drew their materials from some common source. It may be useful to mention the marks by which the two works may be distinguished. The treatise of Nicolaus Præpositus is much shorter than that of Nicolaus Myrepsus, and contains only about 140 or 150 formulæ, in alphabetical order, whereas the other consists of more than a thousand, and is divided into forty-eight sections. Nicolaus Præpositus has prefixed a short preface to his work; in Nicolaus Myrepsus there is none. Nicolaus Myrepsus often quotes several prescriptions for the same remedy; Nicolaus Præpositus never more than one. Both works begin with the '*Aurea Alexandrina*,' but the formulæ are often very different. This work is of very little value, and contains many absurdities, though, with the exception of Mesue, perhaps no work of the kind enjoyed a higher reputation during the middle ages. It has been several times reprinted; the first edition was published, Venet. 1471, fol., in the editio princeps of Mesue, to whose works it has generally been appended.

NICOLA'US DAMASCE'NUS, or Nicolas of Damascus (Νικόλαος ὁ Δαμασκηνὸς), a native of Damascus [DAMASCENUS, NICOLAUS], wrote a general history in Greek, including the reign of Herod the Great, of which Josephus gives the following character:—'For living in his kingdom and with him (Herod), he composed his history in such a way as to gratify and serve him, touching on those things only which made for his glory, and even glossing over many of his actions which were plainly unjust, and concealing them with all zeal. And wishing to make a specious excuse for the murder of Mariamne and her children, so cruelly perpetrated by the king, he tells falsehoods respecting her incontinence and the plots of the young men. And throughout his whole history he eulogises extravagantly all the king's just actions, while he zealously apologises for his crimes.' (*Antiq.*, xvi. 7, 1.) This history extended to 144 books: for Josephus refers to the 123rd and 124th. (*Antiq.*, xii. 3, 2.) The fragments of this history have been published several times. There is an appendix to the edition of Orelli, Leipzig, 1811, 8vo. Nicolaus wrote other works. A fragment of his 'Life of Augustus' is extant, and an autobiography is attributed to him, but it is probably not genuine.

On two occasions Nicolaus appears as the advocate before Agrippa of certain Jews who were molested in the practise of their peculiar customs by the Greeks among whom they lived. (Josephus, *Antiq.*, xii. 3, 2; xvi. 2, 2.) In the year 6 B.C. he was sent by Herod on an embassy to Augustus, who had taken offence against Herod, because he had led an army into Arabia to enforce certain claims which he had upon Syllæus, the prime minister of the king of Arabia, and the real governor of the country. (Josephus, *Antiq.*, xvi. 9.) Nicolaus, having obtained an audience of the emperor, accused Syllæus and defended Herod in a skilful speech, which is given by Josephus. (*Antiq.*, xvi. 10, 8.) Syllæus was sentenced to be put to death as soon as he should have given satisfaction to Herod for the claims he had upon him. This is the account of Josephus, taken probably from the history of Nicolaus himself, who appears to have exaggerated the success of his embassy, for Syllæus neither gave any satisfaction to Herod, nor was the sentence of death executed upon him. (Josephus, *Antiq.*, xvii. 3, 2.) We find him afterwards acting as the accuser of Herod's son Antipater, when he was tried before Varus for plotting against his father's life, B.C. 4 (Josephus, *Antiq.*, xvi. 5, 4-6; *Jewish War*, i. 32, 4), and again as the advocate of Archelaus before Augustus in the dispute for the succession to Herod's kingdom, B.C. 3. (Josephus, *Antiq.*, xvii. 9, 6; xi. 3; *Jewish War*, ii. 2, 6.)

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* Actuarius, Gr. Ἀκτουάριος, a title at the court of Constantinople, given apparently only to physicians, and quite distinct from the use of the word found in the earlier Latin authors. See Du Cange, '*Gloss. Græc.*,' tom. i., p. 46: and Possini, '*Gloss. ad Pachymer. Hist. Andronici*,' tom. i., p. 366, seq., and tom. ii., p. 468-9. Besides Joannes the son of Zacharias, who is better known by his title of Actuarius than by his real name, several other physicians are recorded as having arrived at this dignity.

NICOLAY, BARON LUDWIG HEINRICH, born at Strasburg, December 29th, 1737, was, though not of first-rate talent, one of the most pleasing among the minor poets of Germany. His style is easy and natural, his versification flowing, and his narrative interesting. All these qualities display themselves in his 'Romantic Tales,' which, although their subjects are chiefly derived from Ariosto and Bojardo, are remodelled and treated with great originality, and manifest considerable fancy, skill in the management of the story, and truth of expression, both in the comic and serious parts. Of his abilities, both as a didactic and satiric writer, proof is afforded by his 'Poetical Epistles,' which have much of the spirit and gracefulness of Wieland, with not a little of his manner. His Fables, too, and minor Tales, though not always of his own invention, show genuine talent, and frequently no small power of humour.

Nicolay resided for the greater part of his life at St. Petersburg, where he was invited, in 1769, to undertake the office of preceptor to the grand-duke (afterwards emperor) Paul. Besides being honoured with several Russian orders, he was made director of the Imperial Academy of Sciences in 1798, which office however he afterwards resigned; and in 1801 was raised to the rank of imperial privy-counsellor. He died in 1820.

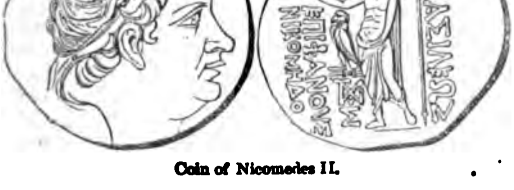
NICO'MACHUS, a physician of Stagira in Macedonia, and one of the family of the Asclepiadæ, flourished about 400 B.C., Ol. xcv. 1. He was the friend and physician of Amyntas, king of Macedonia, but is now only known as the father of Aristotle. (Ammonius, and Diogenes Laertius, in *Vita Aristot.*; Suidas, in voce *Nicomachus*.)

NICOME'DES (Νικομήδης), the name of several kings of Bithynia.

1. NICOMEDES I. succeeded his father Ziphœtes, B.C. 278. His succession was disputed by his brother Zibœtes; and he called in the Gauls to support his claims, B.C. 277. With their assistance he was successful; but his allies became his masters, and the whole of Asia Minor was for a long time overrun by these barbarians. [GALATIA.] He probably died about B.C. 250, and was succeeded by his eldest son Zielas.

2. NICOMEDES II., surnamed Epiphanes, succeeded his father Prusias II., B.C. 149. He accompanied his father to Rome, B.C. 167, where he appears to have been brought up under the care of the senate. (Liv., xlv. 44.) Prusias becoming jealous of the popularity of his son, and anxious to secure the succession to his younger children, formed a plan for his assassination; but Nicomedes, having gained intelligence of his purpose, deprived his father of the throne, and subsequently put him to death.

Nicomedes remained during the whole of his long reign a faithful ally, or rather obedient subject, of the Romans. He assisted the Romans in their war with Aristonicus, brother of Attalus, king of Pergamus, B.C. 131; and he was applied to by Marius for assistance during the Cimbrian war, about B.C. 103. During the latter part of his reign, he was involved in a war with Mithridates, of which an account is given in the life of that monarch. [MITHRIDATES VI., vol. xv., p. 289.]



Coin of Nicomedes II.

British Museum. Actual Size. Silver

3. NICOMEDES III., surnamed Philopator, succeeded his father Nicomedes II., B.C. 91. During the first year of his reign, he was expelled from his kingdom by Mithridates, who placed upon the throne Socrates, the younger brother of Nicomedes. He was restored however to his kingdom in the following year by the Romans, who sent an army under Aquilius to support him. At the breaking out of the Mithridatic war, B.C. 88, Nicomedes took part with the Romans, but his army was completely defeated by the generals of Mithridates, near the river Anmias, in Paphlagonia (Strabo, xii., p. 562); and he himself was again expelled from his kingdom, and obliged to take refuge in Italy. At the conclusion of the Mithridatic war, B.C. 84, Bithynia was restored to Nicomedes. He died B.C. 74, without children, and left his kingdom to the Romans.

(Memnon, as quoted by Photius; Livy; Justin; Appian's *Mithridatic War*; Strabo; Clinton's *Fasti Hellenici*, vol. iii., Appendix 7, 'Kings of Bithynia.')

NICOMEDES. [CONCHOID.]

NICOMEDI'A (Νικομήδεια), a city of Bithynia, at the head of the gulf Astacenus, in the Propontis, was founded by Nicomedes I., B.C. 264. According to Pausanias, this city was originally called Astacus (v. 12, § 5); but Strabo informs us that Astacus was another city on the same gulf, which was founded by the Megarians and Athenians, and afterwards destroyed by Lysimachus; on which occasion its inhabitants were removed to Nicomedia (xii., p. 563. Casaub.).

Under the Roman emperors Nicomedia became one of the chief cities of the empire. Pausanias speaks of it as the principal city in Bithynia (v. 12, § 5); but under Diocletian, who chiefly resided there, it increased greatly in extent and populousness, and became inferior only to Rome, Alexandria, and Antioch. (Liban., *Orat.* viii., p. 203; Lactant., *De Morte Persec.*, c. 17.) It was almost entirely destroyed by an earthquake during the reign of the emperor Julian, but it was again rebuilt with great splendour and magnificence, and recovered nearly its former greatness. (Amian. Marcell., xxii. 9; xxii. 13; xvii. 7.) It is called at the present day Ismid, and is still a town of considerable importance; but it contains few remains of antiquity.

NICOSIA. [CYPRUS.]

NICOTIA'NA TABA'CUM, an annual plant, of which the leaves are used in a variety of forms and ways, and also in medicine. The dried leaves are large, long, entire, smooth, somewhat glutinous, and of a brown colour, with a peculiar stupifying odour, and an acrid, nauseous, bitter taste. The processes of maceration and partial fermentation, and admixture of different substances, render it more agreeable in the dried than in the fresh state. The analysis of tobacco shows its chief ingredients to be:—1st, a tobacco-camphor, called nicotian, or nicotianin, which crystallizes, and is solid at the ordinary temperature of the air; has a faint odour of tobacco, with a warm, bitterish, aromatic, but not acrid taste, and is not possessed of any narcotic power; if applied to the nostrils, it causes sneezing; and if a grain be taken into the stomach, it creates uneasiness and giddiness. It is called by some the acid principle of tobacco, and if such be its nature, it is most probably combined in the herb with, 2nd, nicotina, an alkaloid, which, like conia, does not exist at ordinary temperatures in a solid form, but in a fluid and volatile state, having an oily appearance.

The empyreumatic oil of tobacco appears to be formed during the destructive combustion, and does not exist naturally in the leaf, but is probably formed at the expense of the nicotina. It does not therefore exist in the infusion of tobacco, the mode of action of which differs in several respects from the other forms in which it is employed. The active part of the oil can be removed from it by washing with weak acetic acid. The products of tobacco when burnt, as in smoking, are:—carbonate of ammonia, nicotianin, empyreumatic oil, soot, and some gases.

Nicotina seems to be the formidable principle of tobacco when used in the solid form, or as an infusion; and the empyreumatic oil, when it is smoked, or when obtained by destructive distillation. The action of nicotina is highly poisonous; a quarter of a drop will kill a rabbit; one drop can destroy a dog. It is distinguished from the other alkaloids obtained from the tribe of the Solanaceæ by *not* causing dilatation of the pupil; the external application of it to the eye produces other very alarming narcotic symptoms. The tenth part of a grain put into the eye of a cat causes strong convulsions, with foaming at the mouth, quick respiration, accompanied with rattling in the throat and rapid palpitations of the heart, which can be heard at a considerable distance, staggering, and paralysis of the hinder extremities, which symptoms disappear in an hour.

The empyreumatic oil, in the quantity even of a single drop placed on the tongue, excites convulsions and coma, without affecting the heart. It may prove fatal in two minutes.

Tobacco is a very powerful agent, the active principles of which are extracted by water, either in the form of infusion or decoction. The local effects of tobacco-leaves, or any preparation of them, are those of an acrid substance; hence when taken internally they cause vomiting and purging, pain of the stomach and intestines, followed by inflammation and ulceration. The external application occasions irritation of the part, and, if kept long in contact with it, inflammation: snuffing the prepared powder induces sneezing and increased secretion of mucus; chewing or smoking it causes increased secretion of saliva, with diminished appetite in those unaccustomed to its use.

Besides these local effects it has a secondary action, which results from the absorption of the active principles. It is immaterial by what channel they are introduced into the circulation: the same consequences follow, and affect on the one hand the intestinal canal, the lungs, and the heart; and on the other, the nervous centres of the brain and spinal chord. The former show themselves by nausea, vomiting, purging, pain and inflammation of the stomach, and here and there of the intestines; on the lungs, by the slower, painful, and irregular respiration; and after death the tissue of the lungs is found to be thicker, more injected with blood, and accumulations or extravasation of it. The action on the heart, or probably the nerves of the heart, manifests itself by irregular, generally slower pulsations, and by the heart losing its irritability sooner than after natural death; but the chief secondary action is on the brain and spinal chord, and this succeeds the external as well as internal application of it, but most so after injection into the rectum. Giddiness, weight, and pain of the head; deafness, a feeling like intoxication, staggering, trembling, general weariness of the muscles, with convulsive contractions of them, or cramps, general insensibility, sleepiness, and death are the consequences.

Tobacco must therefore be considered as a narcotic acrid poison. Habit reconciles the system to its action when used moderately, but nothing can secure the body from its irritative property and its ultimate absorption when employed in excess or incautiously. Uncontrollable fits of sneezing have produced death, and smoking a number of pipes or cigars has also caused death. The use of an infusion as a wash to the head in ringworm, or against the itch, has produced death by absorption through the abraded surface. The greater number of fatal cases have resulted from the employment of it as an injection into the rectum, either against worms, or, by a most singular practice, in the form of smoke in the case of persons drowned, a custom which ought to be strongly censured and relinquished.

The few cases which can justify the use of so formidable an agent are those in which great relaxation of the muscles is wished, such as to reduce dislocations or hernias, or to remove obstructions in the intestines, in ileus, and similar diseases. But the utmost caution is here requisite; and an injection of uniform strength, as ordered in the 'Pharmacopœia,' is to be prepared, and thrown up in divided portions, under the direction and in the presence of the medical attendant. In case of over-dose, vital stimulants, such as brandy or ammonia, must be resorted to. The infusion of tobacco has been recommended as a diuretic in some cases of dropsy; but it is a dangerous remedy, and seldom employed.

Against the common use of tobacco for snuffing or smoking it is perhaps useless to declaim. Chewing it is limited in a great measure to sailors, and it were to be wished that the practice of smoking were similarly restricted. The evils which follow indulgence in these customs are not very obvious, but that injury results is in most cases certain. [Antidotes; Errhines.]

NICOTIANIN, the principle which gives the characteristic odour to tobacco. It is a concrete oil, and may be obtained by the following process:—distil six pounds of tobacco-leaves with twice their weight of water, till half has come over. To the distilled liquor add twice its weight of water, and again distil; and this operation is to be repeated. A fatty substance will be found floating on the surface of the distilled liquid in very small quantity, and this is nicotianin.

Its properties are, that it has the smell of tobacco, and a bitterish taste. It is insoluble in water, but readily dissolves in alcohol and in æther; dilute acids do not dissolve it, but potash takes it up. By heat it is of course volatilized, and if water be present, without change. It does not appear to have been analyzed.

NICOTINA, an alkali which exists in the different species of tobacco. It is procured by the action of sulphuric acid upon tobacco-leaves, and subsequent treatment with alcohol, and afterwards with lime or magnesia, and various complicated operations. Other processes have also been adopted.

Its properties are, that it crystallizes in small plates, which, by exposure to the air, absorb moisture sufficient to become a transparent colourless liquid. When cold it is nearly inodorous, but when heated it yields a vapour, the smell of which resembles that of tobacco, and is disagreeable and acrid; its taste is also disagreeable, and somewhat caustic, and remains long in the mouth; even when cooled down to 21° it retains its fluidity. Its alkaline properties are evinced by its action upon test-papers; and when heated to 212° its vapour renders turmeric paper brown. It boils at 375°, is soluble in water, æther, and almond oil; its specific gravity is 1·048. The salts which it forms with alkalis are colourless, and are usually soluble in water and alcohol, but not in æther. Virginia tobacco yields about one-tenth of its weight of nicotina, and there is no one kind which gives much more. It has not been analyzed.

NICTITATING MEMBRANE. [Birds.]

NIEBUHR, CARSTEN, a celebrated modern traveller, and a native of the duchy of Lauenburg, on the southern confines of Holstein, was born in the year 1733. His family had been farmers in easy circumstances, but he lost his parents early; and, through some mismanagement in the division of their property, he was so utterly deprived for a time of the means of continuing his education, that he passed several years of his youth in the condition of a mere peasant, and was even prevented from cultivating a taste for music, which had given him hopes of obtaining the situation of organist. But, in his twenty-first year, an occasion arose which elicited his natural energy of spirit, and decided the direction of his fortunes. Some legal proceedings rendering it necessary to employ a land-surveyor in his native district, he resolved to qualify himself for the office, and for this purpose applied zealously to the study of geometry. With the thirst of knowledge thus excited, being now of age to dispose of the wreck of his little patrimony, he was led to employ a portion of it in acquiring higher instruction in the mathematics, first at Hamburg, and subsequently in the university of Göttingen. Here, as his views enlarged and his pecuniary resources diminished, he gladly embraced an opportunity, in his twenty-fourth year, of entering the corps of Hanoverian engineers: but he was soon diverted from that service by an offer from the Danish government of employment in a scientific expedition to Arabia.

The idea of this enterprise, which forms the most honourable event in the reign of Frederic V. of Denmark, was suggested to his minister Count von Bernstorff, by the learned Michaëlis, for the purpose of illustrating some passages in the Old Testament; and the original project, which contemplated the mission only of a single Arabic scholar, was liberally extended by the Count to include a mathematician for purposes of astronomical and geographical observation, a naturalist, a draughtsman, and a physician. When the first of these appointments was offered to Niebuhr, he showed his conscientious character by stipulating for a delay of eighteen months, in order to improve his scientific qualifications. This period of preparation he employed chiefly in gaining practice as an astronomical observer, and also in studying Arabic for a time with Michaëlis; though, under that instructor, he made but small progress in overcoming the difficulties of a language which he afterwards learned to speak fluently in the country. He modestly declined the title of professor, not considering that his acquirements were sufficient for that distinction; and he accompanied the expedition therefore only as a lieutenant of engineers, in the capacity of mathematician or geographer, to which the Danish minister, who had received some proofs of his disinterestedness in pecuniary affairs, added the responsible office of treasurer to the mission. Its other members were Frederic Christiern von Haven, as professor of the Oriental languages, Peter Forskäl as naturalist, Christiern Charles Cramer as physician, and George William Baurenfeind as painter or draughtsman. By the royal instructions for the expedition, a perfect equality was established among the five members; and they were enjoined to decide every difference of opinion regarding their course by plurality of voices, or if votes should be equal, by lot.

The expedition sailed from Copenhagen, in January, 1761 in a frigate of the Danish royal navy, and arrived, not without some accidents, at Constantinople; from whence, after a short residence, the travellers proceeded in a merchant vessel to Alexandria, ascended the Nile, and reached Cairo in November, 1761. Having carefully explored the pyramids and other antiquities of Lower Egypt, they crossed the desert to Mount Sinai and Suez, embarked at that port in an Arab vessel, and landed at Loheia, in Arabia Felix, the destined seat of their mission, in December, 1762. They crossed the country, mounted on asses, the usual conveyance of Mussulmans as well as Christians in Yemen, and after visiting several places of interest, finally arrived at Mocha, where the philologist Von Haven unfortunately died, in May, 1763. The surviving travellers proceeding from thence to Sana, the capital of Yemen, were favourably received by the Imaum; but they had meanwhile lost another of their number, the naturalist Forskäl, who died on the road. His companions returning to Mocha, there embarked in an English vessel for Bombay, on the voyage to which place the painter Baurenfeind expired; and at Bombay, Niebuhr had the affliction to bury the last of his fellow-travellers, the physician Cramer. The fact is admitted by Niebuhr, that his ill-fated friends persisted in living after the European manner under the burning sun of Arabia; and it may be surmised that they lost their lives through that disregard to necessary habits of abstinence for which the Danes in their tropical colonies are remarkable, even above all other northern people. Niebuhr himself, who had suffered severely from illness with the rest of his party, after their decease adopted the same diet as the natives of the countries in which he was travelling, and thenceforth enjoyed excellent health. Sailing from Bombay, he visited Persia, including the ruins of Persepolis; ascended the Euphrates; proceeded by way of Bagdad and Aleppo to the Syrian coast; embarked for Cyprus, returned from that island to the continent; saw Jerusalem and Damascus; passed through Aleppo, and over Asia Minor to Constantinople; and finally returned to Copenhagen, in November, 1767. The whole of the travels of the mission, which occupied six years, and extended over so many countries, is said, by the good management and conscientious economy of Niebuhr, who indeed defrayed every expense that could be considered personal to himself out of his own narrow income, to have cost the Danish government only the incredibly small sum of about four thousand pounds.

Niebuhr was welcomed in Denmark as he deserved. The government undertook at its charge the engraving of all the plates of his travels, which were to be presented to him as a free gift; and he was left to publish the result of his labours at his own cost and for his own profit. Resolving to commence with the 'Description of Arabia,' he printed, in the year 1772, his volume under this title, which has become the text-book of every writer, from the historian Gibbon down to the present time, who has had occasion to treat of the antient and modern aspect of that country. The depth of research, the fidelity of delineation, and the accuracy of detail which it exhibits on the geography of Arabia, and the enduring character and condition of its inhabitants, have rendered this work of Niebuhr perfectly classical. He has sometimes been compared, and the comparison is just and appropriate, with the historian of Halicarnassus: both travellers were characterised by accuracy of observation, strict veracity, and a simplicity of narrative which art alone can never attain. [HERODOTUS.] The appearance of this work was followed, in 1774-1778, by two volumes of equal merit and interest, narrating his 'Travels in Arabia and circumjacent Countries.' To these volumes it was his intention to add a third, enriched with the result of his inquiries into the state of the Mohammedan religion and Turkish empire, and containing his astronomical observations: but some causes, not sufficiently explained, delayed this publication, until a fire, which, in 1795, destroyed the king's palace at Copenhagen, and with it the original plates both of his published and inedited works, put an end to his design. This third volume was however published in 1837, owing to the liberality of the bookseller Perthes of Hamburg, and the affection of Niebuhr's family, particularly of his daughter, under the title of 'Reisebeschreibung nach Arabien und andern umliegenden Ländern:' it contains his remarks on Aleppo, his voyage to Cyprus, and his visit to Jaffa and Jerusalem, his return to Aleppo, and journey thence through Kóniyeh to Constantinople, and an abridged account of his route through Bulgaria, Wallachia, Poland, and Germany, to Denmark. (*London Geog. Journal*, vol. viii.) After the publication of the first two volumes of his travels, he contributed to a German periodical journal, among other papers, two on the 'Interior of Africa' and the 'Political and Military State of the Turkish Empire.' His principal works, which were published in German at Copenhagen, have been translated into French and Dutch, and reprinted at Amsterdam and Utrecht. Niebuhr himself likewise edited and published, in his usual generous spirit, at his own cost, the contributions to natural history (*Descriptiones Animalium* and *Flora Egyptiaco-Arabica*) of his deceased friend Forskäl, which were also among the fruits of the mission to Arabia.

Niebuhr, whose life was prolonged to a great age, survived his return from his Oriental travels for nearly half a century. He had, about 1772, some thoughts of undertaking another journey of discovery, at the instance of the Tripoline ambassador at Copenhagen, into the interior of Africa: but a happy marriage induced him to abandon this project; and, tired of military service and a residence at Copenhagen, he obtained, in 1778, a civil situation under the government at Meldorf in Holstein, to which he withdrew, and where he passed the long remainder of his existence. He did not however suffer his mind to be idle in retirement; for he maintained an extensive correspondence with the learned in several countries of Europe, and continued so active a public officer, that, at the age of seventy-two years, notwithstanding the failure of his eye-sight, he assisted in a new territorial survey ordered by the Danish government. His long services were rewarded with the cross of Danebrog and the title of counsellor of state; and when he became quite blind, the government liberally refused to accept his resignation, and appointed a friend to assist him in his duties until the end of his life, which terminated in April, 1815. A brief memoir of him in the German language, published by his son at Kiel, two years after his death, furnished the materials for an article in the 'Biographie Universelle,' from which and his works the present account has chiefly been compiled.

NIEBUHR, BARTHOLD GEORGE, was born at Copenhagen, on the 27th August, 1776. His father, Carsten Niebuhr, had returned from the East about nine years before that time, and was residing at Copenhagen as a captain of engineers; however, two years after Barthold's birth, he received the appointment of land-surveyor, which made him remove to Meldorf, a town of Dithmarsh, in Holstein, the native province of the Niebuhrs. It was here that B. G. Niebuhr spent the whole of his infancy and boyhood, living in great retirement, and necessarily contracting studious habits, as well from the absence of all outward interruptions, as because a weakly constitution, produced by a marsh-fever, had incapacitated him for the boisterous amusements of more robust children. He derived great advantages from the society of Bojes, then well known in the literary world, who came to settle at Meldorf as landvogt in the year 1781. The wife of Bojes taught him French, his father instructed him in geography, in the English language, in the elements of mathematics, and in the Latin accidence. He began to learn music in 1783, but never made any great progress in it. In other branches of knowledge so great was his proficiency that Bojes describes him as a juvenile prodigy in 1783, when Niebuhr was only seven years old, and when he was sent to the public school of the place, in 1789, he was placed at once in the first class. He also gave considerable assistance to his father about the same time in making some long calculations connected with his office of surveyor. After having been at school from Easter, 1789, to Michaelmas, 1790, he became the private pupil of the head-master, Dr. Jäger, with whom he read for an hour every day till Easter, 1794, with the exception of three months which he spent at Hamburg, in 1792, at a kind of commercial school kept by his father's friend Professor Büsch. He also received some advice with regard to the prosecution of his classical studies from the celebrated J. H. Voss, who paid occasional visits to his father, and he acknowledges with gratitude the benefit which he had derived, in common with all Germans, from Voss's excellent translations.

Carsten Niebuhr's wish was that his son should engage in some active business; he even entertained the hope for some time that his son might follow in his own footsteps, and become celebrated as an Eastern traveller. But Barthold's tendencies were from the first in favour of a studious life, and his father was unwilling to oppose his inclinations. It was resolved then that after spending two years at Kiel, he should go to Göttingen, and study under Heyne. He had already had communication with the last-named scholar, and had collated for him some MSS. after his return from Hamburg, in 1792.

He studied at Kiel from Easter, 1794, to the spring of 1796. Here he formed an intimacy with the family of Dr. Hensler, professor of medicine, which had the greatest influence on his subsequent career. The widow of Dr. Hensler's son, a lady from Dithmarsh, was residing in his house, and Niebuhr's acquaintance with her ripened into a friendship which lasted till his death. By far the greater part of his numerous letters are addressed to her. In August, 1794, Dr. Hensler was visited by the mother and sisters of his daughter-in-law, and Niebuhr soon formed an attachment to one of the latter, Amalie Behrens, who subsequently became his first wife.

In January, 1796, Count Schimmelmann, the Danish minister of finance, proposed to Niebuhr to become his private secretary. His father accepted the offer for him, and thus Niebuhr was introduced into the best circles of his native city. His bashfulness and studious habits however rendered him unhappy in this situation, and he soon exchanged it for that of supernumerary secretary to the Royal Library, which he entered upon in May, 1797, and held till April, 1798, when he paid a visit of two months to his family in Holstein, and then sailed for England. He resided in London and Edinburgh for about a year and a half, and returned to Holstein towards the end of 1799. About the middle of April, 1800, he went to Copenhagen, and, after a stay of a few weeks, obtained the appointment of assessor in the college of commerce for the East Indian department, and of secretary and accountant to the African consulate. The income arising from this appointment enabled him to marry Amalie Behrens, in May, 1800, and he resided with her at Copenhagen till the year 1806, performing his duties with the greatest punctuality and diligence, and to the entire satisfaction of his employers. He did not however altogether neglect his literary pursuits; they formed his evening amusement, and he found time in the midst of his business avocations to give lessons to the nephew of his friend Count Schimmelmann, and to translate part of an Arabic history of the conquest of Asia. In the spring of 1803 he had to make a journey into Germany on public business connected with the administration of the Danish finances. An offer was made to Niebuhr, at the end of 1805, to enter into the service of the Prussian government, and his dissatisfaction at the prospect of having some one appointed over his head, and the advantages held out by the situation proposed to him, induced him to accept the situation of joint-director of the first bank at Berlin, with the promise of further promotion.

He arrived at the Prussian capital on the 5th October, 1806, shortly before the battle of Jena. A few days after that event he was obliged to take flight with all the other officials. He resided till April, 1807, at Memel and Königsberg, and then became one of the secretaries of the prime-minister Hardenberg, having chiefly to attend to the supply of the army then in the field. This office kept him with the head-quarters of the army till the battle of Friedland, after which he went to Riga. The provisions of the peace of Tilsit having exacted the dismissal of Hardenberg, his office was put into commission, which consisted of Von Altenstein, Von Schön, Stägemann, Von Klewitz, and Niebuhr. Upon the accession of Stein to the administration, Niebuhr was despatched to Amsterdam to negotiate a loan, and he resided there till April, 1809. In December, 1809, he was nominated privy-counsellor, and received a high appointment in the administration of the funds. This brought him to Berlin, where, and at Königsberg, he resided through the winter of 1809-10. The opposition to a financial plan of his made him however more anxious than ever to retire from public life; and after some fruitless attempts on the part of the government to retain him in office, he exchanged his public situation for the post of historiographer to the king, vacant by the death of J. Von Müller. About the same time he was elected member of the Royal Academy of Sciences.

The opening of the university of Berlin, at Michaelmas, 1810, brought forward Niebuhr as a lecturer on Roman history; and the lectures which he delivered in this and the following year were published in 1811, and contain the germs of those new combinations and discoveries for which Niebuhr will be best known to posterity. The time which he spent at Berlin, from 1810 to 1813, seems to have been one of the happiest periods of his life. He formed a small philological society, consisting of Spalding, Buttmann, Heindorf, Schleiermacher, Ancillon, Süvern, Savigny, Schmedding, and Nicolovius, and with these distinguished scholars he spent all his spare hours. He felt very acutely the loss which this society sustained in the death of Spalding (on the 7th June, 1811). How greatly Niebuhr valued his intercourse with these highly-gifted men, may be presumed from the way in which he speaks of them at the end of the preface to his History; and there can be no doubt that many valuable hints in that work were suggested to him by his friend Savigny in particular.

Niebuhr's studious life was interrupted by the war of liberation, as it was called, in 1813-14. He took an active part in these events. He was chiefly with the head-quarters of the allied army till February, 1814, when he was again sent to Holland on public business. He returned to Berlin in the October of that year, and resided there till the summer of 1816, when he proceeded as ambassador to the court of Rome. During this residence at the capital he wrote, besides some political tracts, a biography of his father, who died in April, 1815, and some essays for the Royal Academy of Sciences, and resumed his intercourse with his philological friends. He also instructed the crown-prince of Prussia in the principles of political economy.

His wife died on the 20th June, 1815, shortly before he received his appointment as ambassador. His first intention was to take with him to Rome her sister, his friend the widow Hensler; in fact she came to Berlin for that purpose, in April, 1816, accompanied by her niece and adopted child Margaret Hensler, the orphan daughter of Christian Hensler, who had been professor of theology at Kiel, and the young lady was also to have accompanied Niebuhr to Rome. During their residence with him however he found reason to change his mind; he married Margaret Hensler before he started for Rome, and the widow returned to Holstein.

Niebuhr did not receive his final instructions till after he had been four years in Rome. By his interest however with the pope and his secretary, the Cardinal Consalvi, he contrived to bring the negotiations to a close in seven months after the arrival of his instructions: the Prussian minister, Hardenberg, went to Rome himself in February, 1821, and Niebuhr gave him the credit of completing the concordat, though his own services in the matter were fully acknowledged by his court, and he received from the king of Prussia, as a mark of his satisfaction and approbation, the order of the Red Eagle of the second class, to which the emperor of Austria added the first class decoration of the Leopold order of knighthood.

The climate of Rome had always disagreed with his wife, and as the business which had brought him to the papal court was now finished, he wrote for his recal. This was after the birth of his third daughter, in February, 1822. He was advised in the first instance to apply for leave of absence for a year, which left his return open to him. He spent part of the autumn of 1822 at Albano, and also made a journey to Tivoli. In March, 1823, he went to Naples, in order to visit his friend De Serre, who was French ambassador in that city; and after staying there till the beginning of May, set out for Berlin.

In consequence of some slight difference with the leading men in the capital, Niebuhr retired to Bonn, where a university had been recently established, and where his friend and former secretary, Brandis, was a professor. Here he was attached to the university as an adjunct professor, and gave lectures on Roman antiquities and various subjects. At the same time he availed himself of every opportunity of promoting and encouraging the labours of other scholars. It was partly with this view that he set on foot the 'Rheinisches Museum,' a philological repository, in which the shorter essays and scattered thoughts of learned men might be given to the world. The first volume of this periodical appeared in 1827, under the joint editorship of Böckh, Niebuhr, and Brandis. The new edition of the Byzantine historians, which was commenced under his direction, was intended only as a diversion, taken up to relieve his mind from the severer studies required by the revision and correction of his 'History of Rome.' He brought out the first volume of the new edition of this history early in 1827; the alterations in this edition are so numerous that it may almost be considered as a new work. The publication of the second volume was delayed by a fire, which burned his house to the ground and consumed all the manuscript with the exception of a leaf that he happened to have lent to a friend, and it did not appear till the end of 1830. Niebuhr's sensitive mind was much affected by the Revolution which took place in Paris in the July of that year, and by the subsequent revolt of Belgium: he looked forward with the deepest anxiety to the probable consequences of those events: he expected the renewal of that devastating war which had been the result of the first French revolution; and feared that his own happy dwelling-place, by the Rhine, would be the first to suffer from the invaders. These considerations preyed upon his spirits, and he sunk under the continued agitation of mind produced by them. He died on the 2nd of January, 1831, leaving behind him several children. His family, we understand, is now settled at Kiel; one of his sons is an officer in the Prussian army.

It is difficult to conceive a more excellent and delightful person than Barthold Niebuhr appears to have been; there is no one, of whom we have read, who has combined so blameless a character and so amiable a disposition with such boundless acquirements and such brilliant intellectual qualities. His 'History of Rome' is perhaps the most original work that this age has produced. To understand what he has done in this work, we should keep in mind the state of knowledge on the subject before his time. The disjointed ruins had lain for ages in a confused heap, though there was hardly a child in Europe who was not familiar with their rude outlines, and though many a skilful and laborious workman had endeavoured to reduce them to symmetry and order. Niebuhr, by a series of combinations which will appear most surprising to those who are most capable of appreciating works of genius, succeeded in reconstructing from the scattered fragments a stately fabric, which, if it is not identical with the original structure, is at least almost perfect and complete in itself. There cannot be a greater mistake than to suppose, as some have done, that Niebuhr was a sceptic whose sole delight was to render insecure the basis of historical evidence. He has actually done more than any one that ever lived towards extracting truth and certainty from the misty and mystical legends of early tradition, and toward substituting rational conviction for irrational credulity. The great object which he proposed to himself, in all his philological speculations, was to reproduce a true image of the past by getting rid of the deceitful influence of the present. This view he often expresses in very plain terms. Thus, he says in his introductory lecture on Roman history (*Kleine Schriften*, p. 93), 'As there is nothing which Eastern nations find more difficult to conceive than the idea of a republican constitution, as the people of Hindustan cannot be induced to regard the East India Company as an association of proprietors, or in any other light than as a princess, just so is it with even the acutest of the moderns when they study ancient history, unless they have contrived, by critical and philological studies, to shake off the influence of their habitual associations.' And in a letter to Count Adam Moltke, he exclaims (*Lebensnachrichten*, ii., p. 91), 'O, how people would cherish philology did they but know how delightfully it enables us to recal to life the fairest periods of antiquity. Reading is the most trifling part of it; the chief business is to domesticate ourself in Greece and Rome at the most different periods. Would that I could write history so vividly, that I could so discriminate what is fluctuating and uncertain, and so develop what is confused and intricate, that every one, when he heard the name of a Greek of the age of Thucydides or Polybius, or a Roman of the days of Cato or Tacitus, might be able to form a clear and adequate idea of what he was.' The very existence of such a general design presumes a lively fancy and active imagination: though these are qualities often possessed by shallow and superficial persons, they are very rarely combined with that extensive and minute learning for which Niebuhr was so distinguished. The range of his acquisitions was really wonderful. He had got together a mass of statistical information relative to the modern states of Europe, which would have sufficed of itself to gain a reputation for any man; there was hardly a stray hint in the whole series of classical writers which had escaped his searching eye, and the whole of his knowledge lay before him so as to be comprehended at one glance. In the words of one of his most ardent admirers, 'While his horizon was ever widening before him, it never sunk out of sight behind him: what he possessed he always retained; what he once knew became a part of his mind, and the means and instrument of acquiring more knowledge; and he is one of the very few examples of men gifted with a memory so tenacious as to seem incapable of forgetting any thing, who at the same time have had an intellect so vigorous as in no degree to be oppressed or enfeebled by the weight of their learning, but who, on the contrary, have kept it in orderly array, and made it minister continually to the plastic energy of thought.' (*Philol. Mus.*, i., p. 271.)

Some deductions must however be made from this general eulogy. While Niebuhr's great work has been neglected or censured, with equal injustice, by persons who have been too indolent to encounter the labour of studying it or incapable of appreciating the method of critical investigation which the author has adopted, it may be doubted, on the other hand, whether many scholars, both in Germany and England, have not been too willing to acquiesce in all Niebuhr's results, to adopt whatever he has written, and sometimes even to receive as established truths assertions unsupported by evidence or directly opposed by express testimonies. Some recent German writers have indeed taken a middle course; they adopt the general views and critical method of the historian, but they find much in the details that is defective or erroneous. This appears to us to be the true spirit in which Niebuhr's work should be studied. The young students of Roman history should be told that they will prove themselves worthy disciples of Niebuhr rather by following his method than by assuming his results; it must be impressed upon them that the original authorities should in all cases be carefully sifted and compared, and that they cannot rely implicitly on the authority of their master in cases where the theory depends on philological interpretation. It cannot be denied that the ardent imagination of Niebuhr, and his power of combining and constructing, sometimes led him to form a complete theory before he had examined all the evidence; one consequence of which is, that, under the influence of his own creations, he will sometimes extract a meaning from a passage which the words do not contain, and at other times arbitrarily reject evidence when it interferes with his own hypothesis. It is true that this same power and his intuitive sagacity have sometimes enabled him to supply a link in a chain when all direct evidence is wanting, and the certainty of his conjectures in such cases is at once felt by the symmetry and consistency which they impart to the whole fabric of the theory. The writings of Savigny, the illustrious friend of the historian, also furnish examples of the certainty which historical conjecture may attain when it is founded on complete knowledge and directed by a matured judgment. It must also be remarked that Niebuhr's style is very faulty. It is generally deficient in perspicuity, and though eloquent passages and striking descriptions are found here and there, it wants that sustained dignity which we remark in the writings of J. von Müller and other distinguished historians.

Considering the long time which Niebuhr spent in public life, it is somewhat strange that he should not have been better acquainted than he seems to have been with the modern science of political economy; and he occasionally betrays very crude and ill-formed opinions on the internal polity of other countries; witness his remarks on the relative position of England and Ireland. But with all the drawbacks which the most rigorous criticism can exact, the feeling with which we contemplate his character and attainments is one of almost unmixed admiration. He was in fact a rare combination of the man of business, the scholar, and the man of genius. If he had had no other claim to celebrity, he would have deserved to be mentioned among the general linguists whose attainments have from time to time astonished the world. His father, writing in December, 1807, states that he was then acquainted with twenty languages (*Lebensnachrichten*, i., p. 30), and there is no doubt that he subsequently added to the list. No man has ever borne his faculties more meekly than Niebuhr. Though he had been trusted and honoured by a powerful sovereign, and rewarded for public services in a situation of dignity and importance, and though he was recognised as the chief of philologers in the most learned country of Europe, his habits were to the last those of a retired student, and his manners those of an unassuming domestic man. A very pleasing picture of his mode of living has been given by the late Professor Sandford, who visited him at Bonn, in 1829 (see *Blackwood's Magazine*, for January, 1838, p. 90, &c.); a warm testimony to the benevolence of his character and the goodness of his heart is furnished by Lieber, in his 'Reminiscences of Niebuhr;' and we see the whole man, in all his relations, social, literary, and political, in the highly-interesting collection of his letters now in the course of publication (*Lebensnachrichten über Barthold Georg Niebuhr, aus Briefen desselben*, &c., Hamburg, 1838, vols. 1 and 2).

The following is a list of Niebuhr's philological works:

1. 'Römische Geschichte,' 2 vols. 8vo., Berlin, 1811. This edition was translated into English, by Mr. Walter, Lond. 1827.

2. 'Frontonis Reliquiæ, ab A. Maio primum editæ, notis variorum edidit B. G. Niebuhrius; accedunt C. Aurel. Symmachi octo Orationum Fragmenta.' Berol., 1816.

3. 'Cicero pro Fonteio et Rabirio,' 8vo., Romæ, 1820.

4. 'Flavii Merobaudis Carmina,' St. Galli, 1823, 2nd edition, Bonnæ, 1824.

5. Römische Geschichte,' Erster Theil, Berlin, 1827; Zweiter Theil, Berlin, 1830; Dritter Theil (posthumous), 1832. The two first volumes have been translated into English by J. C. Hare and Connop Thirlwall: 1st vol. Lond. 1828; 2nd edition, 1831; 2nd vol. 1832. The third volume is still untranslated. Of this translation Niebuhr himself has expressed his opinion in dedicating his 'Byzantine Historians' to the translators,—'quorum ope Historia mea Romana à Britannis prorsus ita ut eam animo concepi patrioque sermone conscripsi legitur.'

6. 'Corpus Scriptorum Historiæ Byzantinæ, editio emendatior et copiosior, consilio B. G. Niebuhrii, C. F. instituta,' &c., Bonnæ, 1828. Of this edition Niebuhr published the 'Agathias,' and joined with Bekker in publishing 'Dexippus,' 'Eunapius,' and other shorter histories, which appeared together in one volume.

7. 'Kleine Historische und Philologische Schriften, Erste Sammlung,' Bonn, 1828. This was the first volume of a collection of his shorter essays, which had appeared in the 'Transactions of the Berlin Academy' or in the 'Rheinisches Museum:' it also contained his biography of his father and his introductory lecture on Roman history. Many of these treatises have been translated into English, some of them in the 'Classical Journal' and the 'Philological Museum.' The essays 'On the Geography of Herodotus' and 'On the Scythians' have appeared in a separate form at Oxford.

Besides these works, which he published in his own name, Niebuhr has conferred a most important benefit on Roman jurisprudence by his discovery of the fragments of Gaius. [GAIUS.] He was unable to stay at Verona long enough to copy the MS. himself, and, as he says in a letter to the widow Hensler (*Lebensnachr.*, ii., p. 240), was obliged to content himself with the merit, which would soon be forgotten, of having made the discovery, not by accident, but after a diligent search. Niebuhr interested himself very much in the restoration of passages from lost writings contained in palimpsests, and in consequence became involved in a controversy with his rival discoverer, Mai, with regard to some emendations which he had proposed in certain fragments discovered by Mai, which emendations were subsequently confirmed by a MS. at Turin. Mai charged Niebuhr with having borrowed his emendations from the MS., and it was not without difficulty that Niebuhr prevailed upon the authorities at Rome to grant an *imprimatur* to his justification.

NIEMCEWICZ, JULIAN URSYN, a modern Polish writer, to whom the literature of his country is under considerable obligations for his exertions in its behalf, and for the nationality he infused into it. Neither was it as an author alone that he distinguished himself, for he took an active part in public affairs, and gave indisputable proofs of his patriotism. As nuntius of Lithuania, he displayed his political talents in the diet, 1788-92; and in 1794 became not only the military companion, but the attached friend of Koskiusko, with whom he was taken prisoner and sent to St. Petersburg, where they remained till they were liberated by the emperor Paul on his accession. He afterwards accompanied Koskiusko to the United States, where he became personally acquainted with Washington, respecting whose personal character and domestic habits he has furnished many minute particulars in his 'Krotka Wiadomosc o Zyciu Gen. Washingtona.' His poetical works are rather numerous, and consist of six books of Fables; narratives, and miscellaneous pieces (among which are translations of Milton's 'Allegro' and 'Penseroso'); and 'Spiewy Historycne,' a series of thirty-three historical songs, wherein the poet-patriot chants the heroic deeds of his countrymen. Of these historic hymns, which first appeared in 1816, and have since gone through several editions, a German version, not however including all of them, was published in 1783, by Baron F. Gaudy. His dramatic productions consist of several comedies and tragedies, some in verse and others in prose; among which may be mentioned 'Wladyslaw,' a tragedy, in five acts; 'Casimir the Great,' a prose drama, in three acts; 'Jadwiga, Queen of Poland,' an historical opera; also a translation of Racine's 'Athalie.' His prose works consist of 'Oriental Tales;' a 'History of the Reign of Sigismund III.,' 3 vols., 1819; 'Memoirs relative to the earlier History of Poland,' 3 vols., 1822; 'Lejbe i Siora' (Levi and Sarah), or Letters of two Jewish Lovers, 1825; and 'Jan y Teczyna' (John of Teczyn), an historical romance, the scene of which is laid in the court of Sigismund Augustus (sixteenth century). In the course of it many of the personages of that period are introduced, and the national manners and costume of the time are described with great minuteness.

NIE'MEN is the Polish name of a river, which by the Germans is called *Memel*, and by the Lithuanians *Niémona*. It rises in the swampy region which, between 51° and 56° N. lat., forms the watershed between the rivers which run into the Baltic and Black seas. It originates between 53° and 54° N. lat. and near 27° E. long., and runs in its upper course about 180 miles westward. At the town of Grodno it suddenly turns to the north, and continues in that direction about 100 miles. It then turns again to the west, and soon afterwards is joined, at Kowno, by the Wilia, the largest of its affluents, which flows about 180 miles in a western direction. The remainder of its course is to the west. From Grodno to its entrance into Prussia it forms the boundary-line between Russia and Poland. Its course through Prussia amounts to about fifty miles. About eight miles below Tilsit the river divides into two arms, which branch off respectively to the north-west and south-west. The northern arm, called Russ, divides again, about two miles from its mouth, into two arms, the Atmat and Skirwieck. The southern arm is called the Ghilghe. Both arms empty themselves into the Curisches Haff, a lake of fresh water separated from the Baltic by a narrow strip of land which is formed by a continual line of sand-hills. The delta included between the Russ and Ghilghe, called the island of Kaukehnen, is alluvial and of great fertility, but it is swampy towards the lake. Though impeded by shoals at several places, the river is of great importance for the exportation of the produce of the adjacent countries. Large though clumsily-made river-barges called *wittinnes* bring the produce of Lithuania (governments of Wilna and Grodno) and of a portion of Poland to Königsberg and Memel. These barges go up the Niemen to Grodno, and up the Wilia to Wilna. They bring down all kinds of corn, hemp, flax, hides, bacon, and some minor articles. All the timber exported from Memel is floated down from the interior of Russia. As the wittinnes were formerly frequently lost owing to the westerly and north-westerly gales, which prevail on the Curisches Haff, two canals have been made along the shores of the lake, by which the Ghilghe is united to the Deime, and thus to the Pregel river, on which the commercial town of Königsberg is built. These canals, which were made in the beginning of the last century at the expense and under the auspices of the countess of Truchses, then proprietor of the county of Rautenburg, are called the Little and the Great Frederick's Canal (Grosse und Kleine Friederichs Graben). The former is also known by the Lithuanian name of Greituska (the rapid river), on account of its more rapid course, and is about three miles long. The Great Frederick Canal is about 12 miles long and terminates in the Deime near Labiau. The Deime itself is chiefly an artificial canal, which was made 400 years ago, when Prussia was governed by the Knights of the Order of St. John. This canal, which extends from Labiau to Tapiau, unites the Haff to the river Pregel. In the middle of the last century an attempt was made to establish a water-communication between the Niemen and the Prypec, an affluent of the Dnieper, which runs into the Black Sea. The noble Polish family of Oginsky caused a canal to be dug in the swampy region between the Szczara, a tributary of the Upper Niemen, and the Yasiolda, an affluent of the Prypec. This canal of Oginsky is more than 30 miles long, but as its dimensions are small, and both the rivers which are united by this canal are only navigable for small craft, it is not much used.

There is perhaps no river in Europe whose floods rise to such a height and whose inundations are so destructive as the Niemen. Many circumstances unite to produce this effect. Snow to the depth of from four to six feet falls every winter on the country which is drained by it; and as the course of the river in general lies from east to west, this immense quantity of snow, being dissolved in so short a time as ten or fourteen days, causes the river to rise 20 or 30 feet above its general level; and as the fall of the river is in all its extent very inconsiderable, and its current slow, the water can only be carried off in a much longer time, and hence it accumulates in its bed and inundates the adjacent lands to a distance of several miles in many places, and causes great damage.

NIEUENTYT, BERNARD, was born 10th of August, 1654, at Westgraafdyk, a village of North Holland. There are short notices of his life in Niceron (*Mémoires des Hommes Illustres*, tom. xiii., p. 356), and in the periodical entitled 'L'Europe Savante,' for April, 1719, tom. viii., p. 297, from which the following particulars are taken. His education was conducted with a view to his entering the church, of which his father was a minister; but evincing an early indifference to an ecclesiastical life, he was left by his parent to the free choice of a profession. He accordingly commenced the study both of law and physic, having previously applied himself to the study of logic, in order the more effectually 'to restrain and fix his imagination, and acquire the habit of reasoning correctly.' He appears to have excelled as a public speaker, to which circumstance, and the general amiability of his character, may be attributed his influence in the provincial states, as also in the government of the town of Purmerend, wherein he resided, and of which he was burgomaster. As a physician he is said to have been celebrated; and able and equitable as a magistrate. He was a zealous but not very able supporter of the doctrines of Descartes, and his mathematical writings, though now valueless, obtained a temporary popularity in consequence of their author being one of the first opponents of the infinitesimal calculus. His objections, which Montucla designates 'a mere tissue of absurdities,' were replied to, first by Leibnitz (*Leipzig Acts*, 1694), and afterwards by MM. Bernoulli and Herman, the latter of whom showed, to the satisfaction of mathematicians, that their adversary knew little or nothing of the calculus against which he had written so freely. A work of much greater merit was published by him at Amsterdam in 1715, in one volume 4to., entitled 'The right use of Contemplating the Works of the Creator;' the object of the author is first to convince atheists of the existence of a supreme and benevolent Creator, by contemplating the mechanism of the heavens, the structure of animals, &c.; and secondly, to remove the doubts of Deists concerning revealed religion. It was originally published in Dutch, but has passed through several editions in German, French, and English. The English editions, translated by Chamberlayne, under the title of the 'Religious Philosopher,' appeared at London in 1718-19, and 1730, in 3 vols. 8vo.

Nieuentyt died May 30, 1718, not in 1730, as stated in Hutton's Dictionary. The following are the titles of his mathematical works: 'Considerationes circa Analyseos ad Quantitates infinitè parvas applicatæ Principia, et Calculi Differentialis Usum in resolvendis Problematibus Geometricis,' Amst., 1694, 8vo.; 'Analysis Infinitorum, seu Curvilineorum Proprietatis ex Polygonorum Natura deductæ,' Amst., 1695, 4to.; 'Considerationes Secúndæ circa Differentialis Principia, et Responsio ad Virum Nobilissimum G. G. Leibnitium,' Amst., 1696, 4to.; 'A Treatise upon a New Application of Tables of Sines and Tangents,' 1714 (printed in the 'Journal Littéraire de la Haye).

NIEUPORT, a fortified town in West Flanders, six miles north-west from Furnes, and eighteen miles west-south-west from Bruges, in 51° 8′ N. lat. and 2° 44′ E. long. The town stands about a mile from the sea, on the Yporlée. The port, which is only a fishing-place, consists of a narrow creek, in which vessels are left aground at low-water; this creek forms a quay about 500 feet in length outside the walls of the fort. Nieuport has water communication with Furnes, Ostende, and Bruges, by means of the Yporlée, the Yser, and the Ostend and Bruges canal. The town is regularly fortified and capable of sustaining a long siege; a great part of the surrounding district may be laid under water by means of sluices. There are upwards of 500 houses, a fine church, a chapel, a town-hall, and several hospitals. The population in 1836 amounted to 2847.

NIEUWELANDT, WILLEM VAN DEN, a Dutch author and artist, born at Antwerp in 1584, at first followed the manner of Paul Bril, whom he accompanied to Italy, but after his return, when he fixed himself at Amsterdam, he chiefly painted architectural compositions—ruins, baths, mausoleums, triumphal arches, and other subjects of that class. These works of his pencil, in which he showed how diligently he had studied the antient monuments of Rome, were eagerly sought after, and many of them were engraved. He himself also possessed considerable skill in engraving and etching.

His literary works consist of six tragedies, namely, 'Saul,' 'Claudius Domitius,' 'Nero,' 'Livia,' 'Cleopatra,' and 'Sophonisba;' all of which display talent. The 'Nero,' which was brought out at Antwerp in 1618, at the expense of the city, met with extraordinary success. He also wrote a poem entitled 'Von den Mensch' (Man, or the Vanity of the World), wherein he expatiates on the emptiness of all human pursuits. He died at Amsterdam in 1635.

NIEUWLAND, PIETER, who has already been mentioned in the account of the literature of the Netherlands (p. 161), was one of the most extraordinary men among his contemporaries and countrymen. Like Bellamy, between whom and himself there were only a very few years' difference as to the time of their deaths, as well as that of their births, he raised himself from an obscure station to literary eminence as a poet, and not as a poet alone, but also by his acquirements and labours in philosophy and science. He was born in 1764, at Diemermeer, where his father was a carpenter, and a man of some information for one in his class of life. From him he acquired some insight into arithmetic and geometry; read all the books which the house contained, and at the age of seven began to display a turn for making verses. His verses were considered by others, besides his father, as very extraordinary productions for such a mere child, and caused him to be greatly noticed by many, and especially by Bernardus De Bosch,* who was a lover of poetry, and who had himself some pretensions to be a poet. By him the boy was taken into his own house and placed under the tuition of his brother, the celebrated Jeronimo De Bosch, by whom he was instructed in Greek and Latin, in both which he soon made great proficiency, as well as in other studies. He was then sent to the Athenæum at Amsterdam, where he had Tollius and Wyttenbach for his instructors, and where, in 1780, he gave proofs of his learning and acquirements, by a dissertation on Terence, and another on the Stoic philosopher Musonius. After attending Ruhnkenius's lectures at Leyden, he became 'candidate' of philosophy, and so distinguished himself, that in 1787 the post of head-master at the school of Utrecht was offered him. In the following year he increased his fame by the publication of some of his poetical pieces, including that entitled 'Orion,' one of his noblest productions. In these, and his subsequent poems, there are abundant marks of real genius and originality, striking thoughts and ideas expressed with great power of language. Their chief defect is, that many of them possess little interest of subject, being of the class denominated 'occasional poems,' and therefore charm only by their beauties of execution. But as his translations from Anacreon are unrivalled for their sprightliness and elegance, so is his elegy on the death of his wife for its simple and touching pathos: and if their mere beauties of style can reconcile us to the insipidity and tediousness of Petrarch's amatory strains, that poem may be allowed to charm, though written not by an Italian, but a Dutchman, and though inspired, not by a fanciful platonic passion, but by so homely and old-fashioned a feeling as sincere conjugal affection. His poems, and those of Bellamy, produced a wholesome change in that species of writing: full of feeling and thought, they showed themselves eminently superior to the correct but mechanical and spiritless productions then generally received as poetry.

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* He was born 1746, died 1803. He made himself first known by his poem 'De Eigenbaat' (Interest), and he began a selection from Lavater's writings, and an edition of Vondel's works, but neither of them was completed. Jeronimo, the other brother, and by far the more celebrated of the two, was also the senior, being born at Amsterdam in 1740. As a classical scholar, as a writer of Latin poetry, and as an original critic, he stood high in the learned world. He died in 1811

Nieuwland's high poetical talent was the more remarkable because combined with other talents which have generally been considered incompatible with an ardent imagination. In conjunction with Van Swinden he published a nautical almanac; and also wrote a treatise (1787) on the means of ascertaining the longitude at sea, which has been frequently reprinted. Besides this he had begun a work on navigation, of which only the first volume appeared (1792), his death preventing him from completing it. An account of his other scientific and philosophical writings may be found in his Eloge by Van Swinden. It is related of him that he possessed such quickness of apprehension as to be able to make himself master of the contents of any work by merely running over its pages. That he possessed very extraordinary mental powers and rapidity of apprehension admits of no doubt, when the extent of his studies and attainments is compared with the shortness of his life and the variety of his avocations. In 1789 he was lector in navigation and natural philosophy at Amsterdam; in 1792 he became head teacher at Leyden, in the mathematical and physical sciences; and in 1793 professor of mathematics, physics, architecture, hydraulics, and astronomy. He died on the 14th of November, 1794, about eight months after the death of his wife and child.

NIE'VRE, a department of central France, bounded on the north and north-east by that of Yonne, on the east by that of Côte d'Or, on the south-east by that of Saône et Loire, on the south by that of Allier, on the west by that of Cher, and at the north-west extremity, for a short distance, by that of Loiret. The greatest length of this department is from the north-west, on the bank of the Loire below Neuvy, to south-east, near the banks of the Tannay, 73 miles; the greatest breadth, at right angles to the length, is from the bank of the Allier, near St. Pierre-le-Moutier, to the village of St. Agnant, near Saulieu (Côte d'Or), 65 miles. The area is calculated at 2637 square miles: the population, in 1831, was 282,521; in 1836, 297,550, showing an increase in five years of 15,029 persons, or more than 5 per cent., and giving rather more than 113 inhabitants to a square mile. In size it is above the average of the French departments; but in amount and density of population, considerably below the average. It may be compared in area with the English county of Devon, which however it rather exceeds: in amount of population it falls very far below Devonshire, and scarcely equals the much smaller county of Suffolk. In density of population it falls below any English county except Cumberland and Westmoreland. Nevers, the capital, is in 47° 0′ N. lat. and 3° 10′ E. long., 133 miles in a direct line south by east of Paris, or 140 miles by the road through Fontainebleau, Montargis, and Cosne.

The heights which separate the basin of the Loire from that of the Seine traverse the department from north-west to south-east: in the south-east part they are called the mountains of Morvan, being included in the district of that name, which comprehends the eastern side of the department. [MORVAN.] This eastern portion of the department is the more rugged portion, and consists chiefly or wholly of primitive rocks, granitic or schistose; the western part is covered by beds of the secondary strata, which intervene between the red marl and the chalk: the valleys of the Allier and the Loire, in the southern extremity of the department, and the valley of the Loire, in the north-western extremity, are occupied by the supracretaceous formations.

There are quarries of granite and marble, and of sandstone suitable for grindstones: yellow-ochre and potters' clay are also procured, but the chief mineral treasures of the department are iron and coal. The department is the seventh in the order of productiveness in coal, the quantity of which raised in 1834 was 27,055 tons, and, in 1835, 30,162 tons. This quantity was raised from one pit, in connexion with which (in 1834) 400 labourers were employed, viz. 292 in the pit, and 108 without it. There were in the same year 84 iron-works, in which were 26 furnaces for making pig-iron, 153 forges for producing wrought-iron, and 71 forges for producing steel. Charcoal was the fuel chiefly used, but coal was also employed.

The principal rivers are the Loire, the Allier, and the Yonne. The Loire enters the department on the south side, and flows about 34 miles north-west by Décise and Nevers to the junction of the Allier, on the western border, a little below Nevers, and from thence along the border of the department 44 miles to below Neuvy; in all 78 miles. The Allier has no part of its course within the department but flows for about 24 miles along the south-western and western borders, until its junction with the Loire. These two rivers are navigable throughout that part of their course which appertains to this department. The Yonne (a feeder of the Seine) rises in the mountains of Morvan, near Château Chinon, and flows north-north-west by Château Chinon, Corbigny, Tannay, and Clamécy, into the department of Yonne. Its course in this department may be estimated at 56 or 58 miles: it is not navigable.

The other rivers are all small, and are tributaries of the more important streams above mentioned. The Tannay (15 miles long), the Avron (about 40 miles long), the Accolin (32 miles long), the Nièvre (25 miles long), and the Nohain (25 miles long), join the Loire; the Bayes, the Tamnay, the Vandonesse, the Halene, the Canne, and the Landrage, join the Avron. The Cure (which has a course of 50 miles, but only part of it in this department), the Oussière, the Angnison, and the Beuvron (20 miles long), flow into the Yonne; the Chalaux flows into the Cure, and the Soray into the Beuvron.

There are several lakes or pools, but none are very large. The principal are that of Entrains, near the head of the Nohain (5 miles long, 1 or 2 miles broad), and those at the heads of the Avron and the Bayes, in the centre of the department.

The canals are, the canal lateral to the Loire from Digoin (Saône et Loire) to Briare (Loiret), of which about 36 miles are in this department; and the Nivernais Canal, extending from the Loire, at the junction of the Avron, to the Yonne below Corbigny, and thence by the channel of the Yonne to Auxerre. It is carried from the valley of the Avron to that of the Yonne by a tunnel through the intervening mountain-ridge. About 77 miles of this canal are in the department of Nièvre.

There were, in 1836, eight government roads in the department, having an aggregate length of 257 miles, namely, 214 in good repair, 17 out of repair, and 26 unfinished. The principal road is that from Paris to Lyon, which passes by Neuvy, Cosne, Pouilly, Meves, La Charité, and Nevers, all on the right bank of the Loire: from Nevers the road follows the valley of the Allier by St. Pierre le Moutier to Moulins, in the department of Allier. The road from Bourges (Cher) to Auxerre (Yonne), which crosses the Loire by the bridge at La Charité, passes through La Charité, Varzy, and Clamécy, from whence another road branches to Avallon. The road from Nevers to Auxerre passes through Premery and Montenoison, to Clamécy, where it unites with the road from Bourges. Other roads from Nevers pass, one by Château Chinon to Autun and Châlons-sur-Saône, both in the department of Saône et Loire; and the other along the valley of the Loire by Décise to Charolles and Mâcon, also in the department of Saône et Loire. The departmental roads had an aggregate length of 305 miles, of which 181 were in good repair, 2 out of repair, and 122 unfinished. The aggregate length of the bye-roads, paths, &c., amounted to 2400 miles.

The surface of the department is estimated at nearly 1,700,000 acres, of which nearly 730,000 acres are under the plough. The produce in grain is considerably below the average of France, but, from the smallness of the population, it is (combined with the growth of potatoes) sufficient for the supply of the inhabitants. The corn-land is chiefly in the western part of the department, in the valley of the Loire. The principal crop is wheat, then follow rye, with maslin or mixed corn, then oats, then barley; all these are grown to a considerable extent. The quantity of buckwheat and maize grown is but trifling, especially of buckwheat. The quantity of potatoes is considerably above the average of France, and some hemp is raised. The extent of grass-land is considerable: the meadows and other grass enclosures amount to between 160,000 and 170,000 acres, and the commons and open pasture-grounds to about 38,000 acres. The number of oxen is nearly twice the average of the French departments; they are bred here for the supply of the Paris market. The number of cows is rather below the average of the departments, unless regarded with reference to the population, when it rises considerably above the average. The number of heifers is above the average however estimated. The elevated plains of Morvan constitute the chief grazing-land. Sheep are not numerous; neither are they of good breed, though daily improvements are introduced. The long-wooled English sheep have been naturalised in the department. The number of horses is below the average of France, even when estimated relatively to the population. Oxen are employed in the labours of the field. There is a government establishment of stallions at Corbigny. Game is abundant in the department, the streams and lakes abound in fish, and a few truffles are found.

The vineyards occupy about 24,000 acres, little more than half the average extent of the vineyards of the French departments: they are however very productive, but the wine is only of ordinary quality, except the white wine of Pouilly on the Loire, which is in good estimation. The woodlands occupy above a third of the department, chiefly in the district of Morvan. The timber is excellent, and consists chiefly of oak, hornbeam, and beech. There are abundance of wild cherry-trees, the fruit of which might be made to yield an excellent Kirschwasser. A considerable portion of the supply of firewood for Paris comes from this district: the wood is made up into large bundles or 'trains,' by twisting the branches without rope or other fastening. In this way it is floated down the Yonne, the affluents of which are pent up or opened so as to furnish just the supply of water requisite for the transit of these floating bundles, which as they descend the Yonne and the stream becomes wider are augmented by fresh accessions.

The department is divided into four arrondissements, as follows:—

		Area in sq. Miles.	Population in 1831.	Population in 1836.	No. of Communes.
Nevers,	S.W.	875	86,847	94,382	99
Château Chinon,	E.	650	58,443	61,837	58
Clamécy,	N.	570	70,381	72,334	95
Cosne,	N.W.	542	66,850	68,997	65
		2637	282,521	297,550	317

It is divided into 25 cantons or districts, each under a justice of the peace.

In the arrondissement of Nevers are—the towns of Nevers (population in 1836, 16,967) [Nevers], Décise or Décize (pop. 2154 town, 3068 whole commune), and Pougues, all on the Loire; St. Saulge, near the head of the Canne; St. Pierre le Moutier (pop. 1545 town, 2110 whole commune) and Dorne, between the Loire and the Allier; and La Ferté Langeron, on the Allier. At La Machine near Décise are the great coal-works of the department already noticed. There are also glass-works in this neighbourhood. Pougues is a neat little place of 500 or 600 inhabitants, situated in a pleasant valley. About half a mile from the town is a mineral spring, the waters of which are of good repute in the district, and are said to resemble those of Spa in Germany. They were at one time more famous, and are said to have been visited by Henri III. of France (A.D. 1586). St. Pierre le Moutier owes its origin to the Cluniac monks, who had a monastery here up to the time of the Revolution. There is a large piece of water in the town, which contributes to its embellishment, but is considered to diminish the salubrity of the air. Guerigny, a village on the Nièvre, 7 or 8 miles north of Nevers, has large iron-works, noticed elsewhere. [Nevers.] At the village of Fourchambault on the Loire are large iron-works, which, with their branch establishments in this and the neighbouring departments, furnish employment to more than 2000 men. Steam-power is employed, and the iron is wrought by cylinders or rollers, not hammers. (Dupin, *Forces Productives, &c., de la France.*) Wood and coal (partly converted into coke) are used at these works. There are other iron-works scarcely less important at Imphy, another village on the Loire, 5 or 6 miles above Nevers; at the village of Pont St. Ours on the Nièvre, 2 or 3 miles from Nevers; and at Raveau near La Charité on the Loire. At Pont St. Ours women are employed in some part of the work. There are other iron-works at Bezes and Uxloup in this arrondissement.

In the arrondissement of Château Chinon are—Château Chinon (pop. in 1831, 2466 for the town, or 3865 for the whole commune; in 1836, 2775 for the commune), on the Yonne; Moulins-en-Gilbert, on a branch of the Avron; Luzy, on the Halene; and La Roche Millay, on a small feeder of the Halene. Château Chinon is the chief town of the district of Morvan: it is situated on a hill, commanded by wooded hills of greater elevation in the immediate neighbourhood. The principal trade carried on is in wood, charcoal, and cattle. The other towns of the arrondissement are unimportant. At the village of Vandelesse are considerable iron-works, which in 1827 gave employment to about 60 workmen.

In the arrondissement of Clamécy are—Clamécy (pop. in 1831, 4926 town, 5539 whole commune; in 1836, 5539 for the commune) [Clamecy], Tannay, and Morceaux, on the Yonne; Corbigny (pop. 1692 town, 2077 whole commune), on the Angnison; Corval and Varzy (pop. 1751 town, 2909 whole commune), on branches of the Soray; Entrains, near the head of the Nohain; St. Reverien, near the head of the Beuvron; and Lormes (pop. 1634 town, 2759 whole commune), between the Yonne and the Cure. At Corbigny is a government stud: at Corval, or Corvolle, is a paper-mill on the most approved principles, and at Varzy a considerable manufacture of linen. The other towns are unimportant

In the arrondissement of Cosne are—Cosne, or Cône (pop. in 1831, 5123 town, 5987 whole commune; in 1836, 6212 commune) [Cosne], Neuvy, Pouilly (pop. 1821 town, 3071 whole commune), Meves, and La Charité (pop. 4480 town, 5086 whole commune) [Charité, La], on the Loire; St. Amand, on the Vrille; St. Vrain, on a small stream flowing into the Vrille; Donzy (pop. 1879 town, 3566 whole commune), on the Nohain; Champlemy, near the head of one branch of the Nièvre; and Montenoison and Prémery, on the other branch of the Nièvre. Some geographers have considered Neuvy to be the Noviodunum of Cæsar's 'Commentaries,' a position which we have followed D'Anville in fixing at Nevers. Pouilly is a handsome town in a district which produces a heady wine, compared, but without reason, with Chablis. There are iron-works at Meves on the Loire, at Prémery, at Donzy, and at two or three villages round La Charité. Round St. Amand are a number of potteries, at which a coarse ware is made from sandstone, and exported to Nantes and Paris.

The population, when not otherwise distinguished, is that of the whole commune: we have followed the census of 1831.

The department of Nièvre is under the jurisdiction of the Cour Royale of Bourges, and in the circuit of the Académie Universitaire of the same city. In respect of education it is one of the most backward of the French departments; the number of those who could read and write, of the young men enrolled in the military census of 1828-29, was only 20 in every 100; little more than half the average number in France. The department constitutes the diocese of Nevers, the bishop of which is a suffragan of the archbishop of Sens and Auxerre: it is included in the fifteenth military division, the head-quarters of which are at Bourges; and sends four deputies to the chamber.

In the earliest period of the history of France the department was occupied by the Ædui, except a small portion in the north-west and north, which was included in the dominions of the Senones. These were both Celtic nations. The tract between the Ligeris (Loire) and the Elaver (Allier) was allotted to the Boii, when the latter settled in the territories of the Ædui. (Cæs. *De Bel. Gal.*, lib. i.) The Yonne was known to the Romans by the name Icauna. There were several Celtic or Roman towns within the limits of the department: Noviodunum, or Nivernum, or Nevirnum, now Nevers; Massava, now Meves, formerly written Mesves; Condate, now Cosne; and Decetia, now Decise, all on the Loire; and Alisincum, now Anizi, a village near Moulins-en-Gilbert. Massava and Condate belonged to the Senones, the other towns to the Ædui. The territories of the Ædui were included in the Roman province of Lugdunensis Prima; those of the Senones in Lugdunensis Quarta. On the downfal of the Roman empire, the department fell successively into the hands of the Burgundians and the Franks. In the middle ages it constituted for the most part the county, afterwards duchy, of Nevers; and previous to the French revolution formed the province or military government of Le Nivernois or Nivernais.

NIGER, or rather **NIGIR**, a name which has been given till lately to a large river mentioned by antient as well as modern geographers as flowing through the interior of Libya or Central Africa. Herodotus (ii. 32) gives an interesting account of five young men of the Libyan tribe of Nasamones, which dwelt on the coast of the Greater Syrtis, who proceeded on a journey of discovery into the interior. After traversing in a southern direction the inhabited region, and next to it the country of the wild beasts, they crossed the great sandy desert in a western direction for many days, until they arrived at a country inhabited by men of low stature, who conducted them through extensive marshes to a city built on a great river which contained crocodiles and flowed towards the rising sun. This information Herodotus derived from the Greeks of Cyrene, who had it from Etearchus, king of the Ammonii, who said that the river in question was a branch of the Egyptian Nile, an opinion in which the historian acquiesced.

Strabo seems to have known little of the interior of Africa and its rivers: he cites the opposite testimonies of Posidonius and Artemidorus, the former of whom said that the rivers of Libya were few and small, while the latter stated that they were large and numerous (p. 830).

Pliny (*Hist. Nat.*, v. 1) gives an account of the expedition into Mauritania of the Roman commander Suetonius Paulinus, who (A.D. 41) led a Roman army across the Atlas, and, after passing a desert of black sand and burnt rocks, arrived at a river called Ger, in some MSS. Niger, near which lived the Canarii, next to whom were the Perorsi, an Ethiopian tribe; and farther inland were the Pharusii, as Pliny states above in the same chapter. The Canarii inhabited the country now called Sus, in the southern part of the empire of Marocco, near Cape Nun, and opposite the Fortunate or Canary Islands; and the Perorsi dwelt to the south of them along the sea-coast. The Ger, or Niger, of Suetonius Paulinus, which he met after crossing the Atlas, must have been one of the streams which flow from the southern side of the great Atlas through the country of Tafilelt, and which lose themselves in the southern desert. One of these streams is still called Ghir, and runs through Sejelmesa. (Gräberg's *Marocco.*) Ger or Gir seems to be an old generic African appellation for river. As for the desert which Suetonius crossed before he arrived at the Ger, it could evidently not be the great desert, which spread far to the south of the Canarii, but one of the desert tracts which lay immediately south of the Atlas. Caillié describes the inhabited parts of Draha, Tafilelt, and Sejelmesa as consisting of valleys and small plains, enclosed by sterile and rocky tracts of desert country.

But besides the Ger, or Niger, of Suetonius, Pliny in several places (v. 8, 9, and viii. 21) speaks of another apparently distinct river, the Nigris of Ethiopia, which he compares with the Nile, 'swelling at the same seasons, having similar animals living in its waters, and, like the Nile, producing the calamus and the papyrus.' In his extremely confused account, which he derived from the authority of king Juba II. of Mauritania, he mixes up the Nigris and the Nile together with other rivers, as if all the waters of Central Africa formed but one water-course, which seems to have been a very prevalent notion of old. He says (v. 9) that the Nile had its origin in a mountain of Lower Mauritania, not far from the ocean; that it flowed through sandy deserts, in which it was concealed for several days; that it reappeared in a great lake in Mauritania Cæsariensis, was again hidden for twenty days in deserts, and then rose again in the sources of the Nigris, which river, separating Africa (meaning Northern Africa) from Ethiopia, flowed through the middle of Ethiopia, and became the branch of the Nile called Astapus. The same story, though without any mention of the Nigris, is alluded to by Vitruvius, Strabo, and others, and Mela (iii. 9) adds that the river at its source was called Daras, which is still the name of a river that flows along the eastern side of the southern chain of the Atlas of Marocco and through the province of the same name which lies west of Tafilelt, and is nominally subject to Marocco. The Dara or Draha has a southern course towards the desert, but its termination is unknown. There is another river, the Akassa, called also Wadi Nun, on the west side of the Adrar ridge or southern Atlas, which flows through the country of Sus in a western direction, enters the sea south of Cape Nun, and seems to correspond to the Daras or Daratus of Ptolemy. It has been supposed that the Dara and the Akassa were one river, but the Adrar ridge seems to lie between the two.

Throughout all these confused notions of the hydrography of interior Africa entertained by the antients, one constant report or tradition is apparent, namely, that of the existence of a large river south of the great desert, and flowing towards the east. It is true that Herodotus, Strabo, Pliny, and their respective authorities thought that this river flowed into the Nile, but Mela seems to have doubted this, for he says that when the river reached the middle of the continent, it was not known what became of it.

Ptolemy, who wrote later than the preceding geographers, and seems to have had better information concerning the interior of Africa, after stating that 'Libya Interior is bounded on the north by the two Mauritaniæ, and by Africa and Cyrenaica; on the east by Marmarica and by the Ethiopia which lies south of Egypt; on the south by Interior Ethiopia, in which is the country of Agisymba, and on the west by the Western Ocean from the Hesperian gulf to the frontier of Mauritania Tingitana,' proceeds to enumerate various positions on the coast of the ocean, after which he mentions the chief mountains of Libya and the streams which flow from them to the sea. He then adds, 'In the interior the two greatest rivers are the Geir and the Nigeir; the Geir unites Mount Usargula (which he places in 20° 20′ N. lat. and 33° E. long.) with the Garamantic pharanx (the name of a mountain which he has stated above to be in 10° N. lat. and 50° E. long.). A river diverges from it at 42° E. long. and 16° N. lat., and makes the lake Chelonides, of which the middle is in 49° E. long. and 20° N. lat. This river is said to be lost under ground and to reappear, forming another river, of which the western end is at 46° E. long. and 16° N. lat. The eastern part of the river forms the lake Nuba, the site of which is 50° E. long. and 15° N. lat.' The positions here assigned to the Geir and the direction of its main stream, from the Garamantic mountain to Mount Usargula, being south-east and north-west, seem to point out for its representative either the Shary of Bornou and its supposed affluent the Bahr Kulla of Browne, or perhaps the Bahr Misselad of the same traveller, called Om Teymam by Burckhardt, who says that i indigenous appellation is Gir, a large stream coming from about 10° N. lat., and flowing north-west through Wadai, west of the borders of Dar-Fur. The Misselad is supposed to flow into lake Fittre; we do not know whether any communication exists between lake Fittre and the Tschad. In fact it appears that several streams, besides the Bahr Kulla and the Bahr Misselad, all coming from the great southern range, or Mountains of the Moon, flow in a north-west direction through the countries lying between Bornou and Dar-Fur, and the Geir of Ptolemy may have been the representative of any or all of them. Linant was informed by some Takrousi pilgrims from Dar-Sille that they travelled two months on the Bahr al Abiad before they arrived at Sennaar; and that before arriving at the Abiad they followed the course of another river upwards; and that the Abiad had its rise in a country called Bahr el Lesse, from which some of the waters flow towards Marok, that is to say, to the north-west.

We now come to Ptolemy's Nigeir, a name which, having been mistaken for the Latin word Niger, has added to the confusion on the subject. Nigeir is a compound of the general appellative of Geir or Gir, which is found applied to several rivers in various parts of Africa, and the prefix Ni or N', which is found in several names of the same region reported by Denham and Caillié. Ptolemy makes the Nigeir quite a distinct river from the Geir, and places it to the westward. He says that it joins the mountain Mandrus, 19° N. lat. and 14° E. long., with the mountain Thala, 10° N. lat. and 38° E. long. Its course is thereby defined as much longer and in a less oblique line to the equator than the Geir. In fact it would correspond tolerably well—allowing for the imperfection of the means of observation in antient times—with the actual direction of the course of the Joliba and that of the river of Sakkatoo, supposing that river to form a communication with lake Tschad, as Ptolemy says that the Nigeir has a divergent to the lake Libye, which he places in 16° 30′ N. lat. and 35° E long., and the words of the text seem to express that the water ran into the lake, so that the course of the Nigeir, according to Ptolemy, as well as his predecessors, was easterly, as the Joliba or Quorra actually runs for a great part of its course. 'The lake Libye,' observes a distinguished geographer, 'to which there was an easterly divergent, I strongly suspect to have been the lake Tschad, notwithstanding that the position of Libye falls 300 geographical miles north-westward of this lake, for the name of Libye favours the presumption that it was the principal lake in the interior of Libya; it was very natural that Ptolemy, like many of the moderns, should have been misinformed as to the communication of the river with that lake, and that he should have mistaken two rivers flowing from the same ridge in opposite directions, one to the Quorra and the other to the Tschad (I allude to the Sakkatoo and the Yeu rivers), for a single communication from the Quorra to the lake.' (Leake's paper 'On the Quorra and Niger,' in the second volume of the *Journal of the Royal Geographical Society of London*, 1832, with map at the end of the volume illustrating the subject.

But Ptolemy, after all, may not have been so much misinformed with respect to a communication existing between the lake and his Nigeir, if, as is now strongly suspected, the communication really exists, though in an inverse direction from that which Ptolemy appears to have understood. It is surmised that the river Tschadda, which, at its junction with the Quorra, just above the beginning of the delta, is larger than the Quorra itself, receives an outlet from the lake somewhere about the town of Jacobah. (Captain W. Allen, R.N., *On a New Construction of a Map of a Portion of Western Africa, showing the possibility of the Rivers Yeu and Chadda being the Outlet of the Lake Chad*, in vol. viii. of the *Journal of the Geographical Society of London*, 1838; and also the *Map of West Africa*, No. 11, published by the Society for the Diffusion of Useful Knowledge.) If this surmise prove true, it would explain the statement of the Arabian geographers of the middle ages, Edrisi, Abulfeda, and Leo Africanus, who state that the Nil el Abid, or river of the negroes, flowed from east to west. The Tschadda then would be the river of the Arabian, and the Joliba, or Upper Quorra, that of the Greek and Roman geographers. Both were ignorant of the real termination of their respective streams. 'It is nevertheless remarkable that the distance laid by Ptolemy between his source of the river and the western coast is the same as that given by modern observations; that Thamondocana, one of the towns on the Nigeir, is exactly coincident with Timbuktû, as recently laid down by M. Jomard from the itinerary of M. Caillié; that the length of the course resulting from Ptolemy's positions is nearly equal to that of the Quorra as far as the mountains of Kong, with the addition of the Tschadda or Shary of Funda, and that his position of Mount Thala, at the south-east extremity of the Nigeir, is very near that in which we may suppose the Tschadda to have its origin; so that it would seem as if Ptolemy, like Sultan Bello and other modern Africans, had considered the Tschadda as a continuation of the main river, though he knew the Egyptian Nile too well to fall into the modern error of supposing the Nigeir to be a branch of the Nile. The mountains of Kong, and the passage of the river through them at right angles to their direction, formed a natural termination to the extent of the geographer's knowledge, in like manner as among ourselves the presumed, and at length the ascertained existence of those mountains, has been the chief obstacle to a belief that the river terminated in the Atlantic.' (Leake's Paper already quoted.)

The opinions established by the Arabian geographers of the middle ages of the Niger flowing westward, led Europeans to look for its æstuary in the Senegal, Gambia, and Rio Grande; but upon examination of those rivers the mistake was ascertained; and D'Anville and other geographers separated the course of the Senegal from that of the Niger, and of the latter from that of the Nile. Mungo Park was the first European who saw the great internal river of Soudan flowing towards the east, and called Joliba. He traced it in two different journeys, from Bammakoo, about ten days from its source, to Boussa, where he was unfortunately killed in 1806. Clapperton crossed the river at Boussa, on his second journey to Sakkatoo in 1826; and after his death his faithful servant Richard Lander undertook to navigate the river from Boussa to its mouth. In 1827 he proceeded from Badagry, on the coast, to Boussa, and there embarked on the river; found that it flowed in a southern direction, receiving several large rivers from the east; among others the noble Tschadda, after which the united stream passed through an opening in the Kong chain, and that after issuing from the mountains it sent off several branches both east and west towards the coast, while he himself reached the sea by the branch known till then by the name of Rio Nun.

A fuller description of the river and its banks is given under Quorra, the object of the present article being only to elucidate the historical question whether the great river of the Libya of Herodotus, the Nigris of Pliny, the Nigeir of Ptolemy, and the Niger of modern geographers, be one and the same river with the Quorra. M. Walckenaer (*Recherches Géographiques sur l'Intérieur de l'Afrique Septentrionale*) has maintained the negative side of the question, asserting that the antients had no knowledge of Soudan, and that the Nigeir of Ptolemy was one of the rivers flowing from the Atlas. But Col. Leake has ably answered him and supported the affirmative in the paper above quoted.

NIGER, CAIUS PESCE'NNIUS, appears to have been of humble origin; but his great military talents recommended him successively to the notice of Marcus Aurelius, Commodus, and Pertinax, by whom he was employed in offices of trust and honour. He was consul together with Septimius Severus, and obtained the government of Syria.

On the murder of Pertinax, A.D. 193, the empire was exposed for sale by the Prætorian guards, and was purchased by Didius Julianus, whom the senate was compelled to acknowledge as emperor. The people however did not tamely submit to this indignity; and three generals, at the head of their respective legions, Septimius Severus, who commanded in Pannonia, Clodius Albinus, in Britain, and Pescennius Niger, in Syria, refused to acknowledge the nomination of the Prætorians, and each claimed the empire. Of these, Niger was the most popular, and his cause was warmly espoused by all the provinces of the East. But he did not possess the energy and activity of his rival Severus. Instead of hastening to Italy, where his presence was indispensable, he quietly remained at Antioch, while Severus marched to Rome, dethroned Didius, and made active preparations for prosecuting the war against him in Asia. Roused at length from his inactivity, Niger crossed over to Europe and established his head-quarters at Byzantium; but he had scarcely arrived at this place, before his troops in Asia were defeated near Cyzicus by the generals of Severus. He was soon however able to collect another army, which he commanded in person; but being defeated successively near Nicæa and at Issus, he abandoned his troops, and fled towards the Euphrates with the intention of seeking refuge among the Parthians. But before he could reach the Euphrates, he was overtaken by a detachment of the enemy, and put to death on the spot.

(Herodian, b. ii.; Spartianus, *Life of Pescennius Niger*; Aurelius Victor, *De Cæsaribus*, c. 20; Eutropius, viii. 10; Dion, *Epitome*, b. 73, 74.)

Coin of Niger.

NIGHT-JARS, the English name of those Night-Swallows vernacularly termed Goat-suckers; whence the name *Caprimulgidæ*, by which the family is generally known among ornithologists. Mr. Rennie changes the name of the European Night-Jar to *Nyctichelidon* (Night-Swallow), objecting that the name *Goat-sucker*, which it has received in all languages, and which, he thinks, has been most absurdly continued by systematic naturalists in the term *Caprimulgus*, shows the opinion of it entertained by the vulgar. Now we cannot admit this great absurdity though we entirely agree with Mr. Rennie that 'it is as impossible for the Night-Jar to suck the teats of cattle (though most birds are fond of milk), as it is for cats to suck the breath from sleeping infants, of which they are popularly accused.' If every zoological name that has not a sure foundation were to be changed, there would be no small alteration in nomenclature and not a little confusion; as it is, the perpetual change of names is quite sufficiently perplexing. Nor are we at all sure that such names as *Caprimulgus* are not of some value as showing, in connexion with a true history of the habits of the bird, how the errors and superstitions of old times have vanished before the light of modern investigation. Thus much as an apology for not changing the family name *Caprimulgidæ*.

Mr. Vigors remarks that when we search among the *Perchers* for that point where they approximate the *Owls*, we at once light upon a group, the *Caprimulgus* of Linnæus, whose general appearance and habits point out the affinity. 'The nocturnal and predatory manners of this genus,' says Mr. Vigors, 'the hawking flight, the legs feathered to the talons, the large ears and eyes, the very disk that surrounds the face, and the pectination of the external quill-feathers, observable in some of the species, the general softness of the plumage, together with its peculiarly striking colour and markings, produce a similarity between it and the *Strix* that has attracted the eye of the common observer no less than the naturalist. The provincial names of this genus have generally a reference to this resemblance; while the earlier scientific describers of the different species have for the most part ranked them with the owls. I know not whether the singular character observable in some of the species of this family, the serrated nail of the middle toe, may not be cited as an additional proof of their approach to the *Birds of Prey*. The strong toes of the latter are lost in Caprimulgus: but a construction of similar import (for the serration of the nail appears capable of being applied to the purposes of seizure only), preserves, though faintly, the resemblance. May we not almost venture to affirm that this apparently trivial appendage is an instance of that beautiful shading by which nature softens down the extremes of her neighbouring groups—one of those minute and delicate touches by which she marks at once an affinity and a deviation? But while we may discern at a glance the general approximation of these two families, we must at the same time acknowledge that they stand in need of an intermediate link to give them a closer connection. The weakness of the bill and of the legs and feet of the *Caprimulgus* still keeps it at some distance from the *Owls*, in which the same members are comparatively strong; while the wide gape of its mouth serves to divide the families still further. A connecting link has been however supplied by an Australian group, the *Podargus* of M. Cuvier, which harmonises these discrepant characters. We have an opportunity of observing among the specimens in the collection of the Linnean Society, how far the bill of this extraordinary genus combines the different forms of that of the two genera, and how far the legs, still maintaining the characteristics of *Caprimulgus*, such as the unequal length of the toes, are related to those of *Strix* by their superior robustness. Here indeed there is a beautiful gradation of affinities. All the front toes of *Caprimulgus* are united by a connecting membrane as far as to the first joint; those of *Strix* are divided to the origin; while those of *Podargus* partake of the characters of both, in having the middle toe connected with the outer, but divided from the inner. Again, as I have already remarked, *Caprimulgus* has the nail of the middle toe dilated and serrated: *Strix* has it, generally speaking, undilated and entire at the margin; but in *Podargus* the same part displays the singular dilatation of the one and the marginal integrity of the other. It is difficult to say to which of these groups it comes nearest, until further and more accurate accounts than we at present possess of its food and economy may determine its actual situation. At present it remains osculant between the two families, and may decidedly be pronounced the immediate passage from the *Birds of Prey* to the *Perchers*.' Mr. Vigors adds in a note that he had latterly obtained accounts from actual observers of some of these *Podargi* in New Holland, stating their manners to be generally conformable to those of the *Caprimulgi*.

Mr. Vigors further observes that the union between the two families of *Caprimulgidæ* and *Hirundinidæ* in the most essential particulars, in the habits, economy, and general conformation, is too evident to the common observer, and too universally acknowledged by scientific writers, to need any further illustration. But he remarks that it is gratifying to observe, how, even in minute particulars, a gradual succession of affinities imperceptibly smooths the passage between conterminous groups; nor does he pass over without remark the circumstance of the hind toe of *Caprimulgus* being usually retractile, which enables it to place all its toes in front, in a similar position to that which they maintain in *Cypselus*, where the family of the *Hirundinidæ* terminates. He notices also the conformation of the tail in the two families as showing a similar affinity, observing that some species of *Caprimulgus*, then lately arrived from Brazil, exhibit the forked tail of *Hirundo*, one of which, indeed, the *C. psalurus* of Temminck, has this character developed to an almost disproportionate degree. 'Leaving those typical families,' continues Mr. Vigors, 'with the short bill, and taking a general survey of the tribe, we may perceive that the *Caprimulgidæ* unite themselves to the longer-billed families, by means of the Linnean *Todi*, which preserve the broad base of the bill of the latter, but lead on, by comparative length of that member, to the succeeding family of *Halcyonidæ*. If we compare the bill of the type of the last-mentioned genus, the *Todus viridis*, Linn. [MUSCICAPIDÆ, ante, p. 14], with those of *Caprimulgus* and *Halcyon* [KINGFISHERS, vol. xiii., p. 228], we shall perceive that it stands exactly midway between them in the relative proportions of strength and breadth which it bears to each. In the length also of the tail, an important character in the groups that feed on the wing, it maintains a middle station between them.' For the group which forms the immediate connection between the present family of *Todidæ* and the preceding *Caprimulgidæ*, Mr. Vigors observes that we are indebted to Dr. Horsfield, since in the depressed and broad-based bill and wide gape of *Eurylaimus* we recognise the characters which unite those families [MUSCICAPIDÆ, ante, pp. 15, 16], and Mr. Vigors refers to the valuable plates of the *Zoological Researches in Java*, as exhibiting the intimate approach of the bill of this latter genus to that of *Podargus Javanensis*. Near to *Eurylaimus*, which in the opinion of Mr. Vigors is united to *Todus* by some species now referred to the former genus, but which were originally included in the latter, he would place the genus *Eurystomus* of Vieillot [MEROPIDÆ, vol. xv., p. 118], which in the essential characters of the bill, and from all Mr. Vigors could ascertain of its general habits and economy, seems to him to bear a striking affinity to the present group. Here also the same considerations would incline him to arrange the *Calyptomena* of Sir Stamford Raffles, which differs chiefly from the groups now mentioned in its comparatively shorter bill and the singular covering of plumes that project over the upper mandible. All these and some other corresponding genera will be found, Mr. Vigors makes no doubt, on more accurate knowledge of their economy, to belong either to the present family, which is placed at the extremity of the *Fissirostres*, or to that of *Pipridæ*, which forms, in the system of Mr. Vigors, one of the aberrant groups also of the neighbouring circle of *Dentirostres*, and thus comes in contact with the *Todidæ*. Mr. Vigors admits that more extensive knowledge respecting these birds will determine the line of demarcation between them; but the general affinity by which they approach each other, at least, in continuous families, may at once, in his opinion, be decided without hesitation. ('On the Natural Affinities that connect the orders and families of Birds,' *Linn. Trans.*, vol. xv.)

Mr. Swainson (*Classification of Birds*) considers the order of *Fissirostres* to be best represented by the *Swallows* and *Goat-suckers;* observing at the same time, that the former are the most isolated; whilst the latter, above all other birds, show the nearest affinity to the owls. 'No species, indeed,' says Mr. Swainson, 'has been yet discovered which would perplex a naturalist to decide to which of these families it belonged, but that is not material; we do not uphold the injudicious theory that every one of nature's links is so perfect, or rather so well known, as to leave no unequal intervals in the series; on the contrary, we maintain that such interruptions are frequently found, and in this manner are the *Goat-suckers* detached by a slight interval from the *Owls*.' The same author remarks, that the fissirostral birds, as a whole, are peculiarly distinguished by having the powers of flight developed in the highest degree; all the energies of their nature, he observes, seem concentrated in this one perfection; for their feet are always very short, weak, and generally so imperfect as to be of use only to rest the body after flight; their food being exclusively insects captured upon the wing. 'To accomplish this, proceeds Mr. Swainson, 'nature has given to their mouth an enormous width, by which, superadded to their amazing flight, and rapidity of movement, they are almost sure to capture their prey. Who that has watched the swallow or the goat-sucker, has failed to recognise these peculiar perfections? As the nocturnal goat-suckers frequently prey upon beetles and large moths, the mouth, in such species, is defended by stiff bristles; but these appendages are rendered unnecessary to the swallows; their game consisting entirely of those little soft insects seen in the air on a summer's evening or sporting on the flowers of a sunny field. The goat-suckers choose the twilight, and catch their food precisely in the same way, excepting, indeed, that their little short feet are sometimes used for the same purpose, a most singular part of their economy, first noticed by our countryman White. Some of these nocturnal birds (*Pogardus*,* Cuv.) have a bill nearly as strong as an owl's; others are furnished with forked tails of excessive length; and one species, discovered during our researches in Brazil (*Caprimulgus diurnus*, Temm.) quits the nocturnal habits of its congeners, and in cloudy days may be seen, in troops of fifteen or twenty, skimming over the surface of ponds, precisely in the manner of swallows.' Mr. Swainson then remarks that the *Swallows* and the *Goat-suckers* are, in fact, connected by certain *Swifts*, for the *Balassian Swift* is described as a nocturnal bird, appearing at sunset and going to rest at sunrise; and thus he enters the family *Hirundinidæ*. [Swallows.]

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* *Podargus* must be meant.

The *Caprimulgidæ*, according to Mr. Swainson's classification, consist of the following genera and subgenera. But it should be remembered that he states that he has thought it best not to attempt a natural arrangement, until the family is better understood.

Character of the Family.—Plumage lax, soft. Bill exceedingly small; gape enormous. Feet very short, weak; the hallux directed forwards. (Sw.)

Genus Podargus, Cuv.

Size large. The middle claw not serrated. The hallux not directed forward.

Subgenera, *Podargus* proper. Bill large, very strong; the tip and margins of the upper mandible folding over those of the lower. Culmen elevated and arched. True rictal bristles none. Tongue very thin, entire. Tarsus short. (Swainson.)

Several species of this subgenus have been found in New Holland; and we select as an example of these *Podargus humeralis*.

Description.—Variegated above with ashy brown and dirty yellow; head and sides of the back conspicuously striped with black; forehead and dorsal plumage lightly dotted and banded with white. Tessellated beneath with black stripes and approximating dirty yellow bands. Length of the body 20 inches, and of the tail 8½.

Mr. Vigors and Dr. Horsfield observe that the birds of this genus in the collection of the Linnean Society bear such a general resemblance to each other, that they felt some hesitation in describing them as different species. The careful examination of many individuals in their own country will, in the opinion of these zoologists, alone determine with certainty whether they are distinct or merely varieties of the same species from age or sex. They state however that Dr. Latham, as well as themselves, distinguished this as a species, under the name of the *Cold River Goat-sucker*, from the *Wedge-tailed Goat-sucker* (*Podargus Stanleyanus*). Mr. Swainson also cites it as a species.

Podargus humeralis.

Here we must notice an Asiatic example of this form, *Podargus Javanensis* of Horsfield, the *Chabba-wonno* of the Javanese.

Description.—General colour ferruginous or rufous, with a tint of isabella varied by undulated transverse bands of dark brown. A collar of pale whitish isabella, variegated with two very narrow bands of deep brown, passes round the lower part of the neck, and from this collar several large, irregular, white marks are disposed in an interrupted series from the axilla to the middle of the back; on the breast and belly several white feathers are scattered. The tranverse bands are strongest on the rounded tail. Feet rufous; claws blackish; bill obscure yellow and rather shining; middle toe not dentated. Length 9 inches.

Habits.—Not known. It is nocturnal and conceals itself in large forests.

Podargus Javanensis.

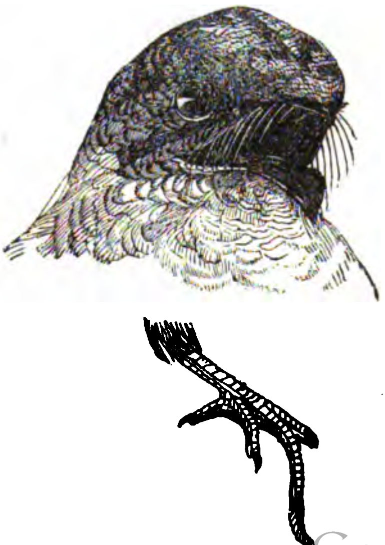
The other two subgenera arranged by Mr. Swainson under the genus *Podargus* are *Ægotheles*, Horsf. and Vigors, and *Nyctibius*, Vieill.

Mr. Allis has stated that the sclerotic ring of the great *Podargus* does not present the slightest appearance of distinct plates, being simply a bony ring.

M. Lesson is of opinion that *Steatornis* [Guacharo Bird] forms the passage between the *Caprimulgi* and the *Crows*.

Caprimulgus. (Linn.)

Bill remarkably small and weak; the sides inflexed and sometimes gaping. Tarsus short. All the toes directed forwards; the inner and outer toes equal; the middle claw pectinated. (Sw.)



Head and Foot of Goat-sucker (Caprimulgus Europæus)

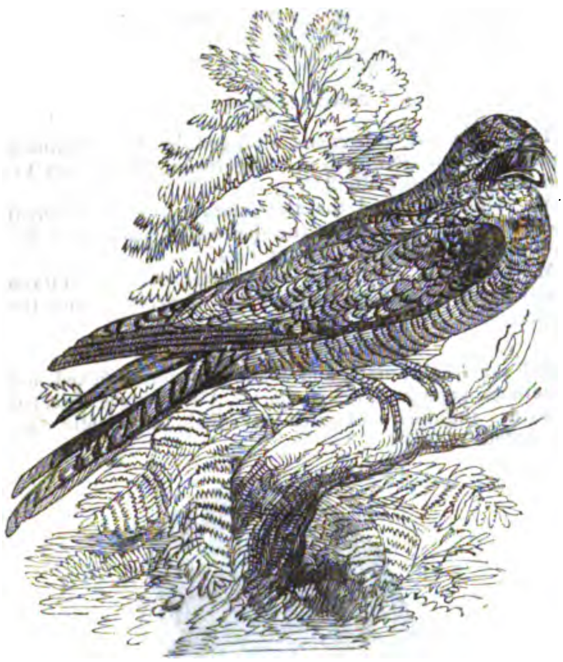
Mr. Swainson subdivides the genus into the following Subgenera, *Caprimulgus*. Gape strongly bristled. Tail lengthened, rounded. Lateral toes equal. (Sw.)

We select as an example *Caprimulgus Europæus*.

Description: Male.—Plumage above and that of the throat ash-grey, thickly streaked and spotted with brown mostly of a yellowish tinge; head and neck with longitudinal blackish streaks; a white stripe beneath the base of the lower mandible extends along each side of the lower part of the head, and there is a central patch of white upon the throat; quills with the outer webs blotched with reddish-brown, and the three exterior feathers with a large white patch near the tips of the inner webs; tail irregularly marked and indistinctly barred with blackish-grey and yellowish-brown; the two external feathers on each side white at their termination. Plumage of the under parts yellowish-brown, with transverse blackish bars. Bill and irides dark brown; tarsi paler.

Female with the plumage of the male generally; but she wants the white spots on the quills and tail-feathers.

This is most probably the *αἰγοθήλας* (Ægothēlas, or Goat-sucker) of Aristotle and the Greeks, and the *Caprimulgus* of Pliny and the antient Italians. There is indeed, as we shall presently see, another European species, but it is very rare. The *Caprimulgus Europæus* is the *Calcabotto Piattaglione*, *Porta quaglie*, *Boccaccio*, and *Cova-terra* of the modern Italians; *Chotacabras* of the Spaniards; *Tettechevre*, *Engoulevent ordinaire*, and *Crapaud volant* of the French; *Milchsauger*, *Geissmilcher*, *Nacht Rabe*, *Nacht Schwalbe*, and *Tag-Schläfer* of the Germans; *Natskraffa*, *Natskarra*, and *Quallknarren* of the 'Fauna Suecica:' *Nat-Ravn*, *Nat-Skade*, and *Aften-bakke* of Brunnich; *Muckenstecher* and *Nachtrabb* of Kramer; *Aderyn y droell*, *Rhodwr*, of the antient British; and *Goat-sucker*, *Night-Jar*, *Jar-Owl*, *Churn-Owl*, *Fern-Owl*, *Dor-Hawk*, *Night-Hawk*, and *Wheel-Bird* of the modern British.



Caprimulgus Europæus.

The absurd story of the goat-sucking habits of this bird may be traced back as far as the time of Aristotle, and is probably of much older date. It has all the appearance of a deep-rooted popular prejudice, which was so extensively believed when that zoologist wrote, as to demand, in his opinion, insertion in his 'History of Animals.' In the ninth book of that history (c. xxx.), Aristotle says, 'The bird called *Ægothēlas* is a mountain-bird, a little larger than the blackbird (κοττύφου) and a little less than the cuckoo. It lays eggs to the number of two or three at most, and is of a slothful nature (βλακικός). Flying upon the goats, it sucks them (θηλάζει δὲ τὰς αἶγας προσπετόμενος), whence it has its name. They say that when it has sucked the teat it becomes dry, and that the goat becomes blind. It is not sharp-sighted by day: but it sees by night.' Ælian's version of the effect of the bird's sucking is confined to the part sucked. He says that the operation makes the teat dry or blind (τυφλοῖ μασθόν), and so the flow of the milk is stopped. He speaks of the great audacity of the bird, observing that it is fearless of the vengeance of the goatherds (iii. 39). Ælian also refers to its goat-sucking propensity in c. 22 of book xvi. Pliny (*Nat. Hist.*, ix. 40) states that the '*Caprimulgi* are nocturnal thieves; for they cannot see by day (interdiu enim visu carent). They enter the folds (stabula), and fly to the udders of the goats in order to suck the milk, from which injury the udder dies away, and blindness falls upon the goats which have been so sucked.' Nor is the charge of goat-sucking the only false accusation made against the Night-Jar. White (*Selborne*) informs us that the country-people have a notion that the fern-owl, or churn-owl, or eve-jarr, which they also call a puckeridge, is very injurious to weanling calves, by inflicting, as it strikes at them, the fatal distemper known to cow-leeches by the name of puckeridge. 'Thus,' says White, 'does this harmless ill-fated bird fall under a double imputation, which it by no means deserves; in Italy, of sucking the teats of goats, whence it is called the *Caprimulgus*, and with us, of communicating a deadly disorder to the cattle. But the truth of the matter is, the malady is occasioned by the *œstrus bovis*, a dipterous insect, which lays its eggs along the chines of kine, where the maggots, when hatched, eat their way through the hide of the beast into the flesh, and grow to a very large size.' (White's *Selborne*.) Belon, in his folio edition (1555), gives no figure of this species, but appears to confound it with an Owl, '*L'Effraye* or *Fresaye*.' In the small 4to. 'Portraits d'Oyseaux,' &c. (1557), a figure is given at the end of the Owls, which, though bad, cannot be mistaken for anything but the *Goat-sucker*, with the titles of 'Αἰγοθήλας, *Strix Caprimulgus*, *Fur nocturnus*, *Effraye*, *Frezaye*,' with the following old quatrain:

'Le hideux cry de la Frezaye effraye
Celuy qui l'oit: elle vole de nuict,
Et à tetter les chevres prend deduict.
T'esbahis-tu s'elle se nom Effraye?'

Food, Habits, Reproduction, &c.—The food of the European Goat-sucker consists chiefly of night-flying and evening-flying moths and beetles, *Phalænæ*, *Melolonthæ*, &c. In the stomach of one which Willughby opened were seeds as well as beetles. The Fern-chafer, *Melolontha solstitialis*, seems to be a favourite food, and hence the bird is frequently found in those neighbourhoods where fern abounds. It spends the summer in the temperate countries of Europe, but on the approach of winter retires to the south of the Mediterranean sea. Its arrival in these islands may be looked for from the middle of May to the end of that month, and its departure takes place towards the end of September or beginning of October. The earliest appearance of the bird in White's Calendar is dated on the 1st of May, and the latest on the 26th of that month. The last-named naturalist paid particular attention to the habits of this species. 'There is no bird, I believe,' writes that delightful observer, in a letter to Pennant, 'whose manners I have studied more than that of the *Caprimulgus* (the goat-sucker), as it is a wonderful and curious creature; but I have always found that though sometimes it may chatter as it flies, as I know it does, yet in general it utters its jarring note sitting on a bough; and I have for many an half-hour watched it as it sat with its under mandible quivering, and particularly this summer. It perches usually on a bare twig, with its head lower than its tail, in an attitude well expressed by your draughtsman in the folio *British Zoology*. This bird is most punctual in beginning its song exactly at the close of day; so exactly that I have known it strike up more than once or twice just at the report of the Portsmouth evening gun, which we can hear when the weather is still. It appears to me past all doubt that its notes are formed by organic impulse, by the powers of the parts of its windpipe, formed for sound, just as cats pur. You will credit me, I hope, when I assure you that, as my neighbours were assembled in an hermitage on the side of a steep hill, where we drink tea, one of these churn-owls came and settled on the cross of that little straw edifice and began to chatter, and continued his note for many minutes; and we were all struck with wonder to find that the organs of that little animal when put in motion gave a sensible vibration to the whole building! This bird also sometimes makes a small squeak, repeated four or five times; and I have observed that to happen when the cock has been pursuing the hen in a toying way through the boughs of a tree. Again—'On the twelfth of July I had a fair opportunity of contemplating the motions of the *Caprimulgus*, or Fern-owl, as it was playing round a large oak that swarmed with *scarabæi solstitiales*, or fern-chafers. The powers of its wing were wonderful, exceeding, if possible, the various evolutions and quick turns of the swallow genus. But the circumstance that pleased me most was, that I saw it distinctly, more than once, put out its short leg, while on the wing, and by a bend of the head deliver somewhat into its mouth. If it takes any part of its prey with its foot, as I have now great reason to suppose it does these chafers, I no longer wonder at the use of its middle toe, which is curiously furnished with a serrated claw.' Mr. Vigors (*loc. cit.*) remarks that the common Barn Owl (*Strix flammea*) possesses the same character of serrated *unguis:* and that some other species of the *Strigidæ* exhibit somewhat of the rudiments of it; thus establishing more closely the affinity of the *Owls* and the *Caprimulgi*. Mr. Vigors adds that his conjecture as to the use of the serrated claw—that is, its being devoted to the purposes of seizure—is considerably corroborated by the passage from White above quoted. At the same time he refers to Wilson, who in his account of the *Caprimulgus Carolinensis* (*Antrostomus Carolinensis* of Bonaparte) assigns a different use to this serrated claw. Of this species Wilson says, 'Reposing much during the heat of the day, they are much infested with vermin, particularly about the head, and are provided with a comb on the inner edge of the middle claw, with which they are often employed in ridding themselves of these pests, at least when in a state of captivity.' Upon this Mr. Vigors observes that such can be at best but an accidental use to which the serration can be applied. There are many other groups of birds, he adds, possessing the same character, to which the same application of it can never be assigned—for instance, the greater part of the genus *Pelecanus* of Linnæus. Many of these birds, whose feet, Mr. Vigors observes, are naturally ill adapted by their webbed structure for laying hold of any object, are yet found to incubate among trees, where the serrated claw may give them a further power of prehension; they are also, he remarks, asserted to seize their prey occasionally with the foot; in which acts the structure of the nail, as in the case cited by White respecting the *Caprimulgus*, may be peculiarly useful. 'The family of the *Ardeidæ* among the wading birds equally exhibit,' says Mr. Vigors, in conclusion, 'an analogous construction in the middle nail. Here again this character seems adapted to their mode of life in enabling them to hold their prey more firmly in those slimy and muddy situations where it might otherwise elude them; while, at the same time, it may assist their feet (which, like those of the *Pelecanidæ*, are naturally ill suited for grasping) in their hold among the trees, where, like some also of the latter family, they build their nests.' Mr. Dillon is of opinion that the chief use of the serrated claw is simply to comb out or dress the *vibrissæ* which surround the gape. Mr. Swainson opposes this view, observing that there is an American group of this family which have no bristles round the bill, and yet have the serrated claws; and another group in Australia which have bristles round the bill, and yet with the claw smooth and simple. He also observes that the Heron tribe have the gape smooth, but the claw serrated. Mr. Rennie remarks that the passage in Wilson 'appears to settle the question;' but he gives no satisfactory reason why.

The Goat-sucker is sometimes to be seen abroad in gloomy days; we have seen it on such days, and generally on the ground. On a tree it is observed to perch not across a branch, but on its longitudinal direction. These birds affect the neighbourhood of oaks, where in May they find the *Melolontha vulgaris*, and at Midsummer the *Melolontha solstitialis*. White graphically describes the evolutions of one round his 'great spreading oak,' where it was hawking after a brood of some particular *Phalæna* belonging to that tree. On this occasion he says it exhibited a command of wing superior to the swallow itself. The same author states that when a person approaches the haunts of this species in an evening they continue flying round the head of the obtruder; and by striking their wings together above their backs, in the manner that the pigeons called smiters are known to do, make a short snap; perhaps at that time, he adds, they are jealous of their young, and their noise and gestures are intended by way of menace. The eggs, two in number, oblong, white or dusky, and streaked somewhat like the plumage of the bird, are equal in size at each end, and are laid on the bare ground, generally among fern, heath, or long grass, sometimes in furze-brakes or woods, but always near the latter. Montagu describes the noise made by the male during incubation when perched, and with his head downwards, as not unlike that of a spinning-wheel, and notices its uttering a sharp squeak as it flies.

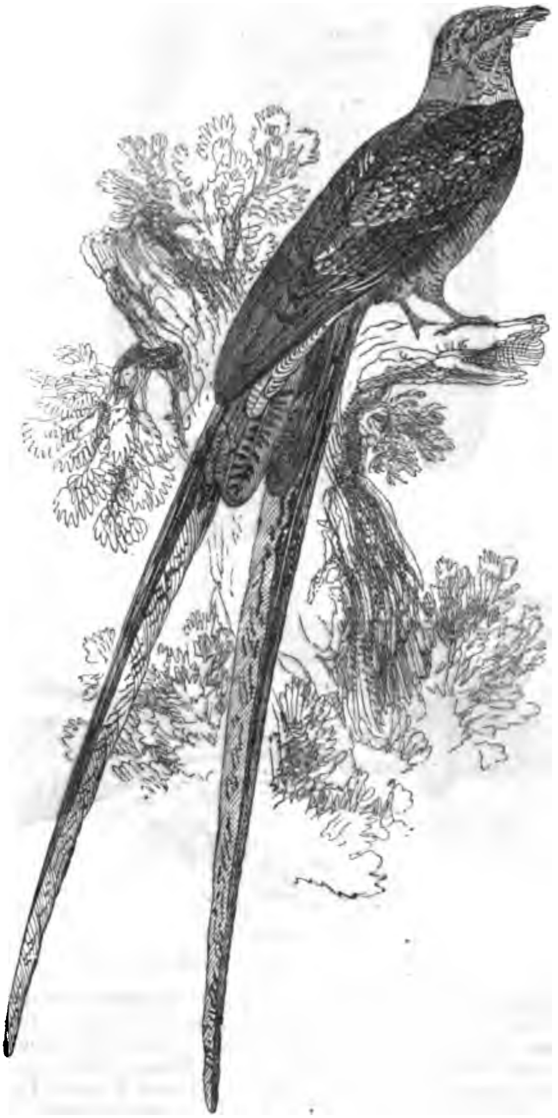
The other European species, *Caprimulgus ruficollis*, which is very rare, has been shot in the oak-woods some miles distant from Algeziras, and also in the valley of the Rio del Mel, near that city. The Spanish name for it is *Samala*. Mr. Gould has no doubt that its natural habitat is Northern Africa. The Prince of Musignano notes it as occurring in south-western Europe during the summer.

Mr. Gould has established a new genus for some of the American *Caprimulgi*, under the name of *Antrostomus*. [WHIP-POOR-WILL.]

Psalurus (Sw.). Gape strongly bristled. Tail excessively long, and very deeply forked.

Example, *Psalurus macropterus*.—A bright ruddy demi-collar ornaments the back part of the neck, and the two external tail-feathers in the male are much longer than the others. The tail of the female is much shorter.

Locality.—Paraguay and Brazil.

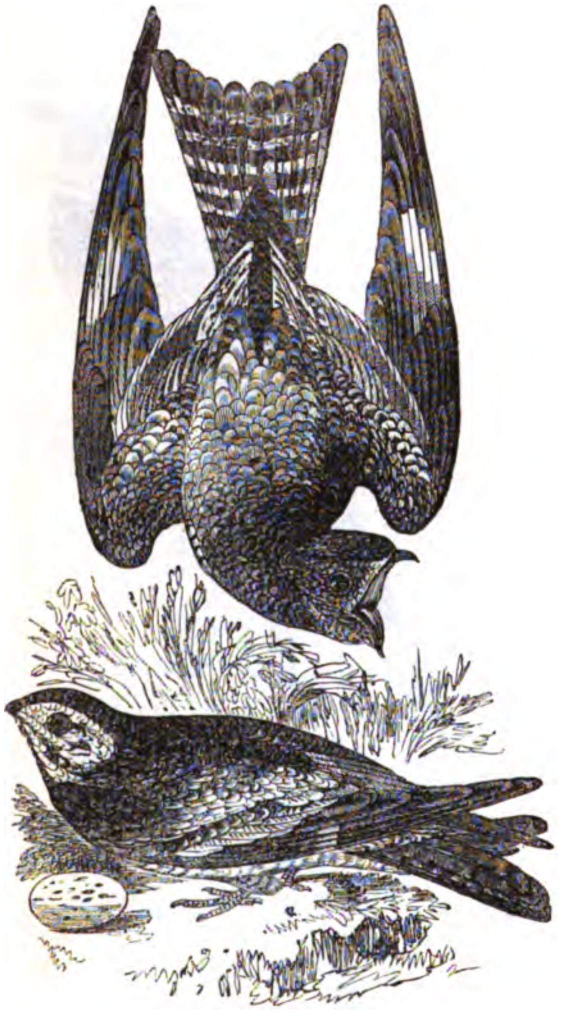


Psalurus macropterus (old male).

Chordeiles (Sw.). Gape perfectly smooth. Wings very long, equal to the tail, which is slightly forked.

Example, *Chordeiles Americanus*. Ground of plumage above, sides of the head and front of the neck, dark liver-brown glossed with greenish. Head, neck, and upper rows of lesser wing-coverts spotted with yellowish brown; back, scapulars, and tertiaries mottled with brownish white, and a little wood brown, the pale colour forming speckled bars on the tail and its coverts; intermediate wing-coverts more thickly mottled with a purer white; greater coverts spotted with brown on the margin; band on middle of quills beginning on the inner web of the first and ending with the fifth, and a broad arrow-shaped mark on the throat pure white. A white dotted superciliary band reaches to the nape. Lateral tail-feathers banded with white. Plumage below and inner wing-coverts barred alternately with brownish-white and liver-brown. Bill blackish. Legs pale. Tail forked. Middle toe, which is longest, with a serrated claw.

This is the *Caprimulgus Americanus* of Wilson, and the *Caprimulgus Virginianus* of the Prince of Musignano, who notices the bird, in his *Geographical and Comparative List*, as *Chordeiles Virginianus* (Bonap.), and *Caprimulgus Popetue* (Vieill.). It is the *Peesquaw* of the Cree Indians.



Chordeiles Americanus.

Upper figure, Male. Lower figure, Female, with an egg.

Habits, Food, Reproduction, &c.—Dr. Richardson informs us that few birds are better known in the Fur Countries than this, which ranges in summer even to the most remote arctic islands. Captain (now Major) Sabine notices it, in the appendix to Captain (now Sir Edward) Parry's 'First Voyage,' as the *Musqueto Hawk*, and states that a female was found on Melville Island, lying dead on the ground about a quarter of a mile from the sea. He adds, that these birds are known to breed and inhabit as far north as Hudson's Bay; but as they live principally in woods, and feed on musquitoes and other winged insects, which are very rare in the North Georgian Islands, it is more than probable that the individual found dead was an accidental visitor, and had perished for want of food. It was extremely thin, but the plumage was in good preservation. Fabricius does not mention it, he observes in conclusion, as known in Greenland. Dr. Richardson states that its very peculiar noise is most frequently heard in the evening, and often seems to be made close to the listener, though the bird that produces it is so high in the air as to be nearly imperceptible. He describes this sound as resembling that produced by the vibration of a tense thick chord in a violent gust of wind, and says that the *Pisk* (the common name for the bird) considerably resembles some of the *Falconidæ* in its evolutions in the air. It often remains stationary, fluttering its wings rapidly, and then suddenly shoots off a long way, by a gliding motion: at that moment the loud vibratory noise is heard. 'It also traverses the air backwards and forwards, quartering the sky as regularly as the Hen Harrier surveys a piece of ground. The female deposits her eggs on the ground without making any nest, generally selecting the border of a cultivated field or an open glade in the forest, and, during incubation, sits so close, that she may be almost trodden down. When any person approaches her, the male sallies from the adjacent thicket and stoops at the intruder, passing within a foot or two of his head, then rising again and wheeling round to repeat the same manœuvre. In the meanwhile, his mate flutters from the nest along the ground as if disabled, and hides herself at a short distance among the grey grass, from which she can hardly be distinguished. The *Pisk* makes its first appearance at Great Bear Lake generally about the last day of May, and was observed hatching on the Saskatchewan on the 8th of June. Its eggs are narrower than those of *Caprimulgus vociferus*, but of the same colours, rather differently distributed; they measure nearly 14 lines in length.' (*Fauna Boreali-Americana.*)

Geographical Distribution.—See above. In Dr. Richardson's table, the extreme northern range of this bird is stated as 68° N. lat. (east of the Rocky Mountains, migratory), and he notices it as observed in the summer, when it is common, on the Saskatchewan, lat. 53° to 54° north, and from 600 to 1000 miles distant from the sea-coast; as very common in the vicinity of Philadelphia, lat. 40° N. (Bonaparte), but as not having its winter-quarters in the United States. It also appears in the doctor's list of species which summer or breed in the Fur Countries and in Pennsylvania, but winter farther to the southward. In the Prince's *Geographical and Comparative List*, the southern and central parts of North America are recorded as the localities of the species.

Scotornis* (Sw.).

General structure of *Caprimulgus*; but the outer toe is shorter than the inner.

Subgenera—*Scotornis*. Rictus strongly bristled. Tail lengthened, graduated, or rounded. (Sw.)

Example, *Scotornis climaturus*, *African Long-tailed Night-Jar*.

Description.—Size rather smaller than that of *Macrodipteryx*, although, from the development of its tail, it is much longer. The bristles considerably exceed the length of the bill; the third quill is longest; the first is rather shorter than the fourth, while the fifth is $\frac{8}{10}$ths of an inch shorter than the fourth. The tail is very long, measuring from the base 9 inches, of which $3\frac{1}{4}$ inches are occasioned by the two middle tail-feathers exceeding the others; the outer lateral toe is shorter than the inner. The ground colour of the plumage is light ferruginous brown varied with dark freckles. The chin and rictal stripe white; the lesser wing-coverts have at their tips a broad band of white, and the greater have a terminal spot of cream-colour, much smaller than the former. The ground colour of the five primary quills is entirely black, without any rufous, their tips only being freckled with grey; but they are crossed in the middle by a snowy-white broad band beginning in the inner web of the first and terminating on the outer web of the sixth quill: the remaining quills are varied with black and rufous and tipped with white. The tail is variegated in the usual manner, the middle pair of feathers having about 20 very slender transverse bars, but much undulated, while the outer margin of the exterior feather, and the tips of that and of the next, are pure white. No grey in the plumage. Total length, including tail, 13 inches. (Sw.)

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* In the *Classification of Birds*, Mr. Swainson prints *Scortornis*; but we apprehend *Scotornis* (Bird of Darkness) is meant; and so the word is printed in his *Birds of Western Africa*.

Locality.—Africa. Common in Senegal.

Scotornis climaturus. (Caprimulgus climaturus, Vieill.)

Macrodipteryx (Sw). Rictus strongly bristled. Wings long, equal to the tail, and with a lengthened reniform feather in each. Tail even.

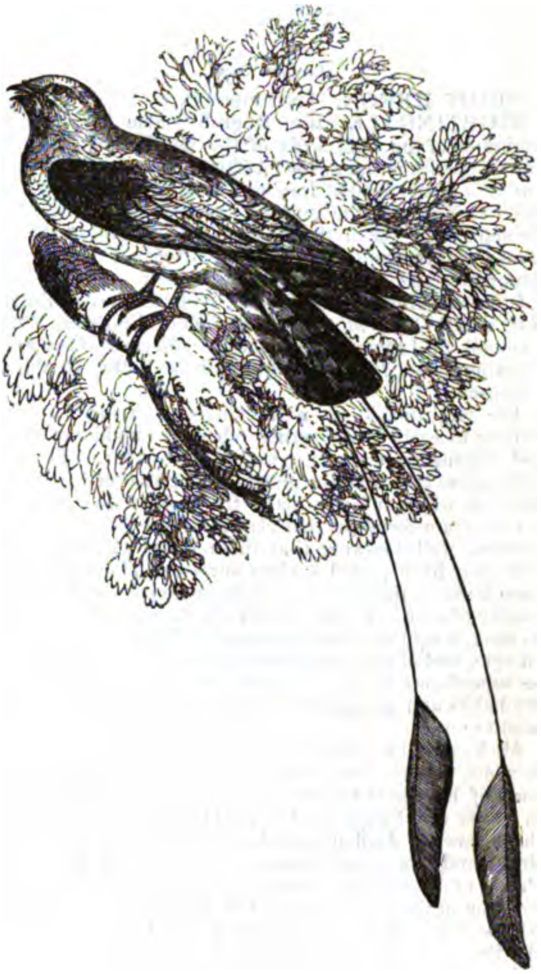
Example, *Macrodipteryx Africanus, Pennant-winged Night-Jar*, or *Long-shafted Goat-sucker*.

Description.—Wings, for the small size of the bird, very long, rather exceeding, or at least equalling, the tip of the tail, which is quite even and consists of ten feathers. Of the three first quills, which are much the longest, the first is shorter than the third, which is slightly succeeded by the second. The long-shafted feathers are inserted immediately between the primary and secondary quills. The bristles of the mouth are strong and equal to the length of the bill, which is weak. The middle toe is lengthened, and the lateral toes are equal. Colour of the plumage mixed, as in others of the family. Upon each web of each of the primary quills is a row of nine rufous and nine black spots: the rufous bars become very small towards the tips, where the black predominates. The lesser quills are black, with four rufous bands, the tips black. The middle tail-feathers are grey, speckled with black points, and crossed by six black bars, all of which are irregular, excepting the last, which, as on all the other feathers, is regular, well defined, and placed just behind the tips; the outer web of the exterior feather is fulvous white, with about ten black spots, at equal distances from each other. Some of the scapulars have a broad cream-coloured stripe, which forms a connected series when the feathers lay over each other, but those which are conspicuous on the supposed female can scarcely be discerned in the male; this latter however has a few obscure white mottles on the chin, throat, and round the ears. Total length about 8 inches.

Mr. Swainson, from whose 'Birds of Western Africa' the above description is taken, observes that the female is entirely destitute of the long-shafted or supplementary feathers. 'Now this,' says Mr. Swainson, 'is a very important fact, for it goes far to prove that they are not essential to the economy of the species; for if otherwise, both sexes would possess them, unless it be contended, a supposition highly improbable, that the male feeds in one manner and the female in another. In the absence of all information upon this point, we are led to conclude that they are more ornamental than useful, given to the male sex as attractive decorations to the female, in a similar manner as the flowing feathers of the Paradise Bird are known to distinguish the male sex. Whether or no these ornamental plumes are lost after the season of incubation is a subject for future inquiry; but they are certainly of very unequal lengths in different individuals. We have seen them in one bird only seven inches long, while in that now before us they measure in extreme length seventeen inches; the webs occupy exactly six, while all the rest of the shaft is naked, the rudimentary hairs on each side merely indicating the position of the laminæ, had they been developed. We cannot subscribe to an opinion we have heard expressed, that these latter have been rubbed or worn off. Another specimen, which we suppose is the female, is perfect in all its plumage, but has no indication, as already observed, of these feathers. In their texture they are remarkably flexible, moving about with the least breath of wind. The inner web is so broad, that the laminæ in the middle measure 2¼ inches; the outer web, on the contrary, is very narrow, and the longest laminæ are hardly half an inch.'

This is the *Caprimulgus Macrodipterus* of Afzelius, and the *Caprimulgus longipennis* of Shaw.

Locality.—Africa, Sierra Leone.



Macrodipteryx Africanus. Male.

Proïthera (Sw.). Rictus almost smooth. Wings very long, equal to the tail, which is short and even. Tarsus very naked.

Example, *Proïthera diurna* (*Caprimulgus diurnus*, Wied., *Nacunda*, Temm.).

Description: Female.—Plumage above a mixture of grey-brown, yellowish-red, and brownish-black, marked with great spots of blackish-brown, with wide borders of yellowish-red; chin pale yellow, striped with grey-brown; tail marbled with brownish-black and bright yellow, with nine or ten transverse bands speckled with brownish-black. Plumage beneath white lineated with grey-brown; middle of the belly white, spotless. Length rather more than 10 inches.

Habits.—See ante, pp. 224, 225.

Locality.—Brazil and Paraguay.

Proithera diurna.

NIGHT HERON. [NYCTICORAX.]

NIGHTINGALE, the English name for the most celebrated of the song birds of the Old World. This well known species is the *ἀηδών* (Aëdon) of the antient Greeks; *Luscinia* of the antient Italians; *Rossignuolo*, *Rusignuolo*, and *Usignuolo* of the modern Italians; *Rossignol* of the French; *Ruiseñor* of the Spanish; *Nachtigall* of the Germans; *Nachtergahl* of the 'Fauna Suecica;' *Nattergale* of Brunnich; and *Eos* of the antient British.

It is the *Luscinia* of Gesner, Aldrovandus, Willughby, Ray, and Brehm; *Motacilla Luscinia* of Linnæus; *Sylvia Luscinia* of Latham and others; *Curruca Luscinia* of Fleming; and *Philomela Luscinia* of Selby, Gould, and Swainson.

The Nightingale, or night singer, is a migratory bird visiting us early in the spring (about the middle of April), and leaving us about August or September. The male birds arrive first, and are instantly sought after by the bird-catchers, who generally make the most of the interval of ten days or a fortnight that elapses before the arrival of the females, well knowing that those males which are taken after they have paired seldom survive. The bird-fanciers have a notion that a Surrey Nightingale possesses the finest quality of tone. To dwell upon the richness and variety of its song, a subject which has employed the pens of poets of all ages, and of all countries where the bird is known, would be superfluous here; but there are points connected with the habits and geographical distribution of the bird which require notice.

M. Temminck states that the Nightingale haunts woods, thickets, and gardens; that it is common in nearly all the parts of Europe to Sweden inclusive; and that it migrates in winter into Egypt and Syria. Hasselquist saw it among the willows of Jordan and the olive-trees of Judea. Mr. Strickland saw it at Smyrna on the 5th of April. The Prince of Musignano notes it (*Specchio Comparativo*) as common in the neighbourhood of Rome, which it leaves in winter only. In his *Geographical and Comparative List*, the Prince records it as found in Europe generally.

Pennant (*Artic Zoology*) says that it visits the temperate parts of Russia, and even some parts of Siberia. The same author (*British Zoology*) remarks that the Nightingale is a species that does not spread itself over our island. 'It is not,' says Pennant, 'found in North Wales, or in any of the English counties north of it, except Yorkshire, where it is met with in great plenty about Doncaster. It has also been heard, but rarely, near Shrewsbury. It is also remarkable that this bird does not migrate so far west as Devonshire and Cornwall, counties where the seasons are so very mild, that myrtles flourish in the open air during the whole year; neither is it found in Ireland. Sibbald places Nightingales in his list of Scotch birds; but they certainly are unknown in that part of Great Britain, probably from the scarcity and the recent introduction of hedges there; yet they visit Sweden, a much more severe climate.' The editor of the last edition of the 'British Zoology' states that in 1808 a Nightingale was several times heard in the gardens of the earl of Lonsdale, in Fisher Street, Carlisle. M. Nilsson notes its arrival in Sweden by the 1st of May. Montagu informs us that it is said to be found only as far north as Yorkshire (his observations being confined to Britain), and certainly not farther west than the eastern borders of Devonshire; although they are plentiful both in Somersetshire and Dorsetshire. 'Why,' adds Montagu, 'they should not be found in all the wooded parts of Devonshire and Cornwall, which appear equally calculated for their residence, both from the mildness of the air and variety of ground, is beyond the naturalist's penetration. The bounds prescribed to all animals, and even plants, is a curious and important fact in the great works of nature. It has been observed, that the Nightingale may possibly not be found in any part but where cowslips grow plentifully; certainly with respect to Devonshire and Cornwall this coincidence is just.'

Mr. Blyth (*Analyst*, and *Note to an edition of* White's *Selborne*) enters fully into the inquiry as to the distribution of the Nightingale in Britain. Among other highly interesting observations, Mr. Blyth remarks that he thinks this bird appears to migrate almost due north and south, deviating but a very little indeed either to the right or left. He states that there are none in Brittany nor in the Channel Islands, Jersey, Guernsey, &c. Mr. Blyth is of opinion that the most westward of them probably cross the Channel at Cape La Hogue, arriving on the coast of Dorsetshire, and thence apparently proceeding northward rather than dispersing towards the west; so that they are only known as accidental stragglers beyond, at most, the third degree of west longitude—a line which cuts off the counties of Devonshire and Cornwall, together with Wales and Ireland. Mr. Gould (*Birds of Europe*), after referring to Mr. Blyth's papers in the 'Analyst,' states that the Nightingale appears to be confined to particular districts: it is, he remarks, plentiful in the southern and eastern counties, while Devonshire appears to be its limit westward, and Doncaster in Yorkshire in a northern direction, few if any authenticated instances being on record of its occurrence beyond that town, which is the more singular, as Nightingales are common in Sweden and other countries situated farther north than England. 'Our own observation,' continues Mr. Gould, 'respecting the migrations of the Nightingale is, that after leaving our island it proceeds to the opposite shores of the Continent, and gradually makes its way southwards, until it arrives in Africa, which is its ultimate resting-place during our winter months. We have ourselves received specimens killed in the northern districts of Africa, but have never obtained any from the central or southern parts of that portion of the globe; it would appear therefore that its distribution over that vast continent is comparatively limited. In no part of Europe is it more abundant than in Spain and Italy; from whence however, equally as from our own, it regularly migrates on the approach of winter.' The islands of the Greek Archipelago are among the favoured localities visited by this delightful bird. Mr. Yarrell (*History of British Birds*, now in the course of publication) says, 'When we consider that this bird extends its visits during the summer as far north as Russia and Sweden, its very limited range in this country is unaccountable. It is found in Sussex, Hampshire, Dorsetshire, and the eastern part only of Devonshire, along the line of our south coast. It has been heard about Teignmouth and Exmouth, but no farther west in that direction. In North Devon it has been heard near Barnstaple, but not in Cornwall or Wales. A gentleman of Gower, which is the peninsula beyond Swansea, procured from Norfolk and Surrey, some few years back, some scores of young Nightingales, hoping that an acquaintance with his beautiful woods and their mild climate would induce a second visit; but the law of nature was too strong for him, and not a single bird returned. Dyer, in his "Grongar Hill," makes the Nightingale a companion of his Muse in the vale of Towey or Caermarthen; but this is a poetical licence, as the bird is not heard there.'

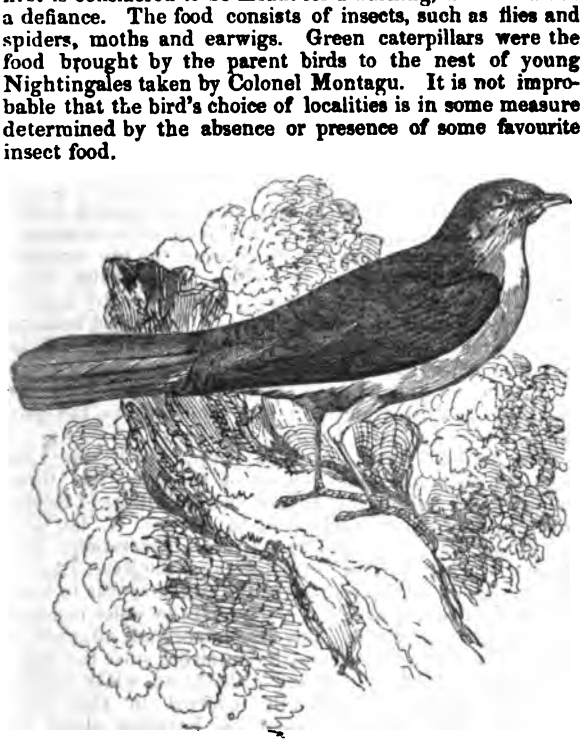
It is singular, that concurring, as all the more modern authors do, that the Nightingale is not now to be found in Wales, a Welsh name for the bird should exist; yet Pennant gives this name in his list, and it will be found at the head of this article. Pennant, be it remembered, only excludes it from North Wales.

In Ireland the Nightingale seems never to have been heard.

Mr Yarrell, who remarks that it is not included by Mr. Rylands in his 'Catalogue of the Birds of Lancashire,' though it has been heard as high up as Carlisle, but no farther, goes on to state, that on the eastern side of our island the bird frequents Essex, Suffolk, Norfolk, some of the more wooded parts of Lincolnshire, and several parts of Yorkshire; but not higher than five miles north of the city of York, as he learned from his friend and correspondent Mr. Thomas Allis. Mr. Yarrell states his belief that it has not been heard in Scotland or in the Scottish islands, which, he adds, considering that it visits Denmark, is extraordinary. He then quotes from a note to an edition of White's 'Selborne,' published in Edinburgh, the following record of an attempt to establish the Nightingale in Scotland:—'It has been generally believed that the migratory songsters, both old and young, return to their native haunts in the breeding season. . . . Impressed with this belief, Sir John Sinclair, Bart., long known for his patriotism, commissioned the late Mr. Dickson, of Covent Garden, to purchase for him as many Nightingales' eggs as he could procure at a shilling each. This was accordingly done, the eggs carefully packed in wool, and transmitted to Sir John by the mail. Sir John employed several men to find and take care of the nests of several Robins, in places where the eggs might be deposited and hatched in security. The Robins' eggs were removed, and replaced by those of the Nightingale, which were all sat upon, hatched in due time, and the young brought up by the foster parents. The songsters flew when fully fledged, and were observed for some time afterwards near the places where they were incubated. In September, the usual migratory period, they disappeared, and never returned to the place of their birth.'

Description.—Rich brown above; rump and tail with a reddish tinge; throat and middle part of belly dirty or greyish-white; lateral parts of the neck, breast, and flanks grey; bill and legs light brown. Sexes alike.

Habits; Food; Reproduction.—The Nightingale shuns observation, abiding in the thickest coverts, and in these the nest is sometimes placed on a low fork, but generally on the ground. Withered leaves, particularly those of the oak, very loosely conjoined with dried bents and rushes, and lined internally with fine root-fibres, form the structure. The eggs, of an olive-brown, are four or five in number. After the young are hatched, generally in June, the melodious song of the male ceases, and is succeeded by a low croak, varied occasionally with a snapping noise; the first is considered to be meant for a warning, and the last as a defiance. The food consists of insects, such as flies and spiders, moths and earwigs. Green caterpillars were the food brought by the parent birds to the nest of young Nightingales taken by Colonel Montagu. It is not improbable that the bird's choice of localities is in some measure determined by the absence or presence of some favourite insect food.



Luscinia Philomela (Bonaparte). The Nightingale.

There is another European Nightingale (*The Thrush Nightingale, Philomela Turdoides* of Blyth, *Luscinia major* of Brisson, *Sylvia Philomela* of Bechstein), inhabiting central Europe. The song of this species is loud, but far inferior to that of the true Nightingale. It is said to be common in Egypt.

Mr. Swainson makes the *Philomelinæ* the second subfamily of his *Sylviadæ*. [SYLVIADÆ.]

NIGRIN, oxide of titanium, containing about fourteen per cent. of iron. It resembles menaccanite in colour, lustre, and appearance of the fractured surfaces. It occurs in Ceylon and in Transylvania.

NIKA, a name given by M. Risso to a genus of *Macrurous Crustaceans*, placed by M. Milne Edwards between the genera *Caridina* and *Athanas* in the tribe of *Alpheans*, to which the latter zoologist also refers the genus *Autonomea*. [SALICOQUES.]

NIKON, a celebrated personage in the annals of Russia, and the sixth patriarch in the Russian church, was born in May, 1605, in a village near Nischnei-Novgorod, where his father was a husbandman. A natural inclination for study led him to become the pupil of a monk in the convent of St. Makarius. The taste which he there acquired for monastic life and discipline was so strong, that although he married, in compliance with the pressing instances of his family, he separated from his wife after ten years' union, and prevailed upon her to enter the convent of St. Alexis at Moscow, while he himself retired to a small island in the White Sea, not far from Solowetz, where there was a brotherhood of hermits living in detached cells. The desolation of the place and the severity of the discipline served rather to increase than to abate the ardour of the new recluse; but the zeal of the brethren led to dissensions that terminated in his expulsion, or at least his flight. Being desirous of replacing their wooden church by a stone edifice, Nikon, and Elizar, the founder and head of the community, proceeded to Moscow, where they collected contributions for the purpose; but on their return, Elizar took the money into his own keeping, and manifested no intention of applying it to the intended purpose. This led to remonstrances and altercations; and to such persecution on the part of Elizar, that Nikon pushed off from the island in a small boat; and after incurring great danger, was driven to the island Kj, at the mouth of the Onega, where he set up a wooden cross. At the same time he made a vow to erect a monastery on that spot, in fulfilment of which may now be seen the magnificent cloister of the Holy Cross. Associating himself with a community called the Koscheoser hermits, he so distinguished himself by his superior sanctity and severity of life, that on the death of their abbot, or principal, he was elected in his place, in 1645. Being compelled three years afterwards to take a journey to Moscow, to arrange some affairs of their community, he there became known to the Czar Alexis Mikailovitch, who was so struck with his eloquence and understanding, that he caused him to be appointed archimandrit of the Novospasky Convent. A new career was thus suddenly opened to him: his influence with the sovereign increased daily, and he employed it in behalf of the distressed. On being appointed metropolitan of Novgorod, in 1648, he attached the people of that city to him no less strongly: his eloquence drew crowds to hear his discourses in the cathedral, and his bounty maintained numbers during a severe famine. Besides this he appeased a violent popular insurrection at Novgorod in 1650, at very imminent peril to his own person. In the mean while he continued in high favour with the Czar, who frequently corresponded with him, and who, on the death of the patriarch Joseph, in 1652, appointed him his successor. It was about this time that he commenced his reforms in the books, as he had previously done in the liturgy, of the church; and held several councils relative to the translations of the Scriptures. But herein his zeal led to his disgrace: his reforms were regarded as dangerous innovations; and notwithstanding the Czar had shown such friendly confidence in him as to place his own family under his care during the pestilence at Moscow in 1653-4, and had attended at the consecration of the Voskresensky monastery (erected by Nikon) in 1657, the patriarch's enemies contrived to prejudice him in the good opinion of his sovereign, and in 1658 he retired to the monastery just mentioned, situated about forty versts from the capital, whence he refused to return. How this unfortunate quarrel and misunderstanding originated is not precisely known; and it will be sufficient here to remark that it increased, till at length, in 1667, a council was held at Moscow, at which the Czar himself presided, and which was attended by the patriarchs of Alexandria and Antioch, those of Constantinople and Jerusalem having excused themselves. The result was that Nikon was deposed from his dignity, and was banished to the Bieloozersky monastery, with the rank of a simple monk. There he remained until after the death of Alexis, whose successor, Pheodor Alexievitch, granted him permission to return to the Voskresensky monastery; but he died on his journey thither, at Yaroslav, August 17th, 1681, at the age of seventy-five.

Nikon compiled a collection of ancient Russian chronicles to the year 1630, which were printed by the Academy of Sciences of St. Petersburg, in eight volumes, quarto, 1767-1792. He also wrote several dogmatical and theological pieces, which were printed in his lifetime.

NILE (*Nilus*, in Latin), the name of the great river of Eastern Africa, the various branches of which have their rise in the high lands north of the equator, and, flowing through Abyssinia and other regions to the westward of it, meet in the country of Sennaar. The united stream flows northwards through Nubia and Egypt, and after a course of more than eighteen hundred miles from the farthest explored point of its principal branch, enters the Mediterranean by several mouths, which form the delta of Egypt. The word Nil seems to be an old indigenous appellation, meaning river, like that of Gir in Soudan and other countries south of the Atlas. The modern Egyptians call the river Bahr-Nil, or simply Bahr; in Nubia it is called by various names; in Sennaar the central branch, or Blue River, is called Adit; and in Abyssinia, Abawi. The three principal branches of the Nile are—1, the Bahr el Abiad, or White River, to the west, which is now ascertained to be the largest and longest: 2, the Bahr el Azrek, or Blue River, in the centre; 3, the Tacazze, or Atbara, which is the eastern branch. These three branches were known to Ptolemy, who seems to have considered the western as the true Nile, and to have called the others respectively Astapus and Astaboras. He fixed the sources of the western river in numerous lakes at the foot of the Mountains of the Moon, which he placed in 10° S. lat. Strabo (p. 821) speaks of the island of Meroe as bounded on the south by the confluence of the Astaboras, Astapus, and Astasobas. In another place (p. 786) he says that the Nile receives the Astaboras and the Astapus; which latter 'some call the Astasobas, and say that the Astapus is another river which flows from some lakes in the south, and makes pretty nearly the direct course of the Nile, and is swollen by the summer rains.' While these passages certainly prove that the antient geographers knew that there were three main streams, they also prove that their notions about them were confused. The numerous reports of the natives, who call this ridge or group of Mountains by the Arabic version of the same name, Jibalu 'l Kamari, though generally pronounced Jibali 'l Kumri, which would mean 'blue mountains,' seem to agree in placing the sources of the Abiad several degrees north of the equator, at nearly an equal distance between the eastern and western coasts of Africa. But we have no positive information either as to the true position of the sources or of the mountains. According to the report of Antonio Fernandez given by Tellez, the high land of Abyssinia extends to the south into the kingdom of Narea, the northern part of which is about 8° N. lat., and it probably extends thence to the westward through central Africa. The Bahr el Abiad was traced upwards by Linant, in 1827, as far as Aleis, a direct distance of 132 geographical miles south of Khartum, which is in 15° 34′ N. lat. and about 32° 30′ E. long., and at the confluence of the Blue and White Rivers. Since that time a party of Turco-Egyptians, headed by Ibrahim Kashef, an officer of the viceroy of Egypt, marched upwards from Khartum for thirty-five days along the banks of the river. On the twelfth day they reached the first island of the Shilluks, and after traversing the territory of that people they entered on the twenty-ninth the country of the Denka, probably the Donga of Browne, through which they continued to ascend along the banks for six days more, when they began to retrace their steps. At this point the river was shallow, full of islands, and six hours in breadth; and there were no mountains in sight. The latter part of the march appears from the description of Ibrahim to have been in a direction nearly west, and as the first island of the Shilluks, which they reached on the twelfth day, is not far from Aleis, according to Linant's statement, the extreme point attained by Ibrahim was probably about 10° N. lat. and 29° E. long. The result of this expedition agrees with Browne's report from hearsay, in giving an easterly course to that part of the river which is south of Dar-Fur, and placing its sources full to the south-westward of that kingdom. (Col. Leake's paper 'On the Quorra,' in the 2nd vol. of the *Journal of the Royal Geographical Society of London*, and Linant's *Journal of a Voyage up the Bahr el Abiad*, with some general notes on that river and illustrative maps, in the same volume.) The enormous breadth attributed to the Abiad by the Turkish party, although it may be exaggerated, leaves little doubt that the river at the extreme point of their journey was much broader than at its junction with the Blue River, and indicates that it has a peculiar character, its origin being perhaps in a lake or lakes which may be supplied by streams flowing from a distant range of mountains. The existence of lakes which have communication with the river only in time of high water is rendered highly probable by a passage in Linant's 'Journal,' which states that at the time of the inundation of the White River a prodigious quantity of fish is brought down towards Khartum by the current.

Mr. Holroyd, in his 'Notes on a Journey to Kordofan in 1836-7,' in the ninth volume of the 'Journal of the London Geographical Society,' states that Khurshid Pasha told him that he had been twenty-one days above Aleis, on the Bahr Abiad, in the boats of the country with soldiers, and had reached Denka. He mentioned that the river divided a considerable distance above Khartum, but was not prepared to say which was the direction of the White Nile properly so called. In the country of the Shilluks it seems that several rivers join the Bahr Abiad from the west, the names of which are mentioned by Linant in his Notes. One of these may be the Bahr el Adda mentioned by Browne as the last western tributary of the Bahr Abiad.

The Bahr Abiad, which at its confluence with the Blue River is only about 1800 feet wide, is described by Linant as being, just above it, in many places a mile and a half wide in the month of April, and even then far within its regular banks, which sometimes appeared four miles distant from one another, and were distinctly marked beyond these limits by a wide sandy beach without any appearance of verdure. But even this is not the full width at the greatest height, as the river then overflows the adjoining country, and the waters extend in some places above twenty miles from side to side. The shores of the river are very flat, especially on the western side, and the water is deep only towards the middle of the stream, where Linant found it to be from three to four fathoms. The rise of the Bahr Abiad is not perceptible till some time after that of the Bahr Azrek, according to Linant; but an American who accompanied Ismael Pasha to Sennaar in 1821 says that 'the Abiad commenced its rise this year about twenty days sooner than the Adit (the name of the Blue River in Sennaar), and that the difference of colour of their waters proves that they flow through very different soils. The white colour of the Abiad is occasioned by a very fine white clay with which its waters are impregnated, whilst the Adit is almost black during the season of its increase.'

At the confluence the contrast between the two streams, says Linant, is very great, the waters of the Abiad being always white, and as it were soapy, even in the dry season, when the Azrek is of a greenish hue. The Abiad remains of the same colour during the inundations, when the Bahr Azrek becomes reddish owing to the alluvium brought down by its affluent the Bahr Toumet, which comes from the highlands of Narea and falls into the Azrek in the province of Fazuolo, above Sennaar.

The Bahr el Azrek, or Blue River, which was long supposed to be the main branch of the Nile, has three sources in the high land of Gojam, near the village of Geesh, south-west of lake Dembea, in 10° 59′ 25″ N. lat. and 36° 55′ 30″ E. long., according to Bruce's observations. The Agows, who inhabit that district, worship the river. [ABYSSINIA; BRUCE.] The sources of the Azrek appear to have been visited by Father Paez, and perhaps by other missionaries, long before Bruce. The vast importance attached to that discovery has become much diminished since the information which we have acquired of the Abiad, whose sources are still unexplored, and still involved in that mystery which the antients represent as hovering about the fountains of the Nile. After a north and north-west course of about seventy miles, the Azrek, or Abawi, as the Abyssynians call it, enters the lake Dembea or Tzana on its south-western side. This fine lake is sixty-five miles in length from south-east to north-west, according to Bruce's map, and above thirty in its greatest breadth; its surface is more than twice that of the lake of Geneva. It occupies the centre of an elevated table-land, surrounded by hills and mountain ranges, from which numerous streams fall into the lake. The Blue River, issuing from the lake at its south-east extremity, runs first to the south-east, forming a large cascade at Alata; after which it flows nearly due south, and then turns to the south-west, encompassing the provinces of Gojam and Damot, and leaving Amhara Proper on its right or eastern bank. After receiving several affluents from the high lands of Shoa and Efat, it turns to the north-west, forming a curve which twice intersects the tenth degree of north latitude, being nearly the same parallel as that of the farthest explored point of the Abiad, which is six degrees of longitude farther west. The vast tract between the two rivers is yet unexplored; it is nominally dependant on Sennaar, and is inhabited by the Denka, the Shilluks, the Bokki, and other Negro tribes, who are pagans.

On the 1st of January, 1822, Ismael Pasha, son of the viceroy of Egypt, with 1500 men, started from Fazoclo, which is about 11° 20′ N. lat., on the left bank of the Blue River, and marched southwards into the interior in search of the gold-mines of Quâmâmyl. After crossing the Bahr Toumet, an affluent of the Azrek, in about 10° 50′ N. lat., they discovered on the 18th the first appearance of gold mixed with the sand in the beds or borders of rivulets. Cailliaud, who accompanied the expedition, found that the washing of the sands produced very little, only four grains of gold in a hundred weight of sand. A negro chief told Ismael that after the rainy season there were sometimes found bits of gold of the size of beans. After seventeen days passed among golden sands, Ismael became convinced of their barrenness; and on the 5th of February gave orders to proceed farther south, and in two days arrived at Singue, south-west of Quâmâmyl, and in about 10° 30′ N. lat. and 34° 30′ E. long. But the negro inhabitants of the neighbouring mountains became so troublesome and daring, that Ismael was obliged on the 11th of February to order a retreat towards Fazoclo. (Cailliaud, *Voyage à Meroë, au delà du Fazogl, &c.*, 1826-7.)

Continuing its course in a north-north-west direction, towards the low country of Sennaar, the Azrek, or Adit, as it is here called, after crossing the province of Fazoclo, a dependency of Sennaar, passes by the town of Sennaar, which is on its left bank, in about 13° 30′ N. lat. and 33° 45′ E. long. Continuing to flow nearly in the same direction, it receives on its right bank the Dandar, Rahat, and other streams which flow from the outer or western side of the highlands which enclose the basin of lake Dembea. The country on its left bank, and between it and the Abiad, constitutes the kingdom of Sennaar proper, which is also called Al Jezira, or the island [SENNAAR], and is divided by the Azrek from Halfay, a Nubian province, forming part of the country of Atbara, or island of Meroe. [NUBIA.] At Khartûm the White and Blue rivers unite, the former being the wider; and the two streams flow for several miles in a common bed without mixing their waters, like the Rhône and the Arve below their junction near Geneva. After passing Halfay the united stream of the Nile bends towards the north-east, passes by Shendy and the ruins of Meroe, and on entering the country of Berber it receives on its eastern bank the Tacazze or Atbara, the third great confluent of the Nile.

The following is a description of the appearance of the Nile in its course through Upper Nubia. 'The Nile below the point of junction of the Abiad and Azrek presents a truly magnificent spectacle. Between Halfay and Shendy the river is straightened, and traverses a deep and gloomy defile formed by high rocky hills, between which the Nile runs dark, deep, and rapidly for about twelve or fifteen miles. On emerging from this defile the river again spreads itself majestically and flows between immense plains of herbage bounded only by the horizon. About thirty miles above Nousreddin, the head village of Berber, we passed the mouth of the Bahr el Isswood (the Tacazze) on the eastern shore; it is the last river that empties itself into the Nile. I estimated it at about two-thirds of a mile at its embouchure. The Nile below the point of junction of this river is more than two miles broad from bank to bank. (*Narrative of an Expedition to Dongola and Sennaar under Ismayl Pacha*, by an American, London, 1822.)

The Tacazze, perhaps the Astaboras of the antients, rises in the high mountains of Lasta, in about 11° 40′ N. lat. and 39° 40′ E. long. Its sources were known to the Jesuit missionaries in Abyssinia, and have been visited of late years by Pearce. It flows for a considerable distance in a northern direction between the range of the Samen mountains on the west, and those of Lasta, Salowa, and Bora on the east. It receives on its right bank the Arequa from Antalo. On arriving at 13° 15′ N. lat. the Tacazze turns to the north-west, forming the boundary between the kingdom of Amhara, on its left, and Tigre on its right bank. The river has numerous rapids, which render it fordable at most seasons of the year. Salt saw in it enormous crocodiles of a greenish colour and large hippopotami. Proceeding north-west the Tacazze flows through the lowlands of Waldhuba and Walkayt, which are dependencies of Tigre; and about 14° 50′ N. lat. and 36° 40′ E. long. it receives on its left bank the Angrab, which rises on the north slope of the high land of Dembea. It afterwards receives several other streams which come from the same direction and pass through the country of Ras el Feel, which was visited by Poncet and Bruce. It then inclines more to the north; and between the parallels of 16° and 17° N. lat., in the country of the Taka, it is supposed to receive on its eastern bank the Mareb, a considerable stream which comes from Tigre, and the course of which has been traced north-west to within a short distance from the Tacazze. [BEJA, or BOJA.] The Tacazze then passes Gous Radjib, visited by Burkhardt on his journey to Suakim in 1814, and inclines again to the north-west, forming the boundary of the so-called island of Meroe and the Berber country [BARABRA]; and at last enters the Nile at 17° 45′ N. lat. and about 34° 5′ E. long. A short distance before its confluence the Tacazze receives on its right bank the Mogren from the north-east, which rises in the Langay ridge near the Red Sea, in the country of the Bishareens. At the season of the inundation the Bahr Mogren brings down from the interior a quantity of black earth, which is said to affect the colour of the Nile. (Linant's *Notes on the Bahr el Abiad.*)

The Nile, from the confluence of the Tacazze down to its entrance into the Mediterranean, a distance of 1200 geographical miles measured along the course of the river, receives no permanent streams; but in the season of rains it receives wadys, or torrents, from the mountains which lie between it and the Red Sea. After flowing through Berber in a north-north-western direction, a populous and fertile district, and full of villages, the Nile enters a barren and dreary country, where the desert sands come close to the river's edge. The rocks and stones of the desert are generally of black granite. No verdure is to be seen, except on the margin of the river. On arriving at about 19° N. lat. the Nile turns nearly direct west, and forms the large island of Mograt. This district is called El Raba Tab; and its malek, or chieftain, is said to rule over eighty-five large and fertile islands formed by the Nile, besides the adjacent banks. The Nile below Mograt turns abruptly to the south-west. This is known as the great bend of the Nile. Continuing in the same direction, it passes through the country of the Sheygia Arabs. [BARKAL.] Arriving at the village of Korti, 18° N. lat. and 31° 50′ E. long., the river turns to the west; and after a course of about thirty miles in that direction, it resumes a northern course, flowing through the province of Dongola. The breadth of the cultivable land on each bank through the Dongola country, which is above 100 miles in length, varies from one to three miles, beyond which is the desert. The left or western bank is the more fertile, the eastern bank being in many places sandy and barren. Some of the islands, such as that of Argo, are very fertile. (Waddington and Hanbury's *Travels;* Rüppel's *Travels in Nubia and Kordofan.*) North of Argo, in 19° 40′ N. lat., the Nile enters the province of Dar Mahass, in Lower Nubia, where it forms a cataract, or rapid, commonly called the third cataract by those who ascend the river. After several windings the river inclines to the north-east; and near 22° N. lat. forms the second cataract, called Wady Halfa, after which it passes the splendid temple of Ipsambul. [ABUSAMBOUL.] Continuing its north-east course, the Nile passes by Derr, Dandour, and Kalabsheh; and at about 24° N. lat. forms the last cataract between granite rocks which cross the river near Essouan, or Assouan. Along this tract of Lower Nubia the valley of the Nile is very narrow, 'the rocks of the eastern and western mountains often coming close to the river, and leaving little space for the deposit of alluvium: in other places, on the Libyan side, the sand covers the whole level space between the hills and the bank; and the character of the country between Wady Halfa and Assouan is totally different from that of Egypt. The river about Kalabsheh rises between 30 and 40 feet perpendicularly during the inundation; and after it has subsided, in February, the stream runs at a rate of two or three nautical miles an hour.' (Sir J. Gardner Wilkinson, *On the Nile and Former Levels of Egypt*, in *London Geog. Journal*, vol. 9.)

After entering the boundaries of Egypt the Nile flows through the whole length of that country, which it waters and fertilises. Egypt owes to the Nile its very existence as a productive and habitable region, and accordingly, in olden times, the people worshiped the beneficent river as their tutelary god. A full account of the Nile in its progress through Egypt, of its periodical rise, and its delta and various mouths, is given under EGYPT.

The rich alluvial deposit which the Nile spreads over the lands of Nubia and Egypt is mainly derived through the Blue River and its affluents the Toumet, Tacazze, Mareb, &c., from the high lands of Abyssinia: the White River brings no such alluvial deposit; but its stream, rising about the same time as the Blue River, assists in raising their combined waters over the lands, which they fertilise in their northward course. Owing to the yearly deposit of alluvial matter, both the bed of the Nile and the land of Egypt are gradually raised, the elevation varying in different places, and always lessening in proportion as the river approaches the sea. According to an approximate calculation, the land about the first or lowest cataract has been raised nine feet in 1700 years, at Thebes about seven feet, and at Cairo about five feet ten inches; whilst at Rosetta and the mouths of the Nile, where the perpendicular thickness of the deposit is much less than in the valley of Central and Upper Egypt, owing to the great extent east and west over which the inundation spreads, the rise of the soil has been comparatively imperceptible. (Wilkinson.) As the bed of the Nile always keeps pace with the elevation of the soil, and the proportion of water brought down by the river continues to be the same, it follows that the Nile now overflows a greater extent of land, both east and west, than in former times; and that the superficies of cultivable land in the plains of Thebes and of Central Egypt continues to increase. All fears therefore about the stoppage of the overflowing of the Nile are unfounded. In the valley of the Nile the banks are much more elevated than the land at a distance from the river, and they are seldom quite covered with water, even during the highest floods. The difference between the height of the banks and the land near the edge of the desert is often as much as 12 and 15 feet. The dykes which form a communication between the villages during the inundation commence on a level with the banks of the river, and as they extend into the interior rise to so great a height above the fields as to leave room for the construction of arches for the passage of the water. This appearance of an elevated strip of land along the banks of a river, sloping towards the interior, is common to other river valleys which are subject to periodical inundations.

NILEUS, a surgeon of the Alexandrian school, celebrated for the invention of a machine called the 'plinthium,' which was employed with success in reducing luxations of the femur. (Cels., *De Med.*, lib. viii., cap. 20; Oribas., *De Machinam*, cap. 8, p. 617.) Some of his medicines are quoted by Galen, Aëtius, Celsus, Paulus Ægineta, Cælius Aurelianus, and Oribasius. The exact time when he lived is not known; but as he is mentioned by Celsus, we may perhaps safely place him a little before the beginning of the Christian æra.

NILGHERRY MOUNTAINS. [HINDUSTAN, vol. xii., p. 207.]

NÎMES or NISMES, a town in the south of France, capital of the department of Gard, in 43° 50′ N. lat. and 4° 23′ E. long.; 358 miles from Paris in a direct line south by east, 450 miles by the road through Auxerre, Lyon, Vienne, Valence, and Pont St. Esprit, or 417 miles by the road through Nevers, Moulins, Clermont, and Mende.

Nîmes, antiently Nemausus (Νέμαυσος), is a town of great antiquity. Strabo (p. 186. Casaub.) notices it as the capital of the Celtic nation, the Volcæ Arecomici, or Aricomisci (Οὐωλκαι Αρικομισκοί), and states that though inferior to Narbonne in the number of strangers and others resorting to it for the purposes of trade, it was superior in the number of citizens; the town exercised authority over twenty-four populous villages, and enjoyed the 'Jus Latii,' by virtue of which those elected to the ædileship or quæstorship in Nemausus acquired the rights of Roman citizens. Nemausus was situated on the high road from Italy into Spain, which, though in excellent condition in summer, was in spring and winter impeded by mud or by floods caused by the mountain torrents. It was fortified with walls and gates by the emperor Augustus, about fourteen years before the Christian æra. In the downfal of the Roman empire Nîmes suffered much. It fell into the hands of the Visigoths, and was comprehended in the kingdom established by them in the south-west of France and in Spain; it was besieged by Wamba, king of the Visigoths (about A.D. 673), against whom it had rebelled, and was subsequently taken by the Saracens, from whom it was wrested by Charles Martel, at whose hands the town suffered much. In the tenth century it became the capital of an hereditary viscounty, and after some changes was united to the crown of France, in the reign of St. Louis, A.D. 1258. In the religious wars of the sixteenth century it was one of the strongholds of the Calvinists: it submitted to Louis XIII., who dismantled the fortifications. In the earlier periods of the French revolution (A.D. 1791) and on the second restoration of the Bourbons (A.D. 1815) it was the scene of serious intestine troubles, political or religious.

Of all the towns in France, Nîmes preserves the most striking memorials of its antient grandeur. It has been styled 'a second Rome.' The antient building known as La Maison Carrée (the square house), is not square, as its name would imply, but a parallelogram. It is surrounded by thirty fluted Corinthian columns, so arranged as to present eleven on each side, six in the front, and as many at the back: the columns at the angles being in this computation counted twice. The columns on the back-front and eight of those on each side are half encased in the wall of the building which fills up the intermediate spaces; the remaining three columns on each side and those of the front belong to the portico, which is of considerable depth in proportion to its width, and is open on three sides. The pillars are nearly 30 feet in height, and nearly 3 feet in diameter; but M. Millin, from whom we borrow these dimensions (*Voyage dans les Dép. du Midi de la France*), does not say whether the first of them includes the base and capital, or is that of the shaft alone. The intercolumnar spaces are less than two diameters in breadth. The total length of the building is given by M. Millin at 72 French (or 77 English) feet, including, we presume, the depth of the portico; the breadth is 36 French (or 38½ English) feet: our authorities do not state whether these are exterior or interior measurements; they are probably exterior. The cornice and frieze run all round the building, and, as well as the capitals of the columns, are regarded as models of architectural beauty: indeed the building is so enriched as to require a large and accurate drawing to do it justice. The very corona is fretted. The only entrance to the building is by a door in the front under the portico; and there were originally no windows; it is conjectured that light was obtained by openings in the roof. The Maison Carrée, like most of the temples of antiquity, was enclosed. The recent excavations, made about three years ago, render it probable that another similar building faced the temple, at some little distance from it. Séguier, a French antiquary, conjectured that it was dedicated to Caius Cæsar and Lucius Cæsar, the grandchildren of Augustus; but it has recently been shown by M. Auguste Pelet to have been erected to M. Aurelius and L. Verus. Probably there were two temples within the same enclosure, one dedicated to Aurelius, the other to Verus. In the middle ages it served as a townhall, was afterwards part of the offices of a private house, and in the time of Louis XIV. the canons of St. Austin fitted it up as a church. When visited by M. Millin, in the reign of Napoleon, it was defiled by filth and exposed to the mischievous pranks of children. The Maison Carrée is now used as a museum for objects of antiquity. The State House at Richmond, in Virginia, which stands on a commanding elevation, is a copy of the Maison Carrée. The plan and drawings were sent to Virginia by Mr. Jefferson, when he was minister of the United States at Paris.

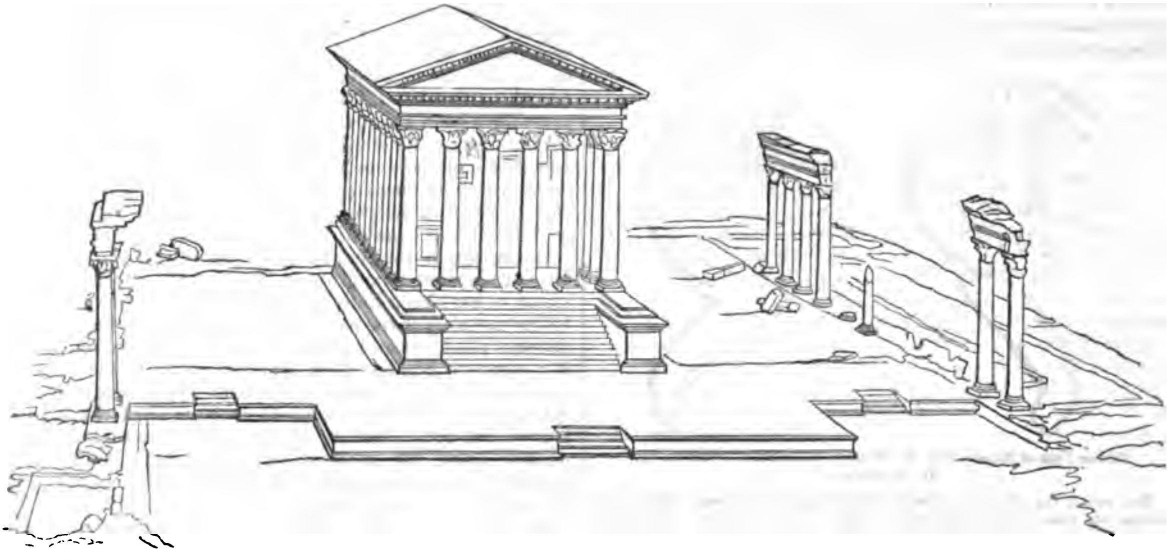
The amphitheatre, which is near La Maison Carrée, is in better preservation than the Coliseum at Rome, and of greater extent than the amphitheatre of Verona. It is a perfect oval. The greater diameter, including the thickness of the wall, is estimated at 405 French, or 434 English feet; the smaller diameter, 317 French, or 340 English feet. The exterior wall, which is nearly perfect, consists of a ground story and an upper story, each pierced with sixty arches, and is surmounted by an attic. Its height from the level of the ground is above 70 English feet. The lower or ground story is adorned with pilasters, and the upper with Tuscan or Doric columns. The attic shows the holes destined to receive the posts on which was stretched the awning that covered the amphitheatre. The rows of seats are computed to have been originally thirty-two in number. There were four principal entrances. The amphitheatre has been computed to hold 17,000 persons: it was built with great solidity without cement: the stones were quarried in the neighbourhood, and some of them are of immense size. When the Visigoths possessed Nîmes, they converted this building into a fortress, to defend the place against Clovis and his Franks. They built the square towers which yet remain near the eastern door. It was defended by the Saracens against Charles Martel, who assailed it with fire, of which it still exhibits the traces. Under the viscounts of Nîmes it was still kept as a fortress. The arena was encumbered till of late years with a parcel of wretched hovels, now removed.

There is an antient edifice which antiquaries have designated the temple of Diana; it is of moderate dimensions, and is built of large stones without cement; but the violence which has been offered to it at different times has reduced it to a mere ruin. The interior still exhibits some remains of a fine vaulted roof and of the niches and columns which once adorned it. A number of inscriptions, capitals, and other fragments of columns, or of different parts of the building, statues, and other antiquities, are confusedly heaped together in this building. The adjacent baths of Diana, and the fountain which supplied them, have disappeared or lost their antique character under the more modern works which have been added to them. The waters of the fountain are conveyed by a canal round one of the public gardens of the modern town, and the place of the baths is occupied by statues and groups in marble, of modern date and inferior execution.

Near the temple of Diana is a singular edifice called La Tour-magne, Turris Magna, 'the great tower.' It consists of a lower story of heptagonal form, 245 French, or 262 English feet in circumference; and of an upper story, an octagon, of 107 French, or 115 English feet in circumference. It is 117 French, or 125 English feet high; but the ruins which surround it much diminish its apparent height. It is built of small square stones, and each front was originally adorned by two pilasters of freestone, Tuscan or Doric. It stands on an elevation, and joined the antient walls of the town; but its origin and use are both entirely unknown.

There are two Roman gates; one is called the gate of Cæsar, and was discovered A.D. 1791, on the demolition of some antient ramparts erected in the twelfth century. This gate is built of large blocks of freestone, and has two large arches in the middle, and two smaller arches, one on each side. It bears an inscription, showing that the gates and walls were the gift of Augustus Cæsar to the colony. The inscription is IMP. CAESAR DIVI. F. AVGVSTVS . COS XII. TRIBV. POTEST. VIII.; and in smaller letters, PORTAS. MVROS. COL. DAT; from which we learn that at this date Nîmes was a Colonia: indeed, Augustus is considered as the founder of the colony. The other Roman gate is far inferior.

Besides these more important remains Nîmes has a vast number of inscriptions, monumental and other, and one or two fine mosaic pavements: in the neighbourhood there is a Roman bridge.



A bird's-eye view of the Corinthian Temple at Nîmes, called the Maison Carrée, with the remains of the Colonnade which once surrounded it.—From the beautiful model by M. Pelet of Nîmes, made during the recent excavations from the year 1822 to the year 1838. N.B. The columns and fragments have not been re-erected, but lie round the area. (Drawn by W. B. Clarke, Nov. 1838.)

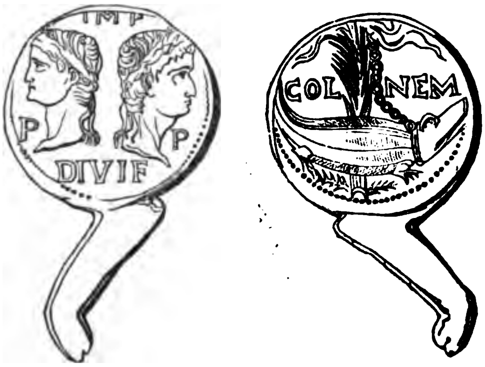
Nîmes is situated in a delightful plain at the foot of hills covered with vineyards and olive-gardens. The city, properly so called, has narrow, crooked, and ill-built streets; it is surrounded by boulevards, which occupy the site of the antient ramparts, and separate the city from its suburbs, which at least equal it in extent, and have straight, wide, and long streets, but the houses are ill built. The boulevards are receiving continual accessions of embellishment from the erection of new and handsome buildings. Of the public edifices the most remarkable are Le Palais de Justice (the court-house), the hospital, the theatre, the cathedral, the college church, and le Dépôt de Mendicité, or poor-house. Le Palais de Justice fronts the boulevard of the esplanade, and is a handsome specimen of Grecian Doric. The hospital fronts another of the boulevards, and is remarkable for the tedious uniformity of its extended front; the theatre is on the same boulevard as the hospital. The cathedral is a Gothic building, and contains some interesting monuments, among them that of Fléchier. Some of the additions to this building are remarkable for their incongruity, being of Greek architecture. The college church is a handsome building of modern date. The Dépôt de Mendicité is established in a fortress, built by Louis XIV., on the ruins of a Huguenot church.

Nîmes has long been an important manufacturing town. Before the Revolution it had a population of 50,000, but the troubles of that period, and the injury to trade which resulted from the long wars that followed, considerably affected it. In 1826 it had 40,000 inhabitants; in 1831 there were 39,639 inhabitants in the town, or 41,266 in the whole commune; in 1836 there were 43,036 in the commune. The principal manufacture is that of fancy silk goods, silk stockings and caps, and other articles, which are made in great abundance and at low price. In quality the goods are not considered equal to the fabrics of Lyon or the silk stockings of Ganges. A considerable quantity of printed cottons, shawls, Madras handkerchiefs, chintzes, and sewing and embroidering silk, is also manufactured. There are several dye-houses and tan-yards, and the town is the great market for the raw silks of the surrounding district. Brandy is distilled and vinegar manufactured. The surrounding hills produce the vine, the fig, the olive, the pomegranate, the almond, and a great number of aromatic herbs; the plains yield pasturage, corn, and vegetables. The town carries on considerable trade in these various productions; in wine, spices, drugs, essences, silks raw and wrought; also in the oleaginous seeds, medicinal plants, and those used in dyeing. The merchants have connections with most of the great towns of Europe, but especially with Amsterdam, Hamburg, Lübeck, and other places in the north. There are two fairs in the year, but they are of short duration and little importance.

Nîmes is the seat of a bishopric· the diocese comprehends the department; and the bishop is a suffragan of the archbishop of Avignon. It has a Cour Royale, the jurisdiction of which extends over the departments of Gard, Ardèche, Lozère, and Vaucluse; and there are subordinate judicial courts and several fiscal or administrative government offices. It has an Académie Universitaire, a Collége Royale or high school, an Académie Royale for the department, a cabinet of natural history, a course of instruction on chemistry as applied to the arts, a public library of 10,000 (or, according to M. Millin, 30,000) volumes, an agricultural society, a society of medicine, a commission of antiquities, and a Bible society. Elementary instruction is considerably diffused. There are several cabinets of antiquities, of which the principal is that belonging to the high school, which contains more than 8000 medals.

Nîmes has been the birth-place of several men of eminence; among them are the Greek scholar Cotelier (Cotelerius); the learned Petit and Seguier; Saurin, an eminent preacher among the Huguenots; and Rabaut de St. Etienne, one of the victims of the Revolution.

The arrondissement of Nîmes comprehends an area of 650 square miles, and contains 72 communes. It is divided into eleven cantons or districts, each under a justice of the peace. The population in 1831 was 128,461; in 1836, 131,712.



Bronze Coin of Nîmes, from the Museum of Avignon. (Drawn by W. B. Clarke.)

This coin is the celebrated 'Pied de Biche,' which is very rare. There is a similar coin which is so common that it is often found current with the copper money of France. The two heads are said to be those of Agrippa and the Emperor Augustus: that on the right hand is Augustus, and that on the left is Agrippa. The inscription is read, 'Imperator Divi Fillus Pater Patriae.' The crocodile chained to a palm tree, surmounted by a streamer, is said to commemorate the victory of Actium and the subsequent reduction of Egypt, of which the crocodile is the symbol. The words Col. Nem. (Colonia Nemausus) refer to the founding of the colony by Augustus. (Rasche, *Lexicon Rei Numariae.*)

NIMWEGEN, or **NYMEGEN**, is a strongly fortified town in the province of Guelderland, in the kingdom of the Netherlands, in 51° 51′ N. lat. and 5° 52′ E. long. It is on the left bank of the Waal, and is built partly on some hills, and partly on the level ground between the hills and the river, over which there is a flying bridge. It is not ill built, yet the streets being narrow, and the houses rising above and overlooking each other, owing to the steep ascent of the hills, the town has an irregular appearance. The inhabitants amount to 17,300. Their chief occupations are tanning, bleaching, glue-making, and especially brewing a peculiar kind of pale beer called Moll, large quantities of which are exported. They manufacture common brass snuff-boxes, and have a good commission trade. They show an old edifice, now forming part of the fortifications, which is supposed to be of Roman origin; and in the town-hall (which is a handsome building) there is a large collection of Roman antiquities. Nimwegen is supposed to be on the site of the Roman Noviomagus. Of the nine Calvinist, Lutheran, and Roman Catholic churches, some are worthy of notice. On an eminence near the river stand the ruins of an antient castle called the Falkenhof, which is said to have been built by Charlemagne, and was the residence of the kings of the Franks. Two public promenades, the Katverbosch and the Belvedere, are much frequented on account of the extensive views which they command of the course of the river and of the surrounding country.

Nimwegen, having joined in 1579 the union of the northern provinces, was besieged and taken by the Spaniards in 1585, but recovered in 1590 by prince Maurice of Nassau. In 1672 the French obtained possession of it without resistance; and in 1678 the treaty of peace was concluded here between France, Spain, and the United Provinces, by which it was restored to the Dutch. In 1702 the French made an unsuccessful attempt to surprise it. During the war of the Revolution it was taken by the French, on the 8th of September, 1794, after a severe action, in which the allies were defeated.

NINEVEH (נִינְוֵה, LXX., Νινευί, Νινευή), called by the Greeks and Romans Ninus (Νῖνος), the capital of the Assyrian empire, was situate in the plain of Aturia, on the Tigris (Strabo, xvi. 737; Herod., i. 193; ii. 150; Ptolem., vi. 1) and not on the Euphrates, as Diodorus states on the authority of Ctesias (ii. 3, 7).

The Hebrew and Greek writers concur in describing Nineveh as a very large and populous city. Jonah speaks of it as 'an exceeding great city of three days' journey' (*Jon.*, iii. 3), and states that there were more than 120,000 persons in it that knew not their right hand from their left (iv. 11). Rosenmüller and other commentators suppose this to be a proverbial expression to denote children under the age of three or five years, and accordingly estimate the entire population at two millions; but the expression in Jonah is too vague to warrant us in making such a conclusion. Strabo says that it was larger than Babylon (xvi. 737); but if any dependence is to be placed on the account of Diodorus (ii. 3), who states that it was 480 stadia in circumference, it must have been about the same size as Babylon. (Herod., i. 178.) The walls of Nineveh are described by Diodorus as 100 feet high, and so broad that three chariots might be driven on them abreast. Upon the wall stood 1500 towers, each 200 feet in height, and the whole was so strong as to be deemed impregnable. (Diod., ii. 3; *Nahum*, chap. ii.)

According to the Greek writers, Ninus was founded by a king of the same name; but in the book of *Genesis* it is only stated to have been built by the Assyrians, which appears to be the meaning of the passage in *Gen.*, x. 11. It was the residence of the Assyrian kings (2 *Kings*, xix. 36; *Isaiah*, xxxvii. 37; compare Strabo, ii., p. 84; xvi., p. 737), and is mentioned as a place of great commercial importance; whence Nahum speaks of its merchants as more than the stars of heaven (iii. 16). But as in the case of most large and wealthy cities, the greatest corruption and licentiousness prevailed, on account of which Nahum and Zephaniah (ii. 13) foretold its destruction.

On the dissolution of the great Assyrian monarchy, in the eighth century B.C., Nineveh was taken by the Medes under Arbaces, in consequence of the river demolishing part of the wall; when it is said to have been destroyed. (Diod., ii. 26-28.) [Assyria.] But it appears to have still existed as the capital of an Assyrian kingdom till B.C. 625, when it was taken by the Medes under Cyaxares. (Herod., i. 106.) The prophecy of its destruction by Zephaniah must refer to its capture by the Medes. Strabo also says that it fell into decay immediately after the dissolution of the Assyrian monarchy by the Medes (xvi., p. 737); and this account is confirmed by the fact that in the history of Alexander the Great the town is not mentioned, although in his march along the banks of the Tigris, previous to the battle of Gaugamela, he must have been very near the spot where it is supposed to have stood. Under the Roman emperors however we read of a town Ninos (Tac., *Ann.*, xii. 13), or Ninive (Ammian. Mar., xviii. 7); and Abulfaraj in the thirteenth century mentions a castle Ninivi.

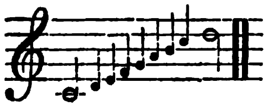
According to Abulfaraj and the general testimony of Oriental tradition, most modern writers suppose Nineveh to have been situated on the left or east bank of the Tigris, opposite Mosul [Mosul] and partly on the site of the modern village of Nunia, or Nebbi Yunus, which contains about 300 houses. (Rich.) From the account of Niebuhr, and more especially of Rich, it appears evident that there must have been formerly a large city on this spot; though it is difficult to determine whether the ruins described by these travellers are the remains of antient Nineveh or of a city built in after-ages. At first sight the ruins of Nineveh present the appearance of a range of hills; but from all these hills large stones, frequently with bitumen adhering to them, are constantly dug out in great numbers. The bridge over the Tigris is said by Rich to have been entirely built of stones dug out of the ruins of Nineveh, which, he adds, is an inexhaustible resource. On the largest of these hills or mounds there is a celebrated mosque, which is supposed to cover the tomb of Jonah. The walls and ditches which surrounded part of the city may still be traced very clearly in many parts. Rich calculated the area enclosed by these walls at from one and a half to two miles broad, and four miles long, extending a little way south of Nebbi Yunus; and he observes that on the river or west side there are only remains of one wall, as well as on the north and south extremities, but that on the east side there are remains of three walls. It is also his opinion that the part enclosed by these walls formed only 'a part of a great city, probably either the citadel or royal precincts, or perhaps both, as the practice of fortifying the residence of the sovereign is of very antient origin. In the East to this day the dwelling of the prince, and indeed of many governors, consists of a number of buildings enclosed in quite a separate quarter; and from what we are told of the Babylonian palaces, and see of that of the Siffiviyahs and of the sultan of Constantinople, this extent would not be too much to assign for the residence of the Assyrian kings.' There are very few traces of ruins outside these walls; but they may probably exist to a greater extent than has yet been supposed, since Rich relates that some people who been digging for stones in a place outside the enclosure, where it would have been impossible to have known from the appearance of the surface of the ground that there had been buildings beneath, found many huge stones laid in layers of bitumen and lime mortar.

Fragments of bricks, whole bricks, and pieces of gypsum, covered with inscriptions in the cuneiform character similar to the inscriptions at Babylon, are frequently found.

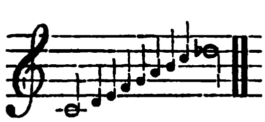
(Winer's *Biblisches Realwörterbuch;* Rosenmüller's *Handbuch der Biblischen Alterthumskunde;* Niebuhr's *Travels;* Rich's *Narrative of a Residence in Koordistan, and on the Site of antient Nineveh;* and the authorities cited in this article.)

NINTH, an interval in music, a discord retarding the 8th, but may be resolved into either the 6th or the 3rd; and though this is the octave of the 2nd, yet it is essentially different in harmony, both as to treatment and effect. [Chord; Thorough-Base.]

Of this interval there are two kinds; the major 9th, composed of six tones and two semitones—



and the minor 9th, composed of five tones and three semitones—



NINUS. [Nineveh.]

NIO, IOS, one of the Cyclades, situated five miles south by west of Naxos, and ten miles north by west of Thera or Santorini. Nio is about nine miles in length and five in its greatest breadth, which is towards the middle of the island. The surface is hilly, but not so rocky or barren as most of the smaller Cyclades. The chief produce is corn, which is of good quality, but the island is deficient in fruit and other trees. The present population, according to Thiersch, is about 2200. The town, called also Nio, is built on a hill on the western coast, above a bay in which there is good anchorage and a fine spring of water issuing out close to the shore. On the eastern coast is another good harbour, called Manganuri. The pilots of Nio are reckoned among the best in the Archipelago. Whilst under the Turks, the harbours of this island were a favourite place of resort for the pirates who infested the seas of the Levant.

Nio was called Ios by the antient Greeks, in consequence, it is said, of having been colonised by the Ionians, before which, according to Pliny (iv. 12) and Stephanus of Byzantium, it was called Phœnicia, from the palm-trees which grew on the island, but which have long since disappeared in the same manner as at Delos and other places, where the palm-tree was also found in antient times. (Spon; Tavernier.)

Strabo, Pliny, and Pausanias speak of the tomb of Homer being at Ios; and the author of the Life of Homer, attributed to Herodotus, reports the epitaph of the poet. The story is that Homer, coming from Samos to Athens, stopped at Ios, which was the native country of his mother, and was there taken ill and died; and the author of the Life above mentioned says that some of the inhabitants of the town, which was built on a mountain, used to come down every day to the sea-coast to attend on the poet during his illness. Tavernier found no antient monuments on the island, but he mentions a medal of Nio in the French king's cabinet, with the head of Jupiter on one side, and on the other that of Pallas with a palm-tree, bearing the legend ΙΗΤΩΝ.

During the middle ages Nio formed part of the duchy of Naxos, founded by the Venetians, but John Crispus, the twelfth duke, detached it from the duchy, and gave it as a separate principality to his brother Marcus, who built a castle on the summit of the hill, round which the modern town of Nio has grown. Marcus also called in many Albanian families to cultivate the soil. His only daughter Adriana Sanudo having married Louis Pisano, a Venetian noble, the dominion of the island passed into and remained with the latter family, until the island was taken by the Ottomans. (Dapper; Tavernier.) It now forms part of the kingdom of Greece.

NI'OBE, the daughter of Tantalus, king of Lydia, was married to Amphion, by whom she had, according to Ovid and other antient writers, seven sons and seven daughters. This is the most commonly received opinion, though Homer (*Il.*, xxiv. 602, &c.) and others give the numbers variously. The pride of Niobe at having this numerous progeny was so great that she is said in antient story to have insulted Latona, the mother of Apollo and Diana, by refusing to offer at the altars raised in her honour, declaring that she had a better claim to worship and sacrifices than one who was the mother of only two children. Latona, indignant at this insolence and presumption, called upon her children to revenge her, and punish the arrogance of Niobe. Apollo and Diana heard the prayer, and obeyed the entreaty of their outraged parent. All the sons of Niobe fell under the arrows of Apollo, while the daughters in like manner met their death from the hands of Diana. Chloris alone escaped the common fate. She was the wife of Neleus, king of Pylos. This terrible judgment of the gods so affected the now heart-stricken and humiliated Niobe, that she was changed by her excessive grief into stone on Mount Sipylus in Lydia. Pausanias says (i. 21, 3) that the rock on Sipylus, which went by the name of Niobe, and which he had visited, 'was merely a rock and precipice when one came close up to it, and bore no resemblance at all to a woman; but at a distance you might imagine it to be a woman weeping with downcast countenance.'

The fable of Niobe and her children has afforded a subject for art, which has been finely treated by one of the greatest antient masters of sculpture. It consists of a series, rather than a group, of figures of both sexes, in all the disorder and agony of expected or present suffering; while one, the mother, the hapless Niobe, in the most affecting attitude of supplication, and with an expression of deep grief, her eyes turned upwards, implores the justly offended gods to moderate their anger and spare her offspring, one of whom, the youngest girl, she strains fondly to her bosom. It is difficult by description to do justice to the various excellence exhibited in this admirable work. Its great merit is independent of fine execution, in which it is inferior as a whole to many other well-known productions of the Greeks. Its excellence consists in the finer qualities of sentiment, as expression, grace, propriety, and variety of action, with that unity of effect by which the scene is brought dramatically and at the same time truly before the spectator, and a story of the most affecting interest told in language that cannot be mistaken. The arrangement of the composition is supposed to have been adapted to a tympanum or pediment. The figure of Niobe, of colossal dimensions compared with the other figures, which are life size, forms, with her youngest daughter pressed to her, the centre; while the rest of the sons and daughters are ranged in various ways on each side, some exhibiting expression of fear, others agonised with pain, others in grief, while one of the sons lies dead or dying, and stretched upon the ground. All are graceful, and some of the figures possess also great beauty, and the action and expression of many of the heads offer admirable examples for study to the artist. The whole attitude and expression of Niobe herself may truly be called sublime. An eminent professor has observed of this figure, 'The character of the head, though indicative of a more matured age and less delicate than the daughters, still presents an image of the most attractive beauty; while grace, sentiment, and dignified simplicity reign throughout the figure.'

The colossal scale of the principal figure has justly been objected to as a fault. The artist doubtless had two purposes in view when he ventured on this deviation from truth. The first was the necessity which he felt of giving a superior height and volume to the apex and key, as it were, of his composition; and next perhaps the desire he had to concentrate the interest in his chief figure by forcing it thus upon the attention. But although we should hesitate before taking any exception to the practice of the great leaders and masters of art, yet, generally speaking, any departure from the truth of nature—the real canon of excellence when rightly studied—is so far from being commendable or admissible, that, where it has been indulged in by the antients with the view of gaining greater effect and energy, it may usually be considered rather as evidence of their inability to work out their idea with the authorised means, than as a practice to be admired or imitated; and it may always be argued that they would have been so much the more entitled to our admiration if they had produced their works within those limitations which nature dictates. The productions which exhibit these faults, for they must be accounted so, will be found to be worthy of the high estimation in which they are held for other properties, and rather in *spite of* than *because of* the licence which their authors have allowed themselves.

The execution of this interesting monument of Greek art is attributed by some to Scopas, a native of Paros, who lived about 300 years before the Christian æra; while others think it is the production of Praxiteles. Pliny says it was a question which of the two was the author of it. The group was in the temple of Apollo Sosianus at Rome. (Plin., *Hist. Nat.*, xxxvi.; Sillig., *Catal. Artificum*, in verb.)

Flaminio Vacca says the group of Niobe and her children was found at Rome, but *outside* the walls, near S. Giovanni; but the learned antiquary Fea denies this, and says it was found near the Villa Altieri. The well known statues of the 'Boxers' were discovered at the same place, and it has been supposed by some that they formed part of the group; the fable being that some of the children of Niobe were slain while thus exercising. (Winckelman, *Sur l'Allegorie*, pref.)

All the above statues are in marble, and are now at Florence in the gallery of the grand-duke of Tuscany; but many of them are thought to be copies only, from originals now lost. There is in England a head of Niobe, which is engraved in the 'Select Specimens of Sculpture,' published by the Society of Dilletanti (vol. i.), similar in action and expression, but preferable, for its style and execution, to that of the Florence statue; and as there are known repetitions of some of the other figures, it is not improbable that the principal and most interesting of the series may also have been frequently copied, and that the figure in the grand-ducal collection, though an antient work, may come under this class.

The subject of Niobe and her children was a favourite one also with the poets of antiquity. Besides the beautiful story in Ovid (*Metam.*, vi. 146), there are numerous epigrams in the Greek Anthology, several of which have great merit, and appear to be descriptive either of the group of figures which still exists, or of some similar group. See particularly that beginning—

Ταντaλὶ παῖ Νιόβα, κλύ' ἐμὰν φάτιν ἄγγελον ἄτας.

For further information and references as to the group of Niobe, see Thiersch, 'Ueber die Epochen der Bildenden Kunst,' &c., pp. 368, &c.

NION, or NYON. [Waadt.]

NIONS, or NYONS. [Drôme.]

NIORT, a city in the west of France, capital of the department of Deux Sévres, situated on the bank of the Sévre Niortaise, in 46° 13′ N. lat. and 29′ W. long.; 218 miles from Paris in a direct line south-west, or 260 miles by the road through Versailles, Chartres, Tours, and Poitiers.

Niort was included in Poitou, and was formerly, with the rest of that province, in the power of the English, from whom it was taken by Philippe II. Auguste, early in the thirteenth century. It subsequently fell again into their hands, and was retained by them for several years. The town is situated in a delightful and well cultivated district, and is built on the slope of two hills and on both sides of the river. It was formerly one of the most wretched looking towns of the district, but the new buildings which have taken the places of the former miserable houses have given it a much better appearance; it is now well laid out, and tolerably well built. The town-hall is a very antient building, once the palace of Eleanor of Guienne, wife of Henry II. of England; there are two churches, one of them an antient Gothic building with a fine spire raised by the English; barracks for cavalry; and an antient castle, which is now used as a prison. The town has two good places or squares, and there is a pleasant promenade near the barracks.

The population of the commune in 1826 was 15,799; in 1831, 16,175 (of which 15,832 were in the town); and in 1836, 18,197. The chief manufactures are chamois and other leather, gloves, shoes, woollen and cotton yarn, druggets and other woollens, saddles, braces, combs of horn and box wood, paper, saltpetre, and confection of angelica.

Considerable trade is carried on in Bordeaux and other wines, in cask-staves and timber for building, in corn, in flour, produced in the surrounding country and sent to the ports of Rochelle and Rochefort, and in wool and hair. There are three fairs in the year, of eight days each, at which a great number of cattle, horses, and mules are sold. Stone is quarried in the neighbourhood. The navigation of the river Sévre commences at Niort.

There are several government offices for fiscal or administrative purposes; two hospitals, a poor-house, and a maternity society; a handsome theatre; a public library of 15,000 volumes; a Royal Athenæum of sciences and arts; a high school, to which are attached a museum of natural history and a philosophical apparatus; a free drawing-school, and a departmental nursery combined with a botanic garden.

Madame d'Aubigné, better known as Madame de Maintenon, was born in the prison of this town, where her father was confined as a state prisoner. Isaac de Beausobre and Louis de Fontanes were also born at Niort.

The arrondissement of Niort comprehends an area of 556 square miles, and contains 94 communes: it is subdivided into ten cantons or districts, each under a justice of the peace. The population in 1831 was 97,222; in 1836, 10,208.

NIPHON, or NIPON. [Japan.]

NISCHNEI-NOVGOROD, that is, Lower Novgorod, or Nischegorod, a government of Great Russia, is situated between 54° and 57° N. lat. and 41° 45′ and 46° 15′ E. long. It is bounded on the north by Kostroma, on the north-east by Wiätka, on the east by Casan, on the south-east by Simbirsk, on the south by Perm, on the south-west by Tambow, and on the west by Wladimir. The area is 20,180 square miles, and it is divided into eleven circles.

Face of the Country; Soil; Climate.—The country is an undulating plain, diversified only by the high lands along the banks of the rivers and by small elevations. There are very extensive plains, uninterrupted by any irregularity of surface. There is also a considerable extent of forest, but only few swamps. The soil consists in a great measure of sand, with a mixture of good earth, and in many places it is covered with a thick layer of black mould; here and there clay is found, with portions of iron or ochre. The hills, none of which are more than from 400 to 500 feet above the level of the sea, generally consist of clay, gypsum, and limestone, and occasionally of sandstone; they are all covered with forests. The principal river is the Wolga, which enters the government from Kostroma, and flows thence to Casan in a semicircular bend. This great river, in its course through the government, receives the following rivers: the Oka, which, rising in Orel, flows through that government, and those of Tula, Kaluga, Riäsan, Moscow, and Wladimir, and, after a course of 340 miles through the most fertile parts of Russia, falls into the Wolga near Nischnei-

Novgorod; and then the Kulma, the Kirsenez, the Sura, a rapid river navigable only in the spring, the Werluga, and the Alatyr. There are few lakes, and none of them are large. The climate is milder than in Wladimir; there is not so much moisture, and spring and autumn are not so variable. The inhabitants are very long lived, and the number of births is often nearly double that of deaths.

Natural Productions.—Nischnei-Novgorod is one of the most fertile and productive provinces of the empire. The inhabitants grow rye, some buck-wheat, millet, peas, and beans, and large quantities of flax and hemp. All the vegetables of Northern Russia are cultivated in the gardens, especially cabbages, carrots, turnips, onions, cucumbers, and pumpkins, likewise abundance of hops, and some fruits, such as apples, cherries, pears, and plums; but the two last are not so good as the others. The forests are very productive; the banks of the streams and rivers are clothed with the finest timber, especially oak and lime trees. The pine, the fir, the beech, and the alder are found in all the forests. The oaks however have been very much thinned; and the great extent of the forests has led to the most extravagant waste. It was not till 1802 that regulations were made for the management of the forests belonging to the crown; but Hassel, in 1821, complains that the undefined privileges of the distilleries, the potash manufactures, and the glass and iron works, are an obstacle to anything like system. In the vicinity of the crown villages in particular, the waste is frightful, and even in the crown forests, from which the admiralty obtains the best timber for the navy, no care is taken to make new plantations. Only the Mordwins, who have inherited from their pagan forefathers a religious reverence for fine lofty trees, take some care of their forests. It does not appear that a better system has been since introduced, for Schubert, in 1836, says, 'no bounds have yet been set to the waste of timber.' The breeding of cattle, though subservient to agriculture, is very carefully attended to. The best horses of the Russian breed are found in this province, where the government and many private persons have studs. The horned cattle are handsome and of a large size. Sheep and hogs are of the common breed. Some poultry, especially geese, abound; bees also are common. The principal fish in the rivers are the bleak, the isinglass fish, and the caviare sturgeon, of which there is a sufficient supply for home consumption.

Manufacture and Trade.—Of all the governments of Russia, Moscow and Wladimir not excepted, Nischnei-Novgorod is that in which the inhabitants are the most generally engaged in manufactures of various kinds, though the province has comparatively few manufactories on an extensive scale. But most of the villages are full of artisans and little manufacturers of all descriptions, who, without belonging to a manufactory, yet make a great abundance and variety of articles. There are also in the country many who carry on some business on a large scale, though it is considered as only a secondary employment; so that weaving mats, making potashes, spinning yarn, linen weaving, and making earthenware, are common all over the country. The few large establishments manufacture woollen cloth, leather of various kinds, linen, Russia duck, cordage, soap, candles, iron, steel, and glass wares.

The exports of the province consist of corn, flour, hemp, flax, yarn, coarse linen, cordage, bass mats, leather, carved and turned wooden wares, oak timber, potashes, cooper's work, iron wire, hardware, glass, cloth, horses, and some other trifling articles, which amply suffice to counterbalance the imports, which are chiefly bar iron, salt, brandy, wine, colonial produce and manufactures.

The population of the province is now nearly a million and a half. The inhabitants consist, 1, chiefly of Russians; 2, Tschuvasches; 3, Mordwins; 4, Tscheremesses; and 5, of some Tartars. The Tschuvasches and Mordwins are probably the original inhabitants, but at present both together hardly amount to 60,000: they however retain their peculiar dialect, and in some degree their antient customs and manners; both they and the Tscheremesses are of Finnish origin. The Greek church predominates, and is under the bishop of Nischnei-Novgorod. The Mordwins and Tscheremesses are most of them baptised, as well as many of the Tschuvasches, but a great portion of the latter are still heathens. They do not worship their gods in temples, but in consecrated places in the open air, which they call Keremet or Irsan, and which are chiefly in groves and forests. They have a supreme god, whom they call Thor, and whom, as well as the inferior gods, they worship as an invisible being; they offer sacrifices to him, believe in a state of future rewards and punishments, and have their priests and conjurors, whom they call Juma and Jömme.

NISCHNEI-NOVGOROD, the capital of the government, is in 50° 20′ N. lat. and 44° 28′ 36″ E. long., at the confluence of the Oka and the Wolga. It consists of three parts. 1. The fortress, at the top of a hill, which is 5665 feet in circumference, is surrounded with a wall which has five square and two round towers, several of which are in a state of decay, and two gates. In this fortress are the two cathedrals dedicated to St. Michael and to the Transfiguration, the palaces of the governors, and some other public buildings, and an obelisk of granite 46 feet high, in honour of Minin and Poscharsky. 2. The city itself is situated on the declivity of the hill on the Wolga, which is pretty well built in the Russian fashion: the streets indeed are narrow, but there is a large open market-place and a fine quay. 3. The suburb, which twenty years ago consisted entirely of wooden houses, but has been since much improved.

This city is the residence of the military governors of Perm and Nischnei-Novgorod, of the civil governor of the latter, the see of the bishop, and the seat of the various public offices. The public buildings and institutions are, 42 churches, of which 30 are of stone, 3 convents, a seminary for schoolmasters, a gymnasium, several schools, a Bible Society, a very fine stone bazaar, and 2200 booths or stalls of wood. The population in 1836 was 24,995, but the domes and steeples of the numerous churches give it the appearance of a much more considerable town. The inhabitants carry on various manufactures of cordage, leather, coarse lace, cloth, copper and iron articles, soap, and candles, and there are many malt-kilns, breweries, and tanneries. But the great and annually increasing importance of Nischnei-Novgorod arises from its fair, of which, as it begins to be much frequented by English merchants, we shall give a rather detailed account, entirely drawn from Russian official statements.

The great annual fair of this part of Russia was established by the Czar Alexis Michailovitsch in 1648, at Makarieff, at which time its duration was limited to five days. New regulations were promulgated in 1679, 1680, 1681, and 1691, by the last of which every facility was granted to foreigners. In 1750 the fair had become so considerable, that the government built a vast bazaar of wood, containing 800 shops; but the quantity of goods brought from Europe and Asia increased every year in such a degree, that the old bazaar could not contain half of them, and in 1809 the emperor Alexander ordered a new building to be erected, which contained 1400 shops. But even this bazaar was soon insufficient, and a great portion of the goods were placed under sheds, the number of which it was necessary to increase every year, till they at length amounted to 1800, the rent of which and that of the shops in the bazaar produced annually 120,000 rubles.

The government had devoted a sum of 600,000 rubles to the erection of this building, which was scarcely completed when it was totally destroyed by a dreadful fire on the 18th August, 1816. The emperor Alexander immediately gave orders for the erection of a more solid and secure edifice: at the same time it was thought desirable to remove the fair to some other place which should afford the merchants greater facilities of communication, and for unloading and loading boats, than Makarieff. The choice happily fell on Nischnei-Novgorod, which is in the centre of that immense system of inland navigation which covers Russia as with a net, and affords a communication from this point with the two capitals, with the White Sea, the Gulf of Finland, and the Caspian. A kind of peninsula opposite the city, on the left bank of the Oka, formed by that river on the south, the Wolga on the east, and lake Mestcherskoe, which has a communication with the Wolga a little farther to the north, was chosen for the site of the new bazaar. It was necessary first of all to raise the ground, which was inundated every spring by the Wolga: to procure earth for this purpose, and likewise to facilitate the movement of the boats, a broad canal, in the form of a horse-shoe, was dug, the two extremities of which join the Oka, while on the other side it communicates by means of lake Mestcherskoe with the Wolga.

On the plateau enclosed by this canal there is now a whole town of stone magazines, built in the form of a large oblong parallelogram, surrounded with shops, before an edifice adorned with three rows of columns, which is the hotel of the governor, in which the local authorities reside during the fair. Forty-eight blocks of buildings, separated by streets which intersect each other at right angles, extend behind this parallelogram. The number of the shops is about 2524, and over each there is a small apartment, in which the merchant may reside. All these buildings are roofed with iron, and the coverings of the open galleries which run along all the façades are likewise of iron, and supported by eight thousand elegant cast-iron pillars. A very broad street, passing through the centre of this commercial town, terminates in a church built in a noble and rich style. A little before the church, in two transverse ranges on the right and left, are the Chinese shops, the fantastic architecture of which, their turned-up roofs, surmounted with flags and long streamers which are moved by every breath of air, give a variety to the appearance of these immense edifices. On the same line, beyond the canal, there is on the west an Armenian church, and on the east a mosque. The remainder of the peninsula beyond the canal round the above-mentioned mosque is occupied by a great number of wooden booths, in which are deposited goods less liable to spoil, such as iron, leather, cordage, &c. There too are the theatre and the numerous tents of the Tartar *restaurateurs*. An island in the Oka, between the town and the fair, is covered with similar booths.

All this vast, regular, and handsome town of warehouses, the erection of which cost eleven millions of rubles, presents for ten months in the year the silence of a desert; but scarcely is the flag announcing the commencement of the fair hoisted on the 29th of June, when all the streets and warehouses are filled with a countless multitude who have flocked hither from the two Russian capitals, from all our manufacturing towns, from the shores of the Baltic and the Caspian, from Bokhara, Khiva, Kokand, and Taschkend, from Asia Minor, from the mountains of Turkistan and the frontiers of China, and, of late years, from different parts of Western Europe. All these magazines and booths are filled with the produce of the most diverse countries, and thousands of boats are employed in landing the goods, or in taking them on board to convey them to the seas which wash the northern and southern shores of the empire. Other goods, such as wooden wares, are piled up even in the open country, and farther on are long lines of carts with their horses, which serve both as magazines, and lodgings for the country-people.

The following table shows the gradual increase of the business done at the fair from 1830 to 1837 inclusive:—

Years.	Value of Goods for sale. Rubles.	Value of Goods sold. Rubles.	No. of Warehouses and Booths let.	Total of Rents. Rubles.
1830	106,107,990	91,281,946	3711½	422,876
1831	129,407,700	98,229,925	3525	401,060
1832	138,207,618	116,158,508	3643	408,807
1833	146,135,681	117,210,676	3893¼	429,528
1834	140,474,355	107,693,395	3868¼	421,308
1835	142,591,640	116,965,740	3961¼	428,402
1836	148,955,595	126,514,046	4149	441,877
1837	146,638,181	125,567,881	4141¼	450,981

Though the crisis which was felt in all the commercial cities of Europe had some effect on the fair in 1837, the result was nearly equal to that of 1836, and with respect to Russian manufactures of cotton, silk, and wool brought to the fair, the quantity was greater than ever. The value of Russian manufacturers exposed to sale and sold was as follows:—

	Exposed to Sale. Rubles.	Sold. Rubles.
Cotton manufacture	27,742,570	22,234,570
Woollen do. .	11,008,600	8,921,600
Hemp and flax do. .	4,906,250	3,981,250
Silks . .	9,316,200	6,744,200
Furs . .	7,496,080	6,021,080
Leather and leather manufactures .	2,224,360	1,688,360
Produce of the mines and founderies, iron, copper, and metal goods	21,127,700	18,645,700
Porcelain, earthenware, mirrors, and glass	1,230,600	985,600
Dried fish, caviare, train oil, and isinglass .	2,756,952	2,471,952
Corn and flour .	3,428,965	2,776,965
Russian wines Brandy, mead, &c.	1,903,389	1,629,389
Refined sugars from St. Petersburg and Archangel . .	3,532,500	10,095,912
Miscellaneous goods,—such as potashes, soap, tobacco, paper, feathers, hogs' bristles, horses' tails, &c. .	7,420,412	
Total of Russian goods	104,094,578	86,185,778

Articles imported from Western Europe in 1837:—

	Exposed to Sale. lbs. English.	Rubles.	Sold. Rubles.
Coffee .	273,600	554,625	8,957,927
Indigo .	263,600	2,278,500	
Cochineal .	..	819,000	
Other drugs & foreign wines	..	7,070,802	
Woollen manufactures .	..	1,387,500	1,098,500
Cotton manufactures .	..	2,433,400	1,981,700
Silks .	..	2,106,700	1,491,400
Manufactures of hemp & flax	..	240,400	199,900
Total foreign merchandise		16,890,927	13,729,427

	Rubles.
Of Asiatic produce the most important article is tea, imported from China by way of Kiachta: 37,000 chests (5700 more than in 1836) of different qualities offered for sale this year were valued at	17,399,500
To which must be added 5000 chests of tea pressed into tablets . .	560,000
Other Chinese goods, such as silks, cottons, &c., the value of which decreases every year, while the exportation of Russian manufacture to China increases in the same proportion .	32,500
Merchandise of Bokhara: — cotton, 200,000 lbs., spun cotton, 1,440,000 lbs., cotton manufacture, called bakhta, 115,000 pieces, furs, &c. . .	4,884,800
Goods brought by the Armenians, Persians, Georgians, &c., viz. raw silk, 40,680 lbs., cottons, furs . .	2,786,376
Total of Asiatic goods offered for sale, and all sold	25,652,676
Total value of all the goods exposed for sale	146,638,181
Total value of goods sold . .	125,567,881

Besides horses and cattle sold during the fair, about 700,000 rubles.

The fair of 1838 was still more advantageous, especially with respect to the sale of several descriptions of Russian goods.

	Exposed for Sale. Rubles.	Value of Goods sold. Rubles.
Russian goods . .	115,682,500	92,600,530
Western Europe and Colonial	17,310,000	13,434,950
Asiatic . . .	23,200,000	23,200,000
Total . .	156,192,500	129,235,480

To the above must be added the receipts of the innkeepers and restaurateurs, both Russian and Tartar, 750,000 rubles; the theatre, 50,000; public baths, 25,000; horses and cattle sold during the fair, 870,000; and many other articles of less importance. The number of shops and booths let was 4533¼, and the rent 471,178 rubles.

The number of strangers attending this fair is estimated at no less than 300,000. (Extracted from the following Russian journals:—*Journal of the Department of the Interior; Journal of Manufactures; Commercial Gazette.*)

The other principal towns in this government are—Arsamas, 8500 inhabitants, with manufactures of silk, leather, silver, iron, and soap, and considerable trade in linen, sailcloth, and shoes; Podschinski, 5500 inhabitants, with an imperial stud; Pawleno-Selo on the Oka, 6600 inhabitants; Liskowa on the Wolga, 4300 inhabitants; Muraschkina, 7000 inhabitants; and several other thriving towns.

(Hassel, *Handbuch*, vol. xi.; Stein's *Handbuch*, by Hörschelmann, vol. i.; Cannabich's *Lehrbuch*, Schubert, *Handbuch*.)

NISHAPOUR. [Persia.]

NISI PRIUS. This phrase in English law is derived from an antient writ continued in practice to the present day, in which the words occur. Previously to the time of Edward I., trials by assizes or juries could only take place in the curia regis wherever the king happened to be resident, or before the justices in eyre on their septennial circuits through the several counties of England. But by the stat. 13 Edw. I., cap. 30 (forming a part of that series of laws commonly called the Statute of Westminster 2), the judges were directed to take certain assizes, and also to try certain inquests, by juries in every county not oftener than three times in every year; but the statute required that the day and place in the county in which an issue was to be tried by the judges should be mentioned in the judicial writ which assembled the jury. Instead therefore of the old form of the Venire facias, or writ for summoning the jury, which commanded the sheriff to bring them to Westminster to try the particular cause in which issue had been joined, the writ contained a clause of Nisi Prius, thus:—'We command you that you cause to come before our justices at Westminster on the morrow of All Souls, twelve lawful men, who, &c., *unless before* (nisi prius) that day, A.B. and C.D., our justices assigned for that purpose, shall come to your county to take the assizes there.' It is always so arranged therefore that the day for the return of the jury at Westminster shall be more distant than the day for taking the assizes in the county according to the statute; and consequently the reservation or exception in the writ invariably takes effect by the justices of assize coming into the county and trying the cause before the sheriff can obey the writ by returning the jury to Westminster. [Assize.] From this clause in the writ prescribed by the Statute of Westminster 2, the phrase Nisi Prius came to be adopted as a general term descriptive of the large class of judicial business which is transacted before judges of the superior courts at the several assizes throughout the country. Thus the judges of assize are called judges of Nisi Prius; when sitting alone to try causes, they are said to be sitting at Nisi Prius; and the law relating to the various matters which arise before them is, somewhat indefinitely, called the Law of Nisi Prius. It is commonly but erroneously stated in our text-books that the judges on their circuits act under a commission of Nisi Prius. This is a common error, derived however from high authority, as it is so stated by Bacon in his 'Essay on the use of the Law;' but in truth there is no such commission known to our law, the authority of the justices of Nisi Prius being incidentally annexed to the commissions of assize in the manner above stated. In Middlesex the judges are empowered to sit at Nisi Prius by the statute 18 Eliz., c. 12; and the practice is regulated by several subsequent statutes. In London they sit at Nisi Prius by virtue of immemorial usage, probably continued with occasional variations from very early times, when the king or his chief justiciary distributed justice in the immediate neighbourhood of the royal residence.

NI'SIBIS. [Mesopotamia.]

NISMES. [Nîmes.]

NITH, NITHSDALE. [Dumfriesshire.]

NITHARD, born A.D. 790, was son of Angilbertus, and of Bertha, daughter of Charlemagne. He lived at the court of Charles the Bald, grandson of that prince, fought in his service, and died of wounds received in it, about 759. Nithard wrote in Latin a history of the wars between Charles the Bald and his brothers, which is inserted in Duchesne's collection 'Historiæ Francorum Scriptores.' In his history Nithard gives the text of the treaty between Charles the Bald and his brother Louis the Germanic, which was sworn to by them at Strasburg, and is dated on the 16th kalends of March, A.D. 842. This treaty was written both in the Latin and Romance languages, and is the oldest existing monument of the latter. It has been often quoted as an interesting document for the history of the modern languages which were formed in Western and Southern Europe after the fall of the Roman empire: the Romance text begins thus:—'Pro Deo amur, et pro Christian poplo et nostro commun salvament, disi di avant, in quant Deus savir et podir me dunat, si salvarai, io eist meon fradre Karlo, &c.

NITRATES. [Nitric Acid.]

NITRE (Saltpetre). [Potassium.]

NITRIC ACID, a substance of great importance and utility in scientific chemistry and in most chemical arts. It was formerly called spirit of nitre, or Glauber's spirit of nitre; and when much diluted with water, it is called aquafortis. This acid exists largely in nature, and principally in combination with potash and with soda, forming nitrate of potash, or nitre, which exists in the East Indies, and nitrate of soda, which is found in South America: from these countries immense quantities of these salts are imported for numerous uses.

Nitric acid is composed of oxygen and azote, in proportions presently to be stated; but it is here to be observed that it never is met with except in combination with a base, nor can it be artificially obtained except in combination with water or a base constituting a salt called a *nitrate*. Dr. Priestley first showed that when the electric spark was passed through confined portions of atmospheric air, an acid was generated, and that it was the nitric acid which was so produced was proved by Mr. Cavendish.

The method by which nitric acid is obtained is that of heating, either in an iron, earthern, or glass retort, a mixture of sulphuric acid and nitre, or nitrate of potash; owing to the greater affinity existing between the sulphuric acid and potash than between the nitric acid and potash, sulphate of potash is formed, which remains in the retort, while the nitric acid separated from the potash is vaporised, and condensed in the receiver with the water of the sulphuric acid.

For manufacturing purposes, in which extreme purity is not so important, iron stills are generally used, and about an equivalent of acid and nitre are employed, with some water. But when pure acid is required, glass retorts are used, and two equivalents of acid are used to one equivalent of nitre; by this operation bisulphate of potash is obtained, which remains in the retort, whilst sesqui-hydrated nitric acid, which is the strongest procurable, is condensed in the receiver.

The properties of nitric acid are, that when pure it is a colourless liquid, but is usually yellowish, owing to a small unimportant admixture of nitrous acid, which does not anywise affect the use of it, and may be expelled by heat. Its smell is very strong and disagreeable, and it emits white fumes. It is so acrid that it cannot be safely tasted without being much diluted, and is even then very sour. In its concentrated state it stains the skin of a yellow colour, and eventually it is destroyed and peels off.

It acts strongly upon most metals; few of them however are dissolved or acted upon by it, unless it is diluted with water, and then in general nitric oxide gas is evolved, which, on coming into the air, absorbs oxygen and becomes nitrous acid vapour; hence the red colour observed when metals are dissolved in this acid.

The density of the strongest acid is 1·5; when mixed with water it gives out considerable heat; it acts strongly on vegetable blue colours, and decomposes alkaline and metallic carbonates with effervescence if previously diluted. When colourless nitric acid is exposed to the action of the light, it undergoes partial decomposition; and owing to the formation of nitrous acid, it is rendered either pale or deep orange, according to the length of time it is exposed to the sun's rays.

Nitric acid, as it exists in nitrate of potash and other anhydrous nitrates, is composed of—

Five equivalents of oxygen .	40
One equivalent of azote .	14
Equivalent .	54

But no gaseous nor any liquid or solid compound of these proportions of these elements is obtainable; and the strongest liquid acid which has hitherto been procured, and which has a specific gravity of about 1·5, consists of—

One and a half equivalent of water .	13·5
One equivalent of nitric acid . .	54·
Equivalent .	67·5

It has already been observed that nitric acid is used for numerous purposes; such as the refining of gold and silver, in preparing various metallic and saline solutions for medicinal purposes, and the use of the dyer and calico-printer in scientific chemical researches it is most extensively employed; its saline compounds are termed nitrates. For an account of these we refer to the particular alkalis, earths, and metallic oxides, under their several heads.

NITRIC ACID,—*Medical Properties of.* This acid in a concentrated form acts as a violent corrosive poison, and is therefore never used in an undiluted state for internal administration, but it is sometimes applied externally, when the object is to effect the speedy destruction of any part. Nitric acid however, from its frequent employment in the arts, is often the cause of accidental, rarely of intentional, poisoning, and it surpasses all the other mineral acids in the rapidity of its action, and in the consequent necessity for prompt and judicious treatment. It may be determined to have been the poisoning agent by its causing the parts which it has touched to be at first white, but soon after of a yellowish colour, which cannot be removed, like the stain of iodine, by adding caustic potass, but on the contrary becomes orange on the addition of an alkali or soap. (Pereira.) When it has been taken internally, the lining membrane of the mouth also peels off in a state resembling parchment. The most appropriate antidotes are such substances as combine with and neutralize the acid: chalk or magnesia, made into a paste with water—or, if these are not at hand, the plaster of the apartment, bruised down and drank—will answer best. 'While these are preparing, the acid should be diluted by the free use of any mild fluid, milk or oleaginous matter being preferred. The carbonates of the alkalis are by no means eligible antidotes, as the resulting compounds themselves possess corrosive properties.' (Christison.) A solution of soap may be administered, though some object to it from the presence of the alkali in it, but apparently without sufficient ground. If recovery should take place, the individual long suffers from indigestion, and is almost always constipated.

In an undiluted form, nitric acid is a most valuable application to sloughing phagedenic ulcers; also for destroying warts, or causing vesication over the stomach in Asiatic cholera, or for dropping into a carious tooth to relieve toothache. For all other purposes it is very largely diluted.

In its action on the system it differs from other acids, inasmuch as it does not produce the cooling and thirst-allaying effect which they do, but on the contrary causes a feeling of warmth in the stomach, with thirst and increase of appetite. The use of it continued for some time gives rise to general effects; an excitement is felt through the whole system; the pulse becomes quick, the exhalation great; and an increased secretion from the salivary glands, mucous membranes, the liver, and kidneys is manifest. Perseverance in the use of this agent however at last produces many bad consequences; and in persons much disposed to bleeding from the lungs, it almost invariably causes such bleeding to occur, as well as heat in the chest and obstinate cough. Very largely diluted, it furnishes one of the best drinks in fevers accompanied with great prostration of strength.

It is also a very excellent tonic in many cases, and seems to form the best substitute for the bile where that secretion is scanty. That it greatly augments the secretion of bile, the nature of the evacuations abundantly proves. Hence it differs from almost all other tonics in not causing constipation, but rather the contrary. In calculous diseases of the phosphatic diathesis it has been used with great benefit; and also, very largely diluted, it has been injected into the bladder as a direct solvent. [LITHONTHRYPTICS.] In the treatment of scrofula it is a most valuable remedy, but its use must be every now and then suspended, owing to the effects which it produces on the stomach.

It has been regarded as a substitute for mercury in some cases, especially as it promotes the secretion of saliva. It ought never to be given at the same time as mercury, nor even soon after a dose of any mercurial preparation, since a poisonous nitrate of mercury may be formed in the stomach. Lastly, nitric acid increases the efficacy of many other medicines, such as ammoniacum, cusparia, and opium.

Nitric acid in the form of vapour was formerly employed as a disinfecting agent, but it is now almost disused. The vapour must be carefully avoided, as the inhalation is very deleterious.

Nitric acid in combination with hydrochloric acid, added to a large quantity of water, has been used as a bath in chronic diseases of the liver, particularly in India, but it does not seem entitled to much credit.

NITRIC OXIDE, the *nitrous air* of Priestley, since also termed *deutoxide of azote, deutoxide* or *binoxide of nitrogen*, &c. Although this gaseous body had been obtained by Hales, yet it is to Dr. Priestley that we owe the first distinct account of the method of procuring it and a description of its properties.

It has been already mentioned that when certain metals are put into dilute nitric acid, they are dissolved. During their solution, owing to the partial decomposition of a portion of the nitric acid and the absorption of its oxygen by the metal, a gaseous body is plentifully formed and evolved, which has the following properties:—it is gaseous, or permanently elastic, not having been hitherto condensed into a liquid by any degree of cold or pressure to which it has been subjected. It is colourless, and probably tasteless and inodorous; but when an attempt is made to inhale it, it excites violent spasm of the glottis by meeting and combining with the oxygen of the air, which converts it into nitrous acid gas, a very different compound. Its specific gravity is about 1·040; 100 cubic inches weighing rather more than 32 grains. Water at 60° dissolves about 11 per cent. It has no action on litmus paper, nor does it in any way exhibit the properties of an acid; but as already noticed, nitrous acid is formed as soon as it comes into contact with oxygen, and then it reddens litmus paper; this property distinguishes it from all other gases whatever, and renders it a test of the presence of uncombined oxygen: this is the gas first employed by Dr. Priestley in his admirable eudiometrical researches. It supports combustion in some cases; thus charcoal and phosphorus immersed into it when they are in vivid combustion, burn splendidly in it, but a candle and burning sulphur are extinguished. It is probably decomposed when passed through red-hot tubes; and the same effect is produced by a succession of electric sparks. It is also decomposed when exposed to zinc or iron, which take away half the oxygen and convert it into *nitrous oxide.* It is soluble in a solution of protosulphate of iron; the solution has a deep green or brownish colour, and has been used in eudiometry to ascertain the proportion of oxygen in gaseous mixtures; but it is questionable whether it can be advantageously so employed.

It is composed of—

Two equivalents of oxygen	.	16
One equivalent of azote	.	14
		—
Equivalent	.	30

or, by volume, of—

Fifty cubic inches of oxygen gas = 17·20 grains
Fiftycubic inches of azotic gas = 15·05 „

32·25 grains.

As then 100 cubic inches weigh 32·25 grains, its specific gravity must be 1·040.

NITRITE. [NITROUS ACID.]

NITROBENZIDE. When benzin is added in small quantities at a time to concentrated hot nitric acid, action takes place, and the resulting compound remains dissolved while the liquid retains its heat, but on cooling a portion of it separates and floats on its surface; this substance, when removed, distilled, and washed with water, is nitrobenzide, and possesses the following properties:—

It is liquid, has a light yellow colour, a very sweet taste, and a peculiar odour, intermediate between that of oil of cinnamon and of bitter almonds. Its specific gravity is about 1·209; it boils at 415°, and condenses without having suffered any alteration; it becomes solid and assumes the form of acicular crystals at about 38°. When heated in concentrated sulphuric acid, both are decomposed, and sulphurous acid is evolved. In a liquid state neither chlorine nor bromine has any action upon it; but when chlorine is passed with it through a red-hot tube, hydrochloric acid is formed. When heated with potassium, it detonates; but potash in solution has little action upon it. Ammonia does not produce any change in it. The specific gravity of its vapour was found by Mitscherlich, who discovered this compound, to be from 4·40 to 4·35; and, according to him, it is composed of—

Hydrogen	. .	4·06
Carbon	. . .	58·54
Oxygen	. .	26·02
Azote	. . .	11·38
		100·

NITROGEN. [AZOTE.]

NITROHEMATIC ACID. This acid was discovered by Wohler. Its name is derived from *hæma* (*αιμα*), *blood*, in allusion to the colour of its salts. It is prepared by mixing carbazotic or nitropicric acid with protosulphate of iron and digesting the mixture with hydrate of barytes and water. The protoxide of iron, separated, becomes peroxide at the expense of the nitropicric acid, and a new acid is formed, which is the nitrohematic acid; it is separated by a tedious process from the barytes with which it combines as it is formed, and then has the following properties:—

It has the form of small brown crystalline grains, and scarcely any taste; when exposed to a moderate heat, it begins to liquefy and afterwards detonates without the evolution of light, but with the formation of cyanide of ammonia and the deposition of carbon, which burns without leaving any residue. It is but slightly soluble in water, and the solution is yellow; it dissolves in nitric acid.

With bases it forms peculiar salts, the solutions of which are of a deep blood red colour; but when dry, they are of a deep brown with a tint of green and a semimetallic lustre; the alkaline and earthy salts of this acid have a bitter taste, and when heated they detonate like gunpowder. The nitrohematate of ammonia has rather a crystalline appearance, and when heated it detonates with the evolution of light, and the formation of much cyanide of ammonia. This acid does not appear to have been analyzed.

NITROLEUCIC ACID, a compound prepared by Braconnot, by heating leucin [Leucin] with nitric acid. To obtain it, the leucin is to be dissolved in nitric acid with the aid of a gentle heat: slight effervescence occurs during the operation, but without the formation of red vapour. By evaporation the liquid becomes a mass of white slender crystals, which are to be pressed between pieces of filtering paper in order to get rid of the excess of nitric acid, and they are then purified by solution in water and recrystallization.

This acid has a sour taste, but not strongly so. With bases it forms peculiar salts, of which only two have been described, namely the nitroleucate of lime and of magnesia; these are both crystallizable, and, unlike the nitrates of these bases, they do not deliquesce when exposed to the air, and they detonate when heated. Nitroleucic acid has not been analyzed.

NITROMURIATIC ACID. [Chlorine.]

NITRONAPHTHALASE, a substance formed by M. Laurent in 1835. It may be prepared by boiling naphthalin in nitric acid; this suffers decomposition, and an oily substance collects on the surface of the liquid, which afterwards becomes solid and crystalline; from this the nitronaphthalase is separated by solution in boiling alcohol and crystallization; it has the form of a square prism terminated by acute pyramids; its colour is sulphur yellow; it melts at about 110°. It may be sublimed without decomposition, and the vapour, on condensing, crystallizes. It is neutral, and insoluble in water, but alcohol and æther readily dissolve it. By chlorine it is decomposed, and chloronaphthalase is formed; bromine has a similar action, but it is not affected by iodine. Hydrochloric acid has no effect upon it; in sulphuric acid it dissolves, and is precipitated from it by water unchanged; nitric acid converts it into nitronaphthalase. A solution of potash in water, even when boiling, produces little effect upon it, but it becomes red in an alcoholic solution of potash, which concentrated sulphuric acid changes to green or bluish green.

According to M. Laurent, nitronaphthalase consists of

Seven equivalents of hydrogen . .	7
Twenty equivalents of carbon . .	120
Four equivalents of oxygen . .	32
One equivalent of azote . . .	14
Equivalent . . .	173

It appears that during the action of the nitric acid on the naphthalin the acid loses one equivalent of oxygen and the naphthalin one equivalent of hydrogen, which form water, and the remaining elements of these compounds constitute nitronaphthalase.

NITRONAPHTHALESE was, like the preceding, described by M. Laurent. It is prepared by boiling nitronaphthalase for a long time in nitric acid; it has the form of minute acicular crystals. It is insoluble in water, slightly soluble in æther, but readily so in alcohol; it becomes liquid at 365°. Hydrochloric or nitric acid has no effect upon it, but hot concentrated sulphuric acid dissolves it, and on cooling the nitronaphthalese crystallizes, and the solution is also decomposed by water. It is but slightly acted upon by a solution of potash even when heated; a little ammonia is however evolved.

By analysis it yielded

Six equivalents of hydrogen . .	6
Twenty equivalents of carbon . .	120
Eight equivalents of oxygen . .	64
Two equivalents of azote . . .	28
Equivalent . . .	218

In the formation of nitronaphthalese by the action of nitric acid upon nitronaphthalase, it appears that the oxygen of the nitric acid removes an equivalent of hydrogen from it, and yields it one equivalent of azote.

NITROPICRIC ACID. [Carbazotic Acid.]

NITROSACCHARIC ACID. When glue is treated with sulphuric acid, a peculiar saccharine matter is formed, which is called sugar of gelatin; and when this is heated with nitric acid, no effervescence occurs, but combination is effected between the acid and the sugar, and the compound crystallizes on cooling. When the excess of nitric acid has been separated by draining, and the nitrosaccharic acid purified by solution in and crystallization from water, it has the following properties:—it has the form of rather flat prisms, which are colourless, transparent, and striated. It has a sour taste, and a sweetish one also. It is very soluble in water, but insoluble in alcohol, even when boiling. When it is heated it swells, decomposes, and yields a penetrating vapour. It forms peculiar salts, which detonate vividly when they are heated. Nitrosaccharate of potash, whether the acid is in excess or otherwise, crystallizes in needles, which are totally different from those of nitrate of potash, though its taste is somewhat similar, but accompanied with a little sweetness. Nitrosaccharate of lime yields fine acicular crystals, which do not absorb moisture from the air, are slightly soluble in alcohol, fuse when heated in their water of crystallization, and afterwards detonate. Nitrosaccharate of magnesia is deliquescent. Zinc and iron dissolve in this acid with the evolution of hydrogen gas, and deliquescent salts are formed. Nitrosaccharate of copper crystallizes and does not alter by exposure to the air; with oxide of lead a salt is formed, which dries into a mass resembling gum; it does not become moist in the air, and decomposes with explosion when heated. Nitrosaccharic acid has not been analyzed.

NITROSULPHURIC ACID. This name has been applied to a mixture of nitric and sulphuric acid first proposed by Mr. Keir as a solvent for silver. He found that when one part of nitre was added to about ten parts of sulphuric acid, a mixture was formed which dissolves silver at a temperature below 200°, while it scarcely acts upon copper, lead, or iron, until diluted with water; and the solution of silver which is formed may be moderately diluted before any sulphate of silver separates. On account of these properties this mixed acid has been found useful in separating silver from old plated articles; the silver may be precipitated from solution either in the state of chloride by the addition of common salt, or, after the silver has been dissolved, the copper from which the silver has been separated will precipitate it in the metallic state, when water is added to the solution.

In 1835 M. Pelouze discovered an acid compound of sulphur, oxygen, and azote, to which he gave the name of nitrosulphuric acid, but he was not able to obtain it in a separate state. It formed however salts with ammonia, potash, and soda. Its properties have not been very minutely examined, but it was found to consist of

One equivalent of sulphur . .	16
Six equivalents of oxygen . .	48
Two equivalents of azote . .	28
Equivalent . . .	92

NITROUS ACID, a compound consisting of the same elements as nitric acid, but combined in different proportions. It consists of, or rather is equivalent to, nitric acid deprived of one-fifth of its oxygen. It may be prepared either in a gaseous or fluid form, in which it differs from nitric acid, for the latter requires either water or a base to hold its elements in combination.

Gaseous nitrous acid is formed by mixing in an exhausted vessel two volumes of nitric oxide and one volume of oxygen gas; immediate combination and condensation occur; heat is evolved; a red gas is formed, which is the nitrous acid; and when this coloured gas is subjected to a temperature of 0°, it becomes liquid. When also nitrate of lead is heated in a retort, it is decomposed, and a red vapour is emitted, which is condensed by being subjected to a freezing mixture.

The properties of liquid nitrous acid are, that when cool its colour is pale, but it becomes darker when heated; it emits a very strong disagreeable odour, and at a very moderate rise of temperature it reassumes the gaseous form. Its specific gravity is 1·451. It is decomposed by water with strong effervescence, and it is immediately separated into nitric oxide, which is evolved (and on coming into the atmosphere, absorbs oxygen and again forms nitrous acid gas), and nitric acid, which remains in solution. It is on account of its easy decomposition that it does not combine with bases to form salts.

Nitrous acid gas is composed of one volume of azotic gas and two volumes of oxygen gas condensed into one volume. Its specific gravity is to that of air about as 3·19 to 1, and 100 cubic inches weigh nearly 99 grains. By weight it is constituted of

Four equivalents of oxygen . .	32
One equivalent of azote . .	14
Equivalent . . .	46

NITROUS GAS. [NITRIC OXIDE.]

NITROUS OXIDE GAS. This compound was first obtained by Dr. Priestley, who called it dephlogisticated nitrous air: he procured it by exposing nitric oxide gas to the action of iron, which deprived it of a portion of its oxygen, and reduced it to the state of nitrous oxide, sometimes called protoxide of nitrogen or gaseous oxide of azote. The properties of this gas were minutely examined by Davy at an early period of his brilliant career. The best method of procuring it is to subject nitrate of ammonia to moderate heat in a retort; both the nitric acid and ammonia are decomposed, and their elementary oxygen, hydrogen, and azote re-combine in such proportions as to form water and nitrous oxide gas.

The properties of this gas are, that it is colourless and transparent, its smell is peculiar but rather agreeable, and its taste is sweet: 100 cubic inches weigh about 47 grains, and its specific gravity is to that of air therefore about as 1·5 to 1. Water absorbs about an equal bulk of this gas, which, on being heated, it gives back unchanged. It has no action upon uncombined oxygen, in which it differs remarkably from nitric oxide. Nitrous oxide gas is composed of one volume of oxygen and two volumes of azote condensed by combination into two volumes, or by weight it consists of

One equivalent of oxygen . .	8
One equivalent of azote . .	14
Equivalent . .	22

Nitrous oxide supports combustion, and a taper, ignited phosphorus, sulphur, and charcoal burn vividly in it; at a red heat it is resolved into its constituent gases in the proportions stated. When a mixture of one volume of this gas and one of hydrogen is fired by the electric spark, water is produced, and one volume of azote remains: this shows that it must contain half a volume of oxygen, it being required to form water with the one volume of hydrogen.

This gas was supposed to be irrespirable, until the contrary was proved by Davy, in his 'Researches on Nitrous Oxide.' To that work we must refer for an account of the very exhilarating effects which this gas produces when respired.

NIVELLES, a town of South Brabant, in 50° 35′ N. lat. and 4° 18′ E. long., on the little river Thienne. It contains manufactories of fine linens, lace, and woollen stuffs; oil-mills and a paper-mill. The population in 1836 was 7814. Nivelles is the chief place of a district, with 127,881 inhabitants. It is distant 19 miles south from Brussels.

NIVERNOIS, or NIVERNAIS, LE, one of the provinces into which France was divided before the Revolution. It was bounded on the north by Orléanois and the district of Auxerrois in Bourgogne; on the east by Bourgogne; on the south by Bourbonnois; and on the west by Berry or Berri. It comprehended a number of subordinate districts, as follow:—

Districts.	Chief towns.
Les Vaux, or Les Vallées de Nevers	Nevers.
Le Donziois . .	Donzi.
Les Vallées d'Yonne . .	Clamécy.
Les Vallées de Montenoison .	Montenoison.
Les Vallées des Amognes	Montigny-aux-Amognes.
Le Pays d'entre Loire et Allier	St. Pierre le Moûtier.
Le Bazois .	Moulins en Gilbert.
Le Morvant . .	Château Chinon.

It is almost entirely comprehended in the modern department of Nièvre, to which we refer for an account of the natural features and present condition of the district. We shall here only notice its feudal history. It constituted the county of Nevers. This county does not appear to have been constituted until the ninth or tenth century, when it was a dependency of the duchy of Bourgogne, to which it was at intervals during that century reunited. The regular succession of its counts begins with Otton Guillaume (A.D. 987). Laudri, son-in-law and successor of Otton Guillaume, acquired the county of Auxerre (A.D. 1015), and Guillaume II. acquired also that of Tonnerre: he was contemporary with King Louis VI. *le Gros*, to whom, in his contests with his vassals, he rendered considerable assistance. Guillaume III., son of Guillaume II., followed Louis VII. of France (*Le Jeune*) to the second crusade (A.D. 1147); and Agnes, countess of Nevers, was the wife of Pierre de Courtenay, the unfortunate emperor of Constantinople (A.D. 1216). The counties of Nevers, Auxerre, and Tonnerre were afterwards (A.D. 1266) separated, and descended to different branches of the family. That of Nevers was for a time held conjointly with the counties of Flanders and Rethel by Louis II., who fell in the battle of Creci (A.D. 1346). It was subsequently possessed by branches of the ducal families of Bourgogne and Clèves, and was raised to the rank of a duchy in favour of François I. of Clèves by the king François I. of France (A.D. 1539).

This François, duke of Nevers, was one of the most distinguished French captains of his day, and signalised his valour and skill in the wars of Henri II. against the emperor Charles V. and Philippe II. of Spain. By the marriage of his grand-daughter the duchy came to Louis de Gonzague or Gonzaga, son of the duke of Mantua, who bore a distinguished part in the religious contests of France in the sixteenth century, and it remained in the Gonzague family until sold to Cardinal Mazarin, a few years after which it was united to the French crown.

NIZAM, the title of the sovereign of Hyderabad, derived from Nizam-ul-Mulk, who, after the death of Aurungzebe, obtained possession of the Mohammedan conquests in the Deccan, his name being assumed as a title by his successors in the sovereignty. After reigning 31 years, Nizam-ul-Mulk died at a very advanced age, in 1748. He was succeeded by his second son Nassir Jung, who was assassinated in 1750. His grandson Muzuffer Jung was then placed on the throne, and also assassinated in the year following. The third son of Nizam-ul-Mulk, Salabut Jung, then reigned until 1763, when he was put to death by his brother Nizam Ali, who thereupon took the reins of government, and held them till his death in 1803. His successor Sekundar Jah died in 1829, and was succeeded by the reigning Nizam.

The province of Hyderabad lies between the 15th and 22nd degrees of N. lat., and between the 75th and 82nd degrees of E. long. It is bounded on the north by Kandeish and the ceded districts on the Nerbudda; on the east by the rajah of Berar's dominions and the Northern Circars; on the south by Guntoor and districts ceded by the rajah of Mysore; and on the east by the Southern Mahratta Country, Bejapore, and Aurungabad. The extreme length of the province from north to south is 420 miles, and its extreme breadth 360 miles; its area is about 95,000 square miles. The surface is hilly, but not mountainous, and consists of elevated table-land: the climate is in consequence more temperate than the lower lands in the same latitude. There are numerous streams during the rainy season, but at other times they are dry, and at no time are any of them navigable. But little is known of the physical features of the country or of its productions.

The Nizam is one of the native sovereigns with whom the East India Company has subsidiary treaties. The chief provisions contained in these treaties are: 1st, protection by the British government against all enemies, foreign or domestic; 2nd, mutual co-operation in the event of hostilities with other powers; 3rd, the maintaining of a British force for the protection of the native state; 4th, the reception of a British resident, by whose counsel the native government is bound to abide as regards all public affairs, internal or external; and 5th, the abandonment on the part of the native prince of all political intercourse with other powers, except through the medium of the British government. Under this system the native princes are little more than viceroys, who administer the government according to the views of their superior; and in fact the British residents appointed under subsidiary treaties are not so much ambassadors as they are ministers. The first treaty made by the British with the Nizam was in 1766, by which we engaged to afford him military aid, and in return received from him the cession of the Northern Circars; but the first subsidiary treaty, as above explained, was made with him in 1790, preparatory to the war with Tippoo Sultan. A second subsidiary treaty was made in 1798, and another (the last) was concluded in 1800. The force which the British agreed then to provide was eight battalions, of 1000 men each, of native infantry, and two regiments, of 500 each, of native cavalry; and the Nizam agreed in return to cede to the English all the territories he had acquired under the partition treaties of 1792 and 1799, that followed the wars with Tippoo. In 1803 an arrangement was made, under which the Nizam agreed to receive a regiment of 1000 European soldiers instead of 2000 natives. Sekundar Jah, who reigned from 1803 to 1829, is represented as having been weak, extravagant, and rapacious; and having been supported by the English, under their treaty, in the oppressive measures which he adopted towards his subjects, a constant change in their condition from bad to worse was experienced, the population became more scanty, and they were gradually and progressively reduced to a condition of abject misery. The consequence thus experienced has been in various cases found to result from the subsidiary connection between England and the native rulers: in the case of the Nizam, this consequence has probably been aggravated by the fact that the government is Mohammedan, while the people are Hindus.

NIZZA. [NICE.]

NOAILLES, DE, the title of an old and illustrious family of the French nobility, which originally belonged to the province of Limousin, where it had a château and hereditary domain not far from Brives. Mention is made of the lords of Noailles in old documents as far back as the beginning of the eleventh century. Moreri (*Dictionnaire Historique*) gives the genealogy of the lords of Noailles, beginning with Hugues, who lived in the first part of the thirteenth century, and who went to the Holy Land with Louis IX. and died on the journey. Many individuals of this family figure in the history of France, as filling high offices both civil and military. The most distinguished are—1. Anne Jules, duke of Noailles, peer and marshal of France, who served in the armies of Louis XIV., and died in 1708. 2. Adrien Maurice, duke of Noailles, son of the preceding. He distinguished himself in the Spanish campaigns during the war of the Succession, took the strong fortress of Gerona in Catalonia, was made grandee of Spain by Philip V., and minister under the regent D'Orléans. He afterwards commanded the French armies in Germany and Italy in 1733-5, and again in 1741-3. He died at Paris in 1766. His wife was Françoise d'Aubigné, niece of Madame de Maintenon. Millot published after his death 'Mémoires Politiques et Militaires pour servir à l'Histoire de Louis XIV. et Louis XV., composés sur les Pièces Originales recueillies par Adrien Maurice, duc de Noailles.' These memoirs contain many interesting particulars. 3. Louis Antoine, cardinal de Noailles, uncle of the preceding, was made archbishop of Paris in 1695. He became involved in the wearisome disputes between the Jansenists and the Jesuits, displeased both parties, and at last incurred the displeasure of Louis XIV. on the subject of the famous papal bull 'Unigenitus.' [CLEMENT XI.; JANSENISTS.] After the death of Louis XIV. the regent recalled Cardinal de Noailles to court and showed him great favour. The cardinal died at Paris in 1728, highly esteemed for his learning and regretted for his sincere piety and his great charitableness. He was a true ornament of the French church. 4. Louis, viscount of Noailles, was returned in 1789 to the States-General for the order of nobility by the bailliage of Némours, and, like several others of his order, cordially adopted the principles of the Revolution. On the memorable night-sitting of the 4th August, Noailles proposed and carried the suppression of feudal rights, and of all other privileges enjoyed by the nobility and clergy, and on the 19th September he moved for the suppression of all titles of nobility, which motion was also carried. After the end of the session of the National Assembly he repaired to the army on the Rhine, but when the Jacobin party obtained the ascendency he emigrated. He returned under the consulate, was sent by Bonaparte to S. Domingo as general of brigade, and was killed, in 1803, in a sea-fight against the English.

NO'BIA, Dr. Leach's name for a genus of Sessile Cirripeds resembling *Pyrgoma* of authors [CIRRIPEDA, vol. vii., p. 209], consisting of a conical paries placed upon a funnel-shaped cavity in a madrepore, but with only two opercular valves instead of four.

NOBILITY. The slightest attention to the nature and the actual experience of man must convince every one that society has a tendency to inequality in the condition of the persons composing it. Take half a dozen youths, and place them in a society apart from all other persons of their kind; place them under no other condition than that each person shall enjoy what is his own in his own way; let the whole be at first as nearly on an equality as possible in respect of advantages which are not those of mere nature; and it is certain that at the end of fifty years they and their families will be in a state of great inequality, that some one among them will have attracted to himself more of the things which make life easy than any of the rest, and that there will be not only a difference but a very great difference between the most and the least successful of the party.

This arises from the inequality of the physical, the moral, and intellectual power of each, that is, of some one of those things which we say are the gifts of nature, combined with the introduction of principles and habits at a very early period of life, the things in short which make the man himself, independently of the adventitious advantages which are derived from the possession of things external to himself.

Thus bodily strength, adroitness, quickness of eye, capacity of bearing fatigue, steady industry, frugality, temperance, caution, foresight, aptness to seize opportunities, knowledge of the dispositions and characters of other men, will in any situation of life prove advantageous to those who possess them; and those who want them and are without an equivalent in some other valuable quality, can never expect to be in a situation equally favourable, when time has been allowed for the exercise of these faculties and for the production of their natural fruits.

Again, in the divine government of the world, or, to speak more generally, in the course of events, there are favourable chances, so to speak, presented to some men; and unfortunate accidents which sometimes deprive the best-deserving and the most able of their reward, or which sink still lower the less deserving and the least able.

When once a little advantage is gained, and another generation arises starting in life with the possession of the advantages which the talent or the good fortune of the father secured for it, if the same good physical, moral, or intellectual faculties are inherited, as may be the case, it is manifest that the elevation will become higher and the distinction greater. This will go on in an accelerating ratio, for the adventitious advantages operate as in a series of compound interest. On the other hand there may be a declension in another, till the lowest possible point of destitution has been reached. It seems that if once the principle of *property* is admitted, and every man is guaranteed in the possession of that which belongs to him, what we have described must necessarily take place. Society may by its institutions do something to restrain this tendency, or something which shall in its effects promote it; but society can never preclude it, except by measures which shall annihilate *property*. Whether such measures can be desirable, it is not our present business to discuss.

It is thus, we conceive, that the distinction of *nobiles* and *vulgares*, which we find in the earliest records of human society, must have originated.

Political consideration and political power will in some degree always follow wealth; and thus it has been that a larger share of influence in the direction of the affairs of a community has always fallen to the lot of those in whose hands, by their own exertions or those of their ancestors, a larger share of adventitious advantages had been accumulated than in the hands of others less able or less fortunate.

Nobility, in the earlier stages of civilization, consisted, it is probable, in nothing more than the union of political power with wealth; but this would soon pass into that other state in which we in Europe now see it, where the particular political advantages were guaranteed to the family of him who once possessed himself of them, by which means there was created a new and very important distinction in society, and it became necessary that society should define who the persons were that were admitted by it to such desirable privileges. It was not now the mere possession of wealth and of that political power which will always more or less attend wealth which made a man *nobilis;* there must be some recognition of his admission into what constituted an order endowed with such privileges. Being once secured as an hereditary possession, these privileges might fall to persons who had not wealth or the means of obtaining it, nor the influence and power which wealth brings with it.

When once society had thus established an order and regulated the means by which persons might be admitted into it, the desire would become general of admission to the privileges and advantages which belonged to it, in persons who had any pretension to aspire to such high advantages. It was then easily discovered that society had thus an unexpensive way opened to it of rewarding very eminent services. A community has not always manors and lands to give to the man who performs for it such services, nor are money pensions out of the taxes, continued from generation to generation, agreeable to those who contribute to the payment of them. But a society accustomed to such an order and sensible of the benefits which attend the existence of such a state of things willingly sees advanced into it men who are distinguished by very eminent talent, very eminent services, or very eminent virtues. It is a reward not given all at once, but through a long succession of years.

In the different countries of modern Europe there are nobles various in their titles and various in the privileges belonging to them. In England, Scotland, and Ireland, the heads of the families which are noble are either dukes, marquesses, earls, viscounts, or barons; all, except the last, originally names of office, originated in that state of society where the *nobiles* were all men in actual political employment. To the heads only are political privileges given, the chief of which is, that the English peers have seats in the House of Lords, and consequently a voice in all projected changes of the law. But the junior members of the family are accounted noble, and have certain titles or honourable distinctions united with their names.

By the English constitution the privilege of placing a family in the rank of the nobility is vested solely in the king. The phrase by which this is usually expressed is, that the king (or queen) is the fountain of honour. It is done by letters-patent declaring that such or such a person is created to the dignity, &c., to descend to the heirs male of his body, or in such manner as the crown may choose to direct.

The persons admitted into the order of nobility in England are now usually—1, Peers of Scotland or Ireland; 2, Persons distinguished for services in the army, navy, diplomacy, and for political services; 3, Younger branches of families already noble; 4, Persons of antient wealth, with sometimes, though rarely, persons of large fortunes which have been recently acquired; and 5, Persons promoted to high judicial appointments, as the lord chancellor, the chief justice of the King's Bench, and others, usually called the law-lords.

Of the 41 persons who were first admitted into the order of the English nobility by King William IV., previous to January 23, 1836, there were—

Irish peers	10
Scotch peers	6
Members of families already noble .	7
Possessors of antient inheritances .	7
Connected with the legal profession .	6
For political services	4
For naval services	1

New creations are essential to keep up the order, as extinction is perpetually taking place in a nobility such as the English, where few of the titles descend in any other way than to the male descendants of the person first ennobled.

There are modern communities, such as the United States of North America, in which there is no nobility in any respect resembling that of Europe. Wealth of course gives some influence and importance to the possessor, but it is also an object of jealousy, which must always be the case, more particularly in democratic constitutions. Office, so long as it is held, gives greater distinction than wealth; but office is only held for a short time, and wealth, although it may be acquired by an individual, is seldom transmitted to a single person, but is usually distributed in moderate or small portions among several persons. Thus it has been observed, that in the United States a family seldom maintains any great wealth or importance for more than two generations. Names which have been made illustrious by an individual are remembered only because of him who first elevated them to distinction, and the descendants of the wealthy lose with their wealth the remnant of that importance which their ancestor acquired. Thus one family of distinction after another sinks into obscurity, and its place is soon filled by a name before unknown.

NOCE'RA DEI PAGA'NI, the Roman **NUCE'RIA**, a town on the south-eastern border of Campania, and now belonging to the province of Principato Citra. It is situated at the opening of a valley into the Campanian Plain, at the foot of that offset of the Apennines which stretches from the central ridge into the peninsula of Sorrento, and on the high road from Naples to Salerno. It is a short distance from the left bank of the river Sarno, in a very fertile country, planted with vines and Indian corn. The country is artificially irrigated from wells. The modern Nocera is an open straggling town: it is a bishop's see, has several churches and convents, a clerical seminary, fine barracks for cavalry, and about 6000 inhabitants. The walls and castle of the old town, which was forsaken on account of the earthquakes, are on the hill above. About a mile from the present town, on the road to La Cava, is a circular church, which has been mistaken by some for an antient temple, but it evidently dates from the earlier ages of Christianity. It is somewhat similar in form to that of S. Stefano Rotondo at Rome; an octagonal basin occupies the centre of the building, the pavement of which is considerably below the exterior level. A double row of marble columns disposed in a circular range support the roof upon arches. The interior is gloomy and the walls are green from the dampness. (Keppel Craven, *Tour through the Southern Provinces of Naples.*)

Nuceria was destroyed by Hannibal (Livy, xxiii. 15), after whose departure for Lucania the dispersed inhabitants were settled by the Romans in Atella, the inhabitants the latter town having been transferred to Calatia (xxviii. 3). The town of Nuceria was however rebuilt and became a Roman colony. After several vicissitudes, it was partly destroyed by earthquakes in the time of the early Norman kings, in the eleventh century, when the inhabitants resorted to the present site. The adjunct 'Dei Pagani' which it bears has been variously accounted for; some derive it from the Saracens, called Pagans in the middle ages, who occupied the town for a considerable time in the tenth century; others from a powerful baronial family, Pagani by name, one of whom, Hugh de Payen, was grand-master of the Templars in the time of the emperor Frederic I. (Lunadoro, *Lettera intorno all' Origine di Nocera*, 4to., Naples, 1610.)

NOCE'RA, NUCERIA, a town of antient Umbria, now belonging to that province of the Papal State called 'Delegazione di Perugia.' It is built on a steep hill on the western side of the central ridge of the Apennines, near the source of the river Topino, the Tenia of the antients, which is an affluent of the Tiber. Nocera lies on the high road from Rome to Pesaro and Rimini, which, after passing by Iguvium, the modern Gubbio, crosses the Apennines near the sources of the Metaurum, following the track of the old Flaminian Way. Nuceria was a city of the Umbri, and is mentioned by Livy (ix. 38) as having surrendered to the Romans, with other towns of Umbria, in 307 B.C. It was afterwards a municipium, like Bevania, Ameria, and other cities of Umbria, but in the wars of the Triumvirate, having taken part against Octavianus, he sent a military colony there. In the fall of the Western empire, Nuceria was repeatedly devastated by the Visigoths and other northern tribes, being on the high road to Rome. Under the Longobards it formed part of the duchy o

Spoleto. In the year 1198 Innocent III. annexed it to the Papal territories. It is now greatly decayed from its former importance, but it is still a bishop's see and has 2600 inhabitants. The surrounding territory, which is hilly, produces wine, oil, and plenty of fruit. In the neighbourhood of Nocera is a mineral spring, which has been found useful in several complaints.

(Jacobilli, *Cronica di Nocera;* Neigebaur; Morichini, *Suggio medico-chimico sopra l' Acqua di Nocera*, Fuligno, 1808.)

NOCHISTLAN. [MEXICAN STATES.]

NO'CTHORA, M. F. Cuvier's name for the *Douroucouli*, a quadrumanous animal of the New World, with several characters that remind the observer of some of the *Lemuridæ* (the Loris especially) of the antient continent and its islands. Indeed Dr. Horsfield and Mr. Vigors observe (*Zool. Journ.*, vol. v.) that to the philosophic inquirer 'it will equally be a *Lemur* among the *Monkeys* or a *Monkey* among the *Lemurs.*'

Humboldt, who first gave a detailed and clear account of this curious form, sees in it, and with good reason, an approximation to the *Slow Lemur* or *Lori paresseux* of the French (*Lemur tardigradus* of the south of Asia), and the physiognomy and features, particularly the eyes, well justify the comparison. So far it would seem to represent in America the *Lemuridæ* of the Old World; but the teeth are the same with those of the *Sajous* (*Simiæ apella, capucina*, &c., Linn.), according to M. F. Cuvier, who observes, that if the canines were small and little in the individual examined by him, it was because that individual was a female. The diameter of the small intestines was extremely small, and the cœcum simple and only about two inches deep, and sensibly smaller than the stomach.

The organs of motion do not present anything very particular; the four extremities or hands are formed exactly like those of the *Sajous*, except that the animal does not extend the fingers of the fore-hands, which remain raised as M. F. Cuvier has represented them (see the cuts). The nails are long, narrow, channelled (en gouttières), and a little hooked; the tail is very moveable, but not prehensile, though the animal can turn it over its back, or round its neck or its legs. The pupil of the eye is round, and the eyes themselves are very large and without any accessory organ.

Profile of the Douroucouli.

Fore-hands of the Douroucouli.

The external ear is much developed and very like that of the *Simiæ* generally. The aperture of the nostrils is not wide. The mouth is very large and without cheek-pouches. The fur is soft, thick, and of a silky nature. The interior of the hands presents areæ formed of very fine striæ, always parallel and ordinarily circumscribed the one within the other. Vulva grandis externè vulvæ canum simillima. Under each axilla a teat.

Colour.—Fur above grey, formed of hairs whose base is black, and which, in the rest of their extent, are annulated with white and black; below, orange from the chin to the vent, the same colour extending upon the sides of the neck. Tail yellowish-grey for three parts of its length, and the rest black. Above the eyes white: three black lines divide the forehead; one springs from between the eyes, the two others arise at the external angle of those organs, and as they ascend are curved towards the first. The inside of the hands and ears is naked and flesh-coloured. The face, naked also, is of a sooty black. The iris is yellowish-brown, and the nails black.

Such are the leading points of M. F. Cuvier's description of the female which he had under his inspection. He gives the following as the dimensions of that specimen:—Length, from the summit of the head to the origin of the tail, 10 inches (French); tail 11 inches; head, from the muzzle to the occiput, 2 inches 3 lines; hand 2 inches; fore-arm 2 inches 9 lines; arm 3 inches; leg 4 inches; and thigh 3 inches 6 lines.

Habits entirely nocturnal. The Douroucouli spends the day in sleep, folded up with the head hidden between the fore-legs; but as soon as the brightness fades into twilight the animal awakes to activity. The eyes, which, if exposed to the full brilliancy of day, are darkened with excess of light, for the iris is then closed completely, perform their office as the shades of night approach, and the pupil then dilates nearly to the size of the eye.

Humboldt informs us that, in a state of nature, the Douroucouli hunts small birds, and also, especially, insects: it eats all sorts of vegetables, but is particularly fond of bananas, sugar-cane, the fruit of the palms, the nuts of the *Bertholettia* [BERTHOLETTIA], and the seeds of the *Mimosa Inga*. They do not live in societies, but pass their time together in pairs. Their nocturnal cry (*muh-muh*) resembles that of the Jaguar, and the whites who visit the missions of Oronooko call it *Titi-Tigre*. Its voice is of extraordinary power and volume when considered in relation to its size. Besides the Jaguar-like cry it has two others, one a species of mewing (*e-i-aou*), and a very disagreeable sound (*quer-quer*) Its throat swells when it is irritated, and the animal then resembles in its dilatation and posture a cat attacked by a dog.

Humboldt's specimen, which he kept for five months, was lethargic during the day, sleeping from nine in the morning to seven at night (whence the species is called *Mono Dormillon*). Sometimes it would begin to slumber at daybreak, and always selected the most shady places; and, like squirrels and weasels, passed readily through small holes and openings. If roused during the day, its large eyes, which at night resembled those of the owl, were lustreless; and when it was wrapped up in the soundness of sleep, its mouth might be opened and its teeth examined with impunity. It was very fond of flies, and sometimes would even hunt for them on a dull day, capturing them with great skill. It drank but little, and sometimes passed twenty or thirty days without taking any liquid. It was kept at night in Humboldt's bed-room, notwithstanding the belief of the natives, that the Douroucoulis will tear out the eyes of sleeping persons. In a state of nature it is generally caught by the natives when sleeping in some hollow tree by day, and the male and female are often taken together.

M. F. Cuvier's Douroucouli was very mild in temper, which he attributes to the sex. He fed her on milk, biscuit, and fruit. Humboldt could not familiarise his.

M. F. Cuvier observes that the genus of which the *Douroucouli* is the type received the name of *Aotus* because the absence of external ears appeared to be its dominant character. This name, he remarks, can hardly be applicable to the animal now before us.

The affinities of this curious form to the *Sajous* and the *Loris* among the *Quadrumana* are shown by its fondness for insects, its nocturnal habits, and various parts of its organization. The last-named habits, its cat-like cries and appearance when excited, and other points, indicate its relation to the *Feræ*. Mr. Swainson notices this approach to the ferocious quadrupeds, and makes this the genus by which we are conducted from the *Cebidæ* to the *Lemuridæ*. In his 'Classification' he places the form in the latter group, between *Tarsius* and *Galeopithecus*.

Geographical Distribution.—South America. Humboldt saw the species in the forests bordering the Cassiquaire and the woods at the base of Mount Duida; also in the vicinity of the cataracts of the Maypures.

Nocthora trivirgata.

NOCTI'LIO. [CHEIROPTERA, vol. vii., p. 25.]

NO'CTUA. (Ornithology.) [OWLS.]

NODE. The points of a planet's or comet's orbit in which it cuts the ecliptic, and the points in which the orbit of a satellite cuts that of its primary, are called the nodes of such planet, comet, or satellite. Generally the point in which one orbit cuts a second is called the node of the first *upon* the second.

NODDY. [BOOBY, vol. v., p. 159; TERNS.]

NOE'TUS, a native of Ephesus or Smyrna, and contemporary with Origen, is chiefly known in ecclesiastical history for the heterodox opinions which he advanced respecting the Trinity. He appears to have believed in only one divine person, and to have denied the distinct and proper personality of the Word and Spirit. He is said by Epiphanius to have asserted that the Father was begotten, suffered, and died, and that in reality he was Christ. From this opinion Noetus and his followers were called Patripassians, that is, persons who believed that the Father alone had suffered for the sins of men; but it has been remarked by Beausobre (*Hist. de Manichée*, p. 533) with considerable truth, 'that this opinion is so absurd and so manifestly contrary to many texts of the New Testament, that it appears scarcely possible that it should be maintained by any reasonable man; which makes him suspect that this was not the opinion of those persons, but a consequence which the orthodox drew from their principles.' Noetus is also said to have maintained that he was Moses and that his brother was Aaron; but it is more probable, as Beausobre has remarked, that Noetus and his brother only pretended to defend the unity of God, as it had been taught by Moses and Aaron.

The followers of Noetus probably joined Sabellius, whose explanation of the doctrine of the Trinity was nearly the same as that of Noetus appears to have been.

(Mosheim's *Ecclesiastical History*, vol. i., p, 273, edition of 1826; Lardner's *Works*, vol. ii., p. 590-600, edition of 1831, and the authorities there cited.)

NOGAYS. The Nogays are a Tartar or Turkish nation, dispersed over the steppes which extend between the lower course of the river Dnieper and Mount Caucasus. The majority of the tribes belonging to this nation live along the Caucasian line, and find pasture for their herds and cattle in the adjacent steppes. That tribe however to which the name of Nogays is more especially applied has for more than fifty years been settled in the steppe which runs along the northern shores of the sea of Azof, on the banks of the rivers Berda and Molotshnia or Moloshnia. They have extensive pasture-grounds on the bottoms of the rivers, a circumstance by which they have risen to prosperity, though the better parts of this land have of late been taken from them and given to some German colonists. I is supposed that the nation settled in these countries a the time of the invasion of the Mongols in the thirteenth century, but some antient writers, especially Pomponius Mela, have left an account of the inhabitants of this region which so exactly applies to the Nogays, that it may be presumed they are the same nation. They lead a wandering life; and their small huts, which are made of felt, are placed upon a carriage and thus removed from one place to another. They have many head of cattle, horses, and sheep: those tribes which live along the Caucasian line also possess camels. They sow wheat and millet in a few places, but pay no further attention to it till harvest-time. Their principal food consists of horse-flesh and mare's milk. The language of the Nogays is a Turkish dialect, but it is said to differ considerably from that of the Tartars who inhabit the Crimea. (Pallas's *Travels through the Southern Provinces of the Russian Empire.*)

NOGENT, the name of several places. Nogent-le-Rotrou, the most important, is noticed elsewhere. [EURE ET LOIR.] Nogent-sur-Seine is described below: the others are too unimportant to require notice.

Nogent-sur-Seine is the capital of an arrondissement in the department of Aube. It is situated on the left bank of the Seine, and on the road from Paris to Troyes, 57 miles in a direct line east-south-east of Paris, or 63 miles by the road. It is opposite to an island in the channel of the river, which island is united to the opposite banks by two stone bridges of one arch each. The town is pleasantly situated, well built, clean, and tolerably well laid out. There are pleasant walks on the banks of the Seine. The town suffered severely in a battle which took place between the allied forces and the French in the year 1814. The town-hall and several houses were destroyed. There are an hospital, a theatre, and a church, that of St. Laurent, remarkable for a handsome steeple. The population of the commune in 1826 was 3325; in 1831, 3277; in 1836, 3355. Hosiery and cordage are manufactured; and there are several corn-mills on the Seine. The river is navigable, and wood, grain, flour, vinegar, wine, charcoal, slates, wool, &c. are sent down the stream to Paris: trade in flour is also carried on with the south of France. There are four fairs in the year. There are a subordinate court of justice and two or three government offices. There are handsome baths on the island in the river.

The arrondissement comprehends an area of 329 square miles, and contains 85 communes: it is divided into four cantons or districts, each under a justice of the peace. The population in 1831 was 32,213; in 1836, 33,856.

NOIRMOUTIER. [VENDEE.]

NOLA, a very antient and once flourishing town of Campania, is situated in a fertile plain between Mount Vesuvius on one side and the first ridge of the Apennines on the other, 14 miles east-north-east of Naples. It is said by Polybius (xi. 17) and others to have been built or colonised by the Etruscans, after their conquest of part of Campania, in the second or third century of Rome. Its Oscan or Etruscan name in the inscription found at Abella is 'Nuvlana,' and it is there mentioned as having community of rites and annual sacrifices with Abella, Abellinum, and Trebula. (Micali, *Storia degli Antichi Popoli Italiani*, chap. xiv.) After the defeat of the Etruscans by the Samnites, Nola is said to have been colonised by the Chalcidians from Cumæ, or from the island of Ænaria (Ischia). Silius Italicus (xii. 161) and Justinus (xx. 1) call Nola a Chalcidian colony. Nola, having joined the Samnites against Rome, was taken by the consul C. Junius Bubulcus, or, according to others, by the dictator Pœtelius (Livy, ix. 28), 311 B.C. After this Nola appears to have continued under its own magistrates and senate as a municipium and an ally of Rome. In the second Punic war we find the senate of Nola wishing to remain faithful to Rome, whilst the people wanted to open the gates to Hannibal. (Livy, xxiii. 14, 15.) Marcellus, the Roman commander, having entered Nola, won over Bantius, one of the popular leaders, who informed him of the secret intelligence between his countrymen and the Carthaginians. When Hannibal approached the town, expecting the gates to be opened to him, Marcellus suddenly issued with his troops from one of three gates, and fell upon the Carthaginians, who were taken by surprise, and obliged to retire with the loss of several thousand men. This was the first action in which the Romans defeated Hannibal. (Livy, xxiii. 16.) Nola is mentioned as a Roman colony in the Social War, when it was taken by the Samnites, who killed the prætor L. Posthumius. (Livy, *Epitome*, 73.) It was afterwards retaken and devastated by Sulla. Augustus, in his last journey into Campania, being taken ill, was carried to Nola, where he died, August 19, A.D. 14.

The present Nola, which is much smaller than the former town, is about one mile in circumference, and has walls and five gates. It is a bishop's see, and has several churches and convents, and some other good buildings, a fine marketplace, a large barrack for cavalry, and about 9000 inhabitants. It is reported that a bishop of Nola towards the end of the fourth century was the first to introduce the use of bells for calling the people to church. In the neighbourhood of Nola a quantity of antient vases or pottery have been found, which are known by the names of Campanian or Nola vases; they somewhat resemble the old Etruscan pottery. (Leo Ambrosius, *De Nola Opusculum*, 1514; Remondini, *Storia Ecclesiastica Nolana*, 1747; Swinburne; Neigebaur.)

Nola is the head town of one of the five districts into which the province of Terra di Lavoro is divided, and which at the census of 1825 contained 117,567 inhabitants. (Peroni, *Censimento dei Reali Dominii*.)

NOLLE PROSEQUI is a phrase used in proceedings at common law to denote the voluntary withdrawal of the plaintiff or other originating party in a judicial proceeding from the further prosecution of his suit, and is derived from the words used in the formal entry of such withdrawal on the record, in which the party 'acknowledges that he will not further prosecute' (fatetur se ulterius *nolle prosequi*). In an action, if the plaintiff enter a nolle prosequi, the defendant is entitled to his costs under stat. 8 Eliz., c. 2, s. 2. The same mode of proceeding does not exist in courts of equity, but the complainant can at any time discontinue his suit upon an application to the court, and paying the costs of the defendant. In criminal prosecutions by indictment, though originated by private persons, a nolle prosequi may be entered at any stage of the proceedings by the king's attorney-general, but it cannot be done without his concurrence, although the prosecutor desires it. It is very unusual however in modern times for the attorney-general to enter a nolle prosequi upon an indictment, except upon the application of the prosecutor. Lord Holt says 'the practice began in the reign of Charles II., and that in all Charles I.'s time there was no precedent of a nolle prosequi upon an indictment.' (6 *Modern Reports*, 262.) But there can be no doubt of the power of the attorney-general to put an end to criminal *informations* filed *ex officio* by him; and in the case of informations filed in the Crown-office by the Court of King's Bench, a nolle prosequi may be entered by the master of the Crown-office upon the application of the prosecutor and with the leave of the court. The effect of a nolle prosequi in criminal cases is to discharge the defendant for the time, but it does not operate as an acquittal; so that he may be indicted again, and it is said that even upon the same indictment fresh process may be awarded.

NOLLEKENS, JOSEPH, though a native of this country, where he was born in Dean-street, Soho, London, August 11, 1737, was of foreign extraction; his father, Francis Joseph, who was an artist of much ability for compositions of landscape and figures after the manner of Watteau, was a native of Antwerp. The senior Nollekens died January 21, 1748, and his widow soon after married again and went to reside in Wales. These circumstances may serve to account for Joseph's neglected education, for his literary attainments scarcely extended to an ordinary knowledge of reading and writing; nor does he appear to have endeavoured in after-life to make up for his deficiencies. It is therefore rather matter of astonishment that he should have been able to accomplish what he did in the superior branch of his art, than that his poetical subjects should have displayed so little of the higher powers of imagination.

At the age of thirteen he was placed with Scheemakers, the sculptor, and while with him obtained some prizes from the Society of Arts, who afterwards voted him fifty guineas, while he was at Rome, for his Timoclea before Alexander. He set out for Rome in 1760, and while there was noticed by some of his countrymen, among others, by Garrick and Sterne, both of whom sat to him for their busts. That of Sterne, which was in terra-cotta, was, for likeness and character, equal to any which he afterwards produced. In Rome he turned his attention also to a rather lucrative if not particularly dignified branch of art, namely, that of manufacturing antiques, by vamping up fragments, finding either heads and limbs for bodies, or bodies for heads and limbs; one of the statues thus compounded was the Minerva, afterwards purchased for a thousand guineas, and now in the Newby collection in Yorkshire. His dexterity and skill in repairs of this kind were subsequently displayed in some of the Townley Marbles. While at Rome he also purchased for a mere trifle, of the workmen by whom they were discovered, a number of fine terra-cottas, which he afterwards disposed of to Mr. Townley, and which are now let into the walls at the British Museum. Among those whose patronage he obtained during his stay in Italy were Lord Yarborough and the Earl of Besborough, for the first of whom he executed a group of Mercury and Venus chiding Cupid.

After about ten years of study in Italy, which had been profitable to him in all senses of the term, he returned to London with habits of economy well calculated to keep what he had acquired and to ensure still further wealth. He established himself in Mortimer-street, became an associate of the Royal Academy, and was shortly afterwards honoured by the king's sitting to him for his bust. This circumstance, and the celebrity which his busts of Garrick and Sterne had previously obtained, perhaps as much on account of their subjects as of their own merit, caused him to be almost overwhelmed with employment of that kind: he had sometimes three or four sitters in the course of one day. Whether this application to the mere taking of likenesses did not tend to render him more studious of the mechanical than the intellectual part of his art, it would be difficult to decide; but it was certainly congenial to his inclination, because it was productive of immediate profit, and suited also to his abilities. The tide of fashion being once in his favour, that oddity of his address and bluntness of manners and speech, which might else have proved disqualifications for that branch of his profession, probably contributed in no small degree to recommend him to those who, accustomed to courtesy and polish of manners in their own circle, were willing to amuse themselves with the oddities of one who had obtained a kind of privilege for freedom of tongue However deficient in education, Nollekens was by no means so either in shrewdness or tact: there can therefore be little doubt he soon perceived that people were more diverted than offended by his bluntness. If he had found that his disregard to the forms of courtesy frightened away the polite and the fashionable from his studio, Joseph would quickly have adopted a very different course, and have become the blandest of the bland.

He had also a good deal of employment in a branch of the art still less favourable than that of bust-making for the display of its higher powers, namely, that of common-place monuments of common-place people, records of persons whom the world did not care to recollect. In such subjects almost the only inspiration that an artist can feel springs out of pecuniary remuneration; yet there were exceptions even in this case, for the monument to Mrs. Howard of Corby Castle is one of his best productions, pathetic in conception, elegant and tasteful in execution; as a work of art, very far superior to that by him of Captains Manners, Bayne, and Blair in Westminster Abbey, which, though a sumptuous, is but a frigid and mechanical work. Notwithstanding both his occupations of this kind and his numerous commissions for busts, Nollekens found time to undertake several statues and pieces of poetic sculpture, among which were no fewer than five Venuses, one of them since known by the name of the Rockingham Venus, and one representing the goddess anointing her hair, which last was reckoned by the artist himself to be his master-piece, and hardly inferior to the antique. Among his groups were a Pætus and Arria and a Cupid and Psyche.

While wealth was pouring in upon him year by year, his expenses by no means kept pace with it, nor were they at all increased by his marriage; for the lady he selected, Miss Mary Welch, though of some beauty and accomplishments, was still more remarkable for her rigid economy. So far the match was a very suitable one, for, although wealthy and childless, both the husband and wife carried their notions of frugality even to penuriousness.

After the death of his wife in 1817, Nollekens began to relax a little of that economy which had before prevailed in his establishment; but it was then too late for him to think of beginning to enjoy the wealth which he had accumulated, and which he then discovered only served to draw around him swarm of greedy legacy-hunters, all professing attachment and sympathy—all eagerly looking forward to the time when his will should be opened. On the 23rd April, 1823, the event so long and anxiously expected took place, and Nollekens expired at the age of eighty-six, dividing, with the exception of a few legacies (amounting to about 6000*l.*), the whole of his vast property (somewhat more than 200,000*l.*) between his friends, Francis Palmer, and Francis Douce, the well-known antiquary, and leaving to each of his executors, Sir W. Beechey and Thomas Smith, only 100*l.* each. Smith, who had been in the sculptor's studio, had expected a very considerable legacy; consequently it is not a matter of much surprise if his biography of the old sculptor is entirely free from that admiration of his subject which most biographers entertain. Nollekens had many good qualities, and one of his worst ones was that of indulging in excessive economy when economy had ceased to be a merit.

NOMBRE DE DIOS. [MEXICAN STATES.]

NOMINALISTS, a sect of the scholastic philosophers, so named on account of the particular tenet by which they were distinguished, and in opposition to the Realists, another scholastic sect. In order to understand the principal point of difference between these parties, which gave rise to long-continued and acrimonious disputation, it is necessary to advert to the doctrines of the ancient philosophy concerning ideas or universals. According to Plato, who appears to have been indebted for his opinion to the Pythagorean school, universals, or, as he called them, ideas, by which are to be understood such things as we express by general terms, have, apart from the mere conception of them by the understanding, an actual and eternal existence in the Divine Mind; and are the patterns or models according to which the individuals of every species are formed, and by which the constitution of each individual is determined. The separate existence of these essences was denied by Aristotle, who taught that forms—which word as employed by him has the same meaning with the ideas of Plato—were eternally united to matter; that unconnected with it they have no existence, and that they are inherent in their objects. Zeno and the Stoics generally ridiculed the belief in such universal natures altogether; and held that the forms of the Stagyrite and the ideas of his preceptor were nothing if distinguished from the notions of them in the mind and the words by which they are designated. The doctrine of Aristotle was universally received among the schoolmen, until after the commencement of the eleventh century. But with the revival of dialectic science, which about this time occurred, it began to be warmly controverted. Those who adopted the Stoical doctrine, and affirmed that words or names only were universal, were termed Nominalists; while those who adopted the Peripatetic opinion, and maintained the proper existence of universals, were termed Realists. The honour of forming the sect of the Nominalists is commonly assigned to Roscelin, canon of Compiègne; but its real founder appears rather to have been John called the Sophist, and supposed by Du Boulay, the historian of the Parisian Academy, to have been chief physician to king Henry I. of France. Be this however as it may, to Roscelin unquestionably belongs the credit of having first raised the sect into eminence. The Nominalist doctrine was highly obnoxious to most of the divines as well as the philosophers of the period, chiefly perhaps, as Brucker supposes (*Historia Critica Philosophiæ*), on account of Roscelin having employed it in illustrating the mysterious constitution of the Divine Nature, and thereby laid himself open to the charge of heresy. Notwithstanding the opposition, originating in this source, which it encountered, many converts were made; and its advancement was greatly promoted by the genius and learning of the celebrated Abelard, who was one of the disciples of Roscelin. So successful was he in his disputes with William de Champeaux, styled 'the venerable doctor,' who flourished about the beginning of the twelfth century, and was then the principal supporter of Realism, that the pupils of the latter in large numbers forsook their master, and became the followers of his more eloquent antagonist. Throughout the whole of the twelfth century the contest between the rival sects continued to be waged. Both parties, by various modifications of their leading doctrines, gradually became divided to a considerable extent among themselves, and a third sect arose, professing to steer a middle course between them, the adherents of which were distinguished by the name of Conceptualists, on account of their holding universality to be the attribute, not of names only, but of conceptions. This sect however obtained but a small share of notice. At this period the Realists, both in number and respectability, had the advantage of their opponents, and the erudition and subtlety of Albert the Great, Thomas Aquinas, and afterwards of Duns Scotus, gave them such a decided predominance, as to throw the Nominalists completely into the shade. In the fourteenth century William Occam, an English Franciscan friar, and a pupil of Scotus, becoming the advocate of Nominalism when it was seemingly about to expire, effected a revival, and brought it into greater repute than it had ever before enjoyed. The discussion of the question respecting universals was once more renewed, with the utmost virulence and animosity on both sides. Blows were resorted to when argument was exhausted; and not unfrequently debates were terminated by bloodshed. Throughout Germany the opinion of the Nominalists was soon almost universally received, while Realism, being supposed to be more consistent with the doctrines of the church, and patronised by successive popes, prevailed in Italy and other countries where the influence of the Roman see was most powerfully felt. Although numbering among its defenders fewer persons of philosophical eminence than were to be found among the leaders of the opposite cause, it still maintained its wonted predominance. John, the twenty-third pope of that name, having finished his disputes with the Franciscans, who had zealously opposed him on certain matters affecting the privileges of their order, directed severe persecutions against the Nominalists. In the year 1339 the university of Paris published an edict, denouncing the philosophy of Occam, the effect of which however does not seem to have been very hostile to its wider extension. Louis XI. of France, in 1473, likewise issued an edict against the Nominalists, in which it was ordered that their writings should be seized and secured in the libraries by iron chains, to prevent their being perused. The consequence was, that the leaders of the sect fled to England and Germany. In the following year Louis mitigated his edict, which he had issued at the suggestion of the bishop of Avranches, and permitted the study of the Nominalist writings. Thereafter this sect obtained the ascendency in the universities of France, as it had formerly obtained it in those of Germany. The Reformation, to which a long train of causes had been effectually conducting, put an end to the controversy so long and so fiercely carried on between the two most memorable parties that have ever arisen among the schoolmen, and the contemporaneous revival of letters eventually gave the death-blow to the scholastic philosophy. Among the most eminent supporters of Nominalism, besides those already referred to, may be mentioned Suisset, Buridan, Marsilius ab Inghen, and Oresmius, in the fourteenth century, and Matthew of Cracow, Gabriel Biel, &c., in the fifteenth.

NOMINATIVE. [CASE.]

NOMSZ, JAN, a Dutch poet, born at Amsterdam in 1738, acquired some distinction by his epic or rather historical poem of 'William I., or the Foundation of the Freedom of the Netherlands,' in twenty-four books, 1779. This production contains passages of great force and beauty, but for what interest it possesses as a whole it is indebted to the materials themselves. As a dramatic writer, Nomsz showed greater talent, especially in his tragedies 'Cora,' 'Zoroaster,' the 'Duchess of Coralli,' and 'Maria van Lalain.' This last-mentioned piece became exceedingly popular, and retained possession of the stage for a long while, the part of the heroine being frequently performed by Madame Wattier-Ziesenis (born at Rotterdam, April 13, 1762, died April 23, 1827), one of the most accomplished women and one of the greatest tragedians of her time, though a Siddons and a Talma were her contemporaries.

Besides some other original tragedies, Nomsz translated several from the French; among the rest Racine's 'Athalie.' He also produced a comedy which is mentioned with commendation by Van Kampen. His miscellaneous pieces and translations, among which that of La Fontaine's 'Fables' ought not to be forgotten, display likewise much talent, and charm by a certain happy ease and naturalness and by their merits of style and versification. Like Camoens, he breathed his last within the walls of an hospital, St. Peter's almshouse at Amsterdam, where he died in 1803, at the age of sixty-five. After all, there is reason for supposing, from a remark of De Vries's while speaking of his writings, that the poverty of his later years was in some measure occasioned by his own want of prudence.

NONAGESIMAL. The nonagesimal degree of the ecliptic is that point of the ecliptic which is highest above the horizon. Every point of the ecliptic is therefore the nonagesimal degree in succession.

NONAGON. [Polygons, Regular.]

NONCONFORMITY is the term employed to designate Protestant dissent from the Church of England. It was in the reign of Edward VI. that the English reformed church first received a definite constitution. During the time of Henry VIII. it remained in a great measure unsettled, and was subject to continual variation, according to the caprice of the king. As organised by Edward, while Calvinistic in its creed, it was Episcopalian in its government, and retained in its worship many of those forms and observances which had been introduced in the days of Roman Catholic ascendency. In the first of these particulars it resembled and in the last two it differed from the Genevan church. During the temporary restoration of the Roman Catholic faith under the administration of Philip and Mary, great numbers of the persecuted disciples of the reformed faith sought refuge in France, the Netherlands, Switzerland, and other parts of the Continent. Of those who fled to Germany, some observed the ecclesiastical order ordained by Edward; others, not without warm disputes with their brethren, which had their commencement at Frankfort, adopted the Swiss mode of worship, preferring it as more simple, and more agreeable to Scripture and primitive usage. Those who composed this latter class were called Nonconformists. The distinction has been permanent, and the name has been perpetuated. Queen Elizabeth's accession to the throne, in 1558, opened the way for the return of the exiles to the land of their fathers. It was natural for each of the parties of which they consisted, to advocate at home the systems of worship to which they had been respectively attached while abroad; and the controversy, which had been agitated by them in a foreign country, immediately became a matter of contention with the great body of Protestants in their own. It suited neither the views nor inclinations of the illustrious princess who then held the sceptre to realise the wishes of the Nonconformists, or Puritans, as they began to be called, by giving her sanction to the opinions which they maintained, and assenting to the demands which they made. The plain and unostentatious method of religious service which they recommended did not accord with that love of show and pomp for which she was remarkable; and the policy of the early part of her reign, in which she was supported by the high dignitaries both in the church and state, was to conciliate her Roman Catholic subjects, who, in rank, wealth, and numbers, far exceeded the Nonconformists. The liturgy of Edw. VI. having been submitted to a committee of divines, and certain alterations, betraying a leaning to popery rather than to puritanism, having been made, the Act of Uniformity was passed, which, while it empowered the queen and her commissioners to 'ordain and publish such further ceremonies and rites' as might be deemed advisable, forbade, under severe penalties, the performance of divine worship except as prescribed in the Book of Common Prayer. This act was only partially carried into effect from the time of its being passed, in 1558, to 1565. But in 1565 it began to be rigidly enforced, and many of the Nonconformists were deprived of their preferments (for notwithstanding their sentiments, most of them had still remained in connection with the Established Church, being from principle averse to an entire separation); many also were committed to prison. The High Commission Court, tyrannical in its very constitution, became still more severe in the exercise of its functions; and at length, in 1593, the parliament declared that all persons above sixteen years of age who should absent themselves for one month from the parish church should be banished the kingdom; and if they returned without licence, should be sentenced to death as felons. These provisions, though directed principally against the Catholics, affected the Protestant Nonconformists with equal severity; and with reference both to Catholics and Protestants who dissented from the Church of England, were unjust and impolitic. The Nonconformists, during the age of Elizabeth, are not to be regarded as an unimportant faction. Both among the clergy and the laity they were a numerous body; and they would have been powerful in proportion to their numbers, had they only been more closely united among themselves. A motion, made in 1561, at the first convocation of the clergy which was held in England to do away with the ceremonies and forms to which the Puritans objected, was lost by a majority of only one, even though the queen and the primate Parker were well known to be opposed to such a change. In the Commons the Puritan influence was strong; and if that house be supposed, in any adequate degree, to have represented the people for whom it legislated, their numerical force throughout the country generally must necessarily have been great. Without presumption therefore they might have expected that their remonstrances would be listened to, and their grievances redressed. And certainly it would have been wiser in the government to have endeavoured to secure their support than to have awakened their discontent and provoked their opposition; more especially when the hostile aspect of foreign nations is considered, and when we remember that the English Catholics, whose numbers and power rendered them particularly formidable, were eagerly watching every symptom favourable to the re-establishment of the antient faith. Nor would it have been a difficult matter to yield to the claims of the Nonconformists. The moderate among them sought not the overthrow of the ecclesiastical constitution, but contended merely that certain rites and observances, which they regarded as departures from the purity and simplicity of Christian worship, should be dispensed with; and, generally, that matters commonly recognised as things indifferent should not be insisted on as indispensable. Doubtless many were less reasonable in their demands, and injustice and persecution tended much to increase their number. A party, at the head of which was Professor Cartwright, of Cambridge, desired a change, not only in the forms of worship, but in church polity also, and would have substituted Presbytery in the room of Episcopacy. Another party, viz. the Independents, or Brownists, as they were then termed, going still further, wished the disseverment of the connection between church and state altogether. Still there is every reason to believe that slight concession to the demands of the less violent, and the display of a spirit of forbearance, would have satisfied many, would have allayed the dissatisfaction of all, and would have been the reverse of disagreeable to the country generally. Unfortunately an opposite course of policy in this and subsequent reigns was chosen; which ultimately conducted to the horrors of a civil war, the subversion of the regal authority, and those disastrous events which make the history of the seventeenth century one of the most melancholy pages of our national annals.

Queen Elizabeth died in 1603, and was succeeded by James VI. of Scotland. From one who like him had been the member of a Presbyterian church, and had on more than one occasion expressed his decided attachment to its principles and worship, the Nonconformists, not without reason, expected more lenient treatment than they had met with in the preceding reign. But their expectations were bitterly disappointed. In compliance with their petitions, a conference was indeed appointed and held at Hampton Court, at which nine bishops and as many dignitaries were present on the one side, and four Puritan ministers, selected by James, on the other. The king himself presided and took part in the debate. But no good results ensued. The Nonconformist representatives were loaded with insults, and dismissed in such a manner as might well give birth to the darkest anticipations regarding the fate of the party to which they belonged. Shortly after, a few slight alterations of the national rubric were made, and a proclamation issued requiring the strictest conformity. In 1604 the book of canons was passed by a convocation, at which Bishop Bancroft presided. It denounced severe temporal and spiritual penalties against the Puritan divines, and was followed up by unsparing persecutions. In spite however of all the means employed for its eradication, the cause of Nonconformity advanced. In the church itself there were many of the clergy who held the Puritan opinions, though they deemed it inexpedient to make a very open display of them, and who sighed for a change; and the number of such was largely augmented by the alteration which James made in his creed, from Calvinism to the doctrines of Arminius.

The son and successor of James, Charles I., adopted towards the Nonconformists the policy of his predecessors. His haughty temper and despotic disposition speedily involved him in difficulties with his parliament and people. In carrying into execution his designs against Puritanism, he found an able and zealous assistant in Archbishop Laud, under whose arbitrary administration the proceedings of the Star Chamber and High Commission Court were characterised by great severity. Many Puritans sought for safety and quiet in emigration; and the colony of Massachusetts Bay was founded by them in the New World. But a proclamation by the king put a stop to this self-banishment; and thus even the miserable consolation of expatriation was denied. Hundreds of Puritan clergymen were ejected from their cures, on account of their opposition to the Book of Sports, published in the previous reign. Calvinism was denounced by royal authority, and severe restrictions laid on the modes and times of preaching. But a change was approaching. In 1644 Laud was declared guilty of high treason and beheaded; and about five years after, Charles shared the same fate. The parliament abolished Episcopacy and every thing in the Church that was opposed to the model of the Genevan church.

During the Protectorate, Presbytery continued to be the established religion. Independency however prevailed in the army, and was in high favour with Cromwell. Under his government the sects of the Quakers and Baptists flourished; and other sects, some of which held the wildest and most visionary tenets, sprung into existence. All were tolerated. Episcopacy only was proscribed; and the Nonconformists, in their hour of prosperity, forgetful of the lessons which adversity should have taught them, directed against its adherents severities similar to those of which they themselves had been the objects. The Restoration, in 1660, placed Charles II. on the throne of his ancestors, and led to the restitution of the old system of church government and worship. The Act of Uniformity was passed in 1662, by which all who refused to observe the rites as well as subscribe to the doctrines of the Church of England were excluded from its communion, and in consequence exposed to many disadvantages and to cruel sufferings. During the same reign was passed the Conventicle Act, which subjected all who presumed to worship God otherwise than the law enjoined to fine and imprisonment, and punished the third offence with banishment; the Five-Mile Act, which banished to that distance from every corporate town the Nonconformist clergy, and forbade them to officiate as schoolmasters except on condition of their taking the oath of passive obedience; and the Test Act, which, though directed against the Roman Catholics, pressed with equal severity against Protestant dissenters, and excluded from offices of trust in the state those who refused to receive the eucharist according to the rubric of the Church of England. After this time dissent continued in a very depressed state, and had to struggle with various fortunes, until the reign of William III., when the Toleration Act gave immunity to all Protestant Dissenters, except Socinians, from the penal laws to which they had been subjected by the Stuart dynasty. The benefits conferred by this measure were indeed subsequently much abridged by the Occasional Communion Bill, which excluded from civil offices those Nonconformists who, by communion at the altars of the Church, were by the provisions of the Test Act qualified to hold them; and by the Schism Bill, which restricted the work of education to certificated churchmen. After the accession of George I. however, these laws were repealed, and since then, by the removal of the Test Act, and by the passing of the acts relating to registration and marriage, dissenters have been allowed the peaceable enjoyment of the rights of consience. It would be a task of some difficulty to enumerate the various sects which may be classed under the general head of Nonconformists. The chief denominations are the Presbyterians, Independents, Baptists, Wesleyan and Calvinistic Methodists, and Quakers. [Baptists; Dissenters, &c.]

NONES. [Kalendar.]

NO'NIUS MARCELLUS, a Roman grammarian, was born at Tibur, in the fourth century. He was the author of a small work entitled 'Compendiosa Doctrina de Proprietate Sermonum,' which was written for the use of his son, and is chiefly valuable for the quotations which it contains from old Latin writers. This work has been edited by Mercer, Paris, 1614, which edition has been republished at Leipzig, in 1826.

NONIUS. [Nunez.]

NONJURORS. [Theology.]

NONNUS (Νόννος), an inhabitant of Panopolis, in Egypt, lived at the beginning of the fifth century of the Christian æra. We have no particulars respecting his life, except that he became a Christian when he was advanced in age. He was the author of two works in Greek, which have come down to us, the 'Dionysiaca' and a Paraphrase, in verse, of the Gospel of St. John. The 'Dionysiaca' gives an account of the adventures of Dionysus from the time of his birth to his return from his expedition into India; and the early books also contain, by way of introduction, the history of Europa and Cadmus, the battle of the giants, and numerous other mythological stories. This work, which consists of 38 books, and is written in hexameter verse, has been condemned by Daniel Heinsius, Joseph Scaliger, and other critics, for its inflated style, and has been pronounced to be unworthy of perusal; but it must be admitted that it contains passages of considerable beauty, and supplies us with information on many mythological subjects which we should not be able to obtain elsewhere. It appears probable that this work was written before Nonnus became a Christian. The best edition of the 'Dionysiaca' is that by Graefe, 2 vols. 8vo., Leip., 1819-1826. D. Heinsius wrote a dissertation on this author, which was published at Leyden, in 1610, with the text of the 'Dionysiaca.' Six books of this poem, from the eighth to the thirteenth inclusive, were published by Moser, with a preface by Creuzer, Heidel., 1809. A French translation of the 'Dionysiaca' was published at Paris in 1625.

The 'Paraphrase of St. John,' which is a poor performance, and has been roughly treated by Heinsius, in his 'Aristarchus Sacer,' Leyden, 1627, was published for the first time at Venice, in 1501. The best edition of it is by Passow, Leip., 1834. This work however is of some value, as it contains a few important readings, which have been of considerable use to the editors of the Greek Testament. It omits the history of the woman taken in adultery, which we have at the beginning of the eighth chapter of St. John's Gospel, and which is considered by Griesbach and many other critics to be an interpolation. In chap. xix. 14, Nonnus appears to have read 'about the *third* hour,' instead of 'about the *sixth*.' (See Griesbach on the passage.)

There are also extant a 'Collection of Histories or Fables,' which are cited by Gregory Nazianzenus, in his work against Julian, and which are ascribed by some critics to the author of the 'Dionysiaca.' But Bentley, in his 'Dissertations on Phalaris,' has given good reasons for believing that this Collection was composed by another individual of the same name.

There were several other writers of the name of Nonnus, of whom an account is given in Fabricius, *Bibl. Græca*, vol. viii., p. 601, 602, ed. Harles.

NONNUS (sometimes called Nonus), a Greek physician, and author of a medical work still extant, entitled *ἐπιτομή τῆς ἰατρικῆς ἁπάσης τέχνης*, 'Compendium totius Artis Medicæ.' Nothing is known of his life, except that he composed his work at the express command of the emperor Constantinus Porphyrogennetus (to whom also it is dedicated), who was most probably the seventh of that name, who died A.D. 959. His real name is supposed by Freind (*Hist. of Physic*), Sprengel (*Hist. de la Méd.*), and Bernard (*Præfat. ad Theoph. Non.*), to be Theophanes, as he is called so in one manuscript, and a physician of that name is found to have lived in the tenth century. In three manuscripts the work is anonymous, and there is only one which mentions the name of Nonnus. This epitome is divided into 297 chapters, and contains a short account of most diseases and their treatment. It contains very little that is original, and is almost entirely compiled from Aëtius, Alexander Trallianus, and Paulus Ægineta: from whom whole sentences are sometimes transcribed with hardly any variation. The greater part of the chapter on Pleurisy (ch. 129) is taken from Paulus Ægineta, lib. iii., cap. 33; part of that on Melancholy (ch. 33) from Alexander Trallianus, lib. i., cap. 16; and all that is valuable about Hydrophobia (ch. 271) is contained in Paulus Ægineta, lib. v., cap. 3. Almost the only point worthy of notice in the work is, that it is the first medical treatise in which any mention of distilled rose-water is to be found; it seems to be meant by the word *ῥοδόσταγμα*, in the ninety-seventh chapter. There are only two editions of this work. The first was published Argentor., 1568, 8vo., Gr. and Lat.; the editor was Jeremiah Martius, and the author's name is written *Nonus*. The last and best was edited by J. S. Bernard, and published after his death, in two vols. 8vo., Gotha and Amsterdam, 1794, 1795, Gr. and Lat., with copious and learned notes by the editor.

NONSUIT. If a plaintiff, having commenced a civil action at the common law of England, is guilty of any neglect or default in prosecuting such action according to the practice of the court in which it is brought, he is adjudged *not to follow* or pursue his remedy, and a judgment of non prosequitur, or *nonsuit*, is entered, upon which he becomes liable to pay costs to the defendant, and in antient times a fine to the king for making a false complaint. This is the general meaning of the term; but according to modern practice it has a more limited signification, the phrase non pros (non prosequitur) being now used to describe the consequence of most of those defaults on the part of the plaintiff which were formerly comprised under the general term nonsuit. Antiently, when it was the practice for the jury to stand at the bar of the court to hear the evidence on a trial, they withdrew, after the judge had summed up the proofs, to deliberate upon their verdict. On coming back to the bar to deliver their verdict, and before they delivered it, the plaintiff was called in order to be ready to answer the fine which became due to the king for his false complaint, in case the decision was against him; and if, upon this call, he did not appear, no verdict could be given upon the evidence either for the plaintiff or the defendant, and the former was said to be nonsuited. Hence arose a practice that when the plaintiff perceived that the evidence given was insufficient to support his action, and that the verdict would probably be against him, he voluntarily withdrew himself, and did not appear when called; the consequence of which was a nonsuit, which was less disadvantageous to him than a verdict for the defendant, as it did not preclude him from bringing a new action. This practice led to a further innovation upon the antient proceeding, and it has long been the usual course for the judge to order the plaintiff to be called, or, in other words, to direct a nonsuit, if, upon the whole of the case in support of the action, he is of opinion that there is no evidence upon which the jury would be justified in finding a verdict for the plaintiff. In consonance to the antient practice however, by which the plaintiff might in all cases appear when called to answer for his fine, and so prevent a nonsuit, he cannot at the present day be *compelled* to be nonsuited, and therefore he may, if he pleases, insist upon the evidence being left to the decision of the jury. It is to this practice of calling the plaintiff, when his evidence, as delivered in court, is insufficient to support his action, that the term nonsuit is now restricted. The consequences of a nonsuit are, that the jury are discharged from finding a verdict, and the plaintiff pays the costs of the suit; but he is still at liberty to commence a new action against the defendant upon the same matter, if he should afterwards be provided with more complete evidence.

Besides the judgment of nonsuit, the judges of the courts of record at Westminster are authorised by stat. 14 Geo. II., c. 17, to give judgment *as in case of a nonsuit*, where the plaintiff has made default in bringing an issue to be tried according to the course and practice of the said courts.

NONTRONITE—*Silicate of Iron.* This mineral occurs in small nodules imbedded in an ore of manganese. Its colour is pale or greenish-yellow. Fracture earthy. Dull. Opaque. Unctuous to the touch and very tender. It is found in the department of Dordogne in France, in the arrondissement of Nontron.

Analysis by Berthier:—Silica, 44; peroxide of iron, 29; alumina, 3·6; magnesia, 2·1; clay, 1·2; water, 18·7.

NOODT, GERARD, born at Nimwegen in 1647, studied first in his native town, and afterwards at Leyden, Utrecht, and Franeker, where he took his degree in law. He distinguished himself as a jurist, and was made professor of law successively at Franeker, Utrecht, and at Leyden. He studied and taught jurisprudence in an enlightened and philosophical spirit. Averse from dogmatism, he readily acknowledged his ignorance on questions which he could not solve. He was well acquainted with the Roman Jurists, as well as with the other Roman writers, especially the historians, upon whose model he formed his own Latin style, which is remarkably pure. His chief works are:—1. 'Probabilium Juris Civilis Libri iv.;' 2, 'De Jurisdictione et Imperio Libri ii.;' 3, 'Ad Legem Aquiliam Liber Singularis;' 4, 'De Fœnore et Usuris Libri iii.,' in which he contends that usury is not contrary to the natural law, and is not forbidden by Divine law. The author traces the history of the Roman law on this subject. 5, 'Diocletianus et Maximianus, sive de Transactione et Pactione Criminum Liber Singularis,' in which he refutes the opinion of some, that a transaction or compromise in capital or felonious criminal cases was allowed by the Roman-law; 6, 'Observationum Libri Duo, in quibus complexa Juris Civilis aliorumque Veterum Scriptorum Loca aut illustrantur aut emendantur;' 7, 'De Usufructu Libri ii.;' 8, 'Ad Edictum Prætoris de Pactis et Transactionibus Liber;' 9, 'Julius Paulus, sive de Partus Expositione et Nece apud Veteres Liber,' in which he maintains that the Roman laws gave to parents the power of exposing or putting to death their infant children, and that this power was only taken away by the emperors Valentinianus, Valens, and Gratianus. This assertion being combated by Bynkershoek, Noodt replied to him in his 'Amica Responsio,' in which he confirms his former assertion by new arguments and authorities. 10, 'De Causis Corruptæ Jurisprudentiæ; 11, 'De Jure Summi Imperii et Lege Regia Dissertatio;' 12, 'De Religione ab Imperio Jure Gentium Libera.' These last dissertations were translated into French by Barbeyrac, and published under the title of 'Du Pouvoir des Souverains et de la Liberté de Conscience,' Amsterdam, 1707. 13, 'Commentarius ad Digesta, seu Pandectas,' which he continued to the 27th book, when he was stopped by death. Noodt died at Leyden in 1725. He ranks among the most distinguished jurists of modern times; and his works display a deep acquaintance with the law and social state of the Romans. His works have been collected and published in 2 vols. fol., Leyden, 1735, with a biography of the author by Barbeyrac.

NOOTKA SOUND is a large bay on the western shores of the island of Quadra and Vancouver, which is on the north-west coast of North America. But Humboldt, in his work on Mexico, states that, according to the survey made by the Spaniards Espinosa and Cevallos, this bay is not in the large island, but in a smaller one, which is separated from Quadra and Vancouver Island by the narrow strait of Tasis. This bay extends in a north-north-eastern direction about ten miles inland between 49° 30′ and 49° 40′ N. lat. and between 127° and 128° W. long., and has a wooded island in its middle. It branches off into several smaller bays or coves, one of which, where Capt. Cook remained some time on his last voyage, and which was called Friendly Cove, has a narrow entrance, but makes a safe harbour, being bounded on all sides by high and wooded land. This cove is near the entrance of the bay. The Spaniards formed a small settlement here in 1789; but as their claims to the country were disputed by the English, they gave it up to them. The English government maintained this settlement for some years, but at last abandoned it. On the shore of the island the land may be considered as low compared with other parts of the north-western coast of America. It presents an alternation of rocky cliffs and sandy beaches; and at the back of the shores there are many detached rocks which are covered with pine-trees. The surface of this low country is very uneven; and at no great distance from the sea it is bounded by a compact mass of rugged mountains, whose summits are covered with snow. (*Voyages* of Cook, Dixon, Meares, and Vancouver.)

NORD, a department in the north (as its name implies) of France, stretching along the Belgian frontier. It is bounded on the north-east and east by Belgium, on the south-east by the department of Aisne, on the south and south-west by those of Somme and Pas de Calais, and on the north-west by the German Ocean. Its form is irregular. Its greatest length is from west-north-west (Gravelines on the banks of the Aa) to east-south-east, near the source of the river Petite Helpe, 114 miles; its greatest breadth, at right angles to the length, is from the neighbourhood of Honnecourt to that of Condé, both on the Escaut, 39 miles. The area is estimated at 2199 square miles. In size it is rather below the average of the French departments, and is about equal to the two English counties of Stafford and Derby. The population in 1831 was 989,938, in 1836 it was 1,026,407, showing an increase in five years of 36,469, or nearly 3·7 per cent., and giving above 466 inhabitants to a square mile. In amount and density of population it surpasses the average of the French departments almost in the proportion of three to one, and far exceeds every other department except the metropolitan department of the Seine, by which it is surpassed in both these respects. It is rather below our own county of Lancaster in the number of its inhabitants, and the population is scarcely half as dense as in the latter county. Lille, the capital of the department, is in 50° 37′ N. lat. and

3° 4′ E. long., 125 miles in a direct line east by north of Paris, or 140 miles by the road through Peronne, Cambray, and Douay, or by that through Amiens and Arras.

The coast of this department extends from Gravelines, at the mouth of the Aa, 19 or 20 miles in a tolerably straight line east by north to the boundary of France and Belgium. It is skirted by broad sands, which stretch out a mile or a mile and a half from the shore, and by a second line of sands lying a short distance off the coast, which form the seaward shelter of the roads of Dunkerque. Dunkerque is the principal port in the department; the mouth of the Aa forms the port of Gravelines, which is however a place of little trade.

The department is generally flat. The hills which form the prolongation westward of the heights of Ardennes, and in which the Escaut and the Sambre have their source, skirt the southern boundary from Avesnes to Cambray; and a branch from these heights bounds on the west the valley of the Sambre, to between Bavay and Maubeuge. A line of low sand-hills or downs skirts the coast. The high ground about Cassel, between the valleys of the Lys and the Yser, is remarkable for the view which it commands: thirty-two towns can be counted, and a part of the ocean, fifteen miles distant, can be seen. This extensive prospect is however owing rather to the general flatness of the surrounding country than to any great elevation of the ground.

The western, or rather north-western side of the department, from the coast to Hazebrouck and Bailleul inland, is occupied by the supracretaceous formations. The country north of Lille is occupied by the same series. The rest of the department, with the exception of a small portion lying east of a line drawn through Bavay and Avesnes, which portion is occupied by the granite and slate rocks, is included in the great chalk district which encircles the Paris basin.

The mineral treasures of the department are considerable, though it affords little metallic ore except iron, which is obtained at Glajon, Trélon, Ohaim, and Féron, in the arrondissement of Avesnes, near the eastern extremity of the department, on the Belgian frontier. There are six or eight coal-pits in the Valenciennes coal-field, which is a prolongation of the great coal-field of Belgium. Altogether, in 1834, 4233 men were employed in the mines, and 1331 in the connected works; the chief pits are at Anzain or Anzin near Valenciennes. [ANZIN.] The quantity of coal raised in the department in 1834 was 527,033 English tons, and in 1835, 531,605 tons; a quantity far exceeding that raised in any other department except that of Loire. The coal is used in the departments of Nord and Pas de Calais, and at Paris; its transport is facilitated by the Escaut, the Scarpe, the canal of St. Quentin, and the rivers Oise and Seine. (*Parliamentary Papers; Statistical View of Mining Industry in France*, presented by G. R. Porter, Esq., to the British Association for the Advancement of Science.) Steam-engines are used for draining the mines. There are considerable beds of peat, and there are beds of fossil ashes that are used for manure. Marble and sandstone suitable for paving are quarried on a large scale; and potters' earth is dug as well as brick earth. There were in 1834 seventeen establishments for making iron.

The principal rivers are the Aa, the Yser, the Escaut, and the Sambre, with their respective tributaries. The Aa has no part of its course within the department; it skirts the south-western border for about 16 or 17 miles, through the whole of which distance it has been made navigable. The Yser rises just within the department of Pas de Calais, and crosses the department of Nord, in a north-east direction, into Belgium, after entering which it becomes navigable, and flows into the North Sea at Nieuport. The Yser receives the Peene, a small stream, near the town of Wormhout. The Lys, after skirting the southern border near the town of St. Venant (Pas de Calais), enters the department, which it crosses in a north-east direction, sometimes within the boundary, sometimes upon it, until it finally quits it to enter Belgium, in which, after a course of many miles, it joins the Escaut. That part of its course which is connected with this department may be estimated at about 35 miles, for the whole of which it has been rendered navigable. It receives on the right bank the Clarence, the Lawe, and the Deule. The Lawe is navigable, and the Deule is incorporated in the line of the navigation from the Scarpe to the Lys. The Deule receives the Marque.

The Scarpe rises in the department of Pas de Calais, enters this department above Douay, and crosses it in a north-east direction to the border of Belgium, on which border it joins the Escaut. Its course in this department is about 26 or 27 miles. It has been made navigable in the upper and the lower part of its course, and these two portions are connected by a line of canal navigation nearly parallel to the river.

The Escaut rises in the department of Aisne, and enters that of Nord a short distance from its source. It runs, in a winding course of 16 miles, northward to Cambray, where it becomes navigable, and then runs 18 miles north-east past Bouchain and Valenciennes to Condé; at Condé it turns north-west, and runs 7 miles to the junction of the Scarpe, after which it enters Belgium. Above the point where the navigation commences, the canal of St. Quentin follows the course of the stream, and unites with the navigation at Cambray. The Escaut receives the Sensée on the left bank at Bouchain, the Selles and the Ecaillon on the right bank, between Bouchain and Valenciennes, and the Haine on the right bank at Condé. The Honelle falls into the Haine, and the Hougneau into the Honelle. None of these tributaries are navigable.

The Sambre rises in the department of Aisne, and entering this department a few miles from its source, runs 30 miles north-east past Landrecies (where the navigation commences) and Maubeuge into Belgium. It receives on the right bank the Grande Helpe and the Petite Helpe, neither of which is navigable.

The department has a number of canals. The canal of Bourbourg commences in the Aa, a little above Gravelines, and runs parallel to the coast past the town of Bourbourg as far as Dunkerque. The canal from Dunkerque to Furnes continues the line of navigation into Belgium. Another line from the Aa to Furnes is formed by the canal of La Haute Colme, which extends from Watten on the Aa to Bergues, and the canal of La Basse Colme, which extends from Bergues to Furnes. These two lines of canal are connected by a short canal from Dunkerque to Bergues.

The canal of La Nieppe commences in the navigation of the Lys, near Aire, and runs east by north until it is joined by a small canal from Hazebrouck; the communication is continued by the canal of La Bourre into the navigation of the Lys, between St. Venant (Pas de Calais) and Estaires. A canal of considerable length passes by Roubaix.

The canal of the Deule, the most extensive in this part of France, commences in the Lys, between Armentières and Warneton, and passes by Lille and Haubourdin to the Scarpe at Douay; its whole length is about 40 miles, part of which is in the department of Pas de Calais. It is divided into the Basse or Lower Deule, between the Lys and Lille, and the Haute or Upper Deule, between Lille and Douay. It receives a canal, cut from the Lys at or below Aire, and carried past La Bassée, from which it takes its name, 'the Canal of La Bassée.' Only a small portion of this canal is in the department of Nord.

The canals of Raches and Le Decours connect the two navigable portions of the Scarpe. The canal of the Sensée follows the line of the river Sensée from the Scarpe near Douay to the Escaut near Bouchain.

The canal of St. Quentin, part of the line which connects the Somme and the Oise with the Escaut, enters the department on the south side, and following the course of the Escaut, opens into that river at Cambray. The canal of Condé commences in the Escaut at Condé, and runs eastward along the valley of the Haine to Mons in Belgium. The canal from the Sambre to the Oise has part of its course in this department.

The length of the navigation, both of the rivers and the canals, in this department, is thus given in the official statements published by the government (*Statistique de la France*):—

Rivers.	Miles
Aa	19
Lys	34
Lawe	1
Scarpe	33
Escaut	38
Sambre	35
River navigation .	160

Canals.	Miles.
Canal of Bourbourg	13
„ from Dunkerque to Furnes	9
„ of La Haute Colme	15
„ of La Basse Colme	9
„ from Dunkerque to Bergues	5
„ of La Nieppe	6
„ of Hazebrouck	4
„ of La Bourre	5
„ of Roubaix	14
„ of La Deule	30
„ of La Bassée	1
„ of La Sensée	17
„ of St. Quentin	16
„ of Condé	4
„ from the Sambre to the Oise	7
„ of Préavén	1
Canal navigation	156

The number of Routes Royales, or government roads, is fifteen: their aggregate length is nearly 363 miles, of which 4 or 5 miles are unfinished, 34 out of repair, and 325 in good repair. The principal roads are those from Paris by Cambray and Douay to Lille, and thence to Ostend; from Paris by Amiens and St. Pôl to Hazebrouck and Dunkerque; and from Paris by Laon to Avesnes, and thence to Mons and Brussels. There are other roads from Paris to Lille; one through Amiens and Arras, and another through Amiens, St. Pôl, and Bethune. A second road from Paris to Dunkerque runs along the coast through Calais and Gravelines. A road from Paris to Valenciennes branches from the road to Avesnes and Brussels at Marle, and runs by Landrecies and Le Quesnoy. A road runs from Lille to Bailleul and Cassel, and thence to Dunkerque; and another to Tournay and Brussels in Belgium. Roads run from Douay to Lens and Arras (Pas de Calais) and to Bouchain; from Cambray to Valenciennes, to Amiens (Somme), Arras (Pas de Calais), and Mézières (Ardennes); from Valenciennes to Tournay and Mons in Belgium; and from Dunkerque and Bergues to Ypres, Menin, Courtray, and Gand, all in Belgium. Of the Routes Départementales, 150 miles were in repair and 27 miles unfinished on January 1, 1837. The bye-roads and pathways had at the same period an aggregate length of about 6300 miles.

This abundance of the means of communication is at once the indication and support of the manufacturing industry of the department. Several of the canals have been made since the general peace of 1815. The greater part of them are less than 5 feet deep. The canals and rivers had, when M. Dupin published his 'Forces Productives de la France' (1827), 66 locks or sluices. In the length of navigation the department exceeds the average of the departments in the proportion of between 4 and 5 to 1; and in the length of the government roads, in the proportion of about 5 to 3. If the comparatively smaller area of the department be taken into the account, the superiority will appear yet greater.

The agriculture of the department is far above that of the rest of France. The soil does not possess any superior excellence, and it has been necessary in many places to overcome by art the difficulty which it presented; in some parts it is marshy, as in the neighbourhood of Dunkerque, where draining has been very successfully practised; in other parts it is occupied by peat mosses; in others it is sandy or clayey: a considerable portion however is a rich loam. Of the whole surface of the department, which may be estimated in round numbers at 1,365,000 acres, nearly two-thirds (890,000 acres) are under the plough. The principal grain crops are wheat and oats, the produce of both of which exceeds, in the proportion of about three to one, the average of the French departments. Rye and maslin (or mixed corn) are also cultivated very extensively: the produce here is double that of the average of the departments, and the preponderance in barley and potatoes is as great.

The crowded population renders however this great productiveness insufficient for the supply of the inhabitants: corn is brought from the neighbouring departments of Aisne, Somme, Ardennes, Meuse, and others. A good deal of the barley is used for malting; as, from the department producing no wine, beer is the common beverage. A considerable quantity of gin or other corn spirit is distilled. The rotation of crops is regulated with considerable skill, and in some cases two crops are obtained in the year. Night-soil and lime are principally employed for manure. Gypsum would be used but for the heavy cost of conveyance from Paris, where the nearest quarries are situated.

The grass-lands are extensive, nearly 240,000 acres being thus occupied, chiefly in the eastern and western parts of the department. The artificial grasses are cultivated in great perfection; the trefoil is especially fine, producing a large seed, and yielding an unusual quantity of oil. Lucerne, sainfoin, peas, beans, turnips, carrots, beet-root, and cabbages of different kinds are also cultivated. The oleaginous grains, cole-seed, linseed, hemp and poppy seed, are extensively cultivated, and there are numerous oil-mills throughout the department. There were, in 1827, about 200 windmills for the expression of oil in the neighbourhood of Lille alone: in the whole department there were nearly 500 windmills and above 30 water-mills used for the same purpose. Of late years steam-mills have been employed.

Hops and tobacco are objects of great attention: the growth of the latter has suffered much from the restrictions laid upon it. About 40,000 acres of ground are occupied by orchards and gardens. Apples, pears, and nuts are grown; and the cultivation of flowers is attended to as much as in Holland.

The number of horses is very considerable, and exceeds the average of the French departments in the proportion of three to one. They are large and strong, and the breeding of them is an important object with the farmers of several districts. The number of cows and heifers is also very great; they are excellent milkers, and the dairies of the department produce much butter and cheese, the former of excellent quality. Bulls and oxen are by no means numerous; they are not so commonly employed in agricultural labour as in many other parts.

The growth of wool is considerable, being nearly double the average produce of the French departments. The sheep are chiefly of native breeds, and produce a long and tolerably fine fleece. Pigs are common. Poultry and water-fowl are abundant. Bees are kept chiefly in the south of the department. The rivers and canals furnish abundance of fish, and the coast-fishery, especially of herrings, is considerable. The woodlands are altogether insufficient for the supply of the department. Timber-trees are grown along the roads and in the hedgerows or other fences. Coal is generally used as fuel; it is procured partly from the coal-pits of the department, and partly from Belgium.

The superior agriculture of this district is ascribed by M. Dupin to the early emancipation of the peasantry from the feudal subjection and its attendant oppressions, to which the peasantry of other parts were subjected. The dukes of Bourgogne, sovereigns of the Low Countries, to which a considerable part of this department appertained, were in general enlightened and generous princes. The country possessed its 'states,' by which taxation was regulated and municipalities were established and encouraged. The effect of these immunities is even yet perceptible in the difference that exists in the social state of the arrondissements of Lille and Douay, which were under the Burgundian sway, and those of Cambray and Avesnes. The former are distinguished by small compact farms (for the peasantry are mostly occupiers if not owners of land), few fallows, and abundant and varied crops: in the latter, farms are larger, fallows more frequent, crops less varied and less abundant. The peasantry of the former are a quiet steady people, obedient to the laws, little given to change, and distinguished by their moral deportment. Few suffer from abject poverty, except the aged and the sick. They usually combine something of manufacture with their agricultural pursuits; and the spare time of the farmer and his wife and children is employed in spinning, linen-weaving, flax-dressing, lace-making, or the manufacture of tobacco.

The department is divided into seven arrondissements, as follows:—

Name.	Situation.	Sq. Miles.	Pop. 1831.	Pop. 1836.	Communes.
Lille	Central	338	294,541	309,349	131
Douay	Central	183	92,750	94,573	67
Dunkerque	W.	279	95,571	96,858	60
Hazebrouck	Central	268	104,007	105,879	53
Avesnes	E.	541	127,353	132,325	152
Cambray	S.	346	152,444	157,362	117
Valenciennes	Central	244	123,272	130,061	80
		2199	989,938	1,026,407	660

The number of cantons, or districts under a justice of the peace, is sixty.

In the arrondissement of Lille are—Lille (pop. in 1826, 69,860; in 1831, 69,073; and in 1836, 72,005), and Haubourdin, on the canal of the Deule; La Bassée, on the canal of La Bassée; Armentières (pop. in 1831, 5943 for the town, 6338 for the whole commune); Warneton and Comines, on the Lys; Tourcoing (pop. 8094 town, 17,973 commune); Roubaix (pop. 12,443 town, 18,187 commune); Lannoy, and Séclin, near Lille. Of some of these an account is given elsewhere. [ARMENTIERES; LILLE; ROUBAIX; TOURCOING.] Haubourdin is a small place, with a population of 1900 in the town itself, or 2151 in the whole commune. La Bassée was formerly a fortress of considerable strength, but is now an open town. The inhabitants (who amounted in 1831 to 2480) carry on considerable trade in corn, cattle, and linen. Peat is dug in the neighbourhood. Comines, on the banks of the Lys, is partly in France and partly in Belgium. The townsmen of the French part (pop. 2966 town, 5316 commune) manufacture tape. Philippe de Comines, one of the best historians of the middle ages, was born here. Séclin had, in 1831, a population of 2258 for the town and 2829 for the whole commune. The villages of Los or Loos, and Wazemmes, close to Lille, are busy manufacturing places; the first has a large house of correction, in which are 1500 prisoners; the second has a population of 8000 or 9000.

In the arrondissements of Douay and Valenciennes are—Douay (pop. in 1831, 18,793; in 1836, 19,173), St. Amand (pop. 4850 town, 8734 whole commune), and Marchiennes, on the Scarpe; Orchies, in the country north-west of the Scarpe; Valenciennes (pop. in 1831, 18,953; in 1836, 19,499), Bouchain, and Condé (pop. 3498 in the town, 5350 in the whole commune), on the Escaut; Arleux and Lecluse on the Sensée, and Haspres on the Selles. The more important of these places are described elsewhere. [AMAND, ST.; BOUCHAIN; CONDE; DOUAY; VALENCIENNES.] Marchiennes had in 1831 a population of 2355 in the town, or 2505 in the whole commune. The townsmen are much engaged in the cultivation of fruit-trees and asparagus. Orchies is a busy town, with 2195 inhabitants in the town, or 3425 in the whole commune. They are engaged in brewing, distilling, tanning, seed-crushing, and the manufacture of soap, hats, and pottery. Haspres had, in 1831, 2726 inhabitants. The village of Anzain or Anzin, near Valenciennes, has important coal-works. [ANZIN.] Famars was the site of a Roman post, 'Fanum Martis,' of which the remains are discernible on a hill.

In the arrondissement of Dunkerque are—Dunkerque (pop. in 1826, 24,517; in 1831, 24,937; and in 1836, 23,808), on the sea; Gravelines (pop. 4193) and Watten, on the Aa; Bourbourg, on the canal of Bourbourg; Bergues (pop. 5962) and Hondtschoote, near Dunkerque; Ekelsbeke, on the Yser; and Wormhout, on the Peene. [BERGUES; DUNKERQUE; GRAVELINES.] Bourbourg (pop. 2378) was antiently a place of strength, but its fortifications were demolished after the peace of the Pyrenees. Some trade in corn is carried on. Wormhout is a post-town, with a population of more than 4000.

In the arrondissement of Hazebrouck are—Hazebrouck (pop. in 1826, 7644; in 1831, 7522, of whom 4748 were in the town; and in 1836, 7674) and Cassel (pop. 2974 town, 4234 commune), on the road from Paris to Dunkerque; Steenvoorde, near Cassel; Bailleul (pop. 6015 town, 9823 commune), near the Belgian frontier; Merville, Estaires, and La Gorgue or Gorgne, on or near the canal of Bourre. BAILLEUL, CASSEL, and HAZEBROUCK are described elsewhere. Steenvoorde had in 1831 a population of 1789 in the town, or 4022 in the commune; the inhabitants tan leather and manufacture woollen and linen yarn. At Merville (pop. 5864 town, 5943 commune) and Estaires (pop. 2969 town, 6504 whole commune) table-cloths and other linens are manufactured. Estaires is probably on the site of Minariacum, a town mentioned in the 'Itinerary' of Antoninus; the townsmen of La Gorgues or Gorgnes (pop. 3225) are engaged in the same manufacture.

In the arrondissement of Avesnes are—Avesnes (pop. in 1826, 3311; in 1831, 3166; in 1836, 3030) and Liessies, on the Grande Helpe; Landrecies, Berlaimont, Pont-sur-Sambre, and Maubeuge, on the Sambre; Le Quesnoy, near the Ecaillon; Bavay, near the Hougneau; and Solre le Château, near the Belgian frontier. [AVESNES.] Landrecies is in the midst of meadows: it is a place of strength, and has stood several sieges. The inhabitants (pop. 3726) carry on trade in cattle and cheese. The navigation of the Sambre commences here. Berlaimont had a population in 1831 of 1914 town, 2068 whole commune. Maubeuge (pop. 6240) is a fortified town. It was conquered by Louis XIV., who retained it by the treaty of Nimeguen. The inhabitants are chiefly engaged in the manufacture of iron goods and nails, and there is a government manufactory of fire-arms. There are coal-pits and slate and marble quarries in the neighbourhood. Le Quesnoy (pop. 3191) has a handsome town-hall. Its barracks will hold 5000 men. Louis XIV. founded an extensive military hospital here. Bavay (pop. 1635) was Bagacum, the chief town of the Nervii. Under the Roman dominion it was a town of importance, being at the convergence of several roads, and was adorned by a circus, an aqueduct, and other buildings. Solre-le-Château (pop. 2103 town, 2477 commune) manufactures lace and leather, and trades in wool and flax.

In the arrondissement of Cambray are—Cambray (pop. in 1826, 17,031; in 1831, 14,510 for the town, or 17,646 for the commune; and in 1836, 17,846) and Honnecourt, on the Escaut; Le Cateau or Château Cambresis (pop. 5814 town, 5946 commune), on the Selles; and Solesmes, between the Selles and the Ecaillon. [CAMBRAY; CATEAU, LE.] The inhabitants of Solesmes manufacture soap, starch, and leather.

The population, where not otherwise specified, is that of the whole commune, and according to the census of 1831.

The manufactures of this department are varied and important. Wool-combing, the spinning of linen, cotton, and woollen yarn, and the manufacture of bleached and unbleached linens of various degrees of fineness, of printed and other cottons, of handkerchiefs, cotton velvet, bed-ticking, table-cloths, and woollen cloths, are carried on with great activity. Various pigments, soft-soap, drawing-pencils, toys, and turnery are manufactured. Distilleries of corn spirit, refining-houses for sugar and salt, breweries, dye-houses and bleach-grounds, iron-works, glass-houses for bottle and window glass, paper-mills, brick-yards, rope-walks, tan-yards, curriers'-shops, saw-yards for marble, &c., are numerous. The manufacture of beet-root sugar is also extensively carried on, and there are government establishments for casting cannon, making small-arms, refining saltpetre, and manufacturing snuff.

The department constitutes the diocese of Cambray or Cambrai, the bishop of which is a suffragan of the archbishop of Paris. It is in the jurisdiction of the Cour Royale of Douay, and in the circuit of the Académie Universitaire of that city. It is in the sixteenth military division, the head-quarters of which are at Lille. It has the fortresses of Gravelines, Dunkerque, Lille, Douay, Cambray, Valenciennes, Condé, Maubeuge, and Avesnes. It returns twelve members to the Chamber of Deputies.

In respect of instruction it is above the average of the French departments, but is by no means equal to those of the east part of France. The number of young men enrolled in the military census of 1828-9 who could read and write was 45 in every 100, the average of France being under 40. The department however holds a high rank in the scale of intellectual culture among the educated classes: it is pre-eminent for the number of its learned societies. Lille has a Royal Society of Science; Douay, a Royal and Central Society of Agriculture, Science, and Art, a Society of the Friends of Industry, a Society of the Friends of the Arts, and a Society of Medicine, Surgery, and Pharmacy; and Cambray has a Society of Emulation. There were in 1829, a Collège Royale, with about 300 students; 15 communal high schools, with about 1500 students; 4 private schools, with more than 200 scholars; 21 boarding-schools for boys, with above 600 scholars; and fifty-three girls' boarding-schools, with about 3000 scholars. There were also 14 schools under the direction of the Frères de la Doctrine, with about 3200 scholars; 12 schools of mutual instruction, with 1200 scholars; and 1117 primary schools, with 62,000 scholars: making a total of 1237 institutions of all kinds for educational purposes; with upwards of 72,000 persons under instruction.

The press is very active: fifteen newspapers or other periodicals are published in the department, viz. four at Lille, three at Dunkerque, two each at Douay, Cambray, and Valenciennes, one at Hazebrouck, and one at Avesnes; besides which 250 works on morals, sciences, and literature are published on the average yearly

There are in the department 46 almshouses or hospitals, with yearly revenues or receipts amounting to 1,350,000 francs, or 54,000*l.*, which provide for 900 sick persons, 2800 old people, and 1400 orphans. A sum of 273,000 francs, or about 11,000*l.*, is set apart yearly from the revenue of the department for the maintenance of about 3500 foundlings, and the communes set apart nearly 1,000,000 francs, or 40,000*l.*, to support above 600 *bureaux de bienfaisance*, or 'charity houses,' which afford relief to 150,000 persons. It may be observed however that the large proportion of persons receiving alms or relief (nearly 160,000, or almost 1 in 6 of the whole population) furnishes a considerable drawback to the pictures which our authorities draw of the prosperity of the department

The department was antiently included in the territory of the Morini, the Atrebates, and the Nervii, all Belgian nations. The Morini dwelt between the Lys and the sea; the Atrebates between the Lys and the Escaut; and the Nervii east and north of the Atrebates. In the Roman division of the Gallic provinces these nations were all included in Belgica Secunda. There were soveral Gallic or Roman towns within the limits of the department, some of them of importance. Castellum Morinorum, 'the fortress of the Morini,' noticed in the 'Itinerary' of Antoninus, was on the site of the modern Cassel; and Minariacum, another town of the same people, on that of the modern Estaires. Origiacum, a town of the Atrebates, mentioned by Ptolemy, was probably the modern Orchies; and Camaracum and Bagacum, two important towns, the latter the chief town of the Nervii, may be recognised in the modern Cambray and Bavay. The Hermonacum of the Theodosian Table, was probably near Le Quesnoy; the Fanum Martis of the 'Notitia' may be recognised in the modern Famars; and the Pons Scaldis of Antoninus was between the modern Valenciennes and Condé. The Locus Quartensis of the 'Notitia,' may be recognised in the modern Quarte, a village on the bank of the Sambre; and the Duronum of Antoninus and the Theodosian Table was at or near a place called Estrun-Cauchie, on the Petite Helpe, near Avesnes.

On the downfall of the Roman empire, the Franks possessed themselves of this part of France, and it is probable that a considerable portion of the department was comprehended in the hereditary dominions of Clovis and his early ally Ragnacaire. During the prevalence of the feudal system one part was comprehended in the county of Flanders, another in that of Hainaut (both established in the ninth century), and another part in Le Cambresis, or territory of Cambray. These counties of Flanders and Hainaut, having come into the hands of the dukes of Burgogne, passed with other portions of their inheritance to the Spanish branch of the House of Austria, which also acquired possession of Le Cambresis. The districts included in this department were conquered by Louis XIV., and formed by him into the military government or province of La Flandre Française, or French Flanders, having Lille for its capital. This country was the scene of the later campaigns of the Duke of Marlborough and Prince Eugene, who took Lille (A.D. 1708), Douay (A.D. 1710), and Bouchain (A.D. 1711), after forcing the lines which the French had constructed to cover the frontier. After the secession of the English from active participation in hostilities (A.D. 1712), Prince Eugene with the other allies took Le Quesnoy and besieged Landrecies; but Marshal Villars, the French general, having gained a victory at Denain near Valenciennes, and taken Marchiennes, obliged Eugene to raise the siege. Villars then retook Douay, Le Quesnoy, and Bouchain; hostilities were however soon brought to an end. In the campaigns of 1793 the department was again the seat of war; the camp of Famars was stormed; Valenciennes, Condé, and Le Quesnoy were taken by the allies; and Dunkerque, Cambray, and Bouchain were besieged or menaced, but in vain. In the campaign of 1794 the allies besieged and took Landrecies, and threatened Cambray, Douay, and Bouchain. Pichegru and Jourdan however, advancing from Lille and Maubeuge, defeated them in several encounters, and retook Condé, Valenciennes, Landrecies, and Le Quesnoy without resistance. In 1815 Louis XVIII., flying before Napoleon, made a short stay at Lille, and in the subsequent advance of the allies into France, they crossed this department, the English passing through Bavay. Cambray was taken by escalade, and Le Quesnoy by capitulation.

P. C., No. 1009

NORDBERG, GEORGE, born at Stockholm in 1677, studied at Upsala, took holy orders, and in 1703 was appointed almoner to the Swedish army under Charles XII., then at Thorn in Prussia. He followed Charles XII. into Poland, Saxony, and Russia, and in 1807 was made chaplain to the king. Being made prisoner by the Russians at Pultawa in 1709, he was sent into Russia together with Count Piper, but was exchanged in 1815, when he again joined Charles XII. at Lund in Scania. Not long after however Nordberg was appointed incumbent of the parish of St. Clair and Olaüs, at Stockholm, where he spent the remainder of his life. After the death of Charles XII. he was commissioned by Queen Ulrica Eleonora to write his history under her own inspection, and the MS. was afterwards submitted to the revision of a royal commission. The work was published at Stockholm in 1740, 2 vols. fol., and translated from the Swedish into French, and published at the Hague, 'Histoire de Charles XII., par M. de Nordberg 3 vols. 4to., 1742. The documents from which Nordberg compiled his history are authentic, and he had himself witnessed many of the facts which he relates, and which he had noted down in his journal. His work is therefore a book of authority. The style however is heavy and diffuse. Nordberg speaks slightingly of Voltaire's 'History of Charles XII.,' which is written in a more amusing style, but is inferior to the work of Nordberg in point of correctness. Nordberg died at Stockholm, in 1744.

NORDEN, FREDERIC LOUIS, born at Glückstadt in Holstein, in 1708, was educated for the navy, and entered the naval school of cadets at Copenhagen. He made great progress in mathematics, and became a very expert draughtsman. In 1732 he obtained the rank of lieutenant in the Danish navy; and soon after, King Christian VI., having been made acquainted with his ability in drawing, gave him permission to travel abroad for his improvement, and allowed him a pension for the purpose. Norden went to Italy, where he spent about three years, after which he was commissioned by the king to proceed to Egypt for the purpose of examining the antient monuments of that country. He arrived in Egypt in July, 1737; and having visited Alexandria and Cairo, he proceeded up the Nile as far as Derr in Nubia, after which he retraced his steps towards Alexandria, where he reimbarked for Europe, in May, 1738. On his return to Copenhagen he was well received by the king, and was made captain in the navy. In 1740 he proceeded to England to offer his services as a volunteer in the war against Spain. He sailed with an English squadron for South America, and returned to England in the autumn of 1741. On being made a member of the Royal Society of London he published in English a memoir on the colossal statues and other remains of antiquity at Thebes. He died at Paris, in September, 1742. His papers and drawings concerning Egypt were arranged by his friends and published in French, 'Voyage d'Egypte et de Nubie,' 2 vols. fol., Copenhagen, 1752-5. The first volume consists entirely of plates, being a series of maps of the course of the Nile from Cairo to Derr, and a succession of views of the scenery along the banks of the river, forming a kind of panorama of the Nile; besides plans and sections of the pyramids, temples, and other remarkable buildings. The second volume contains Norden's journal, which is written in a plain unpretending style. The editors have added a biographical notice of the author. Norden was the first traveller who explored Egypt as an artist, and his drawings gave the first tolerably correct idea of the stupendous monuments of that country. His work was translated into English, and published in London, in 2 vols. fol. Langlès published a new edition of the original French, in 3 vols. 4to., Paris, 1795-8, with corrections.

NORDHAUSEN, a Prussian town in the government of Erfurt, in the province of Saxony, is in 51° 30′ N. lat. and 10° 50′ E. long., on the south side of the Harz mountains, on the little river Zerze, and at the beginning of the celebrated tract called the Gulden Au, that is, the golden valley. It is an old-fashioned place, surrounded with walls and towers, and has seven gates. From the year 1220 till 1802, when it was united to the Prussian dominions, it was a free imperial city. It is built partly in the plain and partly on the declivity of a hill, and consists of the upper and lower towns. There are seven Lutheran churches, a gymnasium, some very well conducted girls' schools, an orphan asylum, three hospitals, and other useful institutions.

The inhabitants, 11,000 in number, manufacture very great quantities of woollen cloths, flannels, and lackered ware; they likewise make vitriol, aquafortis, and cream of tartar: the breweries are very extensive, and the distilleries produce annually 30,000 casks of brandy, and consume 300,000 bushels of corn. The oil-mills produce annually (according to Cannabich) 70,000 cwt. of rape oil and 2,600,000 oil-cakes. The tanneries are likewise important. The inhabitants derive great profits by fattening oxen and swine, most of which (6000 oxen and 30,000 swine) are exported. Besides the profitable export trade in the above articles, the trade in corn is very great, so that on the whole Nordhausen is a flourishing town. It is said that a tribe of gypsies are still living nearly in a savage state in the village of Friedrichslohra near Nordhausen. (Forsteman's *Urkundliche Geschichte der Stadt Nordhausen*; Müller's *Handbuch*, 4 vols. 8vo., 1836. This latter is a topographical dictionary of the Prussian dominion, which is always used in this work as authority for places in Prussia, being a book of official character.)

NORDLAND. [TRONDHIEM.]

NORDLINGEN. [SCHLESWIG.]

NORDSTRAND. [SCHLESWIG.]

NORE. [THAMES.]

NORFOLK, a maritime county of England, on the eastern coast. It is bounded on the south-east and south by Suffolk, from which it is separated in one part by the river Waveney, and in another part by the Little Ouse; on the south-west and west it is bounded by Cambridgeshire, and for a short distance on the west by Lincolnshire; on the north-west it is bounded by the Wash, which separates it from Lincolnshire; and on all other sides by the North Sea or German Ocean. Its form approximates to an oval, having its greatest length, from east by south to west by north, from Yarmouth to the neighbourhood of Wisbeach in Cambridgeshire, 67 miles, and the greatest breadth, from the neighbourhood of Thetford to the village of Blakeney, 42 or 43 miles. The area is estimated at 2024 square miles: the population in 1821 was 344,368; in 1831, 390,054, showing an increase in ten years of 45,686, or 13 per cent., and giving 193 inhabitants to a square mile. In area it is the fourth of English counties, being exceeded only by Yorkshire, Lincolnshire, and Devonshire; in amount of population the ninth; and in density of population the twenty-sixth. Norwich, the capital, is on the river Wensum, about 97 miles in a direct line north-east of London; 118 miles by the mail-road through Bishop's Stortford, Newmarket, Bury, Thetford, and Attleburgh, or 113 miles by the other mail-road through Chelmsford, Colchester, and Ipswich.

Coast-line, Harbours, &c.—The Norfolk coast commences at the æstuary of the Yare, and extends in a regular convex outline to the Wash. It is liable to continual encroachments from the sea, which, especially about Cromer, has gained much on it. It is for the most part low. Between Happisburgh (which is near North Walsham) and Weybourne, a village west of Cromer, are cliffs called the 'Mud Cliffs,' formed of diluvial matter, especially clay, with large masses of imbedded chalk. These cliffs rise in one part to the height of 50 or 60 feet (Mr. R. Taylor, in *Philos. Mag.* for 1824), but are generally much lower. Between the mouth of the Yare and the commencement of the cliffs is a low sandy coast skirted by sand-banks. The channel between these banks and the shore is known as Yarmouth Roads, and constitutes a safe anchorage, in some places of 10, 12, or 13 fathoms. In time of war, this roadstead is the usual rendezvous of the North Sea fleet; and at all times is frequented by the northern colliers in their way southward. West of the cliffs a low sandy or shingly coast succeeds, extending to St. Edmund's Point, at the entrance of the Wash. Along this coast are a line of sand-hills, or as they are locally termed 'meals,' or 'marum hills,' from the marum or marram (*arundo arenaria*) which grows on them. Some of these 'meals' are insulated at high-water. The sands by which Brancaster Bay in this part of the coast, is defended to seaward, render it tolerably safe anchorage, with a depth in some parts of 16 or 18 fathoms. At Hunstanton, near St. Edmund's Point, are cliffs nearly 80 feet high. The Wash is an æstuary, having extensive sand-banks dry at low-water, with channels of deeper water between them. The Ouse and the Nene both flow into it. The deeper water off the Norfolk coast is known as Lynn Well or Lynn Deeps. The coast on the Norfolk side of the Wash is low and marshy. There are a number of creeks and harbours on the Norfolk coast:—Yarmouth, Cley and Blakeney, Wells, Burnham, Brancaster, Thornham, Heacham, Snettisham, and Lynn.

Surface and Geological Character.—Norfolk contains no hills. The rivers flow through valleys of varying breadth, skirted by low rising grounds or uplands. The highest ground in the county is probably on the north-west side, where the chalk downs appear, extending north and south from near St. Edmund's Point to Castle Acre, between Lynn and Swaffham, where they sink beneath the marshy valley of the Nar, from which they again emerge and extend to Downham. This high ground subsides gradually toward the east, where the chalk sinks under the beds of diluvium (or alluvium, for our authorities are not agreed) which overspread a large portion of this county and the adjacent county of Suffolk; but on the west, toward the shore of the Wash, the chalk has a steeper escarpment. On this side the chalk-marl and green-sand crop out from beneath it; and beds of similar character to those of the Weald in the south-east part of England crop out from beneath these formations. The western part of the county is included in the great Fen district. The chalk has been found in many places in the eastern part of the county, beneath the diluvial beds. Near Cromer large portions of it have been washed away by the sea, and the point of 'Foulness' near that town has evidently been the site of a farther extension of the chalk towards the north-east; and some of the shoals which render the navigation of this coast so dangerous are formed of aggregated masses of ponderous chalk flints. This chalk is in some places dug for lime; and at Marham, west of Swaffham, are extensive chalk-pits, the chalk from which is sufficiently hard and dense to be used for building. Among the most curious fossils of the chalk are the flints called by Professor Buckland 'Paramoudræ;' they are commonly about three feet long, pear-shaped, and are found with the smaller end downwards.

The diluvial beds vary in their character. In the eastern part they are of gravel, sand, and clay, embodying in many places fragments of chalk, and containing a substratum of fossil shells, several feet in thickness, called 'crag-pit shells.' Many of these shells approach in their specific characters to the existing species of the neighbouring shores, while others belong to extinct species. Beds of alluvial gravel are found on the sides of the valleys which intersect this district. At Norwich and to the north and west of the city thick beds of sand and gravel are found resting on the chalk, with patches of alluvial clay and brick-earth interspersed. In the western parts of the diluvial districts large blocks or boulders of grey or greenish sandstone, distinguished by its peculiar fossils, are found in pits of the clay or marl which rests upon the chalk. This side of the county is however chiefly distinguished by sandy beds. The Suffolk word 'crag,' meaning gravel, has been adopted into geological science, and applied to beds of hard sand and gravel with fragments of shells, or more generally to the diluvium of this and the adjoining counties.

Chalk is dug for lime in many places; excellent sand for glass-making is procured between Snettisham and Castle Rising; some potters'-earth is found and excellent brick-earth; marl is dug in the valley of the Bure; and the Fen districts of the west furnish peat for fuel and manure.

Hydrography; Probable Changes of the Coast in Past Centuries.—The principal streams flow from the north-west part of the county, where the chalk occupies the surface. The Wensum or Wensom rises at Oxwich, in the neighbourhood of Fakenham, and after making a circuit past that town, flows south-east in a winding channel 45 miles to Norwich, 2 miles below which it joins the Yare. The Yare rises at Shipdam, between Watton and East Dereham, and flows eastward to the junction of the Wensom 25 miles. The united stream, to which some give the name of Wensom, and others of Yare, flows first towards the south-east and then towards the north-east 20 miles, till it expands into a large sheet of water called Breydon Water, 4 miles long and in some parts a mile broad, at the south-western extremity of which it receives the Waveney, and at the north-eastern the Bure; after receiving which it bends and flows 3 miles southward into the German Ocean. From the source of the Wensum, the real head, to the outfal of the river, is 74 miles.

The Waveney rises at Lopham, between Thetford and Diss, and flows first eastward and then north-eastward, past Diss, Harleston, Bungay, and Beccles, to its junction with the Yare, nearly 50 miles. The Bure rises in the northern part of the county, at Melton Constable, between Foulsham and Holt, and flows south-east past Aylsham 50 miles, to its junction with the Yare. These rivers receive several small tributary streams: the Taes joins the Yare near Norwich; and the Thurn, from the neighbourhood of North Walsham, joins the Bure.

In the lower part of their course, the Yare, Waveney, and Bure flow through flat marshy valleys, in which are considerable pools of water, locally designated 'broads' and 'meers.' The valley of the Bure, united with some adjacent vales, forms a wide tract of low land, interspersed with some insulated plots of higher ground called 'holms,' and containing a greater number of 'broads' than any other part of the county. Some of these are of considerable extent, as Filby Broad and Rollesby Broad, forming a winding sheet of water 3 miles long; Hickling Broad, 1½ miles long and as much broad, and others. One arm of the Thurn passes through this lowland tract to the sea near Winterton Ness.

The streams of the western side of the county belong chiefly to the system of the Ouse, which touches the border of the county near Littleport, a few miles below Ely, and flows northward 22 miles into the Wash below Lynn. The tide flows up to Denver near Downham, where it is arrested by sluices· it formerly flowed up much higher. This river is subject to a great swell or overflowing at the equinoxes, especially at the spring-tides of the autumnal equinox. It receives the Little Ouse, the Wissey, and the Nar. The Little Ouse rises at Lopham, in the same tract of swampy ground as the Waveney: it flows west to Thetford, where it receives the Thet from near Hingham, 22 miles long. It joins the Greater Ouse in the marshes near the border of the county. It is a slow stream, 35 miles long, and traverses a flat uninteresting country. The Wissey, or Stoke, is formed by the junction of two streams, which rise, the one between East Dereham and Swaffham, the other west of Hingham, and unite at Buckenham Tofts, north by west of Thetford. From their junction they flow westward past Stoke Ferry into the Ouse near Denver Sluice. The length of the Wissey from the source of either of its tributary streams is about 30 miles. The Nar, or Setchy, rises at Litcham, in the neighbourhood of East Dereham, and flows westward by Castle Acre, and then northward 22 miles into the Ouse above Lynn.

One of the arms of the Nene forms for several miles the boundary of the county; and the Welney, a stream communicating between the Ouse and the Nene, skirts the border just above its junction with the Nene.

Beside these rivers a number of smaller streams fall into the sea along the north coast.

Few parts of England exhibit marks of more remarkable changes than this county. The valleys of the Waveney, Yare, and Bure were originally longitudinal basins of chalk; and subsequently to the deposition of those diluvial beds of gravel and sand, which cover a large portion of this side of the island, were probably arms of the sea. It is contended by Mr. Robberds that beds of shells, most of them of existing species, found on the shores of the adjacent German Ocean, have been deposited on the side of the hills at a height usually of 40 feet, or thereabouts, above the lowest part of the present valleys, which beds are rarely found except on the face or slope of the uplands that skirt the valleys. 'All the circumstances connected with these beds of shells are strikingly and decidedly characteristic of a former strand or beach. An extended line of sand and pebbles, stretching at one uniform elevation along the side of a range of low hills, similar in its nature and appearance to that which universally skirts the ocean, and mixed with shells, some broken and some perfect, with drifted decayed vegetables (whether fuci or not), and with such substances as the retiring tide now leaves on every shore—this exhibits all the strongest features of a permanent boundary between land and water. . . Nor are these the vestiges of that antient ocean which, in ages unfathomably remote, covered the whole of this district. . . As far as my observations have extended, I have never found them beyond the immediate skirts of this valley and its contiguous branches.' (*Geological and Historical Observations on the Eastern Valleys of Norfolk*, by J. W. Robberds, jun.) The period however at which the ocean covered these valleys to the height mentioned is unascertainable; and the facts and deductions of Mr. Robberds as to the height of the waters of this ocean have been controverted. That the valleys were æstuaries seems indeed undeniable; and the bottoms of them, composed of a rich alluvial mud, intermixed sometimes with extensive beds of peat, are the deposits of a much later period than that to which Mr. Robberds's hypothesis refers. It seems probable that the valley of the Bure, as far as Burgh by Brampton, perhaps to above Aylsham, that of the Yare to above Norwich, and that of the Waveney at least to Bungay, were arms of the sea. The low flats north of Yarmouth, in which are so many 'broads,' and through which the Thurn proceeds to the sea, were also parts of an æstuary which probably remained till the time of Alfred, or even that of Edward the Confessor, but has since been left dry. There are local traditions of the sea having once reached Norwich on the Wensum, and Bungay Castle on the Waveney. Indeed the navigation of the Waveney is said to have extended to Lynn, which renders it probable that the whole valley of the Waveney and the Little Ouse was once an arm of the sea, like that which insulated Thanet [Kent], and that Norfolk was consequently an island or a group of islands. Local history, the names of places, the position and form of Burgh Castle (a Roman fort), and the discovery of anchors and other naval appurtenances in the marshes near Burgh, serve to confirm the supposition. We may suppose then that the eastern part of Norfolk was once a group of low islands. The hypothesis, once admitted, accounts for some passages in the history of our island not easily accounted for else. The spot on which Yarmouth stands was not dry land till the eleventh century.

The hundreds of East and West Flegg, in Norfolk, constituted probably one island; the hundred of Lothingland, in Suffolk, another; the 'holms,' in the valley and flats of the Bure, and Ellingham, in the valley of the Waveney, were smaller islands. The entrances of the intervening æstuary appear to have been at Horsea Gap, between Caistor and Happisburgh, at Yarmouth (where the opening extended, it is likely, from Caistor to Gorleston), and at Kirkley-road, near Lowestoft. (Robberds, *ut supra*.) An antient map, a copy of which is preserved by the corporation of Yarmouth, corroborates in a great degree the above supposition (Ives's *Remarks on the Garianonum of the Romans*); and Norwich in antient documents is described as a port.

Navigation and other Communications.—The Wensum and Yare are navigable to Norwich for sea-borne vessels. Norwich was accessible to ships of burden centuries ago, as antient records and historical incidents prove. The southern entrance of the Yare at that time, through what has since been called Lake Lothing, was much used by shipping; but a bar of shingle and sand accumulated at the mouth of it, and this was crowned (A.D. 1712) with an artificial bank to prevent the inundation of the marshes at high tides. The only navigable entrance to the Yare for centuries after the accumulation of the bar at Lake Lothing was by Yarmouth, where sea-borne vessels discharged their cargoes; and the communication with Norwich was carried on by river-craft. In 1827 an act was obtained for making the Yare and Wensum navigable for vessels drawing 10 feet water, and for making a cut from the Yare to the Waveney, and from the Waveney to the sea through Lake Lothing, thus restoring the antient entrance, and making Norwich once more a port. The tide or sea lock of this navigation will admit vessels 84 feet long and of 21 feet in the beam. These works have been completed. The Waveney is now navigable to Beccles for small sea-borne vessels; and to Bungay, a few miles higher up, for river-craft.

The Bure is navigable up to Aylsham, 40 miles from the sea at Yarmouth. The Ant, a feeder of the Bure, is navigable up to Wayford Bridge, and the navigation is continued by a canal up to North Walsham. The Thurn is marked in Priestley's 'Map of Inland Navigation' as navigable up to Hickling Broad.

The Greater Ouse and the Nene are navigable throughout that part of their course which is within this county. The communication between them, by means of the Wisbeach canal and the Well creek, is close on the border of the county. The Little Ouse is navigable up to Thetford; the Wissey, or Stoke, up to Stoke Ferry; and the Nar up to Castle Acre.

The Norwich mail-coach road through Ipswich enters the county at Scole on the Waveney, and runs by Long Stratton to Norwich: that through Newmarket enters the county at Thetford, and runs by Attleburgh. The mail-coach road to Lynn and Wells enters the county about 9 miles beyond Ely, and runs by Downham, Lynn, Snettisham, and Burnham. Another road to Wells enters the county just beyond Brandon in Suffolk, and runs by Swaffham, Fakenham, and Great Walsingham. The road to Cromer branches off from this beyond Brandon, and runs by Watton, East Dereham, and Reepham. One road to Yarmouth branches off from the Norwich and Ipswich road at Scole, and follows the valley of the Waveney by Harleston, Bungay (Suffolk), and Hadisco: but the mail-coach road does not enter the county until it reaches Yarmouth.

The Eastern Counties Railroad is to run to Norwich nearly in the direction of the Ipswich and Norwich mail-road, and from thence is to be continued in an easterly direction to Yarmouth.

Agriculture.—Norfolk has long been considered as foremost among the English counties in an agricultural point of view. The same causes which have made the Netherlands productive, beyond the natural capacity of the soil, have brought about similar effects in Norfolk, where the improved systems of cultivation have been adopted by imitating the Flemings, with whom a direct intercourse has always been kept up from the eastern ports of England.

The climate of Norfolk is somewhat colder than that of the southern and western counties of England. The coast is exposed to the north-east winds, and the whole of the county is nearly a continued plain, with only slight undulations of the surface. Except in a small portion of the county on its western boundary, and a strip along the southern part, which are marshy, the air is dry and healthy. It is, on the whole, as favourable to the tillage of the land and the growth of corn as any part of England.

The soil may be divided into three classes: light sands of various qualities, chiefly in the north-western part of the county; low alluvial clays and loams, on the borders of Lincolnshire and Cambridgeshire; and loams of various qualities, chiefly light, incumbent on a marly clay, in the centre and eastern part. There is a strip of peat and marsh along the southern boundary, where the Ouse and the Waveney take their rise, and run with a very slow current, the one towards the west, where it discharges itself into the Wash, and the other eastward to the sea at Yarmouth. At Lophamford, where there was formerly a gate dividing Norfolk from Suffolk, the water runs to the right and left of the road: and from this point, which is low in appearance, the two rivers begin to flow. The fall from this point to the sea, on both sides, is very trifling, and the whole course lies in low peaty marshes.

The district in which the true Norfolk system of cultivation was first adopted, and where turnips and clover were introduced in the regular rotations, was that on the north-west, where the better kinds of sand prevail. From this district it has gradually spread; and there are now few soils in Norfolk which are considered too heavy to bear turnips, especially after having been well underdrained—a practice which evidently arose from the desire of raising turnips to feed cattle and sheep, and manure the land.

It is now more than a century since the system of cultivation which bears its name has been almost universally adopted in this county. It was the necessary consequence of the introduction of turnips in the place of the old fallow; and has only been modified by substituting artificial grasses, peas, or tares, for the clover, which was found not to succeed when too often repeated on the same land. In the regular course of turnips, barley, clover, and wheat, only one-fourth of the land is in wheat; but in very good loams, and where manure is abundant, it may safely be sown at a less interval than four years, by introducing peas or beans after the first rotation, and taking a crop of wheat after them. Thus the rotation becomes one of six years, viz. turnips, barley, clover, wheat, beans, wheat. There is another advantage in this, that the clover only recurs every sixth year, and its success is more certain. Where the soil is poorer and manure could not be produced in sufficient quantity to keep up the fertility, the artificial grasses may be allowed to remain two or three years for pasture, which recruits the land and saves manure. These circumstances will readily account for all the deviations from the original four years' rotation.

Norfolk was for many years far before other counties, north or south of it, in its agriculture; but for thirty or forty years little or no progress was made; and the Norfolk husbandry, introduced into the north of England and south of Scotland, advanced more rapidly than in the county where it originated. Turnips, having been originally introduced from Flanders and Holland, still continue to be sown broad-cast, as they are there. The raising them on ridges in rows, which is so much preferable, both in respect of the crop and the improvement of the soil, is only adopted by gentlemen and those farmers who have risen above the prejudices attached to a long established practice. Although the drilling and dibbling [Arable Land, vol. ii., p. 226] of wheat have been almost universally adopted, the turnips are still growing irregularly at various distances, a circumstance which precludes the use of the plough in the intervals, and restricts the cultivation to that of the hoe. Hence Norfolk does not in general produce such heavy crops of turnips as similar soils in Northumberland or in Scotland.

The crop which is raised in the greatest perfection in Norfolk is barley. It may be considered as the most important portion of its agricultural produce; and where sheep have been folded on turnips and the surface is enriched by their dung and consolidated by their tread, a slight shallow ploughing makes a perfect preparation for the seed. The old practice in Norfolk was to work the land by ploughing it three or four times for barley after turnips and for wheat after clover, as may be seen by Arthur Young's 'Report' of that county. Young justly condemns this practice on a light porous soil. Since that time a better practice has been introduced, and much useless ploughing has been omitted. On the heavy loams repeated ploughing may be thought necessary; but to plough often early in spring, when the land has been wet for a considerable time, is less likely to pulverise a heavy soil, than to watch an opportunity and plough it at the right time, when the soil is friable and readily crumbles under the harrows. Heavy loams should only be repeatedly ploughed when the earth falls readily from the mould board, which it does when neither too wet nor too dry. Where great attention is paid both to the quality of the grain and the quantity produced, no clover is sown amongst the barley, but it is drilled and hoed like wheat. This however is the exception, the general rule being to sow clover, after a shower, as soon as the barley appears above ground, and to slightly roll the surface.

There are few counties where such an extent of poor unproductive land has not only been brought into cultivation, but made equally productive with those which are naturally fertile, as in Norfolk. This has been effected chiefly by laying considerable portions of the marly clay, found a little below the surface, on the poorer soil which was at the surface, and by an excellent system of draining the land where the subsoil is impervious to water. The drains are made in winter, when labour is cheap, in a very simple manner the inclination of the soil being ascertained, and the ditches deepened so as to carry off the superfluous water, main-drains are laid out to receive the water collected by the smaller branches. Thirty inches is, in general, thought a sufficient depth for a main-drain, which is only two or three inches wide at bottom. In this are laid bushes, heath, broken stones, or, which is best, draining tiles, according to the means of the proprietor or occupier, and the cost at which they can be obtained. Parallel drains from twenty inches to two feet deep are dug which meet the main-drain obliquely downwards at the distance of from fifteen to thirty feet from each other, according to the wetness of the land. By this means all the surface water, which is not held in the soil, and which is more than is required for the healthy vegetation of the crop, runs slowly into these drains, which lead it into the main-drain, and ultimately into the receiving ditch. Thus the land is kept in a sound dry state and however impervious the subsoil, sheep may be folded upon it at all times. This draining is very different from the draining of springy or marshy soils, and requires a different system from that which Elkington practised with so much success. Any man may lay out drains judiciously, where it is only required to give an outlet for the superfluous water which falls on the surface in a rainy climate. The only thing to be attended to, is to proportion the distance of the drains to the nature of the soil with respect to porosity, and to the quantity of rain which usually falls in autumn and winter. A light porous soil of some depth might be much injured by draining, however wet the climate; for if it is useful to take off superfluous water, so it is beneficial to retain it where it runs off too fast.

These are the immediate means by which the waste lands of Norfolk have been brought into a fertile state. But much is also due to the practice of granting long leases to wealthy tenants, in which practice Mr. Coke (now Lord Leicester) has led the way, and justly deserves the title of a benefactor to his country, while he has received his reward in the increase of his property and the affection of his tenants. A proprietor has not always the means, and frequently not the judgment required, to undertake expensive improvements; but a tenant with a lease for a term of years calculates, and lays out his money as a speculation. The benefit which he derives is justly his due, but, whatever be the result, the land is improved, and the landlord benefited in the end. Leases have invariably tended to the rapid improvement of all farms so let, when the means and character of the tenant were ascertained, and judicious clauses introduced, not to fetter the tenant, but to prevent his injuring himself as well as his landlord.

To give even an outline of the mode of cultivation usually followed by the Norfolk farmer would require considerable space. It is sufficient to observe that the principles are chiefly those of a careful garden cultivation, and that, to provide sufficient manure for the corn-crops, half the land is devoted to raise food for cattle. The soil is not stirred so deep as in many other districts, which is owing to the thin staple of it in most places. The Norfolk farmer, in general, prefers a few inches of good earth made rich with manure, to a greater depth of inferior earth. Much time and expense are also saved by slight ploughing, which is performed with a very light plough, turning over a furrow ten or twelve inches wide and seldom more than four inches deep. Thus an acre and a half are prepared for sowing in one day by a boy and two horses. This is particularly the case where turnips have been eaten by sheep folded on the land. The clover-ley and artificial grasses are likewise ploughed shallow for wheat, which is sometimes very advantageously dibbled in the sward when turned over completely; for the wheat tillers and throws up many stems, deriving its nourishment chiefly by the coronal roots. In particular seasons and situations it is often subject to mildew, which is not so much the case where the soil is cultivated to a greater depth.

The chief cultivation and manuring are given in the preparation for sowing turnips, which begin the rotation. The land is ploughed and harrowed repeatedly, the weeds being collected and burnt; and finally it is ploughed in stitches, as they are called in Norfolk, which are divisions consisting of five or ten double furrows, according as the soil is heavy or light. This is done to let the surface water run off by the deeper furrows between the stitches, and for the convenience of sowing or drilling the seed regularly. The turnips are hoed by hand, and the labourers are very expert in leaving them at regular distances. A second hoeing is generally sufficient to destroy the weeds, after which the turnip-leaves so cover the ground that, if any weeds appear again, they are kept under by the shade of the turnip-tops. The turnip-fly and black caterpillar are, as elsewhere, a great torment to the farmer, especially where turnips have been long regularly sown every fourth year on the same land. Various devices have been resorted to in order to prevent the depredations of these insects, but none have had complete success. A muslin net like a bag has been drawn over the land as the turnip-plants are coming out of the ground, and thousands of flies have been caught; but they seem to be produced more rapidly than they can be taken. The most certain preventive is a high state of cultivation and abundant manuring of the land, by which the growth of the turnip is forced, and it is soon in the rough leaf, after which the danger from the fly is over. Against the black caterpillar the only means yet found effectual is driving a large flock of poultry over the land, which devours great quantities of them. Mangel-wurzel has been cultivated by many on the better kinds of loam with various success: in some years they succeed to admiration, and in others fail entirely. There has been a fluctuation in the opinion of farmers with respect to mangel-wurzel; the majority seem now to prefer the Swedish turnip, or Ruta Baga, as more nutritious for feeding stock, and not more liable to failure, with proper attention.

The implements used in the cultivation of the soil are very various. The ploughs in common use are the small swing plough with a single stilt or horn, evidently slightly varied from the Flemish plough, and the same plough with a more upright beam resting on a carriage with two wheels. The peculiarity of the Norfolk wheel-plough is the shortness of the beam, the wheels being very little before the coulter. This makes it much lighter in the hand, although not so steady, if it meets with any obstruction; but it suits the shallow furrow which is usually turned up, and it is so easily managed, that boys twelve and fourteen years old may be seen holding one of them without any apparent exertion, unless it be at the end of the furrow, when it is turned into a new one; and even then a little practice soon enables a boy to let it slide on the edge of the turn-furrow till it enters the ground again. There is scarcely an example of a plough being drawn by more than two horses, which are yoked abreast and driven with rein by the ploughman. The work is so light in general, that the horses work at a brisk pace, and at two yokings, of five hours each, will turn over from one acre and a half to two acres of ground. Four inches is the usual depth, and often even less. The harrows are similar to those used in other counties. The break-harrow or drag has large iron tines, which enter several inches into the ground and divide the sods and clods in the heavy loams. The small harrows are usually compounded of several separate harrows, in order to suit the convex form of the stitches, and harrow every part equally. Barley rollers are essential in the light soils; and in the stiffer loams the spiked roller is found very efficacious in bringing the soil to a fine tilth for receiving the barley and grass seeds.

Portable and fixed threshing-machines are very common, and, when well constructed, are a great convenience, if not an absolute saving, to the farmer. The labourers have foolishly attributed the want of employment, by which they were suffering some years past, to the introduction of machinery in agriculture; and many farmers have been forced to return to the old method of threshing by the flail. But hand-labour might be much more profitably employed in the improvement and preparation of the soil by dibbling, forking, hoeing, and draining; and where these operations are carried on with spirit, the labourer will never complain of being saved the laborious task of wielding the flail from morning till night.

Large barns were once thought necessary to house all the corn in; and the barley was often trod tight in the barn by horses led over it, as it was unloaded from the waggons. But no barns could now hold the produce of many of the larger farms, and stacks well thatched are found to preserve the corn better than close barns, especially when they are built on frames supported by stone, or cast-iron pillars with caps over them, to prevent the rats and mice from making lodgments in the straw. A very ingenious staddle has been invented, all of wrought-iron except the pillars, which are cast. It is cheap and portable, and can be readily moved from one spot to another, where it may be most convenient to build the stack.

On the light lands large flocks of sheep are constantly kept. The old horned and black-legged sheep, which have been in the county from time immemorial, are now in a great measure superseded by the Leicester and South Down breeds. The Norfolk sheep are good, and their flesh superior to most other mutton, at a proper age; but they are great wanderers and trespassers. There are few fences which will keep them in; and since almost all the commons have been divided and enclosed, the quiet sheep are preferred. Of late the Norfolk sheep have been more noticed, and crosses of them with other breeds have been attempted with some success.

When the land is too retentive of moisture to allow sheep to be folded on it in autumn or spring, and yet good turnips may be raised in it, the usual practice in such a case is to fatten bullocks on the turnips and straw in yards or sheds. When the turnips fail before the beasts are fat, linseed cakes must be given to them, which is seldom profitable, except it be by the increase of the manure and its improved quality. When an ox can be entirely fatted from the produce of the farm, the profit is more certain than when food is purchased elsewhere. The favourite oxen of the Norfolk farmer are the small Scotch breeds, Galloway, Aberdeenshire, or West Highland. They fatten readily, are soon fit for the market, and always bring the best price, according to their weight.

There were formerly some considerable dairies in Norfolk, and butter was salted and in repute for ship store or private use; but the land is now mostly arable; sheep give less trouble and are found equally profitable; so that very few if any large dairies are to be met with. The cows kept for private use are mostly of the polled Suffolk breed, which give much and tolerably rich milk. Some cows of this breed have been known to give eight gallons of milk per day a month after calving. There was a custom in Norfolk formerly of letting a cow and her calf run together in a good pasture for a twelvemonth, when they both became very fat and were sold to the butcher. The yearling calf was called a *beeffin*. The flesh was tender, neither like veal nor beef, but preferred by many to either. This practice is now nearly obsolete.

Many farmers in Norfolk breed horses from their working mares; and excellent coach-horses are sometimes produced by a cross with a good bony blood-horse. Very little of the labour of the mare is lost, and that principally in summer, when the foal is very young. She is then worked slightly, but by wheat-sowing time she can do a full day's work, with proper keep, without any detriment to the foal. Thus an extra mare or two may be kept above the number of horses actually required for the farm, which will much assist the operations and expedite the tillage, while they cost but little to the farmer, as the foal will generally repay his own keep with a profit, which goes towards the keep of the mare. Some horses got by a thorough-bred horse out of an active Suffolk cart-mare have proved excellent hunters, and been sold at high prices when five years old, having done sufficient work to pay for their keep from the time they were three years of age.

The Norfolk pigs are generally small and white, with long thin ears, differing in this from the Suffolk breed; but they are so intermixed and crossed, that no very distinct character can be ascribed to them. Those who are curious in the breed of this useful animal cross various breeds according to their fancy, and, by selecting those which fatten early and readily, they produce varieties more or less perfect. Many pigs from Suffolk and Essex, and some from Berkshire, are brought to Norfolk to feed in the stubbles after harvest, or to consume the barley which may have suffered from the weather and is not fit for malting.

Norfolk turkeys are well known as of peculiar size and delicacy. Great numbers are reared every year, and after gleaning the stubbles and having plenty of barley till near Christmas, they are sent to supply the London market. A week before Christmas many of the coaches from Norfolk are completely loaded with turkeys, and travellers are often disappointed of places.

The game with which Norfolk abounds was at one time a source of grievance to the farmer, not only in consequence of its depredations, but of the damage done to his fences by licensed and unlicensed sportsmen. The late law, which permits the sale of game, has greatly diminished the number of preserves and the quantity of game, leaving however sufficient sport for those who are satisfied with moderate slaughter.

The Norfolk farmer has numerous advantages in the disposal of the produce of his land. There are many excellent markets in every part of the county, with easy access to the coast by water-carriage, the county being nearly surrounded by the sea and intersected by rivers and canals.

The principal fairs in Norfolk are:—Attleborough, Thursday before Easter, Thursday before Whit-Sunday, August 15; Aylsham, March 25, last Tuesday in September, October 6; Broomhall, Monday after Holy Thursday, November 20; Burnham, Easter Monday, August 1; Causton, February 1, last Wednesday in April and August; Cley, last Friday in July; Crepingham Magna, August 12; Cromer, Whit-Monday; Dereham, Thursday before July 6, Thursday before September 29; Diss, November 8; Downham, May 29, November 13; East Harling, May 4, September 20, October 24; Fincham, March 3, August 9; Gaywood, June 22; Harleston, July 5, September 9, November 28, for Scotch cattle, lasts a month; Harpley, July 24; Hempnall, Whit-Monday, December 11; Holt, April 25, November 25; Keninghall, July 18, September 4, sheep show; Kipton-Ash, September 4, sheep show; Loddon, Easter Monday, Monday after November 21; Lynn, February 14, lasts eight days, October 16; Massingham, Tuesday before Easter, November 8; Norwich, Maunday Thursday, Easter Monday and Tuesday, Whit-Monday; St. Faith, October 17; Stowbridge, Saturday after Whit-Sunday; Swaffham, May 12, July 21, November 3; Thetford, May 14, August 2, September 25; Watton, July 10, October 10, November 4; Yarmouth, Friday and Saturday in Easter week.

Divisions, Towns, &c.—Norfolk is divided into thirty three hundreds, which, with their situation, area, and population in 1831, are as follows. Norwich is a city and county of itself

Hundred.	Situation.	Acres.	Pop. 1831
Blofield .	Central	20,290	5,290
Brothercross .	N.	18,720	4,143
Clackclose .	W.	91,880	17,663
Clavering .	S.E.	28,880	6,611
Depwade .	Central	30,950	10,031
Diss .	S.	25,450	9,300
Earsham .	S.	24,560	8,485
Erpingham, North	N.E	35,770	10,160
Erpingham, South.	Central	50,760	14,898
Eynsford .	Central	49,990	10,957
Flegg, East .	E.	14,660	24,113
Flegg, West .	E.	18,370	4,212
Forehoe .	Central	41,130	13,838
Freebridge Lynn .	W	78,390	25,597
Freebridge Marshland	W.	57,280	11,274
Gallow .	Central	44,480	9,378
Greenhoe, North .	N.	32,120	10,411
Greenhoe, South .	Central	63,850	10,237
Grimshoe .	S.W.	69,340	6,380
Guiltcross .	S.	29,900	6,761
Happing .	E.	30,240	6,446
Henstead .	Central	19,770	5,410
Holt .	N.	42,290	10,416
Humbleyard .	Central	22,620	5,409
Launditch .	Central	59,930	12,639
Loddon .	S.E.	26,750	7,457
Mitford .	Central	33,570	11,495
Shropham .	S.	53,050	12,028
Smithdon .	N.W.	45,660	8,262
Taversham .	Central	30,980	7,695
Tunstead .	N.E.	35,440	10,593
Walsham .	E.	26,700	4,525
Wayland .	Central	32,610	6,824
Norwich Liberties .	Central	5,920	61,116
		1,292,300	390,054

Norfolk contains the city of Norwich; the parliamentary boroughs of Yarmouth, Lynn, and Thetford; and the towns of Attleburgh, Aylsham, New Buckenham, Burnham, Cley, Cromer, East Dereham, Diss, Downham, Fakenham, Foulsham, Harleston, East Harling, Hingham, Holt, Loddon, Reepham, Stoke Ferry, Swaffham, North Walsham, Walsingham, Watton, Wells, and Wymondham. Castle Acre, Castle Rising, North Elmham, Klenninghall, Litcham, Methwold, Snettisham, and Worsted, were formerly of importance, though now decayed. Banham, Blofield, Coltishall, Costessey, Feltwell, Gaywood, Mattishall, Shipdam, Upwell, and Walsoken, are the principal villages. Of these places, ATTLEBURGH (pop. 1939), AYLSHAM (pop. 2334), LYNN (pop. 13,370), NORWICH (pop. 61,116), THETFORD (pop. 3462), and YARMOUTH (pop. 21,115), are described in their respective articles.

New Buckenham is in Shropham hundred, 93½ miles from London.* The neighbouring village of Old Buckenham had a castle at the time of the Conquest, but this castle was pulled down and a priory of the Black Canons of St. Augustin was built from its ruins in the time of Stephen or Henry II., by William de Albini, to whose father the castle and manor had been granted. At the dissolution, the yearly revenue of this priory was estimated at 131*l*. 11*s*. 0½*d*. gross, or 108*l*. 10*s*. 2*d*. clear. In place of the old castle, William de Albini erected a new one, round which a town grew up, to which the name of New Buckenham was given. A few ruins of the gateway and keep of this castle remain. The area of the parish of New Buckenham is only 250 acres; the population in 1831 was 795, about one-third agricultural. The town is pleasantly situated, and has some neatly built houses. The church is large, and an antient structure, partly rebuilt near the close of the fifteenth century. It has a richly carved screen and some interesting monuments. The market is on Saturday, and there are two if not three yearly fairs. The living is a perpetual curacy, of the clear yearly value of 115*l*., in the appointment of the parishioners. There were in the parish, in 1833, four day-schools (one partly supported by endowment, and one partly supported by subscription), with 85 children; and one Sunday-school with

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* The distances of the towns from London are by the most frequented roads

130 children. Old Buckenham parish contains 5520 acres, with a population of 1201, two-thirds agricultural. The church formerly belonged to the priory. The living is a perpetual curacy, of the clear yearly value of 102*l*., in the gift of the parishioners. There were in 1833 three day-schools (two partly supported by endowment), with 60 children; and one Sunday-school, with 110 children.

Burnham is in Brothercross hundred, 117 miles from London. The parish is distinguished as Burnham Westgate, or Burnham Market, from the neighbouring parishes of Burnham Overy, Burnham Thorpe, Burnham Norton, Burnham Ulph and Sutton, and Burnham Deepdale. The parish of Burnham Westgate has an area of 2930 acres, with a population in 1831 of 1022, more than a third agricultural. The town is on the west side of a small river, the Burn, at the mouth of which is a small harbour. The present church is a neat building of stone and flint. The market has been discontinued, but a considerable corn trade is carried on; some hemp is prepared, and an iron manufactory has been established. There are two yearly fairs. The living is a rectory, with which is united a mediety of the consolidated benefices of St. Margaret's, Burnham Norton, and All Saints, Burnham Ulph. The clear yearly value is 768*l*. Burnham Ulph and Sutton, and Burnham Norton, are so close to Burnham Westgate, as to form with it one town; the aggregate area of the three parishes is 5630, with a joint population of 1569. There were in the three parishes in 1833, one infant school with 40 children; one day and boarding school with 60 children; one day-school, partly supported by subscription, with about 20 children; and two Sunday-schools, with 135 children.

Admiral Lord Nelson was a native of Burnham Thorpe, of which parish his father was rector.

Cley is in Holt hundred, 123 miles from London. It is situated on one side of a small river, and Blakeney on the other; the mouth of the river forms a harbour, called Cley and Blakeney Harbour. The area of Cley parish is 1980 acres, with a population in 1831 of 827; that of Blakeney 1630 acres, population 929: together 3610 acres; population 1756, about one-fourth agricultural. Cley consists chiefly of one street, in the centre of which is the custom-house. The church is a large and curious edifice, partly of early English architecture. The south aisle is of rich perpendicular architecture, with a fine porch. The battlements and parapets of the church are remarkably rich and fine, and the windows are of good composition. The church of Blakeney, a large old building, has a square embattled tower, and a lofty turret at one angle of the chancel, supposed to have been used as a lighthouse. There are some remains of an antient Carmelite monastery. The harbour was much improved about twenty years ago, and the trade with the north of Europe has increased. About fifty vessels, mostly small, belong to the port, some of which are employed in the oyster fishery. There is a considerable importation of corn, coal, timber and deals, hemp, iron, tar, tallow, oil-cake, &c.: the principal article of export is salt, from the salt-works of the neighbourhood. There is a market at Cley on Saturday, and a yearly fair for horses. The living of Cley is a rectory, of the clear yearly value of 338*l*.; that of Blakeney is a rectory, united with the adjacent rectory of Cockthorpe, the vicarage of Little Langham, and the perpetual curacy of Glandford, together of the clear yearly value of 506*l*., with a glebe-house. There were in the two parishes, in 1833, two infant-schools, with 40 children; seven other day-schools, with 179 children; a day and Sunday national school, with 110 children in the week and 126 on Sundays; and two Sunday-schools, with 260 children.

Cromer is on the coast, in Erpingham hundred, 132 miles from London. There was antiently a town or village on this part of the coast called Shipdem, which was destroyed by the sea about the commencement of the fifteenth century. The sea continues to gain on the land, and several houses in Cromer have been destroyed within the memory of those now living. At very low tides large masses of wall may still be seen, which are called by sailors 'Shipdem steeple.' The town of Cromer is situated at the top of the cliffs ('the mud cliffs,' as they are termed), and consists of houses for the most part badly built and of mean appearance. The area of the parish is 800 acres; the population in 1831 was 1232. The town was formerly a fishing-place, but the pleasantness of the surrounding country and the fine sea view have attracted visitors in the bathing season. There are some good inns, and a subscription library and news-room. The bay of Cromer is very dangerous, and most of the fences and outhouses in the neighbourhood are constructed of timber obtained from wrecks: yet the place carries on some trade in coals, timber, tiles, oil-cake, and other goods. Vessels discharge their cargoes on the beach at ebb tide into carts, by which the goods are carried by a road up the cliff. Fishing is actively carried on, and the crabs and lobsters are of excellent flavour. All attempts to erect a pier have failed. The market has been discontinued; but there is a yearly fair. There is a lighthouse on the cliff, a short distance east of the town. A life-boat and Manby's apparatus for saving men from wrecks are kept. There are some batteries, erected during the last war, for the defence of the place. The church is a building of great beauty, in the perpendicular style; the tower is nearly 160 feet high, and is remarkably fine; and some other portions of the church have very excellent details. The west entrance, the chancel, and the north porch are in ruins. The living is a vicarage, of the clear yearly value of 99*l*. There were in the parish, in 1833, one infant school with 60 children; two endowed day-schools, with 70 boys and 20 girls; five other day-schools, with 59 children; one boarding-school with about 20 boys, and two Sunday-schools, with 100 children

East Dereham is in Mitford hundred, 100½ miles from London. Here was antiently a nunnery, founded in the eighth century, by St. Withburga, daughter of Anna, one of the kings of East Anglia. This nunnery was destroyed by the Danes, and the conventual church became parochial. The parish of East Dereham contains 5090 acres; the population, in 1831, was 3913, one-third agricultural. The town is pleasantly situated, and has been much improved; it consists for the most part of well-built houses; the streets are of good width, and are paved with pebbles. The market-place, which is convenient, contains a good assembly-room. The church is a large cruciform building of considerable antiquity; it has a nave with side aisles, two transepts and a choir, with a tower rising from the intersection of the nave and transepts. This tower not being considered strong enough to bear the bells, a large tower was erected in the reign of Henry VII. in the churchyard called 'the New Clocker.' There is also in the churchyard a plain but curious Norman arch covering a spring, to which medicinal virtues were formerly ascribed. The church has a rich and handsome font put up in the fifteenth century; and in the north transept is a monument to the poet Cowper, who was buried in this church, A.D. 1800. There is a good weekly market on Friday for corn, cattle, and provisions; and there are two yearly fairs for cattle, sheep, and toys. Petty sessions are held here every fortnight. The benefices are, a sinecure rectory, of the clear yearly value of 704*l*., and a vicarage united with the chapelry of Hoo, of the clear yearly value of 478*l*., with a glebe-house. There were, in 1833, nine day-schools, with 183 children, and four Sunday-schools, with 375 scholars.

Diss is in the hundred of Diss, 86 miles from London. The parish is divided by the Waveney from the adjacent parish of Palgrave in Suffolk; it contains an area of 3450 acres, and had, in 1831, a population of 2934, one-fourth agricultural. The town is irregularly laid out, and is on a very uneven site, but the streets are clean, and there are a number of good houses. At the extremity of the town is a large mere or pool, covering above seven acres, and abounding with eels. The church is an antient building, erected by the Fitzwalters, lords of the place; it consists of a nave with two aisles and a chancel, and a square tower at the west end. There are several dissenting places of worship in the town. There is a weekly market at Diss on Friday, and a yearly fair for cattle and toys. A few individuals are employed in the manufacture of hempen cloth, a quantity of which is sold at the weekly market. The living is a rectory, of the clear yearly value of 715*l*., with a glebe-house. There were in the parish, in 1833, an infant school with 80 children; a school of industry, with 65 girls; fourteen day or boarding schools, with 242 children, and four Sunday-schools, with 545 children.

Downham is in Clackclose hundred, near the right bank of the Great Ouse, 84½ miles from London. This is a very antient town; according to Spelman it had the grant of a market as far back as the time of Edward the Confessor. The area of the parish is 2880 acres; the population, in 1831, was 2198, more than one-fourth agricultural. The town consists of three streets, which are well paved. The church is an antient building, with a low embattled tower.

there are also several dissenting places of worship. There are mustard-works and oil-mills in the neighbourhood, and a considerable bell-foundry in the town. The market, which is on Saturday, is well supplied with fish and fowl from the Fens. There are two if not three fairs in the year; one of which is one of the largest horse-fairs in the kingdom. The living is a rectory, of the clear yearly value of 403*l.*, with a glebe-house. There were, in 1833, a national school for 60 girls; three other day-schools, with 160 children; a boarding-school, with 89 boys; and two Sunday-schools, with 137 children.

Fakenham, distinguished from other places of the same name as Fakenham Lancaster, is in Gallow hundred, 109 miles from London. The parish has an area of 2360 acres, with a population, in 1831, of 2077, one-sixth agricultural; the hamlet of Alethorpe, belonging to this parish, has an area of 280 acres, with a population of eight persons: making in all 2640 acres and 2085 inhabitants. The town is situated near the river Wensom, on a pleasant declivity. The streets are paved. The church is handsome and commodious, consisting of a nave with two aisles, a chancel, a south porch, and a lofty western tower; this tower has a fine entrance doorway with a large window over it, and a canopied niche on each side. There is an antient market-cross. There is a corn-market on Thursday, one of the largest in the county, which is attended by corn-merchants from Wells. There are two yearly fairs held on Hampton Green, a mile from the town. The quarter-sessions for the county were formerly held here by adjournment alternately with Walsingham, but Holt has been substituted for Fakenham, and the former sessions-house has been converted into a school-room. The living is a rectory, of the clear yearly value of 862*l.*, with a glebe-house. There were, in 1833, two schools, partly supported by endowment, with 55 children; a school supported by subscription, with 42 girls; nine other day or boarding schools, with 299 children; and four Sunday-schools, with 362 children.

Foulsham is in Eynsford hundred, 110 miles from London. The area of the parish is 3100 acres, with a population, in 1831, of 958, about one-third agricultural. The town was nearly destroyed by fire in 1770; since that catastrophe the houses have been rebuilt on a more regular plan and in a more respectable style. The church is a handsome building of flint and stone, rebuilt at the same time as the town. There is a corn-market on Tuesday, and two yearly fairs, one for small dealers and one for cattle; beside a statute fair for hiring servants. The living is a rectory, of the clear yearly value of 602*l.*, with a glebe-house. There were in 1833 six day-schools, with 104 children, and two Sunday schools, with 145 children.

Harleston is in Earsham hundred, 99 miles from London. The area of the parish of Redenhall with Harleston is 1610 acres, with a population, in 1831, of 1784, less than one-fourth agricultural. Part of the town lies in the parish of Mendham, which is chiefly in Suffolk; the Norfolk portion of this parish has an area of 720 acres, with a population, in 1831, of 341, one-fourth agricultural; giving a total for Harleston of 2330 acres, with a population of 2125. The town consists of a main street along the Yarmouth road, and a convenient market-place on the south side of the main street. The 'middle row,' between the street and the market-place, is in the hamlet of Harleston, which is part of Redenhall parish. In this part is a chapel-of-ease, a plain building. There are three dissenting places of worship in the town. The river Waveney flows at a short distance to the south; there are three bridges over it in the neighbourhood. The manufacture of bombazines is carried on to a small extent; there is a well attended corn-market on Wednesday, and two considerable fairs, at which great numbers of Scotch cattle are sold. The parish church of Redenhall is situated on an elevation a mile from the town on the road to Yarmouth. It consists of a nave with two aisles, a chancel, and a fine western tower of perpendicular character. The tower was built A.D. 1460-1520, but the body of the church in the beginning of the fourteenth century.

The living is a rectory, with the chapelry of Harleston annexed, of the clear yearly value of 803*l.* There were in 1833, in the parish of Redenhall and the Norfolk portion of Mendham parish, two infant or dame schools, with 33 to 38 children; a national day and Sunday school, partly endowed, with 90 children in the week and 134 on Sundays; two day-schools, with 40 children; and one Sunday-school with 145 children.

East Harling is in the hundred of Guiltcross, 89 miles from London. The area of the parish is 2990 acres, with a population, in 1831, of 1031, about half agricultural. The town is small and has little trade. There is a weekly market on Tuesday for corn, and there are four yearly fairs, beside a statute fair for hiring servants. The church consists of a nave, two aisles, and chancel, with a south porch with a square tower and a small spire at the west end. It contains a handsome carved screen and some stained-glass windows. There are one or two dissenting places of worship. Quiddenham Hall, the seat of the earl of Albemarle, is in the neighbourhood. The living is a rectory, of the clear yearly of 523*l.* There were in 1833 three day-schools, with 127 children, and one Sunday-school with 100 children.

Hingham is in Forehoe hundred, about 100 miles from London. The area of the parish is 3630 acres, with a population, in 1831, of 1539, two-fifths agricultural. The town is irregularly laid out, but contains some good houses. The market-place is very neat. The church is large and handsome, chiefly in the decorated English style, with very good details and fine tracery in the windows. The east window of the chancel is of fine stained glass, which was brought from a nunnery in the Netherlands and presented to the church by Lord Wodehouse, A.D. 1812. Trinity chapel, attached to this church, has a window of fine stained-glass on which was a mutilated inscription: 'Thys wyndow ys ye mayden cost of Hengham:' from which it has been inferred that the window, if not the whole chapel, was erected by the contribution of the girls of Hingham. The tower is a very fine specimen of flint and stone work. There are three yearly fairs, one chiefly for horses, the others for live stock generally. The market has been given up.

The living is a rectory, of the clear yearly value of 920*l.*, with a glebe-house. There were in 1833 one dame-school with 18 children; an endowed grammar school with 97 children; a school, partly supported by subscription, with 69 children; two other day-schools, with 57 children; and one Sunday-school, with 100 children.

Holt is in the hundred of Holt, 119 miles from London. The parish has an area of 2950 acres, with a population, in 1831, of 1622, less than one-third agricultural. The town is advantageously situated at the junction of several roads in the midst of a pleasant country. It is irregularly laid out, but the houses are neatly built and the streets paved with flints. The town was nearly destroyed by a great fire in 1708, but it was much improved on being rebuilt. There are a neat and commodious sessions-house and a church. There are two dissenting places of worship. There is a well-attended market on Saturday, and there are two yearly fairs. The quarter-sessions for the county are held here twice in the year by adjournment. The living is a rectory, of the clear yearly value of 563*l.*, with a glebe-house. There were in 1833 in the parish one dame-school with 14 children; an endowed school with 60 boys, founded by Sir John Gresham and placed under the government of the Fishmongers' Company in London; seven other day-schools, with 158 children; one boarding-school with 14 children; and two Sunday-schools, with 150 children.

Loddon is in Loddon hundred, 112 or 113 miles from London through Scole Harleston, and Bungay. It is a small place situated on a stream which flows into the Yare. The village of Chedgrave is so closely adjacent that the two form one town. Loddon parish has an area of 2750 acres; population in 1831, 1175; Chedgrave, of 900 acres; population 353: together 3650 acres; population 1528. The principal street runs north and south, having Loddon church about the middle of the east side and Chedgrave church on the north-east side of the town. Loddon church is a fine stone building with an elegant tower, mostly of perpendicular character. Chedgrave church has a fine Norman door and other antient portions. There are a weekly market and two yearly fairs. The magistrates of the neighbourhood hold a monthly meeting at Loddon. The living of Loddon is a vicarage, of the clear yearly value of 300*l.*; that of Chedgrave is a rectory, of the clear yearly value of 182*l.* There were in the two parishes in 1833 one boarding-school with 17 boys; three day-schools, with from 64 to 70 children; and one Sunday-school with 48 children.

Reepham is in the hundred of Eynsford, 111 miles from London. The area of the parish is 570 acres, with a population, in 1831, of 452, almost entirely agricultural. The parishes of Hackford and Whitwell may however be added to Reepham, as they are closely adjacent. Hackford is distinguished as Hackford-by-Reepham or sometimes Reepham-Hackford: it contains 820 acres, with a population, in 1831, of 698, one-fifth agricultural; Whitwell has 1530 acres, with a population, in 1831, of 483, two-thirds agricultural: in all 2920 acres, population 1633. The town is small, but it was formerly remarkable for having three churches, those of Reepham, Hackford, and Whitwell, in one churchyard. One of these, Hackford, was burned in the reign of Henry VIII.; the two others, Reepham and Whitwell, yet remain. The principal trade is in malt. The market is on Saturday, and there is a yearly fair. The living of Reepham is a rectory united with that of Kerdiston, of the joint clear yearly value of 699*l.*, with a glebe-house; that of Hackford or Reepham-Hackford is a rectory united with the vicarage of Whitwell, of the joint clear yearly value of 328*l.* There were in the three parishes, in 1833, one day-school, partly supported by subscription, with 36 children; seven other day-schools, with 126 children; and three Sunday-schools, with 137 children.

Stoke Ferry is in the hundred of Clackclose, 88 miles from London. The parish has an area of 1520 acres, with a population, in 1831, of 706, about one-third agricultural. The town consists of one principal street adjacent to the Wissey, over which there is a bridge. The church is toward the south end of the town. The market, which had been for a long period disused, has been revived within the last few years; it is now held on Friday, chiefly for corn. There is one yearly cattle-fair. Messrs. Whitbread and Co., the great brewers, have extensive malting establishments here. The living is a perpetual curacy, of the clear yearly value of 71*l.* There were in 1833 one day-school, partly supported by endowment, with 50 children, and two Sunday-schools, with 122 children.

Swaffham is in the hundred of South Greenhoe, 93 miles from London. The parish has an area of 8130 acres, with a population, in 1831, of 3285, about one-fourth agricultural. The town is situated on an eminence, and consists of four principal streets. The houses are generally well built, and the town has a neat theatre, an assembly-room, and a house of correction. The church, which is a large edifice in the form of a cross, consists of a nave with two aisles, a chancel, and two transept-chapels. It is the finest parish church in the neighbourhood. There is an embattled tower at the west end, with pinnacles at the corners, and a peal of eight bells; there is also a porch on the south side; the aisles are separated from the nave by fourteen arches, seven on each side, sustained by slender clustered pillars; and above them are twenty-six or twenty-eight light and elegant windows, two over each arch. In these windows are some fragments of stained glass. The roof is of finely carved oak; the church contains several monuments. There are several dissenting meeting-houses. The market is held on Saturday, and there are three fairs in the year. A great deal of butter is sold. The quarter-sessions for the county are held here by adjournment at Midsummer, and races and coursing-meetings are held on an extensive heath of some thousand acres near the town. The living is a vicarage united with the rectory of Threxton, of the joint yearly value of 738*l.*, with a glebe-house. There were, in 1833, one day-school, partly supported by endowment, with 15 boys; seven other day-schools, with 215 children; and two Sunday-schools, with 263 children.

North Walsham is in the hundred of Tunstead, 123 miles from London. The area of the parish is 4010 acres; the population, in 1831, was 2615, about one-third agricultural. The town stands on a gentle eminence above the river Ant, and consists of several streets irregularly laid out. The town was almost entirely burnt in the year 1600. A market-cross, erected in the time of Edward III., was repaired after the fire by Redman, bishop of Norwich. The church is a spacious and magnificent building, an early specimen of the perpendicular style. It has a fine south porch of flint and stone, and a richly carved wooden cover to the font. The tower fell down in 1724, and has remained in ruins ever since. There are several dissenting meeting-houses and a neat theatre. The silk manufacture is prosecuted on a very small scale; there is a weekly market on Thursday, a yearly cattle-fair, and two statute fairs in the year for hiring servants. A navigable canal, connected with the navigation of the Ant and Bure, opens a water communication between this town and Yarmouth. The living is a vicarage united with the rectory of Antingham St. Mary, of the clear yearly value of 336*l.*, with a glebe-house. There were, in 1833, thirteen boarding or day schools, with about 154 children; and three Sunday-schools, with 196 children.

New Walsingham is in the hundred of North Greenhoe, 113½ miles from London. The parishes of Great or Old Walsingham and of Little or New Walsingham adjoin each other; Old Walsingham has 2170 acres, with a population, in 1831, of 434, three-fourths agricultural; New Walsingham has 860 acres, with a population of 1004, about one-fourth agricultural: together 3030 acres; population 1438. A chapel was built at Old Walsingham, and dedicated to the Annunciation of our Lady, A.D. 1061, by the widow of Richoldis de Favarches. Geoffry, her son, in the reign of William the Conqueror, founded here a monastery for Augustinian or Black Canons, and erected a conventual church, giving to the monastery the chapel built by his mother. An image of the Virgin, belonging to this foundation, was held in the very highest regard; pilgrimages to the chapel or shrine of 'Our Lady of Walsingham' were even more frequent than those to the shrine of St. Thomas à Becket, and the possessions of the priory were augmented by large endowments or costly presents. Foreigners of all nations came hither on pilgrimage, and several kings and queens of England, among them Henry VIII. in the commencement of his reign, paid their devotions here. Erasmus, who visited it, has described the riches of the chapel. The monks persuaded the people that the Milky-way in the heavens was a miraculous indication of the road to this place, whence it came to be called by some 'the Walsingham way.' The convent at the suppression had a yearly revenue of 446*l.* 14*s.* 4¾*d.* gross, or 391*l.* 11*s.* 7¼*d.* clear, beside the offerings to our Lady, valued, according to one authority, at 260*l.* 12*s.* 4*d.* yearly, but by another at 26*l.* 15*s.* only.

There are some fine remains of the convent; a richly ornamented lofty arch, supposed to have formed the east end of the conventual church, the western entrance gateway to the monastery, having a broad flattened arch; the walls, with windows and arches of the refectory, 78 feet by 27, with walls 26½ feet high; a Norman arch with zigzag mouldings, which has been removed from its original site; part of the cloisters, incorporated with the modern mansion, a stone bath, and two uncovered wells, called 'the wishing wells,' yet remain. The principal part of these ruins are included in the pleasure-grounds of Walsingham abbey, the seat of H. L. Warner, Esq. There is a fine engraving of the eastern end of the church in the last edition of Dugdale's 'Monasticon.' There was a house of Franciscan or Grey Friars at Little Walsingham, the houses and gardens of which were valued at the dissolution at 3*l.* per annum; there was also a lazar-house, founded A.D. 1492, for two leprous persons. This lazar-house has been enlarged, and is used as a bridewell. The town of New Walsingham is near the river Stiffkey. The church, which is a spacious building, contains an antient font of perpendicular character; its carving is among the richest in England, representing the seven sacraments of the Roman Catholic church and the Crucifixion. An engraving of this font is given in Britton's 'Architectural Antiquities,' vol. iv. There is a yearly fair. Quarter-sessions for the county are held here by adjournment twice in the year. There are Methodist and Independent meeting-houses. The living of Old Walsingham is a chapelry, of the clear yearly value of 168*l.*; that of New Walsingham, a donative, of the value of which there was no return. There were in the two parishes, in 1833, one endowed school, but without scholars; one school, with 12 girls, supported by private charity; seven other day-schools, with 161 children; one day and Sunday school, supported by voluntary contributions, with 37 girls; and four Sunday-schools, with 173 children.

Watton is in the hundred of Wayland, 91 miles from London. The area of the parish is 2000 acres; the population, in 1831, was 1027. The town, which is small, is in the midst of a dairy country, from which a considerable quantity of butter is sent to London. There are in the town some almshouses and a clock-tower. The church, which is at some distance from the town, has a round tower with an octangular top; it is supposed that some parts of the building are as old as the time of Henry I. There is a weekly market on Wednesday, three antient fairs, and two others of modern establishment. Petty-sessions for the hundred are held monthly. The living is a vicarage, of the clear yearly value of 187*l.*, with a glebe-house. There were in the parish, in 1833, a national day and Sunday school, with 120 children, and three day-schools, with 93 children.

Wells is in North Greenhoe hundred, 118¼ miles from London. The area of the parish is 2250 acres, with a population, in 1831, of 3624. The town is on a slight elevation rising above the marshy flat which here lines the coast, and about half a mile from the sea, on a creek, the mouth of which forms the harbour. The shifting sands render this harbour difficult of access, but considerable improvements have been made in it. The town consists of two principal streets, partially paved, and of some smaller streets. There is a custom-house on the quay; there is also a theatre. The trade of the port is considerable. Corn and malt are shipped; and coals, timber, deals, bark, oil-cake, tar, and wine are imported. There is a yearly fair. Petty-sessions for the hundred are held every fortnight. Several of the townsmen are engaged as seamen in registered vessels, or in the oyster or other fishery. The living is a rectory, of the clear yearly value of 738*l*., with a glebe-house. There were in the parish, in 1833, six infant or dame schools, with 124 children; two endowed day-schools, with 60 children; two schools, supported by private charity, with 60 children; eight other day-schools, with 277 children; and two Sunday-schools, with 339 children.

Wymondham (pronounced and occasionally written Windham) is in Forehoe hundred, 100 miles from London. The parish comprehends six divisions, having an aggregate area of 11,240 acres, with a population, in 1831, of 5485. A priory of Black or Benedictine monks was established here before A.D. 1107, by William de Albini, chief butler to Henry I. It was at first a cell to St. Alban's abbey, but was separated from it and erected into an independent abbey about A.D. 1448. It had ten or twelve monks: the yearly revenue at the dissolution was 211*l*. 16*s*. 6¼*d*. gross, or 72*l*. 5*s*. 4*d*. clear. The only part of the conventual buildings now remaining is a portion of the church, which is now used as the parish church. The town grew into importance through the monastery. Ket the Tanner, who raised a rebellion in the county in the reign of Edward VI., was a native of this town.

The town of Wymondham is of considerable extent, and has been much improved of late years. The church was originally cruciform, consisting of a nave with side aisles, the south aisle having the monks' lodgings over it, two chapels forming transepts, a choir, with Lady chapel on the north side, and a tower rising from the intersection of the nave and transepts. There were a chapter-house and other conventual buildings. Between the years 1410 and 1476 the inhabitants built another tower at the western end. The part now remaining consists of the nave with the side aisles (the south aisle having been rebuilt), the western tower, a considerable portion of the central tower, and some fragments of the walls of other parts. The architecture is of different styles and periods; the Norman arches of the nave may be regarded as belonging to the original building. There are several dissenting meeting-houses at Wymondham, and a house of correction. The bombazine manufacture is carried on to a considerable extent; the whole number of persons employed in it is probably near 1000. There are a market on Friday, two yearly fairs for horses and cattle, and occasional statute fairs for hiring servants. The living is a vicarage, of the clear yearly value of 515*l*., with a glebe-house. There were, in 1833, two day-schools, partly supported by an endowment, with 140 children; three other day-schools, with 110 children; and five Sunday-schools, with 599 children. There is an endowment for a free grammar-school, but the Report in 1833 states that 'there had been no child instructed therein for many years.'

Of the places formerly of note, but now decayed, may be mentioned North Elmham in Launditch hundred, 5 miles north of East Dereham. In the Saxon time this was for four centuries (A.D. 673-1075) the seat of a bishopric; and after the see was removed to Thetford, and subsequently to Norwich, the bishops continued to reside occasionally in the manor-house here, which bishop Spencer, in the time of Richard II., obtained leave to convert into a castle. The entrenchment surrounding this castle still remains, and encloses about five acres of land. There are a few remains of the palace overgrown with briars and thorns, and some traces of the cathedral. The parish has an area of 5000 acres, with a population, in 1831, of 1153. The living is a vicarage, of the clear yearly value of 316*l*. The see was formed by dismemberment from that of Dunwich. The two sees were reunited probably about 870 or 871.

Castle Acre is in the hundred of Freebridge Lynn, 4 miles north of Swaffham, on the north bank of the Nar. It is probable that this was a Roman station, for several coins and a tessellated pavement have been dug up here. The castle, from which the place probably gets its name, was erected by William earl of Warren and Surrey, to whom the lordship had been granted by the Conqueror. It occupied the southern side of a hill sloping toward the river, and consisted of three parts or divisions, each fortified with mounds, ditches, and walls, but connected with each other. The earthworks remain, as well as fragments of the building. The principal street of the present village passes through one of the main entrances of the castle; this entrance consists of an outer and inner gate, with a portcullis between them, and two circular bastious to defend the approach. There are traces of a similar entrance at the southern end of the street. Earl Warren founded also a priory of Cluniac monks near his castle; the yearly revenues of which priory at the dissolution were estimated at 324*l*. 17*s*. 5¾*d*. gross, or 306*l*. 11*s*. 4¾*d*. clear. There are considerable remains of this religious house. The ruins of the west front of the church and the towers at the angles are a fine specimen of enriched Norman architecture. There are three doorways in this front; the central and principal one has a number of fine zigzag and other mouldings. The large west window over this doorway forms an exception to the general character of the front, being of perpendicular architecture, but much mutilated; there are pointed arches, or remains of them, on each side of this large window. Some large columns of the nave, but only one in a perfect state, the walls of the transepts, and considerable remnants of the conventual buildings to the south of the church, of the prior's house adjacent to the south-western angle of the church, of the porter's lodge, and of the barn of the monastery, are remaining. The site of the monastery within what may be called the walled precinct contains nearly thirty acres. The village of Castle Acre is still considerable. The area of the parish is 3210 acres; the population, in 1831, was 1333. There are two dissenting places of worship, and in 1833 there were three day-schools, with 125 children, and three Sunday-schools, with 225 children. The living is a vicarage, of the yearly value of which no return has been made. There are two yearly fairs, and the magistrates hold a meeting here once a fortnight.

Castle Rising, also in the hundred of Freebridge Lynn, 5 miles north-west of Lynn, and 2 miles from the Wash, on the Rising or Habingly river, is a place of great antiquity; an old verse, preserved by tradition, declares that 'Rising was a seaport town when Lynn was but a marsh.' It is thought that Alfred the Great built a castle here; at any rate William de Albini, to whose ancestors the Conqueror gave several lordships in the county, built a castle here before 1176; and this edifice appears to enclose a fragment of a more antient building. The trade of the place was considerable, and the town was incorporated, but at what period is not clear; however, the harbour, being choked up with sand, was deserted, and the place fell into decay. It received the elective franchise in the time of Philip and Mary; but from the decay of the town the number of voters was diminished to two or three, when the franchise was taken away by the Reform Act. The corporation has almost dwindled away. The parish and borough contains 2330 acres, with a population, in 1831, of 358, more than half agricultural. There are considerable remains of the castle; the keep is standing, though much dilapidated; the walls are three yards thick, and the division and arrangement of the apartments are very obvious. It stands in a ballium or court surrounded by a moat and embankment. The general style of the building is Norman, and bears a resemblance to that of Norwich castle. Isabella of France, queen of Edward II., was kept in confinement in this castle by her son Edward III., from A.D. 1330 till her death in 1358. The church is a very antient structure; the west front is of remarkably fine Norman composition; it has a fine doorway with varied mouldings, and a large window above, with a series of intersecting arches on each side. The font is antient and highly ornamented. The living is a rectory consolidated with that of Roydon, of the clear yearly value of 419*l*., with a glebe-house. There were, in 1833, two day-schools, with 67 children, and two Sunday schools, with 61 children.

Kenninghall, in Guiltcross hundred, in the neighbourhood of East Harling, is on the Ikeneld Street, and was once a residence of the princes of East Anglia, from which circumstance it derives its name, Cyning-Halla, 'King's Hall' or palace. The site of this palace, which is still discernible, is called 'Candleyards,' a corruption probably of Cyning-hall-yards, and consists of an area of four acres, surrounded by a ditch, and having an artificial mound at each corner. The lordship was conferred by the Conqueror on William de Albini, from whose family it descended to the Montalts, the Mowbrays, and the Howards. The splendid manorial residence of these nobles was forfeited to the crown on the attainder of the duke of Norfolk in the time of king Henry VIII., by whom it was conferred on his daughter the princess Mary, who, as well as her sister Elizabeth, occasionally resided here: it is now pulled down. The church, which is antient, has a south door of very singular Norman composition. The market of Kenninghall has been for many years discontinued. The area of the parish is 3660 acres; the population, in 1831, was 1251, more than half agricultural. The living is a vicarage, of the clear yearly value of 250*l.*, with a glebe-house. There were, in 1833, two boarding and day schools, with 55 children; three day-schools, with 76 children; and two Sunday-schools, with 260 children.

Litcham is in Launditch hundred, 8 miles north-west of East Dereham. The area of the parish is 2060 acres; the population, in 1831, was 771, more than a third agricultural. It was formerly a market-town, but the market has been discontinued; the place however still continues to be the mart of the surrounding villages. The church is an antient structure. There were, in 1833, one day-school, partly supported by subscription, with 70 children; one other day-school, with 20 children; one boarding-school, with 10 children; and one Sunday-school, with 50 children.

Methwold is in Grimshoe hundred, between Brandon and Stoke Ferry. The parish has an area of 13,530 acres, with a population, in 1831, of 1266, about three-fourths agricultural. The market has fallen into disuse. There are a handsome church with an embattled tower, and a Methodist meeting-house. The living is a vicarage united with the rectory of Cranwich or Cranwick, of the clear yearly value of 450*l.*, with a glebe-house. There were, in 1833, one day-school, with 36 children, supported by the duchy of Lancaster; one day and Sunday school, with 16 children in the week and about 22 on Sundays, partly supported by private charity; and one Sunday-school with 217 children.

Snettisham is in Smithdon hundred, about 11¼ miles north by east of Lynn, not far from the Wash. The area of the parish is 5580 acres, with a population, in 1831, of 926, nearly two-thirds agricultural. The market has been discontinued. There are a church and a Methodist meeting-house. Several brass 'celts,' antient instruments of disputed origin and use, have been dug up in this neighbourhood. The living is a rectory, of the clear yearly value of 110*l.*, with a glebe-house. There were, in 1833, one endowed school with 35 children; a school, partly supported by charity, for 47 girls; five other day-schools, with 81 children; one boarding school, with 28 children; and two Sunday-schools, with 73 children.

Worsted is in Tunstead hundred, 12 miles north-north-east of Norwich. The area of the parish is 2410 acres; the population in 1831 was 830, more than half agricultural. This place was formerly the seat of a considerable manufacture, introduced by the Flemings, of woollen twists and stuffs, called from it 'Worsted goods;' but this manufacture was in the reigns of Richard II. and Henry IV. removed to Norwich, where indeed it had been previously established. The market has been discontinued; and the town has now scarcely any manufacture and little trade, though the latter is facilitated by the canal from the river Ant up to North Walsham, which passes near the town. The church is a fine building, consisting of nave, chancel, and tower: the nave and chancel are partly of decorated, but chiefly of perpendicular character; the tower is of decorated character, and is of very admirable arrangement and composition. It is strengthened by rich buttresses and is crowned with pinnacles. There is in the church a font of peculiar richness with delicately pannelled sides; the pedestal has niches and buttresses, and the risers of the steps are pannelled. The cover of this font is of wood, of rich 'tabernacle work,' There is also a fine wooden screen. The living is a vicarage, of the clear yearly value of 251*l.* There were in the parish, in 1833, five day-schools, with 87 children, and two Sunday-schools, with 134 children.

The villages require only very slight notice. Banham (pop. in 1831, 1297) is in Guiltcross hundred, about 2 miles north-east of Kenninghall: it has a small endowment for a school. Blofield (pop. 1092) is in Blofield hundred, 7 miles from Norwich on the road to Yarmouth. It has several schools, one supported by endowment, another by private charity. Coltishall (pop. 868) is in South Erpingham hundred, on the river Bure, 7 miles from Norwich on the road to North Walsham: it has an endowed free-school. Costessey (popularly Cossey) (pop. 1098) is in Forehoe hundred, on the river Wensom, 4 miles from Norwich. It has the fine seat and park of Costessey Hall, the seat of Jerningham lord Stafford. The house is partly antient, partly modern. Contiguous to the house is a handsome Gothic chapel, erected by Edward Jerningham, Esq., a branch of the family. Feltwell (pop. 1231) is in Grimshoe hundred, about 2 miles south of Methwold. It consists of two antient parishes consolidated. Gaywood (pop. 924) is in the hundred of Farebridge Lynn, about a mile from Lynn, and consists of a principal street on the road to Swaffham. It has a large national school. The church serves for the adjoining parish of Bawsey, as well as for Gaywood. Mattishall (pop. 1093) is in Mitford hundred, 11 miles west of Norwich: some manufacture, probably of Norwich stuffs, is carried on. Stripdam (pop. 1889) is also in Mitford hundred, between East Dereham and Watton. There is an endowed school here. It has a handsome church. Upwell (pop., including the chapelry of Welney, 4156, on an area of 22,360 acres) is partly in Clackclose hundred, partly in Wisbeach hundred, Cambridgeshire, chiefly in the former. The village is on a branch of the river Nene, which here forms the boundary between the two counties. There are large garden-grounds in the neighbourhood. The church is on the Norfolk side of the stream. There are a Methodist meeting-house and a charity-school. Walsoken (pop. 1856, on an area of 8800 acres) is in Freebridge Marshland hundred, in the immediate neighbourhood of Wisbeach, to the inhabitants of which the pleasant walks round the village offer an agreeable promenade. Walsoken, with the neighbouring villages of Walton and Walpole, derives its name from its situation, adjacent to an old Roman wall or embankment for securing the country against the inundation of the sea.

Divisions for Ecclesiastical and Legal purposes.—This county is included in the diocese of Norwich, which comprehends Norfolk, Suffolk, and a few parishes in Cambridgeshire. [NORWICH, DIOCESE OF.] Norfolk is divided between the two archdeaconries of I. Norwich and II. Norfolk. I. The archdeaconry of Norwich includes the eleven rural deaneries of—1, Blofield, 2, Breckles, 3, Brisley, 4, Flegg, 5, Holt, 6, Ingworth, 7, Lynn, 8, Taverham, 9, Thetford, 10, Toftrees, and 11, Walsingham. Of these it is proposed that the deanery of Lynn shall be added to the diocese of Ely. II. The archdeaconry of Norfolk includes the thirteen rural deaneries of—1, Brooke, 2, Burnham, 3, Cranewise, or Cranwich, 4, Depwade, 5 Fincham, 6, Hingham, 7 Hitcham, 8, Humbleyard, 9, Reddenhall, 10, Repps, 11, Rockland, 12, Sparham, and 13, Waxton. Of these, it is proposed that Fincham should be added to the diocese of Ely. In Browne Willis's enumeration there are 354 churches and chapels in the former of the two archdeaconries, and 446 in the latter making just 800 in the whole county. In Lewis's 'Topographical Dictionary,' the number of parishes is given at 756; of which 441 are rectories, 171 vicarages, and 78 perpetual curacies; the remaining 66 are not specified.

Norfolk is in the Norfolk circuit, and the assizes are held at Norwich. The quarter-sessions are held at Norwich; from thence the Epiphany, Easter, and Michaelmas sessions are adjourned to King's Lynn, the Midsummer sessions to Swaffham; the Epiphany and Midsummer sessions are further adjourned to Walsingham; the Easter and Michaelmas sessions to Holt.

The county gaol is at Norwich, adjacent to the keep of the castle. The old prison, restricted to the walls of the antient fortress, having been found insufficient for the increasing number of prisoners, the new gaol adjoining it was erected in 1824, at an expense of 50,000*l.* It consists of a keeper's house of octagonal form and three radiating wings. The site is not considered to be well chosen, the sun and air being obstructed by the dense mass of the old castle, and the various buildings are too much crowded together. The discipline of the gaol (by Report of Inspector, Feb. 1, 1836) was considered too lax: but the defects of management result in a great degree from the inconvenient construction and arrangement of the prison. There are houses of correction at Swaffham, Little Walsingham, and Wymondham. There are borough gaols at Norwich, Yarmouth, King's Lynn, and Thetford. The number of prisoners for the county, committed from October in the year 1833 to October in the year 1834, was 1757, viz. 842 to Norwich Castle, 346 to Swaffham, 467 to Little Walsingham, and 102 to Wymondham; in 1834-5, 1665, viz. 801 to Norwich, 333 to Swaffham, 425 to Little Walsingham, and 106 to Wymondham; and in 1835-6, 1541, viz. 718 to Norwich, 287 to Swaffham, 427 to Little Walsingham, and 109 to Wymondham. There is a County Lunatic Asylum, established in May, 1814; into which, from its establishment, up to May 1, 1836, 1020 patients had been admitted. The amount of expenditure for the county rates in 1834 was 15,875*l.* 13*s.* 2¼*d.*, the greater part by far being expended in the prosecution of criminals, maintenance of prisoners, and other charges connected with the administration of justice.

The maritime jurisdiction of the county is under the direction of the vice-admiral of Norfolk, an officer appointed under a commission from the lords of the Admiralty, who is invested with a power to hold a Court of Admiralty for the county, with judges, marshals, and other officers. An appeal lies from this court to the high Admiralty Court. A court for the liberty of the duchy of Lancaster (of the limits of which in this county we are not aware) is held at Aylsham. A court for the liberty of the duchy of Norfolk is held at Lopham, or elsewhere within the liberty, at the discretion of the duke. The extent of this liberty is considerable, and reaches beyond this county. It comprises the whole hundred of Earsham, the half-hundred of Guiltcross, several manors and demesnes in other parts of the county, and several parishes or demesnes in Suffolk, Sussex, Surrey, and in other parts of the kingdom. Within these limits the duke has the return of all writs, bills, summonses, precepts, and mandates of the king, and exercises various other rights. The court of the honour of Rhye is kept at Hingham, and that of the fee or capital lordship of Richmond, at Swaffham.

Before the passing of the Reform Act, twelve members were returned from Norfolk: two for the county, two for the city of Norwich, and two each for the boroughs of Yarmouth, Castle Rising, Lynn, and Thetford. The total number was not affected by that act; the two members lost by the disfranchisement of Castle Rising being counterbalanced by the addition of two members consequent on the division of the county. The eastern division of the county includes the eighteen hundreds of Blofield, Clavering, Depwade, Diss, Earsham, North Erpingham, South Erpingham, Eynsford, East Flegg, West Flegg, Forehoe, Happing, Henstead, Humbleyard, Loddon, Taversham, Tunstead, and Walsham. The court for the election of members is held at Norwich; and the polling-stations are Norwich, Yarmouth, Reepham, North Walsham, and Long Stratton. The western division of the county comprehends the fifteen hundreds of Brothercross, Clackclose, Freebridge Lynn, Freebridge Marshland, Gallow, North Greenhoe, South Greenhoe, Grimshoe, Guiltcross, Holt, Launditch, Mitford, Shropham, Smithdon, and Wayland. The court for the election of members is held at Swaffham; and the polling-stations are Swaffham, Downham, Fakenham, Lynn, Thetford, and East Dereham. The boundaries of the city of Norwich and of the several boroughs were not altered, except by the incorporation with Norwich of some extra-parochial districts, and the addition of the whole of the parish of Gorlestone in Suffolk to the borough of Yarmouth, only a portion of that parish having been included in the old borough boundary.

History; Antiquities.—Norfolk formed part of the dominions of the Iceni or Simeni (Σιμενοι, Ptol.), a people who allied themselves with the Romans in the time of Claudius, but rose in arms on the attempt of Ostorius to form a line of fortified posts along the Severn, the Warwickshire Avon, and the Nene. This hasty rising was vigorously put down by that active commander. [BRITANNIA.] The more terrible rising under Boadicea followed [BOADICEA]; but on her defeat the Iceni seem to have submitted. In the Roman division of Britain, Norfolk was included in the province of Flavia Cæsariensis, which comprehended all the east side and the centre of the island. There were many British and Roman towns or posts in this county, several of which were on the shores of that æstuary, which we have noticed as occupying the valleys of the Wensum, the Yare, the Waveney, the Bure, and the district of the 'broads.' Venta (Οὐέντα, Ptol.), distinguished as Venta Icenorum from several other British towns to which the name of Venta was common, was probably at Caistor St. Edmund's, about 3 miles south of Norwich, and was the chief town of the Iceni. Branodunum and Gariannonum, mentioned in the 'Notitia Imperii,' were probably in this county; the former at Brancaster, the latter on the valley (then the æstuary) of the Waveney: and Ad Taum, mentioned in the Peutinger Table, was probably at Taesburgh, on a branch of the Yare. There are traces of several other posts, of which the names are unknown. The Iciani of the Antonine Itinerary has been placed by some antiquaries at Thetford or Ickburgh, between Brandon and Swaffham. The mouth of the great æstuary, where Yarmouth now stands, is mentioned by Ptolemy under the name Garryenus (Γαρρύενος), the first part of which evidently embodies the root of its present designation 'Yare.'

Of Venta there are some remains on the right bank of the Taes, which joins the Yare. The Romans made it their principal post on this side of the island. There are traces of this station, which comprehended a square of about 30 acres. Foundations of buildings may be traced, and sepulchral urns and other antiquities have been dug up. The station is on a declivity toward the river: its figure approximates to a parallelogram with the corners rounded off: it was enclosed by a single rampart or mound, surmounted by a wall and defended by a ditch. There was formerly a raised mound in each corner. Of a massy tower near the river, designed to guard the gate toward the water, there are considerable remains: it is still above thirty feet high, and is composed of alternate layers of Roman bricks and of flint, imbedded in a strong cement: the outside was probably once faced with stone. The wall which surmounted the mound appears to have been built in the same manner. Many Roman bricks have been used in the erection of the parish church, which stands within the station, as the now ruined church at Reculver in Kent stands within the enclosure of the Roman Regulbium. Venta appears to have been on one of the branches of the great æstuary. Of Branodunum (Brancaster, 4 miles north-west of Burnham-market), one of the stations of the cavalry under the 'Comes Littoris Saxonici' (Count of the Saxon Coast), there are some remains. The station was just at the foot of the declivity that overlooks the marshes: the area was about eight acres. Numerous coins, urns, knives, 'styles' for writing, and other antiquities have been dug up. The site of Gariannonum, another of the posts of cavalry under the same officer, has been much disputed. Spelman proposed to fix it at Caistor, at the northern end of the 'denes' or flats along the shore by Yarmouth, from which town Caistor is distant about 2 miles. But although the name would lead us to fix a Roman post here, yet it is unlikely to have been a post for cavalry, or the chief station of the district. Burgh castle in Suffolk, at the junction of the Waveney and the Yare, has been fixed upon by most antiquaries; but though the remains show it to have been a fortification of importance [BURGH], it could hardly have been suited, situated as it then was on an island, for a post of cavalry. Another locality has consequently been proposed, viz. Whetacre or Whitaker Burgh, on the Norfolk side of the Waveney, on the extreme point of the peninsula formed by the two great branches of the æstuary, now the valleys of the Waveney and the Yare. (Robberds's *Geological and Historical Observations on the Eastern Valleys of Norfolk.*)

Ickburgh, 4 miles east of Methwold, bears in its name an indication of having been a Roman post; and from the first syllable it has been proposed to identify it with the Iciani of Antoninus: but the uncertainty of the connected stations, and the occurrence of the same element in several other names, for example Ixworth, makes it difficult to determine. The discovery of various antiquities at North Elmham, and the early importance of that place under the Saxons, lead to the supposition of its having been a Roman town or village.

The names of some places, as Attleburgh, on the road between Thetford and Norwich; Burgh, near Aylsham, in the neighbourhood of which, at Oxnead, antiquities have been discovered; Happisburgh, on the coast between Yarmouth and Cromer; Oxburgh (where are the remains of a ditch and fortification), on the Wissey, near Stoke Ferry; and the discovery of antiquities at other places, as at Buxton, between Aylsham and Coltishall, Castle Rising; South Creak, between Burnham and Fakenham; Narborough and Narford, 5 miles north-west of Swaffham; Old Walsingham; and West Acre, near Castle Acre, render it probable that they had a Roman origin; and it may be observed that nearly all of them are on the sea or on the verge of those marshy valleys which line the banks of the chief rivers, and which, whether belonging to the system of the Yare or the Ouse, we have every reason to think were æstuaries in the time of the Romans.

There are traces in the county of Roman or other antient roads. A road, nearly coinciding with the Norwich mail road, ran from the neighbourhood of Diss to Venta Icenorum or Caistor. This is marked in Donald and Milne's 'Map of Norfolk' as the 'Pye Road.' Another from Ixworth in Suffolk ran in nearly a direct line by Castle Acre to Holme, near St. Edmund's Point or Brancaster. This is called the Iedder or Peddar's Way. A third road ran from Venta (Caistor) or Ad Taum (Taesburgh), across the valley or æstuary of the Waveney at Bungay; this is called by Donald and Milne 'Stone Street.' The Ikeneld Street crossed the Little Ouse above Thetford, and ran in the direction of Venta. Other roads ran from Venta by Burgh, near Aylsham, to the coast near Cromer; another from the same place to Brancaster; a third westward from Venta across the Great Ouse and the Nene into the Midland counties; and a fourth by Burgh Apton near Loddon, in the direction of Whetacre Burgh, probably the Roman Gariannonum.

It has been inferred with considerable probability that the Saxons had obtained a settlement on parts of the east and south coasts of this island before the overthrow of the Roman empire. 'This district,' says Sir F. Palgrave, 'in the last ages of the Roman empire was placed under the command of a military count, called "Comes Littoris Saxonici." It has been supposed that this shore was so called merely because it was open to the incursions of the Saxons; but it is most probable that they, like the Scots, succeeded in fixing themselves in some portion of the district, for it appears a strange anomaly that a country should be named not from its inhabitants but from its assailants; and in the "Littus Saxonicum" of Gaul they had obtained a permanent domicile not far from Bayeux.' ('History of England,' in the *Family Library.*) This early settlement of the Saxons was probably chiefly in the counties of Norfolk and Suffolk, and perhaps Essex, and will serve to account for some circumstances in the subsequent history of those districts which are otherwise unaccountable.

The time of this settlement can only be conjectured; the most probable period was the usurpation of Carausius in this island, during the reign of Diocletian and Maximian in the other parts of the Roman empire. Carausius was himself a seaman and cultivated the alliance of the Saxons, and employed them in the fleet by which he long bade defiance to the power of the emperors. It is not unlikely that to him may be ascribed the erection of those forts in Norfolk and Suffolk called 'burgi,' or towers, which at once restrained his barbarous allies and defended the æstuaries and coast from attack; and of which traces remain in the frequent occurrence of the Teutonic termination 'burgh.' The subsequent usurpers who arose in Britain probably encouraged new settlements of Saxons, whose warlike habits rendered them serviceable soldiers in the bloody contests then carried on.

In the general conquest of England by the Saxons and their kindred tribes, Norfolk and Suffolk and some parts of the adjacent counties were formed into the kingdom of East Anglia, constituted probably by the coalition of the independent settlements of the 'North folk' and the 'South folk,' that is, of the people north and south of the æstuaries of the Waveney and the Little Ouse.

The settlement of the Angles here (A.D. 527) was attended by many battles, but the contest does not appear to have been protracted or severe, and in a very few years (A.D. 534) the barbarians were sufficiently strong to invade the banks of the Rhine, and furnish the only instance upon record of the insular Saxons assailing the Continent. This comparatively easy formation of an extensive state, and the early development of its aggressive power, can only be accounted for by the supposition that the founders of the East Anglian settlements landed on a coast already settled by men of the same origin and of kindred habits; it may be received then as a corroboration of the conjecture that Carausius or some other ruler had already located the Saxons here.

The history of the East Anglian expedition to the Continent (A.D. 534-47) is singular. The hand of an East Anglian princess had been solicited by the Prince of the Varnians, who lived somewhere between the Rhine and the North Sea. Political reasons led the Varnian to reject the lady whom he had wooed, in order to marry his father's widow, a Frankish princess. The rejected fair one, supported by her countrymen, invaded his territories, defeated his army, took him prisoner, and compelled him to repudiate his Frankish wife and fulfil his first engagement.

It was not till some years after this that the settlements of the East Angles were consolidated into a monarchy Uffa was the first who is spoken of as king of East Anglia, about A.D. 571. His successors were called from him Uffingas, popularly corrupted in an after-age into Fikeys. Under his grandson Redwald, East Anglia became a powerful state. Redwald protected Edwin the fugitive prince of Deira; and taking arms on his behalf, defeated and slew Ethelfrith of Bernicia, who had expelled Edwin and seized his kingdom. Redwald became bretwalda, or supreme head of the Anglo-Saxons. He had embraced Christianity, but was not able to introduce it into his dominions except by a compromise with the hereditary idolatry of his subjects; and Christ and Odin were worshiped in the same temple. Eorpwald and Sigebert, the sons of Redwald, who successively ascended the throne, succeeded in establishing Christianity. Sigebert was an encourager of learning, and founded a school, which some consider to have been the germ of the university of Cambridge. East Anglia however ceased to be a powerful kingdom; it became subject to the supremacy of Edwin, now bretwalda, or head of the Anglo-Saxons.

Sigebert had just abdicated his throne and retired to a monastery (A.D. 633) when his successor Egeric or Egric, brother of Redwald, who had previously ruled over a part of the kingdom, was attacked by Penda of Mercia. The East Angles by main force drew Sigebert from his retreat and compelled him to accompany them to the field, hoping for victory under the guidance of so pious a prince. They were defeated; and Sigebert, who refused to bear arms and carried only a white wand, was slain, as well as Egric. Annas, nephew of Redwald, succeeded, but he too was many years afterwards killed by Penda (A.D. 654). His brother and successor Ethelhere, accompanying Penda in his attack upon Oswio of Northumberland, was with him defeated and slain in Winwidfield, or the plain of the river Winwid, near Leeds in Yorkshire (A.D. 655). Some obscure princes, of whom the names are barely known, succeeded; but in 792, Ethelbert or Agelbright, a prince of greater reputation, was king. He visited the court of Offa, the powerful king of Mercia, to solicit the hand of his daughter, but was murdered by the Mercian king, at the instigation of his wife (A.D. 792), and his kingdom annexed to Mercia. The Mercian power was not sufficient to repress anarchy, which was probably promoted by the disjointed nature of East Anglia, consisting of peninsulas and islands, separated by arms of the sea, and probably inhabited by a race maintaining more of their original character than the other Anglo-Saxons. On the defeat of the Mercians by Egbert, they rose in arms to assert their independence, and Beornwulf and Ludican, kings of Mercia, were successively defeated and slain by them. They appear however to have submitted quietly to the supremacy of Egbert.

Shortly before the death of Ethelwulf, A.D. 855, Edmund was crowned king of East Anglia at a place called, by Asser, Burva. According to the chronicles he was of the 'old race of the Saxons' in Germany; and Hunstanton, near St. Edmund's Point, on the north-west coast of the county, is named as the spot on which he landed. One of the accounts of Ragnar Lodbrog, the Danish pirate, places the scene of his catastrophe in East Anglia. The tradition is that he was driven in a boat, in which he was hawking off the Danish coast, by stress of weather over to England; and entering the æstuary of the Yare, landed at Reedham, a village between Yarmouth and Norwich. The inhabitants brought him to the court of Edmund at Caistor, where he was murdered by Bern, the king's huntsman, without his master's knowledge. His death led to the subsequent invasion of East Anglia by the Danes. (Spelman's '*Icenia*,' quoted in Swinden's *History of Great Yarmouth.*) The more generally received account however places the scene of Ragnar's death in Northumberland, and ascribes it to the orders of Ella, king of that country. (Turner's *Anglo-Saxons.*)

In the great invasion of England by the Danes, or Northmen, under the sons and kinsmen of Lodbrog, East Anglia was the first part attacked. The Northmen landed and formed a camp, in which they passed the winter, demanding and receiving from the East Anglians a supply of horses (A.D. 866).

The nature of the country, its insular or peninsular character, and its separation by æstuaries and marshes from the more civilized parts of the Anglo-Saxon territories, had probably led the East Angles to retain a larger portion of their primitive character, superstitions, and habits; and this enabled and disposed them to coalesce with invaders in whose character and mode of life they would only behold a renewal of what they themselves had been. William of Malmesbury (*De Gestis Reg. Anglor.*, lib. ii, cap. 5) says, ‘Orientales Angli et Northanimbri cum Danis unam in gentem coaluerunt.’ It is probable indeed that from the first settlement of the barbarian allies of Carausius, the character of the inhabitants of this district had undergone comparatively little change, and hence the facility with which new swarms of barbarians were received and naturalised. In A.D. 870 the Danes returned and established themselves at Thetford. Edmund fell in an attempt to expel them. He was canonised, and has given name to St. Edmund's Bury. The dominion of the invaders became permanent. In the peace made between Alfred and Guthrun or Godrun (A.D. 883), this county was included in the Danelage or Danelagh, and though subject to the supremacy of the Anglo-Saxon kings, became Danish in its character and probably in its language, so far as this differed from the Anglo-Saxon.

Among the characteristics still remaining of Danish possession may be noticed the frequent recurrence of the termination *by*, in such names as Filby, Ormesby, Scratby, Thrigby, &c., villages in the country round Yarmouth; and perhaps the frequency of the termination *oe* or *hoe*, an island, in such names as Hadiscoe, Limpenhoe, villages in the same parts of the county, and in the names of the hundreds Forehoe, Greenhoe, and Grimshoe; there is also in the names Worsted, Tunsted, &c. the termination *sted*, which is common in Holstein and Angeln.

The submission of the East Angles to the Anglo-Saxon supremacy was unsteady. They failed in their engagements to Alfred, when he was attacked by the redoubted Hastings, A.D. 893. At the commencement of the reign of Edward the Elder (A.D. 905), they supported his competitor Ethelwald; and Eohric or Eric, a Danish chieftain of East Anglia, fell with Ethelwald in an attack upon the Kentish men in Edward's army. A treaty of peace between the East Angles and Edward was made a year or two after; and (A.D. 921) the direct sovereignty of the country appears to have passed into Edward's hands by the willing act of the people, after he had defeated some of the Anglo-Danes at Temesford in Bedfordshire, in which battle an East Anglian king or chieftain fell. William of Malmesbury speaks of the expulsion of the East Anglian Danes, ‘expulsis Danis,’ but this expression is to be understood not of the Danes generally, who had probably merged in the body of the inhabitants, but only of those who were unwilling to submit to the Anglo-Saxon government.

Under the Anglo-Saxon princes, East Anglia was governed by Ealdormen. Athelstan, of the blood royal, with his sons Ethelwold or Ethelwulf (who was slain by King Edgar, in order that he might marry his wife Elfleda) and Ailwin or Ethelwin, were Ealdormen of East Anglia.

When the struggle between the Anglo-Saxons and the Danes was renewed in the reign of Ethelred II., the East Angles equipped a fleet for the defence of the island, a circumstance which indicates that they had not lost their maritime habits. At a subsequent period (A.D. 1004) East Anglia was attacked by Sweyn, king of Denmark, who brought his fleet up to Norwich, which he plundered and burnt. Ulfketul or Ulfkyttle, a man of Danish extraction, was Ealdorman of East Anglia at the time. He, being unprepared to repel the attack, first attempted negotiation, but finding that fail, he resorted to force, and defeated the invaders, who had taken and burnt Thetford. The victory was dearly bought, and the Danes, though with difficulty, escaped to their ships. In A.D. 1010, the Danes, under their leader Thurkill or Turketal, occupied East Anglia, and obtained a portion of it (probably Suffolk) in permanency by making peace with Ethelred. Ulfkytlle, who probably had retained Norfolk and other parts in the east of the island, fell in the battle of Assandren (A.D. 1016) between Edmund Ironside and Canute the Dane. In the subsequent division of the island between these princes, East Anglia fell to the former. On the death of Edmund and the accession of Canute to the sovereignty of England, Thurkill was appointed (A.D. 1017) earl (a title of Danish origin, equivalent to the Saxon Ealdorman) of the whole of East Anglia, but was soon afterwards (A.D. 1021) banished, and in his exile was killed by the peasantry of Denmark. In the reign of Edward the Confessor, the earldom of East Anglia was held by Harold, afterwards king; but when Harold, with his father and brethren, was declared an outlaw (A.D. 1051), his earldom was given to Algar, the son of Leofric, earl of Mercia. On the restoration of Harold (A.D. 1052) he resumed his earldom but resigned it again to Algar, upon receiving the earldom of Wessex on the death of his father, earl Godwin (A.D. 1053). Two years later Algar was driven into banishment, but restored a year after. However, in A.D. 1057 he finally resigned the earldom of East Anglia for that of Chester; and East Anglia perhaps reverted to the possession of Harold, whose brother Gurth became earl of Suffolk. The limits of the kingdom and earldom of East Anglia were probably coincident with those of the East Anglian bishopric, the seat of which has long been fixed at Norwich. Its first seat was at Silthestow, afterwards called Domnoc or Dommoc, now Dunwich in Suffolk, where it was established by Sigebert, king of the East Angles, about the middle of the seventh century. In A.D. 673 the diocese was divided, a bishopric being established at North Elmham in Norfolk. About A.D. 870 or 871 the diocese was reunited under the bishop of Elmham; in A.D. 1075 the see was transferred to Thetford, and about A.D. 1094 to Norwich, where it has ever since remained.

After the Conquest the earldom of Norfolk and Suffolk was bestowed on Ralf de Guader, one of William's Breton auxiliaries according to some accounts, but according to others a native of Norfolk; but he having rebelled, was besieged in Norwich castle, and being forced to surrender, was banished, and the earldom of Norfolk bestowed on Roger Bigod, another of the companions of the Conqueror. On the death of William, Roger supported the claim of his eldest son Robert to the throne, which led to the devastation of the county. Bigod was obliged to submit to William Rufus. Hugh Bigod, one of the successors of Roger in his earldom, supported Stephen, who revived in his favour the title of earl of East Anglia. In the rebellion of the children of Henry II. against their father (A.D. 1177), Norfolk was the scene of contest; Hugh Bigod being a supporter of the young princes: he died attainted of treason. His son John succeeded to his father's title after payment of a heavy sum, in consequence of his father's attainder: he was one of the barons who extorted Magna Charta from John. In the subsequent war with the barons, the king came into this county: and it was in crossing the Wash from Lynn into Lincolnshire that he lost his baggage. The forces of Louis the Dauphin and his confederates afterwards overran this county. In the great rebellion of the Commons under Wat Tyler (A.D. 1381), the men of Norfolk took part under the command of John the Litester (or Dyer): but they were put down by the courage and activity of Henry Le Spencer, bishop of Norwich, who defeated them at North Walsham, and caused the Litester and the other leaders to be executed. At this time the manufacture of woollen stuffs was flourishing in the county; and Norwich was a large and populous city. The earldom of Norfolk had, before this, passed from the Bigod family to the Mowbrays. Thomas de Mowbray was created duke of Norfolk by Richard II. before A.D. 1380. He was banished by the king, A.D. 1398, and died at Venice two years afterwards. In the time of Edward IV., the direct male line of the Mowbrays having become extinct, the title of duke of Norfolk came to the duke of York, one of the young princes smothered in the tower by Richard III., who had married Lady Anne Mowbray, daughter of the last duke. Upon his death the dukedom was conferred by Richard on Sir John Howard, in whose family it has ever since remained. Henry VII., in order to assure himself of the loyalty of the people, visited Norfolk at the time of the imposture of Simnel: he kept his Christmas (1486?) at Norwich, and made a pilgrimage to the house of Our Lady of Walsingham.

Of the edifices of the middle ages, monastic, ecclesiastical, or castellated, Norfolk has several remains. The castle and cathedral of Norwich, the antient buildings of Lynn, and the abbey at Thetford, are noticed elsewhere. [LYNN; NORWICH; THETFORD.] Walsingham, Wymondham, and

Castle Acre, abbeys or priories, have been already described. Langley abbey is on the verge of the marshes of the valley of the Yare, 2 or 3 miles north of Loddon. It was founded A.D. 1198, by Robert Fitz-Roger Helke, or De Clavering, for Premonstratensian canons: its yearly revenues at the suppression were 128*l.* 19*s.* 9½*d.* gross, or 104*l.* 16*s.* 5*d.* clear. The abbey of St. Bennet of Hulme is in the marshes near the junction of the Bure with the Thurn and the Ant. The spot on which it was built had been granted by an East Anglian chieftain, about A.D. 800, to a society of religious Eremites, who built a chapel and other buildings here. This was destroyed by the Danes in the invasion under the sons of Lodbrog (A.D. 870). The chapel and houses were rebuilt about a century after: and King Canute founded and endowed, before A.D. 1020, a Benedictine monastery, whose yearly revenues at the dissolution were 677*l.* 9*s.* 8¼*d.* gross, or 583*l.* 17*s.* 0¼*d.* clear. At West Dereham, between Stoke Ferry and Downham market, an abbey for Premonstratensian canons was founded A.D. 1188, by Hubert, then dean of York: its yearly revenues at the dissolution were 252*l.* 12*s.* 11½*d.* gross, or 228*l.* 0*s.* 0¾*d.* clear. The chapel and hospital (afterwards priory and abbey) of North Creak, 2 miles south of Burnham-market, were founded by Sir Robert de Nerford, A.D. 1206. The priory and abbey belonged to the regular canons of St. Austin: it did not continue till the dissolution. Of all these institutions there are ruins which contain some beautiful portions, chiefly in the early English style. The chief remain of that of St. Bennet of Hulme is the gate-house, over which a draining mill has been erected; and there are traces of walls enclosing an area of at least 35 acres. There are some remains of Beeston priory, founded for the canons of St. Austin, in the reign of John or of Henry III. They are near the sea, on the road between Cromer and Cley, about 3 miles from Cromer. The revenues of this priory at the dissolution were 50*l.* 6*s.* 4¼*d.* gross, or 43*l.* 2*s.* 4½*d.* clear. There are a few remains of the once extensive priory of Flitcham, about 9 miles north-east of Lynn: they are used for or are incorporated in the barns, stables, or other offices of a farm-house. This priory was founded for Austin canons by Sir Robert Aguillon, in the reign of Henry III.; and had a yearly revenue at the dissolution of 62*l.* 10*s.* 6½*d.* gross, or 55*l.* 5*s.* 6¾*d.* clear. Binham priory (5 miles south-east of Wells), founded by Peter de Valoines, nephew of William the Conqueror, for Benedictines, subordinate to the great abbey of St. Alban's, had at the dissolution a yearly revenue of 160*l.* 1*s.* 0*d.* gross, or 140*l.* 5*s.* 4*d.* clear. The ruins are very considerable and interesting, but are gradually mouldering away. The nave and north aisle, and a portion of the south aisle of the conventual church, with the chief part of the west front, and the ruins of the north transept, remain. The west front is of early English character, very fine: it had a beautiful large window, now blocked up with plaster. The interior of the church is of Norman architecture. The nave and north aisle are at present used as the parish church. Of Broomholm priory near the sea, between Cromer and Yarmouth, founded by William de Glanvill (A.D. 1113) for Cluniac monks, there are some remains incorporated into a farm-house, or converted into offices: revenue at the dissolution, 144*l.* 9*s.* 0¾*d.* gross, or 100*l.* 5*s.* 3¼*d.* clear.

Several of the churches near the valley of the Waveney and in other parts of the county have round towers of no great dimensions, surmounted by an octagonal upper story. The origin of these towers has furnished a subject for much antiquarian conjecture. Hadiscoe church, in the valley of the Waveney, one of these, has a Norman doorway: Gillingham church, near Hadiscoe and Framlingham Earl, are chiefly of Norman architecture; the former church has a tower rising from the centre; the east end of the church, which is semicircular, is covered with thatch. Hillingdon, Thwaite, and South Lopham churches have all portions of Norman architecture. Little Snoring church has a doorway exhibiting a curious mixture of Norman and early English character. Northwold church has in the chancel against the north wall a lofty shrine, the upper part of which is composed of canopies over niches, while the lower part forms an altar tomb, on which are three figures of armed men in a posture of alarm, designed to represent the soldiers at the resurrection of our Lord. This shrine was erected for the purpose of the ceremonies used on Good-Friday and Easter-day. At Houghton, near Walsingham, is a small antient chapel, which affords a beautiful specimen of architecture, chiefly of decorated English character

The principal castles are those at Norwich, described elsewhere [NORWICH]; Castle Acre, and Castle Rising, described above, and Caister next Yarmouth. Caister is built of brick, and has been thought to be one of the oldest brick edifices in the kingdom. Others however ascribe its erection to Sir John Fastolfe, an officer who served with great distinction in the French wars of Henry V. and VI. It was twice besieged in the war of the Roses. An embattled tower at the north-west corner, one hundred feet high, and the north and west walls remain; but the south and east sides are levelled with the ground. There are the ruins of a castle at Weeding All Saints, near the Little Ouse, opposite Brandon. The gateway of Titherington-hall, commonly called Middleton Castle, at Middleton, 4 miles south-east of Lynn, is yet standing. It is of brick, and consists of a square tower with turrets at the four corners, rising considerably higher than the rest of the tower. It was probably erected by the Lord Scales, who distinguished himself in the French wars of Henry V. and VI.

There are several antient manor-houses or halls: Oxburgh Hall, near Stoke Ferry, on a stream that flows into the Wissey, was erected near the end of the fifteenth century by Sir Edmund Bedingfield. It is wholly constructed of brick, and originally enclosed a quadrangular court, 118 feet by 92. The entrance is over a bridge (formerly a drawbridge), and through a gateway between two fine towers 80 feet high. The floors and the roofs of some of the rooms are of fine brick, and the walls are in some parts covered with old tapestry. Part of the original building has been taken down, and the disposition of the other parts changed. The whole is surrounded by a moat 52 feet broad and 10 feet deep. Of East Basham House, near Fakenham, built in the reign of Henry VII. or Henry VIII., the walls of the porter's lodge and some of the apartments on the northern side of the court remain, and are appropriated as a farm-house. At Fincham, about 4 miles east of Downham-market, is an old house, now occupied as a farmhouse, which exhibits an early specimen of the revived Grecian style in domestic architecture. Winwal House, near Stoke Ferry, is perhaps the most antient domestic edifice in England. It has Norman buttresses, and some portion of ornament in that style. It consists of two stories, each containing two apartments; the whole building is only 33 feet long by 27 deep, and scarcely 16 feet high. Oxnead Hall, and Blickling Hall near Aylsham, belong to a later period—Oxmead to that of Elizabeth, Blickling to that of James I. or Charles I.

In the disturbances which arose out of the Reformation, Norfolk became the scene of tumult. A rising took place at Attleburgh (A.D. 1548), and it soon became serious. Ket, a tanner of Wymondham, was chosen leader of the rebels, who encamped on Mousehold heath, near Norwich, to the number of 20,000. Ket, with two assessors from each hundred in the county, held a court of justice under an oak, since called 'the oak of reformation,' and issued edicts levying contributions for the support of his followers. The marquis of Northampton, who commanded a force sent to watch the rebels till a more powerful army could be collected, having entered Norwich with 1100 men, was beaten out by them with the loss of 100 men. The rebels burnt part of the city, and returned in triumph to their camp on Mousehold. They were however at length attacked by the earl of Warwick with an army that had been collected to invade Scotland, and were totally defeated in a place called Duffen Dale, to which they had retired. Ket was hanged on Norwich castle, and his brother on the tower of Wymondham church; and the rebellion, which had also broken out in other parts of England, was put down.

In the struggle between Charles I. and the parliament this county zealously embraced the side of the latter, and was one of 'the associated counties' under the earl of Manchester. The king had little hold on the county at any time. Lynn, of which his troops had taken possession, was besieged and taken by the earl of Manchester.

(Blomefield's *History of Norfolk;* Donald and Milne's *Map of Norfolk;* Conybeare and Phillips's *Outlines of the Geology of England and Wales;* Greenough's *Geological Map of England,* Robberds's *Historical and Geological Observations on the Eastern Valleys of Norfolk;* Priestley's *History of Navigable Rivers and Canals;* Lewis's *Topographical Dictionary; Beauties of England and Wales; Parliamentary Returns and Papers;* Ives's *Enquiry concerning Gariannonum;* Turner's *Anglo-Saxons,* and *Hist. of England in the Middle Ages;* Sir F. Palgrave's *Rise* *and Progress of the English Commonwealth*, and *History of England* (*Anglo-Saxon period*), in the 'Family Library;' Rickman's *Gothic Architecture;* Britton's *Architectural Antiquities.*)

STATISTICS.

Population.—Norfolk is partly an agricultural and partly a manufacturing county; it may be ranked mostly, among the whole of the counties, as the former, being the fifteenth on the list in 1831. According to the Population Returns of 1831, of 93,498 males twenty years of age and upwards only 4740 were then employed in manufactures or in making manufacturing machinery, while 45,413 were engaged in agricultural pursuits; 37,466 of the latter number were agricultural labourers. Of the 4740 men engaged in manufactures, 3752 were employed in the manufacture of bombazine in Norwich, 247 in Wymondham, and about 300 at Marsham, Hevingham, Haynford, Bunwell, and a few other places. About 100 men were employed in hempen and linen manufactures at North and South Lopham and elsewhere; at Great Yarmouth, about 30 in winding and weaving silk, and as many perhaps in other places; a few men were employed in the various villages in the woollen manufacture, and about twenty in making agricultural machines.

The population of Norfolk at each of the four following periods, was—

	Males.	Females.	Total.	Increase per cent.
1801	129,842	143,529	273,371	..
1811	138,089	153,910	291,999	6·81
1821	166,892	177,476	344,368	17·93
1831	189,323	200,731	390,054	13·26

showing an increase between the first and last periods of 116,683, or more than 42½ per cent. on the whole population, being 14¼ per cent. below the whole rate of increase throughout England.

The following table exhibits a summary of the population of every hundred, &c., as taken in 1831.

HUNDREDS, CITIES, OR BOROUGHS.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Blofield (Hundred) .	888	1,055	3	20	669	246	140	2,644	2,646	5,290	1,296
Brothercross . .	872	954	11	18	534	291	129	2,047	2,096	4,143	1,064
Clacklose . .	3,288	3,621	15	94	2,269	887	465	8,809	8,854	17,663	4,415
Clavering . .	1,057	1,288	4	8	896	274	118	3,294	3,317	6,611	1,656
Depwade . . .	1,752	2,068	11	31	1,295	499	274	5,028	5,003	10,031	2,522
Diss . . .	1,647	1,933	7	53	989	541	403	4,596	4,704	9,300	2,216
Earsham . . .	1,513	1,737	2	39	1,077	464	196	4,132	4,353	8,485	1,984
Erpingham, (North) .	2,018	2,164	24	80	1,143	485	536	5,057	5,103	10,160	2,444
Erpingham, (South) .	2,994	3,293	21	90	1,841	916	536	7,382	7,516	14,898	3,632
Eynsford . .	1,841	2,351	7	40	1,440	564	347	5,524	5,433	10,957	2,769
Flegg, East . .	625	662		18	422	104	116	1,508	1,490	2,998	721
Flegg, West . .	685	835	2	11	530	142	163	2,120	2,092	4,212	1,020
Forehoe . .	2,504	2,851	17	44	1,469	1,063	319	6,912	6,926	13,838	3,364
Freebridge, (Lynn) .	2,105	2,472	20	47	1,688	514	270	6,084	6,143	12,227	2,907
Freebridge, (Marshland) . . .	2,179	2,328	11	99	1,669	394	265	5,687	5,587	11,274	2,836
Gallow . . .	1,755	2,006	9	51	1,188	461	357	4,592	4,786	9,378	2,267
Greenhoe (North) .	2,101	2,259	4	66	944	633	682	5,071	5,340	10,411	2,291
Greenhoe (South) .	1,850	2,068	8	27	1,197	596	275	5,102	5,135	10,237	2,445
Grimshoe . .	1,252	1,349	7	37	897	273	179	3,268	3,112	6,380	1,672
Guilt Cross . .	1,009	1,395	6	26	813	223	159	3,399	3,362	6,761	1,671
Happing . . .	1,198	1,413	2	18	944	257	212	3,200	3,246	6,446	1,664
Henstead . .	1,070	1,167		23	764	289	114	2,757	2,653	5,410	1,399
Holt . . .	2,102	2,289	26	54	1,164	584	541	5,122	5,294	10,416	2,593
Humbleyard . .	921	1,110	10	16	807	210	93	2,675	2,734	5,409	1,353
Launditch .	2,235	2,678	23	51	1,825	571	282	6,474	6,165	12,639	3,212
Loddon . . .	1,316	1,502	9	29	910	386	206	3,762	3,695	7,457	1,845
Mitford . . .	2,229	2,366	23	77	1,260	792	314	5,712	5,783	11,495	2,737
Shropham . .	1,493	1,760	9	32	1,184	394	182	4,311	4,255	8,566	2,136
Smithdon . .	1,494	1,781	4	58	1,165	386	230	4,122	4,140	8,262	2,082
Tavesham . .	1,428	1,582	2	85	997	412	173	3,811	3,884	7,695	1,889
Tunstead . .	2,158	2,347	7	71	1,347	570	430	5,173	5,420	10,593	2,516
Walsham . .	773	934	5	5	633	222	79	2,287	2,238	4,525	1,195
Wayland . . .	1,333	1,422	3	16	1,000	334	88	3,363	3,461	6,824	1,666
King's Lynn (Borough)	2,707	3,035	27	180	24	1,736	1,275	5,972	7,398	13,370	2,846
Norwich (City) .	13,156	14,572	67	1,050	509	9,174	4,889	27,761	33,355	61,116	14,245
Thetford (Borough) .	675	716	12	13	81	467	168	1,585	1,877	3,462	820
Yarmouth, Great (Borough) . . .	4,570	4,869	23	191	26	2,297	2,546	8,980	12,135	21,115	4,105
Totals .	74,793	84,232	439	2,868	37,610	28,871	17,751	189,323	200,731	390,034	93,498

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the four dates of—

		£.		s.	d.	
1801	were	169,733,	being	12	5	for each inhabitant.
1811	. .	291,501	„	19	11	„
1821	. .	256,044	„	14	10	„
1831	. .	299,357	„	15	4	„

The sum expended for the same purpose for the year ending March, 1838, was 167,784*l.*; and assuming that the population had increased from 1831 to 1838 at the same rate of progress as in the ten preceding years, the above sum gives an average of 7*s.* 10½*d.* for each inhabitant. These averages are above those for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending 25th March, 1838, was 358,006*l.*, and was levied upon the various descriptions of property as follows:—

On land . .	£281,879	0*s.*
Dwelling-houses .	63,041	13
Mills, factories, &c. .	8,842	19
Manorial profits, navigations, &c.	4,242	10
Total	£358,006	2

The amount expended was—

	£	s.
For the relief of the poor . .	£316,654	16s.
In suits of law, removal of paupers, &c.	8,841	7
For other purposes . .	32,125	17
Total money expended	£357,622	0

In the Returns made up for the subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 355,684*l.* 18*s.*, 327,050*l.*, 275,951*l.* 18*s.*, not given for 1837, and 191,226*l.* respectively; and the expenditure of each year was as follows:—

	1834. £	1835. £	1836. £	1837. £	1838. £
For the relief of the poor	306,787	273,425	230,762	177,538	167,748
In suits of law, removal of paupers, &c. .	9,535	8,084	6,697	2,613	1,637
Payments towards the county-rate . .	35,565	16,469	16,430	not given	18,199
For all other purposes		29,322	25,844	16,845	17,921
Total money expended	£351,837	327,300	279,733		205,541

The saving effected in the sum expended for the relief of the poor in 1838, as compared with that expended in 1834, was therefore 139,003*l.* 9*s.*, or more than 45 per cent.; and the whole sum expended was less in 1838 than it was in 1834 by 146,346*l.*, or more than 41 per cent.

The number of turnpike trusts in Norfolk, as ascertained in 1836, were 15; the number of miles of road under their charge was 271. The annual income arising from tolls and parish composition in lieu of statute duty in 1836 was 16,016*l.* 18*s.*, and the annual expenditure in the same year was as follows:—

	£.	s.	d.
Manual labour . .	3,087	3	0
Team labour and carriage of materials	1,036	13	0
Materials for surface repairs .	2,598	9	0
Land purchased . .	130	12	0
Damages done in obtaining materials	144	8	0
Tradesmen's bills . .	824	0	0
Salaries of treasurer, clerk, and surveyor	1,122	8	0
Law charges . . .	194	13	0
Interest of debt . . .	2,958	5	0
Improvements . . .	1,546	11	0
Debts paid off . . .	543	6	0
Incidental expenses . .	392	7	0
Estimated value of statute duty performed . . .	1,242	6	0
Total expenditure	£15,821	1	0

The county expenditure in 1834, exclusive of that for the relief of the poor, was 15,875*l.* 13*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building, repairs, &c.	739	5	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	7,356	13	0
Shire-halls and courts of justice, building, repairing, &c. . .	114	5	0
Lunatic Asylums .	296	3	0
Prosecutions . . .	3,731	16	0
Clerk of the peace . .	742	15	0
Conveyance of prisoners before trial	1,048	14	0
Conveyance of transports .	405	15	0
Vagrants, apprehending and conveying	54	19	0
Constables, high and special .	31	5	0
Coroner . . .	329	16	0
Miscellaneous . . .	1,024	6	0
Total expenditure	£15,875	13	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 1871, 2829, and 3650 respectively, making an average of 267 annually in the first period, of 404 in the second period, and of 521 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 362, 283, and 279 respectively. Among the persons charged with offences there were committed for—

	1831.	1832.	1833.
Felonies . .	282	218	238
Misdemeanors .	80	65	41

The total number of committals in each of the same years was 337, 264, and 289 respectively.

	1831.	1832.	1833.
The number convicted was . .	229	189	205
The number acquitted was . .	78	34	47
Discharged by proclamation . .	30	41	37

There were 588 persons charged, in 1838, with crimes at the assizes and sessions in Norfolk. Of these 31 were charged with offences against the person, 11 of which were common assaults; 33 were charged with offences against property committed with violence; 495 with offences against property committed without violence; only 3 were charged with malicious offences; 6 for forging and uttering base coin, and 20 for various misdemeanors. Of the whole number committed 412 were convicted, 117 were acquitted, 11 were not prosecuted, and no bill was found against 46. Of those convicted one was sentenced to death, but not executed, his sentence was commuted into transportation for life; 36 were sentenced to transportation for various periods; 7 to imprisonment for 2 years, 41 for 1 year, and 288 for 6 months or under; 10 were fined, and 1 was found insane. Of the whole number of offenders, 515 were males and 73 females; 225 could neither read nor write, 270 could read and write imperfectly, 82 could read and write well, 4 had superior instruction, and the degree of instruction could not be ascertained of the remaining 7.

The number of persons registered, in 1837, to vote for county members was 15,601. Of these, 9496 were freeholders, 39 leaseholders, 1824 copyholders, 3474 occupying tenants, 210 annuitants, and 1558 whose tenures were part freehold and part copyhold; being 1 in 25 of the whole population, and 1 in 6 of the male population 20 years of age and upwards, as taken in 1831.

Norfolk contains 9 savings' banks; the number of depositors and amount of deposits, on the 20th of November in each of the following years, were as under:—

	1832.	1833.	1834.	1835.
Number of depositors . .	6959	7683	8473	8953
Amount of deposits . .	£212,809	£233,265	£250,423	£263,465

The various sums placed in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	5,387	£38,334	5,857	£42,094	6,630	£46,049
,, . 50	2,711	84,070	3,037	93,570	3,377	103,985
,, 100	1,225	83,590	1,316	90,095	1,378	95,273
,, 150	393	47,070	392	45,905	454	54,230
,, 200	214	37,287	237	40,931	257	44,337
Above . . 200	17	3,598	18	3,811	22	4,630
	9,947	293,949	10,847	316,406	12,118	349,500

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835:—

	Schools.	Scholars.	Total.
Infant schools . . .	133		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		800	
Females . .		782	
Sex not specified .		1,169	
			2,751
Daily schools . . .	1,091		
Number of children at such schools; ages from 4 to 14 years:			
Males . .		13,342	
Females . .		11,783	
Sex not specified .		7,252	
			32,377
Schools .	1,224		
Total of children under daily instruction			35,128
Sunday-schools . . .	502		
Number of children at such schools; ages from 4 to 15 years:—			
Males . .		11,568	
Females . .		12,575	
Sex not specified .		6,277	
			30,420

Assuming that the population between the ages of 2 and 15 years has increased in the same proportion as the whole of the population since 1821, and that the whole population has increased in the same ratio since 1831 as in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 thus found residing in Norfolk, in 1833, was about 130,798.

Fifty Sunday-schools are returned from places where no other school exists, and the children who are instructed therein (1994 in number) cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain.

Sixty-eight schools (containing 3737 children), which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. In some of the Sunday-schools, some persons as old as 50 years are in attendance. Making allowance for these two causes therefore, we may perhaps fairly estimate that little more than one-third of the children between the ages of 2 and 15 years are under instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	—	—	6	176	115	1,787	12	788
Daily Schools	88	2683	113	4,340	768	18,787	122	6567
Sunday Schools	12	677	448	27,124	2	103	40	2516
Total...	100	3360	567	31,640	885	20,677	174	9671

The schools established by dissenters, included in the above statement, are—

		Scholars.
Daily-schools . .	18, containing	590
Sunday-schools . .	123 „	10,960

The schools established since 1818 are—

Infant and other daily schools	535, containing	17,259
Sunday-schools . .	291 „	21,963

Thirty-two boarding-schools are included in the number of daily-schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by dissenters, with whom are here included Wesleyan Methodists, together with Roman Catholics.

Lending libraries of books are attached to 45 schools in this county.

NORFOLK ISLAND is situated in the Pacific Ocean, between 29° and 29° 10′ S. lat. and 168° and 168° 5′ E. long., about 900 miles from Port Jackson in Australia. It is about six miles long from north-west to south-east, and nearly four in breadth. It rises from the sea with steep cliffs to a height of from 200 to 300 feet. These cliffs consist of a hard firm clay, of a very fine texture, and there are only a few paths by which the summit can be attained. Beyond the cliffs the island extends in an uneven plain, cut in many places by deep ravines. At the north-western extremity is a high hill, called Mount Pitt, which attains an elevation of about 1200 feet above the sea. The whole island is covered with a thick forest of heavy timber-trees. Many of the pine-trees are from 180 to 220 feet high, and from 4 to 8 feet in diameter at some distance from the ground. Among these is the araucaria. [Araucaria.] As the soil of the island is very fertile, a British settlement was formed in 1789, from Sydney in Australia; but although the grain sown produced abundant crops, and potatoes and other vegetables succeeded, and although the climate was very favourable to the health of the settlers, and the water good, it was abandoned some years afterwards on account of the difficulty of landing. The sea surrounding the island has a rocky bottom, and there is no good anchorage. A number of large rocks also lie scattered about close to the shore, on which a continual surf breaks with great violence. There are only three places at which boats can effect a landing, and at these only with certain winds, and never in gales, which are rather frequent. Sometimes no landing can be effected for weeks together, and vessels, being obliged to stand off, are in danger of being lost on the numerous reefs. Norfolk Island has lately been made a penal colony for convicts from New South Wales; and it now seems to be the intention of government to try there the experiment of an improved and beneficent system of convict discipline, which, while carrying out the punishment inflicted by the law, shall lead to reformation of the criminals. (Hunter's *Historical Journal of the Transactions at Port Jackson and Norfolk Island*, London, 1793.)

NORFOLK. [Virginia.]

NO'RICUM, a province of the Roman empire, was bounded on the north by the Danube, on the west by Vindelicia and Rhætia, on the east by Pannonia, and on the south by Illyricum and Gallia Cisalpina. It was separated from Vindelicia by the Œnus (Inn), and from Gallia Cisalpina by the Alpes Carnicæ or Juliæ; but it is difficult to determine the boundaries between Noricum and Pannonia, as they differed at various times. Under the later times of the Roman empire, Mount Cetius and part of the river Murius (Mur) appear to have formed the boundaries. Noricum would thus correspond to the modern Styria, Carinthia, and Salzburg, and to part of Austria and Bavaria. A geographer who wrote in the reign of Constantius, the son of Constantine the Great, includes Germania, Rhætia, and the Ager Noricus in one province. (Bode's *Mythographi Vaticani*, vol. ii.) Noricum is not mentioned by name in the division of the Roman empire made by Augustus, but it may be included among the Eparchies of the Cæsar. (Strabo, p. 840.)

Noricum was divided into two nearly equal parts by a branch of the Alps, which was called the Alpes Noricæ. These mountains appear to have been inhabited from the earliest times by various tribes of Celtic origin, of whom the most celebrated were the Norici (whence the country obtained its name), a remnant of the Taurisci. Noricum was conquered by Augustus, but it is uncertain whether he reduced it into the form of a province. It appears to have been a province in the time of Claudius, who founded the colony Sabaria, which was afterwards included in Pannonia. (Plin., iii. 27.) It was under the government of a procurator. (Tac., *Hist.*, i. 11.) From the 'Notitia Imperii' we learn that Noricum was subsequently divided into two provinces, Noricum Ripense and Noricum Mediterraneum, which were separated from each other by the Alpes Noricæ. In the former of these a strong military force was always stationed, under the command of a dux.

In addition to the Norici, Noricum was inhabited in the west by the Sevaces, Alauni, and Ambisontii, and in the east by the Ambidravi or Ambidrani; but of these tribes we know scarcely anything except the names. Of the towns of Noricum the best known was Noreia, the capital of the Taurisci or Norici, which was besieged in the time of Cæsar by the powerful nation of the Boii. (Cæsar, *Bell. Gall.*, i. 5.) It was subsequently destroyed by the Romans. (Plin., *Hist. Nat.*, iii. 23.) The only other towns worthy of mention were, Juvanum (Salzburg), in the western part of the province, Boiodurum (Innstadt), at the junction of the Inn and Danube, and Ovilia, or Ovilaba, or Ovilava (Wels) south-east of Boiodurum, a Roman colony founded by Marcus Aurelius.

The iron of Noricum was in much request among the Romans (Pliny, *Hist. Nat.*, xxxiv. 41); and according to Polybius gold was formerly found in this province in great abundance (quoted by Strabo, iv., p. 208).

NORMA, the Rule, a constellation of Lacaille, situated between Scorpio and Lupus. Its principal stars are as follows:—

Character.	No. in Catalogue of		Magnitude.
	(Piazzi). Lacaille, C.	Astron. Society.	
α	92	1889	5
δ	242	1831	5
γ^2	1351	1862	5

NORMAL. This word (from *norma*) is generally used to mean a perpendicular drawn to the tangent line of a curve or the tangent plane of a surface, It formerly meant simply *perpendicular*. [Tangent.]

NORMAN ARCHITECTURE. Some remarks upon this style have already been made in the article Gothic Architecture, where it is spoken of as one of the local modifications of that generic style comprehended under the terms Romanesque, Lombardic, and even Byzantine, and of which the distinctive and characteristic feature is the round-headed (rund-bogen styl) or semicircular arch. Being imported into this country immediately from Normandy at the time of the Conquest, it has obtained among us the epithet which it bears, and our examples of it are frequently further distinguished by that of *Anglo-Norman.* Between this and the earlier Anglo-Saxon some have endeavoured to draw a line, yet it is little more than an imaginary one, it being exceedingly doubtful whether any specimens of the latter are extant. Those examples which were assumed to be Anglo-Saxon are now admitted to be Norman; or if a doubt in favour of their genuineness remains, they merely prove that, instead of being a distinct style, the Anglo-Saxon itself was no more than an imitation of the mode of building then prevalent on the Continent—an offshoot of the same parent stock; for the distinctions endeavoured to be established between what has been called Anglo-Saxon and Anglo-Norman are not those of *style*, taking the term in its most comprehensive meaning, but of *mode of treatment;* the rudiments of both being alike, not only as regards the form of the arch, but nearly all other particulars, as far as buildings of one and the other class—supposing them to be distinct ones—have features in common: the differences are local and accidental; the architectonic principles and the taste as to a predilection for certain forms and details are the same.

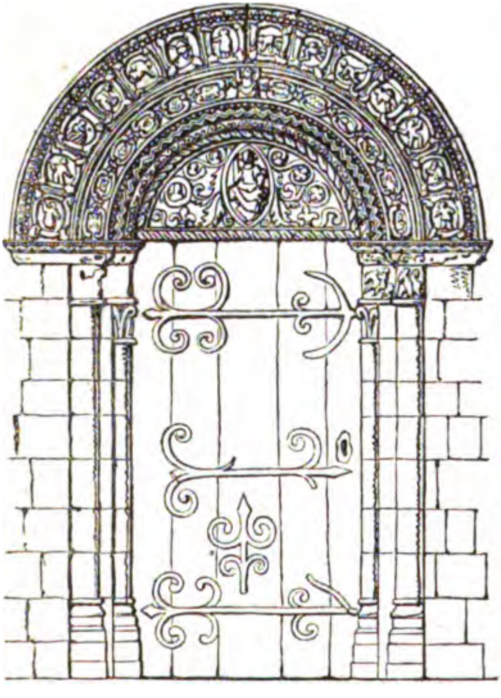
The Anglo-Norman period of our architecture may be said to extend from the date of the Conquest to nearly the end of the following century, that is, to the close of the reign of Henry II., 1189; but there are very few buildings in this style throughout, though there are many which retain detached parts and features belonging to and some which mainly consist of it, more or less intermixed however with what is of later date and in different style. Besides which, some of the structures which may safely be received as genuine Norman, as far as mere dates go, furnish very little information as to the style itself, beyond what may be equally well or better ascertained from other specimens: they are so plain in themselves, and the few features which they do exhibit have so little remarkable in them, that what is chiefly to be learnt from such examples relates only to the mode of building employed, apart from architectural style, except as far as massiveness of construction and the absence of what constitutes design contribute towards character. Such is the case with respect to one entire class of buildings, namely, the castles of the Anglo-Norman period, which, however interesting they may be in other respects, offer comparatively little for study to the architect, as they seldom present to the eye more than enormous masses of masonry, where grandeur is produced by bulk alone, without deriving anything from the efforts of art.

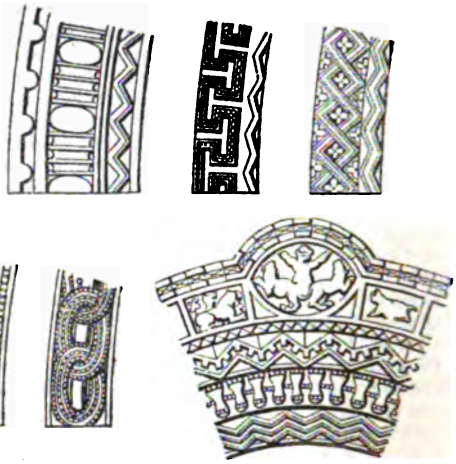
A great deal of Norman work is to be met with in the older parts of several of our cathedrals, and also in many smaller churches, such as Barfreston in Kent; New Shoreham, Sussex; Iffley, Oxfordshire; Steetly, Derbyshire, &c., which, having remained comparatively untouched, exhibit, although upon a limited scale, more of the Norman style and the peculiar mode of applying it than many larger edifices, notwithstanding that these latter occasionally present decorative features in this style which do not occur in buildings of a less pretending character. The older parts of Canterbury, Winchester, Gloucester, Ely, Durham, Norwich, Lincoln, and Oxford cathedrals are in this style. The nave and choir of Norwich in particular (founded in 1096), with the exception of pointed windows of later English character inserted in the upper part of the choir, are almost entirely Norman, of which they present a very fine example. Both that and the older portions of Gloucester are referred to by Hope as specimens of the Lombard style in England. It must be confessed however, that, putting aside the mere form of the arch and a few other individual parts, there is quite as much dissimilarity as resemblance between the Lombardic or round-arch style of Italy and that of this country. The combinations are almost altogether different. In England we have no instance of the low gable extending over a whole front, nor of sloping arcades beneath it [LOMBARDIC ARCHITECTURE, *cut*, p. 100], nor of tiers of small external galleries, nor of large circular windows as a principal feature in a façade, and still less of anything at all analogous to cupolas. Neither have we any examples of projecting doorways and porches resting upon richly sculptured columns, nor of ornamented pilaster-like shafts similar to that shown in the cut just referred to. Indeed we have very little remaining to show us the style of exterior composition employed by our Anglo-Norman architects in their larger edifices. The west fronts of Rochester and Lincoln cathedrals are almost the only parts that can be considered as specimens of Anglo-Norman architecture; yet each of them has many interpolations of other styles. The lower part of the former is entirely Norman, and has a remarkably fine though not very spacious centre doorway; but the large window over that entrance, in the later Gothic or perpendicular style, is so very prominent a feature, as greatly to take away from the effect that would else be produced by the other parts. The front of Lincoln presents little more than a surface decorated by small columns and arches, as is shown in the cut, p. 318, GOTHIC ARCHITECTURE. The general form, whose horizontal outline is broken only by a small gable of later date, is heavy, nor is there anything in common between this façade and those of the Lombardic churches. Wherever a superior degree of decoration was aimed at, the Anglo-Norman builders seem to have contented themselves with covering what would else have been blank surfaces with tiers of columns and arches of the kind referred to. The two transept towers of Exeter Cathedral, the front of Castle-Acre Priory, and of St. Botolph's Priory, Colchester, present little more; consequently, notwithstanding the variety as to detail, there is, as was also the case with Grecian architecture, a very great sameness as to general composition and design.

In the interiors of buildings this style exhibits itself more decidedly, owing not only to the perspective effect of a succession of spacious open arches, as in the naves of Norwich, Rochester, Chichester, Ely, and Peterborough cathedrals, but also to greater size and massiveness. Although such difference of character may at first appear somewhat incongruous, it being usual to find more minute and delicate forms employed for the internal parts of a building, the reason for it is evident; the tiers of pillars and arches on the exterior of Norman structures are merely decorations of the surface, while the arches and piers within are essential parts of the fabric. Instead of anything like lightness, we here meet with extraordinary massiveness, and sometimes uncouthness of proportions, arising from the excessive bulk of the piers from which arches spring: which character exhibits itself most strikingly when, as is the case with some of those in the nave of Norwich cathedral, the piers are merely short cylinders, with a kind of plain capital, and are not formed by shafts attached to a central mass of masonry. In the building just mentioned some piers of that description are ornamented on their surface by spiral grooves or flutings; and we may here remark that in that and other examples both cylindrical and clustered piers occur, not only in the same building, but in the very same part of it; and that great variety of detail and ornament is frequently observed in the mouldings of arches, columns or piers and their capitals, though they are uniform as to size, and compose a single range. Owing to the great diameter required for the supports of larger arches below, the mere pillar-shape was never employed for them, for although pillars of slender proportions were introduced for such purpose, it was only as *pier shafts*, or when the entire pier was made to consist apparently of a cluster of slender pillars, as some of those in the nave at Durham. It is true that slender detached pillars are of frequent occurrence, but then it is only to support small arches, as where a window is divided into or composed of two or more such arches, or in the triforia and other galleries within the building, where openings corresponding with the larger arches below are divided after the same fashion, and therefore do not form a continued arcade, but coupled or tripled arches at intervals, between the main piers. Sometimes the larger arches below, instead of being connected and resting upon the general capital of the pier, spring from *nook-shafts* or slender attached pillars, within the re-entering angles of the pier itself, the face of which was either left as a plain space dividing those pillars and the arches from the adjoining ones, or else decorated with another shaft carried quite up to the springing of the vault, and therefore very appropriately distinguished by Whewell by the term *vaulting-shafts.* Of the latter mode, the nave of the Abbaye aux Dames at Caen presents an example; while the Abbaye aux Hommes at the same place and the nave of Chichester give a combination of both; for there the loftier shaft does not fill up the space between the archivolts of the arches at their springings. But although attached pillars and shafts were almost uniformly of exceedingly tall and slender proportions, we occasionally meet with pillars short and stumpy and with bulky capitals, although the arches are very narrow, and the pillars themselves in situations where more delicate forms would have been sufficient. Of single columns approaching to the proportions of antient Roman columns, like those which are found in the Lombardic buildings of Italy, our Anglo-Norman structures afford scarcely an example, except it be in that part of Canterbury cathedral called Becket's Crown, where columns partaking very much of the Corinthian character, though somewhat bolder and more masculine, are employed as piers to support the arches (not round-head, but pointed); or they are rather coupled columns united back to back. Within crypts very short detached single columns were employed to support the arches of the vaulting, but this deviation from the usual practice would seem to have been occasioned merely by the local peculiarities of such subterraneous apartments, and consequently it can hardly be considered as characteristic of the style itself.

Having spoken of the style generally, we shall now briefly describe its principal component parts and separate features, which are not very numerous in themselves, although it would occupy some space and require a great number of explanatory cuts, if we were to attempt to notice the varieties of them, because few as are the general forms, and unvaried as is the general character, the diversity of detail and minutiæ is exceedingly great.

Doorways, even in small and otherwise plain buildings, and even when small in themselves, seem always to have had a great deal of embellishment bestowed upon them; and many have therefore been preserved in buildings, in every other part of which nearly all traces of the original Norman edifices have been obliterated by subsequent alterations. In many instances doorways are very deeply recessed, and in proportion to the aperture or door itself the dressings or decorations occupy a great space. This is likewise the case in the Gothic or pointed style; and it not only allowed great latitude in other respects, but enabled the architect to make what would else have been an insignificant feature, an important one in the design. A cut of the doorway at Romsey abbey is given at page 321 of GOTHIC ARCHITECTURE, and we here introduce another specimen from Barfreston church, Kent, which, although small, is in some respects not only of a different but of a richer and more elegant character, and will serve as an example of a square-headed door, where the arched space above it is filled up with sculpture. In this example the archivolt mouldings extend on each side considerably beyond the general recess of the doorway; which was frequently but by no means invariably the case. The *chevron*, or zigzag moulding, was a very favourite ornament with the Normans, both for archivolts and other decorative mouldings; but that there were great varieties of such mouldings will appear from the following specimens.

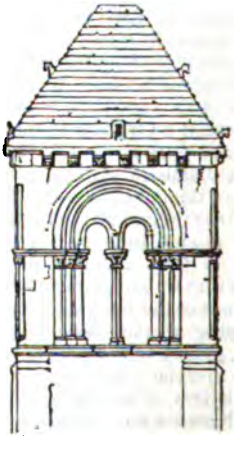




Few as these examples are, they will convey some idea of the delicacy and even elegance of the ornamental detail employed in this style.

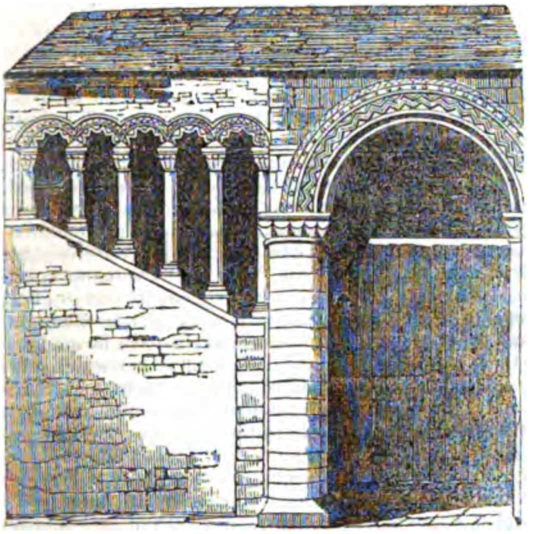
Windows had scarcely ever much decoration; they were generally small and placed at a considerable distance from each other; sometimes, too, merely plain apertures in the wall, and rarely more than scantily ornamented. At p. 201, GOTHIC ARCHITECTURE, are two specimens of Norman windows, one consisting of a single opening, the other divided by a central pillar. In regard to such feature, the Norman and Gothic styles differ essentially, quite as much as if not more than they do in the mere form of their respective arches; for besides that windows are very secondary features in the one style, whereas they are among the principal and most characteristic features in the other, Norman windows have neither mullions nor transoms, nor any tracery or open compartments in head of the arch; for even where the aperture is divided into two smaller arches, resting upon a central pillar, the space or head between those arches and the larger one which includes them is never perforated or otherwise decorated. Hence the windows themselves were necessarily limited as to size: not but that it would have been very possible to increase the number of openings by means of additional pillars, and by afterwards perforating the general head of the window above the smaller arched divisions, although not with equal consistency as in Gothic architecture, where the mouldings of the mullions are continued upwards and form the ribs of the tracery, however complicate it may be. Sufficient hints for such purpose might have been found in some of the intersecting patterns of ornament which occur among the exterior enrichments of Norman buildings.

By way of showing how windows were occasionally made more important external features than usual, we subjoin a sketch of one in the upper part of the tower of Than Church in Normandy, where, although the apertures themselves are narrow, the external breadth is rendered very considerable by means of the numerous pillars, or nook-shafts, on each side. Handsome in its general character such form



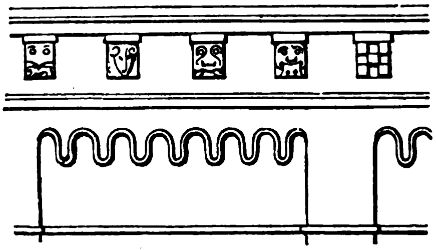
of window would admit of almost any degree of enrichment, by the mouldings being carved. In the story beneath it is a narrower window, with openings not half the breadth of the others, yet very nearly of the same height, and in other respects very different; but for that we must refer to the original plate, in Pugin's 'Architectural Antiquities of Normandy,' which comprises also a very interesting section of the whole tower. We may however call attention to the steep pyramidal stone roof, which form is supposed to have afterwards led to that of the spire, in like manner as its ornaments of animals' heads and figures may have suggested the first idea of crockets. Both triple windows, and window-like openings in internal galleries, divided by two pillars into three arches, of which the middle one is wider and loftier than the others, also occur. There are also windows in this style which, though narrow, are of very considerable dimensions as to height, like those at the east end of Canterbury Cathedral.

As a very peculiar and interesting specimen of Anglo-Norman architecture, and for the purpose of showing how, by increasing the number of openings and pillars, windows might have been extended in this style, we here exhibit a sketch of an external staircase leading to the registry at Canterbury.



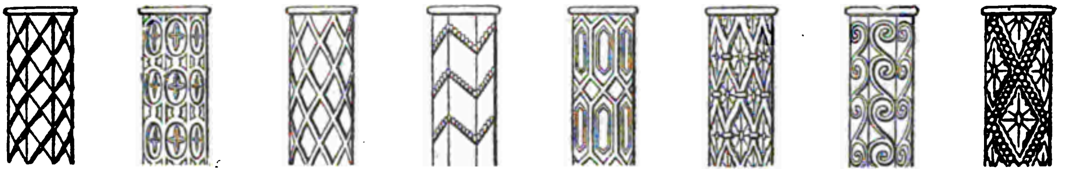
In this example there is somewhat to remind us of the open galleries of the Italian Lombardic, especially of those upon sloping lines beneath pediments [LOMBARDIC ARCHITECTURE, *cut*, p. 100], with this difference, that here the arches form a horizontal line. We have here also an instance of what was by no means uncommon in small arches in this style when they are not pierced through, which is, that the inner margin of the arches is formed by a chevron moulding which scallops them.

Buttresses, to which buildings in the Gothic style are indebted for so much of their character and effect, can hardly be said to exist in either Norman or Lombardic architecture. The enormous thickness of the walls and their solidity, owing to the smallness and infrequency of apertures in them, rendered such additional support unnecessary, even where the vaulting of the roof was large and bold. Hence nothing more than either *buttresses*, or *pilaster strips* (as they are conveniently termed by Mr. Whewell), were introduced, and these more for the sake of producing some variety and degree of expression than for actual strength, their projection beyond the general plane of the wall being very inconsiderable, and no more in fact than that of the corbelled parapet, or *corbel-table;* consequently buttress-strips do not so properly constitute projecting surfaces, as the intermediate spaces of wall form recessed compartments, or large pannels. The parapet itself was seldom more than a plain corbel-table, without battlement, except in castellated buildings; but sometimes, instead of forming a horizontal line, the lower edge of the corbel was what might be described as *embattled-reversed*, that is, indented like a range of battlements hanging downwards, or else made *wavy*, or scalloped with curves.



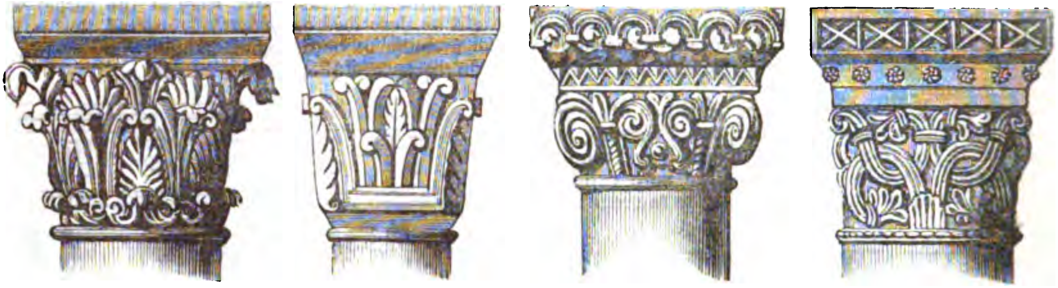
But the more common mode was to make the lower edge of the corbel table straight, with a series of corbel mouldings beneath it, frequently intersected by small blocks at intervals (after the manner of modillions), which were either left plain or sculptured with grotesque heads and figures. Occasionally again the corbelling assumed the form of a series of small interlacing arches, of which kind of decoration instances frequently occur in the Italian Lombardic.

Pillars and *Columns*, with which the massive circular arch-piers, or piers with nook-shafts, are not to be confounded, exhibit great diversity of character, both as to proportions and decoration, from the rudest and plainest forms to either the lightest or the most enriched. Neither are the two terms to be regarded as precisely synonymous, it being as well to observe the distinction made between them by Whewell, and to restrict the latter term, which is also termed the *nebule* moulding, to such pillars as approach to the general proportions and character of classic columns, as is the case with those already mentioned as being in Becket's Crown, Canterbury. *Pillars*, on the contrary, have very great variety of proportions, either much below or greatly above such standard. The shafts are for the most part plain, though instances occur of their being carved (as was oftener than not the case with the columns of Lombardic porches); and in the undercroft at Canterbury Cathedral there are pillars whose shafts are fluted spirally. Raised mouldings, intersecting each other spirally so as to form a diamond-pattern on the surface, are by no means unfrequent; and some of the circular arch-piers in Durham cathedral are so ornamented: zigzag or chevron lines were also employed for decorating the surfaces of piers and columns, and were disposed either annularly, in horizontal rings, or spirally. Of these and some other varieties specimens are here shown.



With respect to capitals, the diversity is so great as to render it impossible, at least here, to attempt to classify them, or particularise even the leading varieties: while some are both rude and plain, others are remarkable for the delicacy of workmanship and the taste shown in their enrichments: some, though they do not lack ornament, are either too poor and insignificant, while others again, though quite plain, have something pleasing in their mass and contour, and in the proportion they bear to the height of the shafts. Of the plainer sort of capitals, the most common shape of those occurring in Anglo-Norman buildings is what Mr. Whewell designates the *Cushion Capital*, and which is formed by an inverted cone, of convex contour, spreading up towards the abacus, but intersected by four planes, producing as many flat surfaces or sides, answering to those of the abacus. This will be rendered more intelligible by the annexed examples from Rochester Cathedral, although they instance varieties of the cushion capital, the stem or circular part of each being cleft, whereby the planes or faces forming the sides become scalloped.

Of the variety of sculptured and enriched capitals, the four specimens here annexed do not go far towards conveying an adequate idea, nor are they the very best that are to be met with; nevertheless they may suffice. The first two are foreign, namely, from Jumieges and Sanson sur Rille; the others from St. Peter's, Northampton, and Steetly church, Derbyshire. The last of these is as remarkable for the Grecian character of the intertwining volutes carved upon it, as the first is for its striking general resemblance to the Corinthian capital. The one from Northampton has the least to recommend it, being a very uncouth composition. Besides those in our own cathedrals, a few other examples of sculptured capitals, more curious however than valuable as studies on account of the taste which they display, will be found in Pugin's work already referred to; but there has been comparatively very little published to elucidate architecturally the subject of the Norman style.



Pier-Arches, that is, open arches resting upon piers, as those within churches, do not materially differ in design from those which ornament doorways, except that they are not so profusely decorated, and the archivolt mouldings do not occupy by any means so much space in proportion to the width of the opening. The arches themselves being uniformly circular (though in some few cases either somewhat more than a semicircle or prolonged perpendicularly to the impost), exhibit so far no variety; still, as regards the entire aperture, of which the arch itself forms the head, there is very great variety of character, according to the proportion which the heights of the supporting piers bear to the diameter of the arch, or opening between them. About twice the breadth appears to have been the average height of arches (*i.e.* openings) between piers; when much above that standard they may be called lofty (as the arches of the nave at Durham); and when much beneath it, they may be considered of low proportions. Besides the difference of character thus occasioned, much is also produced both by the form and proportions of the piers themselves. A circular or octagonal pier, for instance, appears much more massive than one composed of clustered shafts, &c., though the general diameter of the latter may be the same, or even somewhat more. Though we cannot pursue this point any further, we would recommend those who feel at all interested in the subject to make such comparisons for themselves; and they will doubtless find that they will be led on to make many others, and to enter into original investigations.

As the best way perhaps of impressing on the memory the leading characteristics of Norman architecture, we shall here briefly contrast them with those of the Gothic style.

Norman.	Gothic.
Round-headed arch.	Pointed arch, varying in proportions.
No tracery in windows.	Windows with mullions, transoms, and tracery.
Buttress-strips.	Buttresses rising in offsets or stages.
No pinnacles.	Pinnacles.
Battlements, doubtful if any.	Battlements in the ecclesiastical as well as military style.
Spires scarcely known.	Spires characteristic features.
Splayed surfaces of rare occurrence.	Splays for receding parts, universal.
Niches ditto.	Niches very general.
Windows generally small and few.	Windows spacious and numerous.
Horizontal lines and arrangements prevalent.	Vertical lines and arrangements.
Arch-piers very massive.	Arch-piers comparatively slender.
Vaulting simple and mostly plain.	Vaulting more complex and decorated.

Norman architecture, we may add, certainly contains many excellent rudiments and materials for a more finished style, and would no doubt have attained to greater consistency and variety, and increased in elegance and refinement, if the application of the pointed arch had not led to a system which completely superseded it. Still it is rather singular that, in an age when we confine ourselves to no one particular mode of building, but employ Grecian, Italian, Gothic, Tudor, Elizabethan, &c., as taste or circumstances may dictate, no attempt should have been made to revive this particular style. It is true that it presents no models for direct imitation, even for purposes of modern church architecture; it would require to be greatly modified; to have much supplied, in order to accommodate it to present usages; to be purified of much uncouthness; to be, in a word, remodelled: still, on that very account, does it recommend itself—not indeed to those who have no other guidance but precedents—but to those who are capable of entering into its spirit, able to discriminate between its valuable qualities and its defects, to treat it with originality, and to give free scope to their own inventive powers; just as Gärtner and some other modern German architects have formed a style of their own, taking for the basis of it one which may be considered the parent stock of both Lombardic and Norman, namely, the Byzantine, of which the round-headed arch constitutes a characteristic feature.

NORMANDIE, one of the provinces or military governments into which, before the French revolution, France was divided. It stretches along the coast of La Manche, or the English Channel, from near the mouth of the Somme, to the western side of the peninsula of Cotentin, which is included within it. It is bounded on the north and west sides by the sea, on the north-east by Picardie, on the east by the Ile de France, on the south-east by Perche, on the south by Maine, and on the south-west by Bretagne. It comprehended a number of subordinate divisions, which we give, adding the name and population of their chief towns, according to the census of 1831.

LA HAUTE NORMANDIE, capital *Rouen*.

Le Pays de Caux	Caudebec	2,832
Le Pays de Bray	Neufchâtel	3,430
Le Vexin Normand	Gisors	3,533
Le Roumois	Rouen	88,086
Le Pays de la Campagne	Evreux Breteuil la Guérande	9,963 —
Le Pays d'Ouche	Glos la Ferrière	—
Le Pays de Lieuvin	Lisieux	10,257
Le Pays d'Auge	Pont l'Evêque	2,118

LA BASSE NORMANDIE, capital *Caen*.

La Campagne d'Alençon	Alençon	14,019
Le Pays d'Houlme	Domfront	1,873
La Campagne de Caen	Caen	39,140
Le Bessin	Bayeux	10,303
Le Boccage	Vire	8,043
Le Cotentin	Coutances	8,957
L'Avranchin	Avranches	7,269

Le Vexin Normand was so designated to distinguish it from that portion of Le Vexin which was in the early ages included in the domains of the crown, and entitled Le Vexin Français.

The population of the five departments into which Normandie has been divided, with the exception of the arrondissement of Mortagne in the department of Orne, which comprehends a portion of the county of Perche, was, in

1831, 2,520,018. The greatest length of the province, from north-east to south-west, from the neighbourhood of Eu on the Bresle to that of Pontorson on the Couesnon, is about 170 miles; the greatest breadth, at right angles to the length, from Cape La Hague or La Hogue, at the extremity of Le Cotentin, to the neighbourhood of Domfront, is 110 miles. The area may be estimated at about 11,100 or 11,200 square miles, giving 225 to 227 inhabitants to a square mile, a density of population far above the average of France. This area is nearly double that of Yorkshire.

A detailed description of the country is given under the departments into which it is now divided. [Calvados; Eure; Manche; Orne; Seine Inferieure.] Normandie contains no great elevations, except in the south, where it is traversed by the eastern prolongation of the Armorican chain of hills, and in the west, where a branch of that chain extends into the Cotentin. It is watered on the east side by the Seine and its tributaries the Eure and the Rille; in the centre by the Orne, Dives, and Toucques; and in the west by the Douve, Vire, Sée, and Celune. The climate is moist and temperate, and the soil produces abundantly all sorts of grain; apples and pears are grown in great quantity, from which are made cider and perry, the common drink of the peasantry, who grow no wine. The meadow and grass lands are extensive and excellent, and afford pasturage to numbers of cattle and horses. The tables of population given above will show that Normandie contains many important towns. Manufactures are common, especially of cotton; and along the coast are the ports of Dieppe, Le Hâvre, Honfleur, Isigny, Cherbourg (for the navy), and Granville.

The country which afterwards constituted the duchy of Normandie was, in the earliest period of Gallic history, inhabited by a number of Celtic nations. The Baiocasses, Viducasses, Lexovii, and Aulerci Eburovices inhabited the districts now chiefly comprehended in the departments of Calvados and Eure; and their territories comprehended the following Celtic or Roman towns:—Baiocasses—Aræegenus, afterwards Baiocasses (Bayeux), and Grannona (Port-en-Bessin), on the coast near Aræegenus; Viducasses—Viducasses (Vieux), near the Orne above Caen; Lexovii—Noviomagus, afterwards Lexovii (Lisieux), and Breviodurum (Pont Audemer) on the Rille; Aulerci Eburovices—Mediolanum, afterwards Eburovices (Evreux), Condate (Condé sur Iton) above Evreux, and Uggade (Pont de l'Arche) on the Seine. The other nations and towns are noticed elsewhere. [Manche; Orne; Seine Inferieure.] These nations were all included in the Roman province of Lugdunensis Secunda, which nearly coincided with the subsequently established duchy of Normandie, and of which Rotomagus (Rouen) was the capital. This part of Gaul was, on the downfal of the empire, conquered by Clovis (A.D. 497-500), and incorporated by him in the kingdom of the Franks. In the division of the Frankish territory among the sons of Clothaire I., it was included in the kingdom of Neustria, which comprehended the country between the Channel and the Loire, the middle of Champagne, and the frontier of Bretagne. On the etymology of the name Neustria scholars are not agreed: it seems to include the same element as our own word 'west' and the French 'ouest,' with the addition of the initial consonant.

In the attacks of the Northmen or Danes on France, Neustria had its share of the general devastation. Among the most formidable of their chieftains was Rollon or Rollo,* who first attacked France in A.D. 876: he ravaged alternately the north and the south of France, the Low Countries, and England; and in A.D. 911 he led a numerous army from the last-mentioned country to the siege of Paris. He extended his ravages in every direction; and though he experienced some reverses, and appears to have failed in his attempt upon Paris, he received, from the weakness or policy of Charles le Simple, king of France, the hand of his daughter Gisele or Giselle in marriage, with the cession of an extensive province, to be held as a fief, on condition of his ceasing to ravage the rest of the kingdom and making profession of the Christian religion. The ceded province was north of the Seine, and extended from the Epte to the sea; it became the duchy of Normandie, so called from the Northmen, or (to give them their more familiar designation) the Normans (in French, Normands), by whom it was possessed. A circumstance which occurred at the conference held for confirming the treaty is indicative of the situation and character of the parties. Rollo, having refused to kneel before the king and to kiss his feet in recognition of his sovereignty, commanded one of his soldiers to perform for him these acts of homage. The rude soldier, seizing the king's foot, handled it so roughly as to overturn him from his chair, amid shouts of laughter on the part of the Normans, and a prudent silence on the part of the king's French attendants. As the province had been utterly wasted by the ravages of the invaders, the counts of Dol and Rennes in Bretagne were pledged to furnish provisions to the new settlers; and the king ceded to Rollo his claims to the sovereignty of that part of Bretagne which had ceased to recognise the authority of the crown of France.

The conversion of the northern pirates into cultivators of the soil which they had previously ravaged, is one of the remarkable historical features of the dark period which succeeded the downfal of the Western empire, and in no instance was the change more striking and more complete than in the case now before us. Much is doubtless to be ascribed to the personal character of Rollo, who appears to have possessed qualifications far beyond those of an ordinary sea-king. He introduced the feudal system in a completeness and regularity to which it had not attained in those parts where it had been the growth of many years and of various circumstances. The first fiefs granted by him were to some of the churches of his duchy, the rest of which he divided into counties and distributed among the chief officers of his army. The Normans applied themselves with energy to the cultivation of the ravaged lands; strangers from all parts were invited to settle within the duchy, and so severely and successfully were the laws administered for the protection of property, that it is said that a bracelet which Rollo suspended from an oak in a forest near the Seine remained untouched for three years. The anecdote may be apocryphal, but it shows the opinion entertained of the efficiency of his police. He rebuilt the ruined churches and took every precaution for the defence of his territories against the attacks of other pirates, enclosing the towns with walls, securing the mouths of the rivers by barricades, and keeping up the valour and warlike skill of his subjects by hostilities along his frontier, especially against the Bretons, whom he reduced to subjection.

The number of warriors whom Rollo established in his new settlement is calculated, by M. Simonde de Sismondi (*Hist. des Français*, pte. ii., c. xiii.), at not more than 30,000, but the energy which this admixture of a new and warlike population infused into the degenerate population of France rendered their establishment an event of great importance. They effected few external changes; they adopted the language, the social and political institutions, and the religion of the nation which they had conquered; but they imparted to each that vigour which was the characteristic of their own nation. The rude dialect, formed by a corruption of the Latin language, which was then common in France, became in their hands a regular and a written language, embodied in their judicial code or in the poetry and romance which constituted their popular literature. The feudal system received from them, as already noticed, its most complete and regular form; and acquired a stability which rendered it an important instrument in the restoration of social order in Europe. Their attention to the sermons and the scholastic and catechetical instructions of the clergy was marked by the same assiduity which characterised their other pursuits; and the faith of their Scandinavian fathers was abandoned for the profession of Christianity, of which the churches and the priests had been, during their piratical career, the objects of their bitterest hostility.

Some years after the establishment of the duchy, a new invasion of France by the piratical Northmen took place (A.D. 923-927), and the invaders, when defeated, found shelter and assistance among the subjects of Rollo, by whose support they were enabled to renew their ravages. The cession of Le Bessin, or the territory of Bayeux, and of a portion of Maine, bought off the duke of Normandie, and the pirates, left to their own resources, were almost entirely destroyed in a battle near Limoges.

Rollo abdicated his duchy (A.D. 927) in favour of his son. An antient writer has recorded the form of words used by him: 'C'est a moi de mettre mon fils à ma place, et à vous de lui garder fidelité.' The time of his death is not clearly ascertained; he lived certainly one year, perhaps five years after his abdication.

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* His name is variously written—Rolf, Rou, Raoul, or Harvul. He is also called Robert.

Guillaume (William) I., called Longue Epée (long-sword), was the successor of Rollo. He contracted alliances by marriage with some of the most powerful of the French nobles, and gained several advantages over the Breton chiefs who opposed him. He received from Raoul or Rodolphe, king of France, the cession of Le Cotentin and L'Avranchin, which he added to his dominions. He had a principal share in the restoration of Louis IV. d'Outre-mer to the throne of France; but in the civil dissensions of France, he forsook his party for that of Otton or Otho the Great of Germany, rival of Louis. He returned however to his allegiance (A.D. 942) after a time, and was reconciled to the king. He afforded an asylum to Harold or Harald VII., king of Denmark, whom he restored by an armed force to his throne. Guillaume was assassinated by the attendants of Arnolphe, count of Flanders, at a conference which he held with that noble at Pecquigny on the Somme (A.D. 942), just as he was on the point of abdicating his duchy to assume the habit and vows of a monk.

The assassination of Guillaume brought the duchy into great peril. He left no legitimate offspring, but his natural son Richard I., afterwards called *Sans-peur* (the fearless), a boy of ten years, was recognised as duke by the Normans, and placed by them under the care of three or four guardians, of whom two at least were recent emigrants from Denmark, and had not renounced paganism. Louis IV. d'Outre-mer, king of France, hastened to Rouen (A.D. 943) and secured the person of the young duke, whom the Normans, not without some distrust, allowed him to convey to Laon, that he might be there brought up in a manner befitting his rank and prospects. Hugues, duke of France and count of Paris, also interfered in the affairs of the duchy, and both he and Louis justified their intervention by urging the necessity of excluding the pagan guardians, and diminishing their influence and that of the other adventurers who had arrived, during the ducal reign of Guillaume, from the north. A period of general dissension ensued, and the warfare assumed a partially religious character. Louis of France, involved in a harassing contest with his vassals, and especially with Hugues, sought to make up his quarrel with the latter by an agreement for the partition of Normandie; and these two, uniting their forces, attacked the duchy one side, while it was assailed on the other by the Bretons, who gladly seized so favourable an opportunity of throwing off the Norman yoke. The address and perseverance of Bernard the Dane, regent of Normandie, triumphed over these difficulties. He drew off Louis from his agreement with Hugues, and called in Harold, or Aigrold, king of Denmark, to the support of Richard, who had been delivered from his virtual captivity at Laon by an adroit stratagem (A.D. 944). Louis was shortly afterwards (A.D. 945) seized and detained captive at Rouen by Bernard, in consequence of an affray between his attendants and those of Harold, and obtained his release, on conditions highly favourable to the Normans, only to pass into another captivity in the hands of Hugues of Paris, by whose intervention the Normans had let him go. He remained a year in this second captivity, and his release (A.D. 946) was soon followed by a renewal of the war, in which Richard and Hugues were in alliance against Louis and his supporters. In this warfare Richard grew up, signalising his courage and obtaining thereby his distinguishing epithet of Sans-peur. Louis (A.D. 954) and Hugues (A.D. 956) died leaving their children minors; and the obscure annals of the following years present little worthy of notice.

In the reign of Lothaire, son and successor of Louis IV., new attempts, either by treachery or force, were made on the person and dominions of Richard (A.D. 963), who resorted for assistance to the king of Denmark and obtained the support of an auxiliary force. By the ravages of this barbarous soldiery the king and his chief adviser, Thibaut, count of Chartres, were obliged to sue for peace. On the death of Louis V., successor of Lothaire, Richard was one of the most energetic and influential supporters of Hugues Capet, in his acceptance or perhaps usurpation of the throne of France (A.D. 987). Richard died at Fécamp (A.D. 996), after a reign of fifty-three years, in which he had displayed the qualities which then ranked highest in public esteem.

The early part of the reign of Richard II., surnamed *Le Bon*, was distinguished by an event little noticed in history, but presenting one of the most remarkable phenomena of the period. The peasantry of Normandie, consisting of the descendants of Romanised Gauls and Franks, of those who had been reduced to or retained in an inferior condition by the settlement of the Northmen under Rollo, and of those who had subsequently emigrated from other parts of France, determined on claiming an equality of privilege and station with their northern conquerors. In this resolution indeed nothing more is discernible than the impatience of degradation and wrong, and the sentiment of national independence, which distinguished other popular outbreaks of this and subsequent periods. The singularity of the proceeding consists in the deliberation and caution with which it was conducted.

Secret assemblies were held in each county of the duchy, and two deputies were appointed by each to meet in a general assembly in a central place, to maintain their pretensions to perfect equality with the dominant race. The plan was however discovered. A band of soldiers, despatched by the duke, surprised the general assembly at its sitting, seized the deputies and others of the peasantry, and causing them to be mutilated by cutting off their hands and feet, sent them home to strike general terror. The design was abandoned, and the peasantry resigned themselves to a servitude against which they deemed it in vain to struggle (A.D. 997).

The reign of Richard II. is also remarkable for the first establishment of a connection between the affairs of Normandie and England, then governed by Ethelred II., the weakest prince of the Anglo-Saxon dynasty. The first incident which brought the countries into contact was the marriage of Ethelred with Emma, the sister of Duke Richard (A.D. 1002). In the following year hostilities appear to have broken out between the two powers, and a force, landed from an English fleet, was repulsed in an attempt to ravage the duchy. At a subsequent period Ethelred, when attacked by Sweyn, king of Denmark, and abandoned by his subjects, took refuge in Normandie (A.D. 1013-14); until recalled by his subjects. On his death, his wife Emma and her children returned to Normandie, and remained under the care of Richard, who however took no active measures for asserting the claim of his nephews against the Danes. Emma herself married Canute the Dane, the usurper of her children's inheritance.

Another remarkable event marked this reign. Rodolph, a Norman chieftain, who had some complaint against Richard, proceeded with many companions to Rome, in the double character of a pilgrim and an appellant to the authority or influence of the pope (A.D. 1016). By the advice of the pontiff he engaged in the service of the Lombard princes of Benevento, and attacked the Greeks of Apulia, which country was then subject to the emperors of Constantinople. Many young Normans, encouraged by Duke Richard, engaged in the service of Rodolph; and this expedition, in the course of a century, led to the establishment of a Norman dynasty on the throne of the two Sicilies [SICILIES, KINGDOM OF.]

In the internal dissensions of France, Richard II. was commonly the faithful supporter of King Robert, who had succeeded his father, Hugues Capet. He was engaged in various struggles with the other powerful nobles of that kingdom; in his contest with Eudes II., count of Champagne and Blois (A.D. 1016-23), he scrupled not to summon to his aid the savage hosts of Norway and Sweden, and the terror caused by the arrival of these allies led to an accommodation.

On the death of Richard II. (A.D. 1026 or 1027), his eldest son Richard III. succeeded to the throne. Soon after his accession he had a war with his brother Robert, who had inherited a district of the duchy in subordination to the duke. He obliged him to submit; but, immediately on his return to Rouen, he died under circumstances which led to a strong suspicion of poison; and the vacant duchy was seized by Robert, whose character and exploits obtained for him the twofold epithet of *Le Magnifique* (the magnificent) and *Le Diable* (the Devil). He had to struggle against the rebellion of his vassals, who were encouraged to resist him by the odium which attached to him as the reputed murderer of his brother and lord. But he triumphed over these opponents, and became the arbiter of the disputes among his neighbours, restoring Baudouin or Baldwin of Flanders to his country (A.D. 1030), and enabling (A.D. 1031) Henri I. to mount the throne of France in spite of the opposition of Constance, the queen-mother, and her younger son Robert, duke of Bourgogne. Henri, in return for his powerful support, ceded to him as a fief the district between the Epte and the Oise (*Le Vexin Français*). In 1034 Robert equipped a fleet for an expedition to England, in order to restore Alfred and Edward (afterwards the Confessor), the children of Ethelred II. by Emma, to the throne of their ancestors, then usurped and occupied by Canute the Dane. The fleet was however driven back by a tempest, and Robert, changing the direction of the force he had gathered, sent it into Bretagne, and compelled Alain or Alan, who then held that duchy, to do homage to him. Robert shortly afterwards set out on a pilgrimage to the Holy Land, after having recommended his only son William the Bastard, a boy of eight years, to the fidelity of his nobles; and died at Nicæa in Bithynia, A.D. 1035.

Guillaume (William) II., known at first, from the illegitimacy of his birth, by the surname of 'the Bastard,' afterwards, from his acquisition of England, by the more respectful designation of 'the Conqueror,' had been, before his father's departure, taken to the court of Henri I. of France, and entrusted to his care. On the death of Robert, Henri took his young ward to Rouen, and established him in possession of his father's dominions, except Le Vexin Français, which in the time of his own difficulties he had given to Robert as the price of his aid, and which he now retained.

The tender age of the young duke, and the stain attaching to his birth, encouraged several of the chieftains of Normandie to dispute his claim or to rebel against his authority. Guido, or Gui, count of Macon, grandson, by his mother, of the duke Richard II., was his most formidable competitor; and the Norman nobles, embracing one side or the other, and seizing the opportunity of civil discord for revenging their private quarrels, fortified their castles, and spread the flames of war throughout the duchy. The desolation caused by these and similar feuds, not only in Normandie, but in all parts of France, led the clergy to attempt the establishment of 'the peace of God,' which would have caused the almost entire cessation of private war. The attempt was too much at variance with the state of society and the spirit of the age to be effectual; but when the priesthood, instructed by experience, set themselves to limit and regulate an evil which they could not suppress—when, under the title of 'the truce of God,' they secured certain periods of time, and portions of territory, and classes of persons, from the violence of warfare, their benevolent aim was more successful. The confusion and troubles of Normandie continued however during the minority of Guillaume, whose courage, steadfastness, and vindictive character, were developed and strengthened by the scenes amid which he grew up. His ducal rank was preserved during his minority, rather by the mutual jealousies of his subjects than by his own power; but as he approached manhood he was enabled to maintain his authority; and in a victory, obtained at Val des Dunes, between Caen and Argentan (A.D. 1047), he crushed his most formidable competitor, Guido of Macon, who was supported by nearly the whole body of Norman nobles. Henry I. of France was present at this battle, with an auxiliary force of 3000 men, on the side of Guillaume.

By the consequences of this victory, and of subsequent advantages which he obtained over other assailants, Geoffroy Martel, count of Anjou (A.D 1048), and Guillaume, count of Arques, an illegitimate son of Richard II. (A.D. 1054), the power of Guillaume was so far consolidated as to lead him to extend his ambitious views to foreign lands, and especially to the British Islands.

When Ethelred II., king of the Anglo-Saxons, died, his wife and children returned to Normandie, where the latter grew up, and remained until one of them was invited into England, where he was murdered, and the survivor, Edward the Confessor, was elevated (A.D. 1042) by the nobles and clergy of England, under the influence of Godwin, to the now vacant throne of that kingdom. Edward was in manners, language, and affections a Norman rather than a Saxon; and his reign of twenty-three years (A.D. 1042-1066) was chiefly occupied by a struggle between the Normans, with whom the king had surrounded himself, and the Anglo-Saxon or native party under Earl Godwin and his sons. [HAROLD II.] This predilection of Edward for his Norman relatives and friends encouraged the ambition of Guillaume, who visited England with a large retinue, or even armament, at the time of the predominance of the Norman party. 'As he journeyed through the land of the English,' says a modern writer, 'the Duke of Normandie might have believed for a moment that he was still in his own territories. The fleet which he found at Dover was commanded by Normans; and at Canterbury some Norman soldiers composed the garrison of a fort built on the declivity of a hill. Crowds of Normans came to salute him in the dress of captains or prelates. Edward's favourites came to pay their respects to the chief of their native country; and, to use the language of that day, thronged round their natural lord. William appeared in England more like a king than Edward himself; and it was not long before his ambitious mind conceived the hope of becoming so without difficulty at the death of this man, whom he found a slave to Norman influence.' (Thierry, *Conquête d'Angleterre*, liv iii.) The fluctuations of the struggle between the parties at the English court do not belong to our present subject; and the events which led to the accession of Guillaume to the English throne are described elsewhere. [HAROLD II.]

Henri I. of France had supported the count of Arques against Guillaume, and he subsequently (A.D. 1058) attacked Normandie, but without success. A peace was concluded next year, and continued for the remainder of the reign of Henri, and a portion of the reign of his successor Philippe I. During the troubles of Anjou, the succession of which was disputed, and while Bretagne was torn by internal dissensions, Guillaume seized his opportunity, and wrested the suzerainty of Maine from the rival counts of Anjou. He also carried on war with the Bretons, over whom he gained some advantages (A.D. 1065) a year before his expedition to England. He set sail for the conquest of England from St. Valery-sur-Somme on Michaelmas-day, A.D. 1066.

A revolt of the people of Le Mans, who afterwards submitted (A.D. 1068-1070), is among the indications of the rising spirit and importance of the inhabitants of towns; and led, though unsuccessful in its immediate object, to the formation of municipalities in most parts of France. Troubles of greater extent followed. Guillaume had, soon after the conquest of England, during a fit of illness, designated his eldest son Robert as his successor in the duchy, and caused the Norman grandees to do homage to him as their duke; but on his recovery, he had not only refused to deliver over to Robert the government of the duchy, but withheld from him the county of Maine, which had been granted to him as his wife's dowry. According to other accounts, William, on setting out for the conquest of England, had engaged to Philip, king of France, in order to obtain his consent to the enterprise, that he would, if successful, resign his continental dominions to Robert. (*L'Art de vérifier les Dates.*) These and other wrongs, real or imagined, drove Robert into exile, and led him to make incursions into Normandie, which were repressed by Guillaume. In 1087 Guillaume demanded of Philippe I. of France the restitution of Le Vexin Français, which had been withheld from him by Henri I. Philippe refused: war ensued, and an accident which occurred in the course of it led to the death of Guillaume, after he had governed the duchy of Normandie fifty-two years.

On the death of Guillaume, Robert became duke of Normandie, and returning from exile, took possession of his inheritance. He made a vain attempt, by means of his partisans, to possess himself of England, which had fallen to the share of his next brother Guillaume le Roux, or William Rufus or the Red (A.D. 1088). The misconduct of Robert, and the intrigues of his brothers, excited general discontent in Normandie. In the universal confusion, the people of Le Mans and the county of Maine again revolted; and the citizens of Rouen, of the party of Guillaume, introduced a body of the troops of that king within their walls. The citizens and their auxiliaries were however defeated by Henri, count of Coutances and Avranches (afterwards Henry I. of England), the youngest of the Conqueror's sons, who, on this occasion, supported Robert (A.D. 1090). Guillaume soon after landed in Normandie; and he and Robert made up their quarrel, and uniting their forces, deprived Henri of his two counties and drove him into exile (A.D. 1091). They divided his lands between them, and Guillaume returned home. The weakness of Robert encouraged the licentious violence of his barons, and Normandie continued to be the scene of confusion; until the duke, eager to engage in the first crusade, pledged his dominions to his brother the king of England for a sum of money, and embarked for the Holy Land (A.D. 1096). Guillaume, thus possessor of the duchy, renewed the contest with Philippe for the possession of Le Vexin Français, and sought to recover Maine, but his projects were cut short by death (A.D. 1100).

The death of William and the absence of Robert gave opportunity to Henri to seize the throne of England; but his hands were too full to allow him to make any attempt on Normandie, which quietly submitted to the dominion of Robert on his return (A.D. 1101) from the crusade. In 1102, at the invitation of his partisans, Robert landed in England to dispute the crown of that kingdom; but seeing little hope of success, came to an agreement with his brother, and returned. The political necessities of Henri obliged him to leave Robert for a time in possession of Normandie, which, under his weak sway, was torn by anarchy and dissension; but as Henri gained stability, he began his encroachments on his brother, whom (A.D. 1106) he assailed with an army of Anglo-Normans. The discontent of Robert's subjects favoured his designs: he took Bayeux after a stout resistance, and burned it, and Caen surrendered; but Falaise and Tinchebray resisted. The two brothers engaged in conflict under the walls of the last-named town; Robert was defeated and taken, and an English army conquered Normandie, as, forty years before, a Norman army had conquered England. Robert died, after a long captivity, A.D. 1134. [HENRY I.]

Henri governed with vigour the country which he had unjustly acquired. He put a stop to internal warfare, resumed or compelled the restoration of many grants made by his brother, restored to the Church the possessions that in a time of discord had been wrested from it, and regained possession of all that had belonged to his father. His attempts to possess himself of the person of Guillaume, son and heir of Robert, who took refuge in France, led to mutual jealousy and distrust between him and Louis VI. *Le Gros*, king of France. The counts of Flanders and Anjou allied themselves with Louis, and war broke out (A.D. 1108), and continued for two years. After a short cessation it broke-out again (A.D. 1111), and the discontent of some Norman lords added to the difficulties of Henri; but he managed to draw the count of Anjou over to his side: the count of Flanders was dead, and he forced Louis to conclude a disadvantageous peace (A.D. 1114).

Guillaume, the son of Robert, was now of age; and compassion for his lot and that of his captive father, and dislike to the stern government of Henri, had disposed the Norman lords to revolt. Louis and the young count of Flanders embraced the party of Guillaume, and attacked Normandie, but without success (A.D. 1117). The count of Anjou having joined their party, they renewed their attack; the Norman lords revolted (A.D. 1118), and Henri seemed on the point of losing the duchy; but a succession of favourable events enabled him to regain the superiority, and by the mediation of the pope, Calixtus II., peace was restored (A.D. 1119). New discontents and troubles broke out after the death of Guillaume, the only legitimate son of Henri, who was drowned in his passage from Normandie to England (A.D. 1120). It is likely that these discontents were caused or augmented by the fear that Normandie and England would become mere provinces of Germany by the marriage of Maud, or Mathilde, daughter and heiress of Henri, with the emperor of Germany, Henri V., which had taken place A.D. 1114, when the princess was only ten years old. The king of England however obtained the recognition of his daughter as heiress to England and Normandie, and after the death of her husband the emperor (A.D. 1125) married her A.D. 1129, notwithstanding the repugnance of his nobles, and of Maud herself, to the son of the count of Anjou, Geoffroi Plantagenet, who succeeded, by the abdication of his father, to the county of Anjou and its dependencies, in the same year in which the marriage was celebrated.

The death of Guillaume, son of Duke Robert, and claimant of Normandie (A.D. 1128), seemed to secure the great object of Henri's cares, the quiet succession of his daughter. But notwithstanding this favourable event, his latter days were embittered by the quarrels of himself and his daughter with Geoffroi of Anjou; and on his death (A.D. 1135), his cares were frustrated by the usurpation of his nephew Etienne, or Stephen, count of Boulogne. Usurpation led to civil war, and both England and Normandie suffered from a long series of hostilities, and from the consequent social disorganization. Geoffroi and his allies, with a powerful army (A.D. 1136), entered the duchy, which was almost defenceless; but the cruelty of his ravages provoked the hostility of the people, who were disposed to recognise him; and the resistance of the peasantry, and a wound which he received, led to his retreat. Etienne passed over from England to Normandie (A.D. 1137), and did homage to Louis VI. for that duchy; but he too displeased his subjects and returned to England, and the duchy remained without a master until A.D. 1144, when it was conquered by Geoffroi, who, in his turn, did homage for it to the king of France, now Louis VII., and Maud exercised a government little more than nominal until A.D. 1151, when Geoffroi died, and was succeeded in his Anjevin and Norman states by his son Henri, afterwards Henry II. of England.

Henri had indeed been invested with the rights of his parents over Normandie before Geoffroi's death (A.D. 1150), and the recognition of his investiture by the king of France had been purchased by the cession of Le Vexin Normand. In A.D. 1152 he married Eléonore, duchess of Aquitaine from whom Louis VII. of France had just been divorced. This union, by uniting under one chieftain Normandie, Anjou, and Aquitaine, rendered his power superior to that of the king of France: he managed to break up a hostile league formed against him, restored to his domain many fiefs which his father had alienated, repressed a rebellion of the barons of Aquitaine, and, in 1154, raised his greatness to its acmé by his succession, on the death of Etienne, or Stephen, to the crown of England. His right to Anjou was disputed by his younger brother Geoffroi, on the ground that his father had bequeathed it to him. This was true, and Henri had sworn to execute his father's will; but the pope absolved him from the obligation of his oath: the king of France, who had undertaken Geoffroi's cause, was won over by his address; and the defrauded prince was obliged to content himself with lands unfortified and a pension from his brother (A.D. 1156).

The talent and ambition of Henri, his extensive plans of aggrandisement, his struggles with Louis VII. of France, and his memorable contest with Becket, are recorded in another place. [HENRY II.] The history of Normandie is involved in that of the sovereign. In 1168 Henri invested his eldest son (also called Henri) with the duchy, but did not admit him to the administration of the government; and this constituted one of the grievances alleged by the young prince to justify his subsequent rebellion. Louis VII. of France, who supported him, besieged Rouen, which, by a gross breach of faith, he was on the point of taking (A.D. 1174). The arrival of Henri with a strong body of Brabançons, or mercenaries (whose employment was gradually preparing the downfal of the feudal system), compelled him to raise the siege, and peace was soon after restored. Henri died in 1189, worn out and broken-hearted by the ingratitude and perpetual rebellions of his children. His eldest and third sons, Henri and Geoffroi, had preceded him to the tomb.

Richard Cœur-de-Lion or the Lion-hearted succeeded his father in Normandie as well as in England. He had, before his father's death, and while in rebellion against him, done homage to Philippe II. Auguste, king of France, for the duchy and all the other fiefs possessed by his father in France. He was crowned as duke of Normandie after his father's death and before his own departure on the third crusade. [RICHARD I.] During his captivity in Germany the duchy was attacked by the king of France, who took several towns, but failed in his attempt on Rouen (A.D. 1193). The treachery of Prince Jean or John, Richard's brother, afforded him a fair prospect of wresting the duchy from its rightful owner; but the release of Richard and the double treachery of Jean frustrated his plans, and a petty yet destructive war followed, which, though interrupted by a short peace between the two kings, and by some subsequent temporary suspensions of arms, continued till the death of Richard (A.D. 1199), an event which happened in the course of an obscure struggle, but which led to consequences of the most important character, especially to Normandie.

The duchy of Normandie was now fast approaching the term of its existence. The conquests and other acquisitions made by its rulers had in reality impoverished and weakened it. The energies of William the Conqueror were, after his invasion of England, directed to the confirmation of his successful dominion over that kingdom. The weak and unsteady rule of Robert, his eldest son, prevented a separation which might have protracted the power and the existence of the duchy, and threw the government into the hands of Henri I., who entertained a jealousy of the native Normans, and limited his favour and confidence to Anglo-Norman and Breton chieftains. The extension of the domains of Henri II. divided his attention, and provoked genera jealousy of his ambition and power; and Richard had wasted his strength in the crusades, and in a petty warfare with the king of France. But the energy which marked the character of these Anglo-Norman princes protracted the downfal of a power which seemed to threaten the independence of the rest of France, and which downfal immediately followed the acquisition of the sovereignty by a weak hand.

The dominions of Richard passed into the hands of Jean, or John, his youngest brother; but his claim was disputed by Artur, or Arthur, duke of Bretagne, son of Geoffroi, the third son of Henry II. There can be no doubt of the superiority of Artur's claim; but his tender years prevented his availing himself of it; and Jean, who showed more vigour and address in his usurpation than at any other period of his life, established his power with little difficulty (A.D. 1199). Philippe however embraced the cause of Artur, and though he abandoned it for awhile in a treaty with Jean (A.D. 1200), took it up again in a subsequent quarrel which he had with that prince. The capture of Artur (A.D. 1202), and his subsequent assassination by Jean at Rouen (A.D. 1203), put an end to the struggle. The crime however cost Jean his duchy; general indignation was excited by it: Philippe overran the duchy and took the strongest fortresses, not indeed without a brave resistance. Jean fled to England, and his subjects, abandoned by their prince, hastened to submit to the invader. Rouen was the last town to capitulate, and Normandie passed finally into the hands of the French king. Philippe accused Jean before the peers of France of the murder of Artur; and though such a tribunal had no cognizance of other crimes than those committed by a vassal against his suzerain, procured a sentence of forfeiture against him, by virtue of which the duchy was ever after united to the crown of France, though the legal act reuniting it in perpetuity to that crown was not executed till the reign of Jean II. of France (A.D. 1361).

In the wars of the English, under Henry V. and VI., Normandie came again into their hands, and was almost the last portion of France which they retained. They no longer however held it as a feudal duchy, but as a part of the kingdom of France to which they laid claim. The leading events which occurred in the duchy during that period are noticed elsewhere. [ARC, JEANNE, D'; BEDFORD, JOHN DUKE OF; CHARLES VII. (of France); HENRY V.; HENRY VI. (of England).]

(Sismondi, *Histoire des Français*; Thierry, *Conquête d'Angleterre par les Normands*; *L'Art de vérifier les Dates*, &c.)

NORRKÖPING, a town in Sweden, situated in 58° 36′ N. lat. and 16° 28′ E. long., on the banks of the river Motala, which falls into an inlet of the Baltic, called the Brävicken, a short distance below the town. This inlet is about 22 miles long, with a breadth varying between half a mile and two miles, and has depth enough for middle-sized vessels, which may sail up to the town. Norrköping is built on both sides of the river. The streets are wide and generally straight, though the town stands on undulating ground; the houses, partly of wood and partly of stone, are only two stories high, but have a neat appearance. Among the public buildings none are distinguished for architectural merit except the town-hall. The manufactures are numerous, though commonly on a small scale. The most important are those of woollen cloth (of which in 1831 not less than 342,922 ells were made), in brass, which occupies more than three hundred persons, in snuff, and paper. Several vessels are annually built. The manufactured goods supply the most important articles for exportation, but they go only to the other towns of Sweden, especially to Stockholm. Iron is also an important article of export, as all the iron worked in Eastern Götaland is exported from this town. Most of the grain grown in the plain of Linköping is also shipped at this harbour. The town had, in 1831, 62 vessels at sea, carrying 3958 tons. The population did not much exceed 10,000 in 1833. It has several good institutions for education, a grammar-school, three free-schools for the lower classes and two for orphans. The Jews are permitted to settle in this town, and have a synagogue. Norrköping is situated in the district (län) of Linköping.

(Forsell's *Statistik von Schweden*; Schubert's *Reise durch das südliche und östliche Schweden*.)

NORRLAND. [SWEDEN.]

NORROY. [HERALDRY.]

NORRSKA FIELLEN (the Norwegian Range), a term lately introduced into geography to indicate the mountain-mass which occupies with its branches the greater portion of the Scandinavian peninsula. This name is more properly applied to the southern portion of the range, which is sometimes also called the Dovre Field, though this name properly belongs to the most northern portion of the Norrska Fiellen. The northern portion of the range is called Kiölen. The boundary-line between the Norrska Fiellen and the Kiölen lies between 63° 30′ and 64° N. lat., east of the Värdals Fiord, the eastern portion of the bay of Trondhiem, where the range is less than 12 miles across, and presents one of the most convenient roads for passing it.

The range of the Scandinavian mountains begins on the south with Lindesnaes (or Lime-cape), the most southern extremity of Norway (south of 58° N. lat.), and extends to Cape Nordkyn (71° N. lat.) and the Varanger Fiord, over a space exceeding 1000 miles in length. The Norrska Fiellen is only about 360 miles in length, but it considerably exceeds the Kiölen range in width and in elevation.

The Norrska Fiellen occupies more than three-fourths of the southern part of Norway. Its elevated rocky masses approach close to the southern and western shores: on the east its boundary is determined by a line beginning on the south on the shores of the Skagerrack at the Langesunds Fiord (9° 40′ E. long.), and thence drawn to the town of Trondhiem, though some of its lower offsets advance considerably to the east of that line. In the whole country west of this line there is no low level, except in the narrow valleys; but on the summits of the rocky masses there are extensive plains.

In the most southern districts, south of 59° N. lat., or of a line drawn from Lyse Fiord to Langesunds Fiord, the mountain-masses do not attain a great elevation. They rise from the sea with a steep ascent to the height of 300 or 400 feet; but at the distance of about 20 miles from the coast they hardly exceed 1000 feet in elevation. Farther north they rise still higher in the Heck Field and in the Bygle Field, which attains an elevation of 2000 feet above the sea. In the latter the upper part of the mountains begins to extend in plains. South of it they are broken into narrow ridges running north and south, and separated from one another by deep narrow valleys. These valleys, though they contain only a small portion of low and level land fit for agricultural purposes, are fertile, and being sheltered against the western and northern winds, have a more temperate climate than any other part of the globe under the same parallel. The declivities of the ranges, nearly to their summits, are covered with forests where they are not very steep, which contain large pines, birches, and beeches. The coast is much broken, but none of the numerous inlets advance more than 5 miles within the mountain-masses, and most of them not half that distance.

Bygle Field and the mountains south of it are only the southern slope of the whole mass. North of 59° N. lat. it attains, in the Yökle Field, an elevation of about 4500 feet, which may be considered as the general height of the Norrska Fiellen as far as the Dovre Field, whose branches extend to 63° N. lat. The highest part of the rocky masses is towards the western shores. These shores are cut up in a very remarkable manner by numerous inlets, which are generally only a few miles wide, but penetrate to a great distance inland, some of them 70 and 80 miles, between the huge mountain-masses that enclose them. Along the open sea and close to the water's edge the mountains are on an average between 600 and 1000 feet high, and they continue to rise as they proceed eastward; so that at the distance of 10 or 15 miles they attain the general level of about 4500 feet, which they preserve for more than a hundred miles. They form indeed an elevated plain of uneven surface, on which are scattered bold peaks, rugged precipices, and extensive lakes. The general elevation of the plain does not rise above the line of perpetual congelation, which in 60° N. lat., in this country, is said to occur at an absolute height of 5600 feet, and in 62° N. lat. at 5100 feet; but it rises considerably above the line of trees, which cease to grow, even in a stunted state, below the height of 4000 feet. The surface of the plain consists either of barren naked rocks, or is covered with extensive morasses. In some places there are tracts on which heath and lichens are thinly scattered. These tracts are inhabited by the rein-deer and lemming. Here and there a few depressions occur in the plain, which in summer are covered with a scanty growth of grass, and are pastured for about two months; but they are from 50 to 60 miles distant from the nearest village. Along the western shores, owing to their steepness and the western gales to which the declivities are exposed, the mountains are quite bare. But along the shores of the inlets, or *fiords*, there are level tracts of moderate extent, which are partly covered with tall pines, and are partly cultivated. The clear blue water of these inlets, the high mountains rising from their shores with a steep ascent, varied by the forests and cultivated spots, give to the whole a degree of beauty and sublimity which is hardly surpassed in any country on the globe. The scanty and scattered population find their subsistence mainly in the deep sea, which contains fish in abundance. The beauty of these inlets is sometimes much increased by the falls of water from the high rocks which surround them. Some of these falls pour down perpendicularly from a great height, as the Feigum Foss (or Fall), 700 feet, the Sevle Foss, 1000 feet, and the Keel Foss, 2000 feet. These three cataracts occur on the shores of the Sögne Fiord. On the Hardanger Fiord are the Skyttie Foss, 900 feet high, and the Böring Foss, likewise 900 feet high. The eastern declivity of the Norrska Fiellen may be considered to commence about 100 miles from the western coast, near 8° E. long. This slope is much less rapid than the western, occupying about 50 miles in width, and descending in this space about 4500 feet. Its surface is exceedingly broken, consisting of precipitous ridges, which have flat and sometimes extensive plains at their tops, and of deep narrow valleys. Though a few of the ridges, as the Halling Skarven (5436 feet), the Gousta Field (5522 feet), rise above the line of trees, the valleys and a large portion of the declivities of the lower mountains are covered with extensive woods, and the largest and best portion of the timber exported from Norway comes from this region. But the valleys are generally too high for cultivation, though they supply good pasturage. Many of the valleys are occupied by deep and extensive lakes, especially near the beginning of the descent. Several of these lakes are from 2000 to 3000 feet above the sea-level.

The highest part of the Norrska Fiellen is situated at the innermost recess of the Sögne Fiord, and is known by the name of Hurungerne. Its surface is covered with snow nearly all the year round. The Skagstöls Tind, which is 7647 feet above the sea, is the highest summit of this mountain-mass which has been measured. Contiguous to the Hurungerne, on the north-west, is the Sögne Field, which is somewhat lower; but west of the Sögne Field lie the Justedals, or Snee Bräen, an immense sheet of perpetual snow and ice, covering a surface of more than 600 square miles. This is by far the largest mass of ice in Europe, as the large snow-fields which surround the Finster Aarhorn and the Jungfrau do not occupy more than 200 square miles. The elevation of the Snee Bräen is not known, but it is estimated that the lower parts do not descend below 6000 feet, and that the more elevated portions attain 7000 feet above the sea. From the sides of this mass descend glaciers, which terminate in several lakes at their base. The Folge Fonden is another remarkable and elevated mountain-mass; it is situated on the southern shores of the Hardanger Fiord, and partly occupies the peninsula formed by this long frith and one of its branches, the Sör Fiord. The masses of ice covering its summit extend 25 miles from north to south, and about 10 miles in average width, so that they occupy a surface of 250 square miles. Its elevation is stated at 5427 feet, but as glaciers descend from the sides to a height of only 2000 feet above the sea-level, the summit must rise above the snow-line, as no glaciers can descend from a mountain which is not always covered with snow. Its elevation consequently must be greater, or the snow-line in 60° N. lat. must occur at a lower elevation than 5600 feet. We suspect the latter to be the case. From this glacier ice is brought to London when there has been no frost in England during the winter.

The most northern portion of the Norrska Fiellen is the Dovre Field, in the southern and highest part of which is the Snee-hätten (snow-hat), which rises to 7489 feet above the sea, and more than 3000 feet above the mountain plain on which it stands. The northern and lower parts of the Dovre Field approach the entrance of the Trondhiem Fiord or Bay of Trondhiem.

The mountain plains of the Norrska Fiellen terminate with the Dovre Field. East of 10° E. long. the rocky masses [illegible] in plains, nor do they constitute a continuous range; still the country between 61° 30′ and 63° N. lat. and between 10° and 11° 30′ E. long. is a mountain region, its surface being in general more than 2000 feet above the sea-level, and there being only a few valleys which sink below that elevation. Its surface is exceedingly broken, and presents a continuous succession of ascents and descents. Neither the mountains nor the intervening valleys occupy a large space; mountains generally extend from north to south, in the direction of the whole system, but they rarely continue for a few miles without being broken by deep depressions. Still more rarely do their summits present a level surface. Many of the valleys are only ravines, which however widen towards the border of the mountain-region so as to become narrow valleys, and to admit cultivation, which even extends on the declivities of the mountains to some elevation. The whole region is wooded, though the timber-trees are not so large as on the eastern declivity of the mountain-plains. Several of the mountains rise above the line of trees, but only a few attain the snow-line. The Tron Fiellet (near 62° N. lat.) is 5593 feet, and the Sylfiellen (near 63° N. lat.) is 5747 feet high.

The scanty population of the countries adjacent to the Norrska Fiellen, and the great facilities for communication by sea, account for the small number of roads which traverse this extensive mountain region. Only two roads are fit for carriages; one of these roads connects the two principal towns of Norway, Christiania and Bergen. It runs from Christiania northward, skirting the eastern shores of an extensive lake, the Rands Fiord, at the northern extremity of which it turns west, and begins to ascend the eastern declivity of the mountain mass. It passes over the tableland in a depression lying near 61° N. lat., between the Hurungerne on the north and Mount Sule Tind on the south. The highest point of the road does not much exceed 3000 feet above the sea, from which elevation it descends in a narrow valley between high mountains to the Sögne Fiord, and then traverses a hilly and broken tract till it reaches the Södra Oester Fiord and Bergen. The second road leads from Christiania to Trondhiem. It runs from Christiania north-north-east to the southern extremity of the lake of Miösen; then along the eastern shore of that lake and the banks of the river Lougen, which falls into the lake. After ascending the valley of this river nearly to its northern extremity in a north-north-western direction, it ascends the Dovre Field in a north-eastern direction, passing near the base of the Snee-hätten, where it attains an elevation of more than 4500 feet. As snow-storms are very frequent even in summer in this elevated region, and travellers are exposed to great danger during these storms in an uninhabited region, four *field-stuer*, or houses of refuge, have been erected ever since the thirteenth century; they occur in a space of about ten miles. The road then descends in a northern direction to the valley of the Driv Elf, passes through a depression in the mountains into the valley of the Orkel Elf, and through another depression into that of the Guul Elf, which it follows to the vicinity of Trondhiem. A carriage-road leads from Trondhiem to Röraas, by which the produce of the copper-mines of the last-mentioned place is brought to the port to be shipped. This road follows the road to Christiania as far as it lies in the valley of the Guul Elf, and then runs along this river to its source, where it crosses a mountain-side, probably more than 3000 feet about the sea, west of the lake of Oresund, whence it descends to Röraas, which is somewhat more than 2500 feet above the sea.

The most frequented road, as it appears, is that which lies in the deep depression of the mountains between 63° 45′ and 64° N. lat., which divides the Norrska Fiellen from the Kiölen, and by which the western districts of Swedish Norrland bring their produce to the harbour of Trondhiem, in preference to taking it to the harbours on the Gulf of Bothnia. It runs from the town of Oresund in Oresunds Län on the northern side of the lake of Störsjon, and after passing along the southern base of Mount Areskutan, which is 4775 feet above the sea-level, it traverses the boundary-line between Sweden and Norway, and its highest level occurs west of Stalstugan, where it is little more 2000 feet high. Hence it descends in the valley of the Suul Elf to the eastern extremity of the Trondhiem Fiord, along the shores of which it continues to the town of that name.

* North of the depression in which this road lies begin the Kiölen mountains, or the northern part of the Scandinavian range: they present a different character, forming a con-

tinuous range, which in general occupies a space of twenty-five miles in width. Between 64° and 68° N. lat. the range extends in a north-north-east direction, but farther north it runs north-east, and towards its northern extremity, north of 69° 30′ N. lat., east-north-east. Between 64° and 65° N. lat. nearly the whole width of the mountain mass lies within the territories of Norway, but farther north, up to 69° N. lat., it is nearly equally divided between Norway and Sweden, the watershed constituting the boundary-line between these countries. Farther north the Kiölen mountains belong to Norway, except a small tract along the upper course of the Muonio river, which is under the dominion of Russia.

South of 66° N. lat. the highest part of the range is in the middle. It does not generally rise to a great elevation, though always above the line of trees; a few isolated summits are always or nearly always covered with snow. The declivity towards the east is not very steep, descending, in a distance of about ten or twelve miles, about 2000 feet to the base of the mountains, which is about 2000 feet above the sea-level. The lower offsets of the range extend however farther eastward to a distance of about 20 miles; they are commonly below the line of trees, and the valleys embosomed by them are often from six to eight miles wide, and generally covered with woods. The western declivity is exceedingly steep and broken. It descends, in a space of ten or twelve miles, from an elevation of about 4000 feet to the level of the sea. Rugged and precipitous masses of rock enclose long and wide valleys; the rocks are usually bare, or covered with heath and lichens, and sometimes with brushwood, but the valleys contain forests of fine timber-trees, especially that of the Namsen-elf. The elevated rocky masses extend to the very shores of the sea, which consist of a succession of deep inlets and projecting headlands. The Folden Fiord penetrates seventy miles into the rocky masses.

North of 66° N. lat. the high mountain-masses rise to a greater elevation, and occupy a much larger space. Numerous summits lie along the watershed, which are always covered with snow. The highest of these snow-capped summits is the Sulitelma, near 67° N. lat., which is 6155 feet above the sea. Here also the eastern declivity is not steep, but exactly resembles the descent farther south; towards the west however the high mountain-masses preserve a great elevation to the very shores of the sea. Cape Kunnen, near 67° N. lat., consists of rocks which rise in perpendicular precipices to the height of 1000 feet, and at a distance of about four miles inland they attain an elevation of 4000 feet. The whole rock is covered with perpetual snow, the glaciers extending on the south side to the very edge of the sea. This shows that the snow-mass by which this glacier is fed must be very extensive. No glacier occurs on the Norrska Fiellen and Kiölen mountains between the Justedals Bräen and Cape Kunnen. Other parts of the coast are less elevated, but in several places the mountains near the coast rise to 3000 feet.

The islands, which are numerous along the coast, must be considered as portions of the range, and the mountains of which they consist rise to a great elevation. The island of Alsten, which is of moderate extent, rises almost perpendicularly out of the sea, and the seven pointed peaks with which it terminates ascend far beyond the region of snow, rising to more than 4500 feet, whilst the snow-line hardly exceeds 4000 feet. The mountains on the island of Dunnöe are above 3000 feet high. The valleys, which are enclosed between the high masses of the continent, are deep and rather narrow; though in general well wooded, they do not contain timber-trees, and the soil is not adapted to agriculture, except in a few places.

The Sulitelma is the highest mountain in Europe north of the Polar circle. It has been examined by Wahlenberg, a Swede, who found that the snow-line on the Swedish side occurs at about 3800 feet, but on the western declivity it descends nearly 1000 feet lower. The vegetation on the two sides therefore differs considerably. In Sweden the fir-trees ascend the declivity of the Sulitelma to about 1200 feet, the pines to 1400 feet, and the birch to 2100 feet. A mountain on which the birch does not grow is called *fiell*. Above 2100 feet only bushes are found, especially birches, and two kinds of willow, *Salix glauca* and *Salix hastata*, but they disappear at about 2800 feet. The mosses on which the rein-deer feed extend to 800 feet below the snow-line, and to this height the Laplanders advance with their herds in summer. *Ranunculus nivalis* and similar plants are found in the crevices of the bare rock, projecting out of the snow-masses 500 feet above the snow-line, and *Lichenes umbilicati* even 1500 feet higher in similar situations. Higher up all vegetation disappears, and no animal or bird is met with, except the *Emberiza nivalis*.

North of 68° N. lat. the mountains along the watershed of the rivers, which flow respectively into the gulf of Bothnia and into the Atlantic, sink to a much lower level, none of their summits attaining the snow-line. The highest portion of the range lies along the West Fiorden, or the long strait which divides the Lofoden Islands from the continent, and on these islands themselves. In these parts numerous mountain-masses rise above the snow-line. The Faxfield, an isolated mass (near 69° N. lat.), rises to 4260 feet; the mountains along the eastern shores of Lyngen Fiord rise almost perpendicularly above the region of snow to upwards of 4000 feet, and the glaciers descend to about one-fourth of this height. At 70° N. lat. is the Yökle Field, between Quänanger Fiord and Alten Fiord, which rises to 3700 feet, and is covered with extensive snow-masses. It is the most northern snow-mountain of the Kiölen on the continent. In these parts all the mountain-masses are isolated, being separated from one another by deep valleys with steep sides, exactly resembling the deep sounds between the islands lying along the shores. The mountains on the Lofoden Islands are hardly inferior in height. Snow-capped summits occur in East and West Vaage, and they rise in Hindoe and some smaller islands to 3200 feet above the sea. Farther north they are less elevated, but the last snow-mountains occur on the island of Seiland, where they may be considered as a continuation of the Yökle Field, which stands opposite the island, on the continent. The islands farther north up to Mageröe, which contains North Cape, are far less elevated. This is the most dreary part of the Kiölen range. The rocks are naked and the valleys narrow. They contain little wood, and that of a small size. In a few places at the innermost recesses of the friths some few spots occur, where potatoes are cultivated. The sea supplies the scanty population with subsistence.

The Yökle Field may, in some measure, be considered as the termination of the high range. Rocky masses of considerable elevation separate indeed the great bays, called Alten Fiord, Porsanger Fiord, Laxe Fiord, Tana Fiord, and Waranger Fiord, but they decrease in elevation as they proceed farther east. The highest portion of these rocky masses occurs at the extremity of the headlands, on the shores of the Icy Sea, but as they advance south they gradually decrease in height, until at the southern extremity of the fiords they unite in a table-land with an undulating surface, intersected by low long-backed hills of gentle ascent. This table-land descends gradually and continually towards the northern extremity of the Gulf of Bothnia; and it contains the last elevated summits of the Kiölen Mountains. The Vorio Duder, south of the innermost recess of the Porsanger Fiord, probably attains nearly 3620 feet, and Mount Rastekaise, south of the Laxe Fiord, 3200 feet. Between the Tana Elf and the lake of Enara is Mount Peldoive, an isolated height, rising to 2130 feet, but not above the region of the birch. Farther east every trace of mountains disappears. This region is somewhat more favoured by nature than that south of Yökle Field. It is true that the Porsanger Fiord and the bays east of it, being open to the northern and eastern gales, do not admit any kind of cultivation: but on the Alten Fiord, which is sheltered against these winds by the elevated islands lying before its entrance, barley and potatoes are successfully cultivated, and the birch trees attain a considerable size, though this place is in 71° N. lat. It is the most northern place on the globe in which grain is grown.

The Scandinavian range consists mostly of primitive and transition rocks: secondary rocks occur very rarely. Gneiss constitutes by far the most prevalent component of this range. Granite is not frequent; it appears, like the other primitive rocks, in some degree subordinate to gneiss. The transition formation is mostly composed of grauwacke, alum-slate, clay-slate, and limestone, but it also contains sandstone and other rocks. This range is rich in metals. Iron occurs in immense layers on the eastern declivity near its extremities, in Norway, in the province of Christiansand, on the south, and, in Sweden, in Lulea Lappmark, on the north; in the latter, near the church of Gellivara, there are mountains many hundred feet high, consisting entirely of iron-ore. But the rich iron-mines of Sweden are not within the range; they are situated in the lower country which extends south-east of it. Silver occurs at Kongsberg and Iarlsberg in Norway, and at the Nasafiell in Pitea Lappmark; but it is worked only in the first-mentioned place. Copper is found in the Dovre Field, at Röraas, Medal, and Selby; the mines of Röraas are productive. Lead is also found in the southern district of Norway, and at the Nasafiell. Cobalt occurs in several places on the eastern declivity of the Norrska Fiellen; zinc, marble, and slate also abound in several places.

(Von Buch's *Travels through Norway and Lapland;* Elliot's *Letters from the North of Europe;* Everest's *Journey through Norway, Lapland, and part of Sweden;* Wahlenberg's *Reise auf den Sulitelma;* Schubert's *Reise durch das südliche und östliche Schweden;* Barrow's *Visit to Iceland.*

NORRTELGE. [SWEDEN.]

NORTE, RIO DEL. [MEXICAN STATES.]

NORTH AMERICA. [AMERICA, NORTH.]

NORTH AMERICAN INDIANS. When the Europeans began to visit the coast of North America, they found that continent inhabited by a great number of nations which had made little progress in civilization, as the term is understood in Europe, and were therefore called savages. To judge from the structure of their body, they all seemed to belong to the same race. But it was afterwards discovered that in the most northern regions there were tribes which differed considerably from the rest in their physical character. These northern tribes, which belong to one nation and speak one language, are called Esquimaux, and the description which M'Keevor gives of their personal appearance is inserted in the article ESQUIMAUX. The same author indicates the differences which exist between them and the other tribes in his description of the Crees. [CREES.] If we compare this latter description, and the drawings of the heads, prefixed to Chappell's 'Voyage to Newfoundland,' with the drawings, in Kotzebue's 'Voyage of Discovery,' of the inhabitants of Kotzebue Sound, it can hardly be supposed that the inhabitants of the countries round Hudson's Bay and those of the north-western extremity of North America belong to the same race. The inhabitants of Kotzebue Sound exhibit the features of the Mongol race, the broadest part of their face being somewhat below the eyes, from which point the face narrows towards the chin and towards the upper part of the head, thus producing some resemblance to a lozenge, according to an expression of Dr. Fr. Buchanan, in his description of the inhabitants of India without the Ganges. The broadest part of the face in the North Americans who live east of the Chippewyan range is in the upper part, as far down as the cheek-bones, whence the face narrows to the chin. Humboldt observes that the forehead of the Americans is considerably inclined backwards, and with it the whole facial line, while in the Mongols it approaches much more to the form of the skull of the Caucasian race. It would seem therefore that America has not been entirely peopled by any of the nations which inhabit the eastern countries of Asia, for all of them, from the Gulf of Siam to Behring's Strait, exhibit the characteristic features of the Mongol race. It is only the tribes scattered along the north-western shores that resemble those which inhabit the north-eastern coast of Asia. Kotzebue did not observe any difference between the inhabitants of Kotzebue Sound and the Tschukutskoi, except that the latter were something taller and stouter.

Besides the language of the Esquimaux, which is peculiar to that nation, the North American tribes inhabiting the country east of the Chippewyan Mountains seem to speak three principal languages, with a multiplicity of dialects peculiar to individual tribes. The most southern language is spoken by the tribes to which, since their emigration in 1837 and 1838, the countries have been assigned which lie on both sides of Red River, the Mississippi, and the Arkansas river, namely the Creeks, Chickasaws, Chocktaws, Seminoles, Cherokees, and some smaller tribes. The Iroquois is spoken by the Mengwe, or six nations, in New York, the Wyandots in Ohio, Michigan, and Upper Canada, and some other tribes near Lake Michigan and Lake Superior. The Lenni-lenapé, Algonquin, or Cree language, is used by all the tribes inhabiting the country west of Hudson's Bay, and also by those who occupy the tract between Lake Superior and the Chippewyan mountains. The nomadic tribes of the desert extending along these mountains southward to the Red River of the Mississippi seem to speak the same language, which appears also to be spoken in the countries west of the Chippewyan range and south of the Columbia river. But with respect to the languages spoken in the other parts of the north-western coast of America, our information is too scanty to enable us to form any opinion as to their connection or affinity.

When the Europeans began to settle on the eastern shores of North America, the adjacent countries were inhabited by aboriginal tribes, some of which are stated to have been very numerous. In the space of about 200 years many of these tribes have entirely disappeared, and others have left the eastern country and retreated into the interior. The destruction of these tribes is owing to the settling of the Europeans in America. It is generally supposed that it has been brought about partly by the extension of cultivation, by which the hunting-grounds of the aborigines were gradually limited, so that they could not find subsistence by the chase, and partly by the war which the settlers carried on against them. But we are inclined to think that the most efficient cause in bringing about their destruction was the use of fire-arms, by which the wars, which always exist between single tribes, were rendered much more destructive of life. The small-pox was probably not quite so destructive as the musket; yet even a few years ago several numerous tribes were much reduced by that disease, and the Mandans were nearly annihilated by it. Owing to these and other causes, the number of aborigines in the countries contiguous to the Atlantic had been so much reduced, that at the commencement of this century only a few tribes were found in the United States east of the Mississippi river, and still fewer in the British colonies of New Brunswick and Lower Canada, where they were only in possession of the rocky and elevated region which extends on both sides of the St. Lawrence river below the town of Quebec. In Labrador however and the other countries surrounding Hudson's Bay the native tribes still exist.

The number of Indians in the countries east of the Mississippi was, in recent times, comparatively small. They inhabited distinct districts, but were surrounded by a white population. The whites did not always behave towards them according to the rules of justice, and this created ill-will in the minds of the Indians. Accordingly the Indians usually joined the enemies of the republic, as appeared in 1811, when they joined the Spaniards, and in 1812, when they joined the British. The general government of the United States was well aware of the danger of having such subjects within their territories, who, in addition to what has been stated, in no way coalesced with the other inhabitants, nor was it probable they ever would. The government accordingly wished to remove them to those parts of their territories where no invasion of an enemy could be feared, to place them, if possible, where they would have no connection with the great bulk of the white population. Still no effective steps for this purpose were taken till 1834, when the state of Georgia expelled the Cherokees from its territories, and at the same time the Seminoles in Florida began to make war on their white neighbours. The executive of the general government was now empowered to remove the Indians to the west of the Mississippi river, under treaties, and to assign them territories with fixed boundaries, and at the same time to declare that it should not be lawful for whites to settle among them, except some few mechanics who would be required for agricultural purposes, especially blacksmiths, wheelwrights, and millers. The country assigned to them is situated to the west of the states of Arkansas and Missouri, and of the new territory of Iowa. The greatest part of this country consists of extensive prairies without trees or water, and is quite unfit for white settlers. But extensive bottoms occur along the rivers, which are considered quite sufficient to maintain the scanty population of Indians, when cultivated with care. It is very improbable that the United States will ever be attacked by an enemy from this side, and they have now nothing to fear from the Indians uniting with their enemies. The plan has been well executed, as the general government has acted with more than common liberality. A good price was stipulated for the cession of the tracts inhabited by the Indians, and the money was divided into three unequal parts, according to the circumstances of each tribe. One part of the money was appropriated to the liquidation of the debts which the tribes and the individuals composing them had contracted with their white neighbours; another part was appropriated to paying the expenses of their removal and those incurred in the establishment of the new settlements; and the third was to provide an annuity until they should have ample means of procuring subsistence. Under such treaties, the Indians, who, up to the year 1836, had resided east of the Mississippi, are to be removed to the west of that river. All the tribes, except the Wyandots in Ohio, have accepted the conditions, and the greater part of them took possession of their newly-assigned territories during the years 1837 and 1838. The remainder, it is supposed, will follow in 1839 and 1840. The following table is taken from the last Report of the Commissioners of Indian Affairs, dated November 25, 1838:—

Names of the Tribes.	No. of individuals to be removed originally.	No. of individuals removed before Nov. 25, 1837.	No of individuals removed since Nov. 25, 1837.	No. of individuals still to be removed.
Chippewas, Ottawas, and Pottawatomies	8,000	2,190	151	5,648
Pottawatomies of Indiana . .	1,786	494	768	150
Choctaws	18,500	15,000	177	3,323
Quapaws	476	476	..	..
Creeks	22,000	20,437	4,106	750
Florida Indians . . .	3,765	1,079	1,851	835
Cherokees	22,000	7,911	18,000	..
Kickapoos	588	588	..	..
Delawares	826	826	..	..
Shawnees	1,272	1,272	..	..
Ottowas	420	374	..	200
Weas	225	225	..	..
Piankeshaws	162	162	..	..
Peorias and Kaskaskias . .	132	132	..	..
Senecas from Sandusky . .	251	251	..	..
Senecas and Shawnees .	211	211	..	..
Ottowas and Chippewas . .	6,500	..	..	6,500
Winnebagoes	4,500	..	..	4,500
New York Indians . .	4,176	..	..	4,176
Chickasaws	5,000	..	4,600	400
	100,790	51,629	29,653	26,482

It appears from this table that the whole number of Indians who were to be removed to the countries west of the Mississippi does not much exceed 100,000, and that the removal of about four-fifths had been effected at the end of 1838. We shall now notice the countries which the principal tribes have hitherto occupied, and the territories which are assigned to them on the west of the Mississippi, and add a few observations on their present condition and progress in civilisation.

The more numerous tribes which inhabited the southern states of the Union have been settled on the Red and Arkansas rivers. The Chocktaws and Chickasaws, who occupied the largest portion of the state of Mississippi [MISSISSIPPI], are now established on the Red River and the country between this river and the Arkansas; the Chocktaws, in the districts contiguous to the boundary line of Arkansas; and the Chickasaws, in those which lie along the frontier of Texas. The Chickasaws also occupy the south fork of the Canadian river, but a great number of the Chickasaws have settled among the Chocktaws. As both tribes speak the same language and intermarry with each other, there can be no doubt that in a few years they will be one people. The Chocktaws are governed by a written constitution and laws. They meet annually in their general council on the first Monday of October. The nation is divided into three districts; each district sends ten councillors, elected by the votes of the males who are twenty-one years old and upwards. They have only a representative body; the three hereditary chiefs have a veto on all measures passed by the council, which however when passed by two-thirds become a law. They have judges and officers to enforce the laws, with a jury chosen in the ordinary way. Since their settlement in their new country, the Chocktaws have changed their constitution so far as to admit the Chickasaws into their council, with a chief and ten councillors, which it is supposed will greatly contribute to unite both tribes into one. Both tribes apply to agriculture with industry and skill, and raise corn, beans, pumpkins, and melons in abundance; in the southern districts they also cultivate cotton. They have extensive pasture-grounds for cattle and hogs on the prairies which extend between the two rivers. They have also several schools, and a number of missionaries are settled among them.

The Creeks, who previously to 1837 were in possession of an extensive tract in the state of Alabama [ALABAMA; CREEK INDIANS], are now settled on the northern fork of the Canadian river, where they possess extensive and fertile bottoms for the cultivation of corn, pumpkins, beans, melons, &c., but their pasture-grounds are inferior to those of the Chocktaws. A portion of them have settled on the Arkansas river. They are more inclined to labour than any other tribes, and they are good agriculturists. They are at present opposed to missionaries being sent to instruct them. They have not, like the Chocktaws, formed a constitution and laws, except such as are passed by the chiefs in council. The Seminoles, or Florida Indians, are settled on the northern fork of the Canadian river, between the two tracts occupied by the Creeks. They are much behind their neighbours in civilization, and not much disposed to agricultural labour.

The Cherokees, who formerly occupied a portion of Georgia and Alabama, are now established on the bottoms of the Arkansas river, where they cultivate maize, wheat, oats, potatoes, beans, and vegetables. They are further advanced in civilization than any other Indian tribe. They are governed by written laws, enacted by the council of the nation, which meets annually in October. Judges are appointed in each district, with a sheriff to execute the laws. Trial by jury exists, and generally the laws as to property and the punishment of crimes are the same as in the United States.

The two smaller and united tribes of the Senecas and Shawnees, which formerly inhabited some tracts in Illinois, are now settled on the Neosho river, an affluent of the Arkansas from the north; and the Quapaws, who formerly lived within the state of Arkansas, have been removed to the same parts. These three tribes have not made much progress in agriculture and the arts of civilization, and are much exposed to the depredations of the Osages, a tribe which occupies the banks of the Osage river, and gains its livelihood chiefly by hunting. But as game begins to be scarce, the Osages are often in distress, and plunder their neighbours.

As most of the tribes which are dispersed through the states north of the Ohio were averse to removing to the countries on the Red and Arkansas rivers, several of them have been settled west of the state of Missouri, on the banks of the Osage and Kanzas rivers and on the Missouri river itself. The four small tribes of the Weas, Piankeshaws, Peorias, and Kaskaskias, with a small number of the Ottowas, altogether not exceeding 1000 souls, occupy the tracts adjacent to the northern banks of the Osage river, and in their neighbourhood are also settled the Pottawatomies of Indiana, who somewhat exceed 1000 in number. All these tribes, through not yet entirely accustomed to agricultural labour, raise nearly as much maize, potatoes, and other articles as are required for their subsistence, and show a disposition to adopt exclusively agricultural habits. A few of them send their children to school, especially among the Peorias.

The tribes of the Shawnees, Delawares, and Kickapoos, which, taken together, compose a population of above 2500, are settled near the confluence of the Missouri and Kanzas rivers, and on the bottoms contiguous to the last-mentioned stream. These nations have entirely given up the chase, and have begun to cultivate the country assigned to them with great industry; they raise maize, beans, peas, potatoes, turnips, and melons in abundance. Many of them send their children to school.

The Chippewas, Ottowas, and Pottawatomies, who were removed from the state of Michigan, are settled on the banks of the Missouri, north of its confluence with the Kanzas river. But as they have not yet decidedly adopted agricultural habits, the labour of the fields is still left to the women, who cultivate potatoes, pumpkins, melons, &c.

In this way the aboriginal tribes, who have removed to the west of the Mississippi, have been distributed. The settlement of such a number of Indians in these parts must of course reduce the extent of the hunting-grounds of those tribes who inhabit these regions, and consequently their means of subsistence. This is however much less the case than may be imagined. The countries on the Red and Arkansas rivers, where the most populous tribes are settled, were nearly uninhabited, none of the wandering tribes having chosen them for their exclusive and permanent hunting-ground, on account of the want of game and the scarcity of buffaloes. They were only visited from time to time by small bands, mostly belonging to the Pawnee nation. The case is somewhat different with the tribes settled on the banks of the Missouri river and its affluents. They partly occupy the hunting-grounds of the Osages, Pawnees, Otoes and Missourias, and Omahas; and it is probable that this circumstance will lead to some hostilities. It is hoped however that they will not be destructive or lasting, as these tribes do not depend entirely on the produce of the chace for their subsistence, but cultivate their lands, though only to a small extent.

It is the general opinion that all the aboriginal tribes of North America originally obtained their subsistence by hunting and fishing, and that agriculture was introduced among them by the Europeans. But this opinion appears to be in some degree erroneous, for most of these tribes cultivated the ground to a small extent, and raised maize, pumpkins, melons, and tobacco. This amount of agriculture was not limited to the tribes which inhabited the southern states of the Union, but extended to those in the valley of the Missouri to its great bend (near 47° N. lat.), where the Mandans and Minitaries lived in permanent villages, and cultivated maize and some vegetables even when they were first visited by the whites. The labour of the fields however was entirely left to the squaws, or women, and limited to what could be done with the hoe. The produce thus raised was insufficient for the maintenance of the families, and the deficiency was supplied by the produce of the chace. Most of the tribes bordering on the newly settled Indians are in this semi-barbarous condition, as the Osages on the Osage river, the Kanzas on the Kanzas, the Pawnees on the Platte river, the Otoes and Missourias, and the Omahas, who live in the valley of the Missouri north of its confluence with the Platte or Nebraska river, and finally the Mandans and Minitaries. The tribes which occupy the country between the Missouri and Mississippi are not more advanced in civilization; but these tribes have lately begun to use the plough, and even the male population are inclined to take part in agricultural labours.

The aboriginal tribes, which entirely subsist on the produce of the chace, and have no permanent residence, are found within the territories of the United States only along the Chippewyan mountains, and range over the extensive desert which stretches from the base of the mountains about 400 miles eastward. The number of these wandering tribes is very great, but most of them belong to two great nations, known by the names of the Sioux and Blackfeet. The several tribes of the Sioux of the Upper Missouri speak the same language, and range over the whole extent of country from the Mandan villages to the head of the rivers Platte and Arkansas. Some of their tribes occupy the country east of the Missouri, and extend eastward to St. Peter's river. The Blackfeet chiefly inhabit the mountainous country which extends around and among the different rivers by which the Missouri is formed; but they extend their hunting excursions northward to the Saskatchevan, and southward to the Platte and Arkansas rivers. As the Chippewyan mountains within the limits of the Blackfeet territory contain several depressions which present no obstruction even to the passage of wheel-carriages, the Blackfeet frequently pass to the banks of the Columbia river. Though they are all called Blackfeet, it is supposed that some of their bands speak different languages.

These barbarous nations appear to have no laws except such as grow out of usage or such as are sanctioned by common consent. The executive power seems to be vested in the chiefs and warriors, but in cases of importance, and especially when they make war or peace, the grand councils of the nations deliberate on the matter. To these councils, which are called *medicine*, or rather *magic feasts*, none are admitted but the principal men of the nation, or such as have signalised themselves by their exploits in battle, hunting, stealing horses, or in any other way that is accounted laudable by the Indians. The decision to which the council comes, of whatever nature it may be, is published to the people at large by certain members of the council, who perform the office of criers. On such occasions the criers not only proclaim the measures which have been recommended, but explain the reasons of them and zealously urge the people to support them. It is also the business of the criers, who are generally men of known courage and approved character, and are able to enforce their precepts by an appeal to their own example, to harangue the people of the village daily and to exhort them to such a course of life as is deemed praiseworthy. On such occasions, which are at the quiet time of morning or evening, the crier marches through their temporary villages, uttering his exhortation in a loud voice, and endeavouring to inculcate correct principles. The young men and children of the village are directed how to demean themselves, in order to become useful and to enjoy the esteem of good men and the favour of the good spirit. They believe in the existence of a Supreme Being, whom they denominate 'Master of Life,' or 'Good Spirit,' but their ideas of his attributes are vague and confused.

The country inhabited by these tribes is frequently traversed by the citizens of the United States in their expeditions to the Columbia river. The Americans also carry on a considerable trade with the Indians themselves. The quantity of furs which they procure is small, but they obtain a great number of buffalo hides.

Passing to the British dominions in North America, we find in Lower Canada only small remnants of the once powerful tribes of the Iroquois, or Mohawk Indians, the Algonquins, and Hurons, who live in small villages, amidst the white settlers, and have adopted agricultural habits, raise maize, wheat, some other grains, potatoes, and other vegetables. The Mic-Mac Indians, who occupy the shores of the Bay of Chaleurs and the banks of the river Ristogouche, are more numerous. They live by fishing, and do not cultivate any kind of vegetables. The mountainous country north of the St. Lawrence river, on both sides of the Saguenay river, the shores of St. John's Lake, and the interior of Labrador, are occupied by the tribes of a nation which is called Montagnais, or Mountain Indians, who wander about in that extensive region without any fixed residences, and live by hunting and fishing.

The tribes which still occupy a great portion of Upper Canada are more numerous. A large part of the country between the river Ottawa and Lake Huron is still in their possession. The principal nations in this tract are the Ottawas and Chippewas, who live in the countries which surround Georgian Bay on the south, and on the Manitoulin Islands, and are allied with the tribes known by the same name and occupying the north-western part of the state of Michigan, and the Missisaqua Indians, who occupy the eastern shores of the Georgian Bay. All these tribes live by hunting, and possess a country rich in game and furbearing animals. The shores of Lake Superior, as well in Upper Canada as in the United States, are inhabited by the Ojibwas, who seem to be only a branch of the nation called the Crees, or Knistineaux, which extends farther north to the shores of Hudson's Bay and the Mississippi or Churchhill river. These nations are hunters. The country on both sides of the boundary-line between the United States and the British possessions, and extending from Lake Superior to the Chippewyan mountains, is in possession of two nations, the Chippewas and Assinaboins. The Chippewas, who occupy the eastern districts as far west as the Red River of Lake Winnipeg, inhabit a rocky country almost entirely destitute of game, and live partly by fishing and partly by collecting the wild rice which covers most of the lakes and swamps with which this country abounds. The Assinaboins, who live west of the North Red River, are considered as a branch of the Sioux, and visit the plains south of the Saskatchevan river in quest of buffaloes, which form their chief subsistence.

Neither the Assinaboins nor the Crees extend their wanderings to the base of the Chippewyan mountains, the former being divided from them by some tribes of the Blackfeet, and the latter by the Asseeneepoytuk, or Stone Indians. The last-mentioned tribe hunts on the extensive plains between the forks of the Saskatchevan river. The Crees extend their excursions northward to the banks of Athabasca Lake. North of this lake and along the shores of Slave and Mackenzie rivers are the Beaver Indians, the Hare Indians, and the Louchen Indians, and in the countries east of the river the Copper and Dogrib Indians. The three last-mentioned tribes are separated from the Icy Sea by the Esquimaux, who occupy the shores of that sea. All these tribes live principally by hunting, but they also fish in the extensive lakes which cover a great portion of their country.

Our information respecting the aboriginal tribes which inhabit the countries west of the Chippewyan range is too scanty to enable us to give even a list of them. The most powerful tribes on the banks of the Columbia river, the only portion of the north-west coast of America which is tolerably well known, are the Snake Indians, or Shoshonees, and the Flatheads. The Shoshonees occupy the countries on the southern and the Flatheads those on the northern branches of the Columbia river.

(Long's *Expedition to the Rocky Mountains*, by James; Long's *Expedition to the Sources of St. Peter's River*, by Keating; Franklin's *First* and *Second Journey to the Shores of the Polar Sea*; Irving's *Astoria;* M'Keevor's *Voyage to Hudson's Bay*; Kotzebue's *Voyage round the World;* Bouchette's *Topographical Dictionary of Lower Canada; Annual Report of the Commissioner of Indian Affairs*, Washington, 1838.)

NORTH CAPE. [TRONDHIEM.]

NORTH KYN CAPE. [TRONDHIEM.]

NORTH SEA. The *German Ocean*, though touching out a small portion of modern Germany, and though more commonly called the North Sea, still maintains its antient name, derived from Oceanus Germanicus. (Ptolemy, *Geogr.*, lib. ii., cap. 3.) It is separated from the Atlantic by the British Islands, which form its western limits, and on the opposite side by Norway and Denmark from the Baltic. To the southward it is bounded by the coasts of France, Belgium, the Netherlands, and Germany; and to the northward an open space between the Shetland Isles and the Norwegian province of Bergen unites it to the Polar Sea. With the Atlantic it is connected through the Strait of Dover by the English Channel; and with the Baltic by the broad gulf called the Skagerrack, which, turning to the southward round the peninsula of Jutland, there takes the name of the Kattegat; and then divides into the three navigable but narrow passages called the Sound, the Great Belt, and the Little Belt. It extends across ten degrees of latitude and eleven of longitude; its greatest length may therefore be taken at 600 geographical miles, its extreme breadth at 350, and its superficies at about 140,000 square miles.

On its north-eastern side the bold rocky face of Norway, intersected by deep fiords, rises precipitously from its bosom; but the sea here receives few tributary streams from the interior mountains, and it preserves a depth of many hundred feet along the base of the cliffs. Its south-eastern and southern coasts are low; the Elbe, the Weser, the Rhine, and the Schelde pour out through those alluvial shores enormous quantities of sand, which have more or less filled up the southern portion of the basin. This sand, as it subsides through the water, is swept by the alternate flood and ebb into long sinuous and shallow banks, which, rising in narrow ridges towards the surface, place themselves in directions parallel to the contiguous shores, or rather in lines radiating from the Strait of Dover, through which the North Sea tides enter and return. The east coast of England partakes of the same character, and is exposed to the same effects; the Thames, the Ouse, the Humber, the Tyne, the Forth, and the Tay, contributing their unceasing though comparatively trifling efforts to front the shore with similar shoals. All these shoals and banks obstruct the free navigation of the sea, and, combined with the stormy and foggy character of the climate, have led to the destruction of an immense number of vessels. There are other banks, which do not seem to be attached to the shores or to assume the same ridge-like form, but which have been equally the result of the same causes; for however weak may be the impulse of the rivers at such a remote distance from the shore, or however slow the transporting power of the tides, yet, when multiplied by the action of successive ages, they will sufficiently account for the deposit of all these submarine accumulations. Such are the long North Bank, the Dogger Bank, the Well Bank, the Broad Fourteens, and others which need not be enumerated. No accurate representation of any of these banks has ever yet been made: the best charts have merely consisted of the patchwork improvements of consecutive corrections, or of the reports of pilots who were without the means of giving precision to their discoveries; and it is therefore with great satisfaction that we find Great Britain at length taking up this important desideratum, and employing an active and skilful naval officer in a thorough investigation of the whole sea. Beginning to the southward, where he has received every facility from the Dutch and Belgian governments, and advancing regularly by zones, he will be able to produce a complete map of the singularly undulating surface of the bottom, noting every variety of sand, gravel, or shells, along with their characteristic tints. This survey will be as valuable to the mariner, whose existence depends on a correct knowledge of the varying depth beneath his keel, as it will be interesting to the philosopher who contemplates the gradual operations of nature. The deep holes which are found in this sea form another of its singular features. There are several of these holes, but it will be enough for our purpose to particularise the 'Little Silver Pit' off the coast of Holderness in Yorkshire. The northern end of this singular hole is in 53° 45′ N. lat., 0° 47′ E. long., from whence it runs in rather an irregular form and nearly on the true meridian to 53° 20′ N. lat., 0° 43′ E. long., a length of 25 miles. Its breadth at the northern end is little more than half a mile, but towards the middle it is two miles, whence it narrows to one mile and a quarter, and again increases to two miles in breadth towards the southern end. The Little Silver Pit, so called in contradistinction to the Great Silver Pit (which is an extensive space of comparatively deep rocks between the Dogger and Well banks) is situated seven leagues eastward of the entrance of the river Humber. The depth of the water on its edges varies from 50 to 80 feet, and yet, in this singular submarine ravine there is a depth of 330 feet, in 53° 31½′ N. lat., 0° 41½′ E. long., the deepest part of this hole yet discovered. But the most surprising feature of the Little Silver Pit consists in the great steepness of its sides, and it would appear somewhat extraordinary, taking into consideration the sandy, gravelly, and loose nature of the surrounding ground, together with the action of the tides, which run at the springs with a velocity of more than three miles an hour in a diagonal direction across it, that the hole is not in course of gradual filling up. But on the other hand, when we further consider that in most of its parts we find a bottom of mud and clay, we have a strong proof that the surrounding materials are not in any great degree washed down into it, and are therefore compelled to acknowledge that an air of mystery belongs to its character, still remaining to be explained away. The Little Silver Pit is marked in charts of very antient date, another proof that it is kept open from some great and unknown cause. It is the resort of fish of various kinds peculiar to the North Sea as ground-fish, and soles of unusually large dimensions have recently been taken from it, but it is a place very dangerous to trowling-nets by reason of its narrowness, the perpendicularity of its sides, and the diagonal set of the tides, rendering it extremely difficult to drag nets fairly along its bottom. The North-north-east hole, so called from its position with respect to Cromer, is another of these remarkable places, and characterised nearly as the other is; it is situated eight leagues to the eastward of the Little Silver Pit; its greatest depth yet discovered does not however exceed 265 feet.

One island only interrupts the uniformity of this sea, Helgoland Rock, which lies off the mouth of the Elbe, unless the Bell Rock and the May Rock, situated in the opening of the Frith of Forth, may be so called: on each of these three insulated spots lighthouses have been erected. Lighthouses have likewise been established on all the salient points of the coast, as well as at the entrance of all the principal ports; and floating-light vessels have also been moored on several of the detached banks. Between Dover and the Shetlands 56 lights may be reckoned, and on the opposite continent 25 succeed each other from that on Cape Grinez in the Strait of Dover to the entrance of Bergen. Multitudes of buoys and beacons have also been placed on the sand-banks, wherever the swell of the sea would admit of their being secured, in order to mark the proper channels, but no pains or expense can be too great to ensure the safety of the skilful and hardy seamen who traverse this sea, or to facilitate the extensive traffic which it is the means of supporting between the active and industrious nations that inhabit its shores. It carries the great staple commodities of the northern regions of Europe, their coals, the timber of their inexhaustible forests, their hemp, and their hides and tallow, and bears back in return the manufactures, the necessaries, and the luxuries of more favoured climates. It is the marine highway to the capitals of eight different states, and it may be asserted that no sea in the world of equal dimensions can boast of half such a commercial intercourse, either in the number of vessels which it employs or in the general value of their cargoes.

The profusion of fish in the German Ocean has in all ages been celebrated, and the protection of its fisheries has given rise to more than one national quarrel. The skill and enduring perseverance of the hardy Dutch and British fishermen who frequent this turbulent sea are proverbial: at all times of the year they brave its inclemencies in pursuit of the fish which are in season. The principal of these are cod, hake, and ling, with turbots, soles, and other flat fish, and especially the vast swarms of mackerel and herrings which at certain periods visit our shores, and which give active employment to thousands of men, women, and children. The lobsters found on our own rocky coasts are not sufficient to supply the demand, and the London market alone employs five or six vessels constantly plying between this country and Norway, which seems to be their favourite habitation. When brought over, they are deposited in large wooden cases, properly perforated, and secured in a creek called Hole-Haven, on the Essex side of the Thames, near the upper part of Sea Reach, from whence they are transmitted to Billingsgate according to the consumption.

To trace the course of the tides in the German Ocean would require a long article, so various are the phenomena, and so incongruous do they at first sight appear; the flood running to the northward along one part of our coast and to the southward in another; rising upwards of 20 feet in some of its æstuaries, and elsewhere being scarcely perceptible; and though everywhere regulated by the phases of the moon, yet showing high-water in one place at the same moment that it is low-water in another. A few words will explain the general principle of these apparent irregularities. The great tidal wave which rolls up from the Atlantic Ocean splits at the south-west angle of Ireland into two streams, one of which pursues its straight course up the English Channel, though somewhat retarded in its progress by the converging shores; while the other passes to the northward, and bending round the north of Ireland and Scotland, pours through the Pentland Frith with a velocity of seven or eight miles per hour, or, sweeping round the Orkneys and Shetlands, turns to the southward along the coast of Great Britain, but spreading as it goes across the whole expanse of the German Ocean. This circuitous course requires more time for the transmission of the northern wave than that which arrives through the Strait of Dover, and therefore when the two flood-tides meet, which takes place off the coast of Essex, the northern is half a day later than the other branch from which it was originally separated. On the coast of Holland this meeting occurs not far from the Texel, but in the widening interval between those two shores these opposite streams seem to neutralise each other, so as to produce neither rise nor fall. Besides the action of the lunar tides, the effects of distant currents are sometimes manifest in the northern part of this sea, produced by the melting of the polar ice, and, in an opposite direction, by the continuous movement of an offset from the Gulf Stream of America.

The icebergs which quit the arctic seas and melt in the vicinity of the German Ocean, the overflowing of the Baltic Sea, and the volume of fresh water constantly pouring into its confined space from the surrounding rivers, sufficiently prove, whatever may have been asserted to the contrary, that its water must contain considerably less salt than that of the Atlantic.

NORTH-WEST PASSAGE. If a vessel by sailing from the western shores of Europe in a north-west direction were to enter the Pacific, it would be said to have made the North-West Passage. The first attempts to accomplish such a voyage are nearly coeval with the discovery of America. These attempts have been frequently renewed, but it is still doubtful if such a voyage can be accomplished.

A few years after the discovery of America, Vasco de Gama succeeded in reaching the shores of Malabar in Hindustan. He returned to Europe in 1499. On comparing the geographical position of the countries discovered by Columbus and Vasco de Gama, it was evident that an immense space lay between them. This space comprised the great kingdom of Cathay (China), which on the globes and maps made by the German geographers of that time, on the authority of Marco Polo (who however had not determined the geographical position of any place which he visited), extends more than twenty degrees east of its true position. It was therefore concluded in Portugal, that Vasco de Gama had only sailed half way to Cathay, and that the countries discovered by Columbus were much nearer to Cathay than the coast of Malabar was. It was supposed, that if a vessel were to sail past the countries discovered by Columbus, either to the north or the south, it would reach Cathay This consideration gave rise to the first attempt to make a North-West Passage, which was viewed as of such importance, that the attempt was made before the second Portuguese fleet, under the command of Cabral, was despatched to the East Indies. In 1500, Gaspar de Cortereal, a distinguished nobleman, was sent out to make the North-West Passage. He discovered a large part of the north-eastern coast of Labrador, and, as it is said, to the extent of 600 or 700 miles. The following year he returned to the place to which his discoveries had extended, and came to a strait, which was called the Strait of Anian, after the name of one of the officers. It can hardly be doubted that this is the strait which is now called Hudson's Strait. Being entangled in the floating ice which encumbers that strait all the year round, his vessels were separated. The vessel of Gaspar de Cortereal was never heard of, but the two others returned to Lisbon. A brother of Cortereal sailed in 1502 in search of him, but he also never returned. After these disasters the Portuguese abandoned the attempt.

John Cabot had previously (1497) discovered the island of Newfoundland, but evidently without any design of discovering a North-West Passage. His son Sebastian Cabot, who had accompanied him on his voyages, sought for the passage in 1517, when he accompanied Sir Thomas Pert, but this voyage added nothing to what had been done before. For a long time no attempt was made, probably because Magalhaens had succeeded in entering the Pacific at the southern extremity of America by the strait which bears his name.

The spirit of maritime discovery was excited in England about the middle of the sixteenth century, and lasted more than fifty years. All the numerous attempts made in this eventful period were at the expense of private persons, or rather at the expense of companies of merchants. The attempts were first directed to the discovery of a North-East Passage, by which it was proposed to reach the Pacific by sailing from west to east along the northern shores of Asia. The real extent of the continent of Asia was then unknown. Three vessels sailed under the command of Sir Hugh Willoughby and Richard Chancellor in 1553, for the sea which washes the northern coast of Europe. The vessels separated: Sir Hugh perished with his whole crew on the coast of Lapland, and Chancellor entered the White Sea. Chancellor's discovery was of importance: it led to the establishment of a trade between England and Archangel, and to the design of the English of carrying on commerce with India by means of the Volga and the Caspian Sea. This enterprise of trading with India through the Volga so completely engrossed the attention of the merchants of London, that all further attempts at discovering the North-East Passage were abandoned. Towards the end of the sixteenth century the Dutch commenced their enterprises in this direction, for which they had a strong motive. Having risen in arms against Philip II., king of Spain, who was then also king of Portugal, their vessels were excluded from the ports of America and of the East Indies then in possession of those nations. In their voyage to such parts of the East Indies as did not belong to the Portuguese, and on their return home, they had to traverse a large extent of sea, of which the Spaniards then claimed the dominion, and in which their merchant vessels were in danger of being taken. The Dutch merchants accordingly resolved to try if it was possible to reach the East Indies by a North-East Passage. William Barentz made two voyages (1594-1596), but was unable to proceed east of Nova Zembla and the Strait of Waygatz, on account of the quantity of ice which always covers the sea to the east of that island. Since his last voyage, in which he passed the winter on Nova Zembla, the North-East Passage has been given up as impracticable.

In the meantime the North-West Passage was lost sight of until the year 1576, when the attempt was again made by the English, who prosecuted this object with great ardour for forty years. All that has been effected towards discovering the North-West Passage is due to the English. The first English seaman who did anything decisive towards this object was Martin Frobisher, who made three voyages (1576, 1577, and 1578) to the northern seas. In the second voyage he discovered Frobisher's Strait (63° N. lat.), and in the third he re-discovered the Strait of Anian, or Hudson's Strait. He was followed by John Davis, who likewise made three voyages (1585, 1586, and 1587). In the first voyage he discovered Davis's Strait between Greenland and Cumberland Islands, sailed up to Mount Raleigh (66° N lat.), and afterwards found the inlet, now called

Cumberland Strait (65° N. lat.). In his third voyage he extended his discoveries along the western shores of Greenland as far north as Sanderson's Hope (72° N. lat.), and in sailing southward he likewise found the entrance of Hudson's Strait, which had been seen before that time by Corteral and Frobisher, but none of these three navigators seem to have advanced any great distance into it. [Davis.] Henry Hudson, after several unsuccessful voyages of discovery to the north-east and north, directed his last voyage to the north-west, and penetrated through the strait into the bay, both of which are now called by his name. He passed the winter on the shores of the bay, hoping to find a passage to the Pacific in the following year, but his crew, which had suffered great hardships during this voyage, mutinied, and abandoned him and some of his adherents in a boat in the middle of the bay. Hudson was never heard of afterwards. [Hudson.] In the two following years some parts of Hudson's Bay were explored. In 1612 Sir Thomas Button discovered Roe's Welcome, the strait between Southampton Island and the continent; and Bylot in 1613 discovered Fox Channel between Cumberland Island and Southampton Island. Bylot and Baffin in 1614 penetrated through Davis's Strait and explored Baffin's Bay to its most northern extremity, called Sir Thomas Smith's Sound (78° N. lat.). In returning along the western shores of Baffin's Bay, they passed the wide opening of Lancaster Sound (between 73° and 75° N. lat.), but considered it a closed bay. As their researches had been made with great care, Baffin was of opinion that all attempts to find a North-West Passage in these parts were useless, and this opinion soon became so prevalent as to put a stop to all voyages of discovery in this direction. The voyages were now directed only to the exploration of Hudson's Bay, and were prosecuted with less ardour. In 1631 James discovered James's Bay, the most southern part of Hudson's Bay, and Fox again examined the two straits which enclose the island of Southampton, Roe's Welcome, and Fox Channel. More than a hundred years later, in 1741, Middleton explored Wager River and Repulse Bay, to the west of Roe's Welcome, and found that both were closed inlets.

While the English were pursuing their discoveries on the north-eastern shores of North America nearly without interruption, the Spaniards made some feeble attempts along the north-western coast with the view of finding a North-West Passage. Their voyages led to no important result, except that two of their navigators pretended that they had discovered the passage. Juan de Fuca is said to have entered a large bay between 47° and 48° N. lat., and to have sailed through a strait in a north-eastern direction until he reached the Atlantic Ocean. He sailed from Acapulco in Mexico, and returned to that place. Admiral de Fonte is said to have entered, in 1640, a broad navigable inlet, situated in 53° N. lat., which led him to an inland lake of great dimensions, and thence to the Atlantic. The short accounts which exist of these voyages were not printed in England till a long time after their pretended performance, and it must be observed that the Spanish government never admitted that the voyages had taken place; a fact which at that time was attributed to the jealousy which prompted the Spaniards to exclude all foreigners from their possessions in America. Humboldt, in his work on Mexico, says, that after the most careful researches in the archives of Mexico, he was unable to find any document in which Juan de Fuca or the Admiral Bartolomeo de Fonte was even mentioned. The accounts of the voyages, attributed to these navigators, are evidently fabrications, invented for the purpose of appropriating to the Spanish nation the honour of the discovery, if such a passage should ever be found. Juan de Fuca had certainly visited the north-western coast of America; the southern strait by which the island of Quadra and Vancouver is separated from the continent still bears his name.

When the distinguished navigator Cook entered on his last voyage of discovery, he was instructed to try how far he could advance northward between Asia and America. He reached Icy Cape (70° N. lat.), where he found that a barrier of ice extended from one continent to the other. In the same voyage he visited several parts on the western coast of North America, and found that on the western side too the rocky shores were indented by numerous inlets. The nearly forgotten fabrication of Juan de Fuca was again discussed, and the English as well as the Spaniards soon after sent several expeditions to survey these coasts. After a close examination of the whole coast north of 45° N. lat., it was ascertained that it consisted mostly of islands, separated from the continent by narrow sounds, and that the numerous inlets by which the continent itself is indented do not extend far inland, and terminate at the foot of elevated mountain-ranges.

The question as to the existence of a North-West Passage now seemed to be decided in the negative, when the whalers who annually visit the sea on both sides of Greenland reported that in the years 1816 and 1817 the arctic seas were much less encumbered with ice than had ever been observed. The British government now resolved to make an attempt to settle this question. In 1818 two vessels were despatched, under the command of Captain John Ross and Lieutenant Parry, to re-examine the shores of Baffin's Bay. All the bays and inlets which these navigators entered were closed by mountains or ice, and Captain Ross was also of opinion that this was the case with Lancaster Sound (between 73° and 75° N. lat.), and that a North-West Passage did not exist in these quarters. But Parry thought that the last-mentioned inlet had not been examined with sufficient care, considering its great width. Parry was sent in the following year (1819), for the purpose of examining Lancaster Sound more closely than had been done by Captain Ross. On entering the sound he sailed in a westerly direction 30 degrees of longitude, or 540 miles, having on the north a series of elevated tracts, broken apparently into islands by intervening channels. These channels were not examined, and may perhaps turn out to be only bays. The larger of these islands were named by him respectively Cornwallis, Bathurst, and Melville Island. On the south side of the sound were two large islands, of which the eastern was called Cockburn Island; the western remained nameless, as it was supposed to form a part of the American continent. The channel which divides these two islands received the name of Regent's Inlet. West of 100° W. long. no land was in view on the south. Parry and his crews passed the winter on Melville Island, hoping in the following summer to reach the Pacific. He was unable however to advance west of Melville Island, the sea being covered with thick and impenetrable ice; but no land was in sight, except that at a great distance to the west-south-west there appeared a bold coast, which was named Banks's Land. It was now clear that it was only owing to the series of islands which skirt the northern shores of this long strait that they had been enabled to proceed so far westward, and that the sea ceased to be navigable where these islands terminated.

All hope of reaching the Pacific by Lancaster Sound being frustrated, Parry proposed to try if the object could be effected by any of the inlets which open into Hudson's Bay, the northern portion of which had not been explored. In 1821 he entered that bay, and passing between Cumberland Island and Southampton Island, he advanced to Repulse Bay, which he examined and found to be completely enclosed, as Middleton had described it. He then explored a part of the contiguous coast to the northward, in which he found another large indentation, which he called Lyon's Inlet. His vessels were soon afterwards frozen up in the midst of the sea, near Winter Island (65° N. lat.). In the following summer he continued his voyage northward, and discovered the whole coast between 65° and 70° N. lat., in which no deep indentation occurred, with the exception of a wide sound between 69° and 70°, which he explored for more than 60 miles, when he found that it was closed by a barrier of ice, lying south and north across the strait, but he ascertained that beyond this barrier there was an open sea, a circumstance which agreed with the information that he had obtained from the natives. This opening therefore was not a bay, but a strait, which he called, after the two vessels under his command, Fury and Hecla Strait. At the time of this discovery the season was far advanced, but he hoped to be able to reach the open sea west of the strait the following summer, and accordingly he passed the second winter on the island of Igloolik, at the eastern extremity of the strait. But though he waited to the middle of August in the following year, the strait continued to be covered with ice, and he was obliged to give up all hope of effecting his purpose.

The result of this attempt showed that Fury and Hecla Strait did not allow a navigable North-West Passage. Parry, whose success had deservedly secured the confidence of government, again obtained the same vessels for the purpose of trying whether Regent's Inlet, which, according to the information obtained from the Esquimaux, stretches far to the south, might not allow a passage. On arriving at the entrance of Regent's Inlet, he found it much encumbered with ice, and was obliged to pass the winter from 1824 to 1825 in Port Bowen, on the western coast of Cockburn Island. In trying to sail southward the following July, one of the vessels (the Fury) was lost in the ice, and Parry returned home in the Hecla. Government did not think fit to continue these voyages, which led to no definite result; but as the last attempt of Parry had been merely interrupted by an accident, it seemed still probable that a navigable North-West Passage might exist through Regent's Inlet. A wealthy individual, Sir Felix Booth, furnished all the expenses for a new adventure, the direction of which was given to Captain John Ross, who, after passing through Lancaster Sound, entered Regent's Inlet in 1829, and sailed along the western shores of the inlet as far south as Felix Harbour (70° N. lat.), where he passed the winter. The following seasons were unfavourable, the sea being constantly encumbered with heavy ice, and he was obliged to remain nearly on the same spot two more winters. This circumstance gave him an opportunity of examining the adjacent countries, and he found that the country west of Regent's Inlet was not an island, but joined to the continent of America by a low isthmus of inconsiderable length and width. It is however supposed that a strait actually exists in this part, which escaped his research. The peninsula which Ross considered to be united by the low isthmus to the continent of America was called by him Boothia Felix. The shores of the continent itself, west of the isthmus, were examined to a distance of 70 miles, and the most western cape which was reached was called Victory Point (69° 46′ N. lat. and 98° 33′ W. long.). In another excursion the Magnetic Pole was found to be in 70° 5″ N. lat. and 96° 46′ 45″ W. long. Not being able to extricate his vessels from the ice, Captain Ross and his crew returned in 1832 in boats to Hudson's Bay, where they were received on board of a whaler.

The only North-West Passage the existence of which is certain, is the long strait which is connected with Baffin's Bay by Lancaster Sound. This strait ought, in conformity with the precedent of Magalhaens, to be called Parry's Strait. Since however its western extremity is always blocked up with ice, it never can be available for the purposes of navigation. Still it is not improbable, as already mentioned, that another strait divides Boothia Felix from the continent of America. This hitherto unknown strait has lately attracted a great deal of interest, as being connected with the northern termination of the American continent. The whole line of coast between Behring's Strait and the mouth of the Mackenzie river is now known. Between the discoveries of Captain Beechey, who advanced to Point Barrow (71° 28′ N. lat. and 156° 10′ W. long.), and those of Sir John Franklin, who went as far as Point Beechey (70° 30′ N. lat. and 150° W. long.), only a coast-line of about 130 miles remained undiscovered, and this tract was explored, in 1837, by Messrs. Dease and Simpson, agents of the Hudson's Bay Company. (*London Geo. Journ.*, vol. viii.) East of the Mackenzie river the coast-line as far as Point Turnagain (near 109° W. long. and 68° 30′ N. lat.) was discovered by Sir John Franklin and Doctor Richardson, and the distance between this cape and the Point Victory of Captain Ross does not much exceed 300 miles. Dease and Simpson advanced to 106° W. long. in 1838 (*London Geographical Journal*, vol. ix.), so that the whole distance now unexplored does not much exceed 200 miles. Captain Back, in his expedition in search of Captain Ross, found a sea between 67° and 68° 30′ N. lat. and 95° and 97° W. long. Back observed a pretty strong current setting eastward, which is the strongest argument for presuming that a strait exists in these parts, probably to the south of Point Victory. If the Hudson's Bay Company continue to encourage their agents, in a few years more we shall be acquainted with the whole extent of the American continent towards the north, and the question respecting the North-West Passage will be finally settled.

It is evident that the great advantages which were once expected to accrue from the discovery of a North-West Passage, can never be realised, and it is even doubtful whether such a passage will be of any use at all. Even if the yet undiscovered portion of it should be navigable, that portion which we already know is totally unfit for navigation during the whole year. Between the mouth of the river Mackenzie and Barrow Point, the most north western cape of America, the sea, even in August and September, is so encumbered with ice, that in some parts it is impossible to advance in large boats. It is certain that a trading vessel will never find its way through that frozen sea. Still we are inclined to attach some importance to the discovery of that passage, not only as a geographical question but also in a practical point of view, simply because we can never form a just idea of the usefulness of anything before it is known.

(Barrow's *Chronological History of Voyages into the Arctic Regions*; *Voyages* of Ross and Parry; Franklin's *Expeditions to the Polar Regions*; *London Geogr. Journal*, vols. v., viii., and ix.)

NORTH-WESTERN TERRITORY is a term frequently used to designate a part of the territory which lies to the west of the Chippewyan or Rocky Mountains, in North America. No general name has yet been given to the countries, which extend along the Pacific, from Cape Mendocino (near 40° N. lat.) to Behring's Strait (north of 65° N. lat.) and the Icy Sea, and occupy the space between the Pacific and the Chippewyan Mountains. We shall however give a short description of these countries under this head.

The Chippewyan or Rocky Mountains run from the mountain-knot of the Sierra Verde (between 40° and 42° N. lat.), in a general north-north-western direction, through twenty-five degrees of longitude (from 110° to 135° W. long.) until they terminate at the mouth of the Mackenzie river (68° N. lat.). The most eastern range of this extensive mountain-system constitutes the eastern boundary of the region in question. The shores of the Pacific, which bound it on the west, run (between 40° and 45° N. lat.) nearly due north, and gradually approach the mountains. The distance between them may on an average be estimated at 670 miles, until they reach the Sound of Juan de Fuca (47° N. lat.), where they are only about 400 miles distant. From this sound the coast trends north-north-west, and runs parallel to the Chippewyan Mountains to Behring's Bay (60° N. lat.), preserving a distance of about 380 miles from them. From Behring's Bay the coast-line turns westward, and runs in that direction more than 700 miles. This latter coast is parallel to the coast-line of the Icy Sea, which is ten degrees farther north, and thus the north-western extremity of North America forms an extensive peninsula, nearly 700 miles in width and more than 700 long, which terminates on the west in projecting headlands on the shores of the Kamtchatka Sea, Behring's Strait, and the Icy Sea.

According to a rough estimate, the area of this region is above 1,000,000 square miles, which are thus distributed:— The southern region (between 40° and 47° N. lat.) is on an average 670 miles wide from east to west, and about 480 miles long; the area is 300,000 square miles. The central region (between 47° and 60° N. lat.) is about 900 miles long and 380 miles wide: the area is 300,000 square miles. The northern peninsula measures 700 miles from south to north, and more than 700 miles from east to west: the area is 500,000 square miles, The total area is 1,100,000 square miles, which is equal to the basin of the Mississippi river.

Cape Mendocino, which may be considered the most southern extremity of the *Southern Region*, rises from the sea with a steep ascent to a great elevation. It consists of bare rocks, furrowed by deep clefts and narrow valleys, which are the only portions of this mountain-mass that are wooded. The coast north and south of this cape to a distance of several miles has the same character, though it is not quite so high. It is supposed that Cape Mendocino is the western extremity of an elevated mountain-range which runs eastward to the Chippewyan range, and joins it at the mountain-knot of the Sierra Verde. This supposition is founded on the information that this tract contains the watershed between the numerous tributaries of the Columbia river, and the Rio S. Sagramento or Buonaventura, which falls into the Bay of S. Francisco [CALIFORNIA], and the Rio Colorado [MEXICAN STATES]. Another range runs northward from this transverse chain, about 150 miles from the sea, to the Columbia river: it attains a considerable height, and about 50 miles from the banks of that river rises in Mount Hood to the height of about 15,900 feet. This range approaches close to the river, and produces the rapids and waterfalls which are called the Long Narrows. The mountain-chain is continued north of the river to the Sound of Juan de Fuca, where one of its summits, Mount St. Helen's, is 14,400 feet high. This range divides the more fertile portion of the southern region from that which is sterile. The country west of the range is in general covered with trees. Along the western declivity of this range is the Columbia valley, which is 60 miles wide towards the north, and extends far to the south: its southern districts have not been explored. It is a country of great beauty: the surface is intersected with numerous small lakes and pools, and exhibits great luxuriance in its extensive meadows and fine forests. The river Wallámot, or Wallamatte, runs through this valley. A range of high hills runs on the west of the valley, and from this range to the shores of the Pacific there is a mountainous country, but it is in general covered with dense forests of hemlock, spruce, white and red cedar, cotton-wood, white oak, and some other kinds of trees. These forests extend to the shores of the sea, which are rocky and precipitous, and generally bare. This mountainous country approaches the Columbia river on the south, about 70 miles from its mouth, and compels it to change its western into a north-western course. The banks of the river where the mountains border it are often high and rocky, with low marshy islands at the base of the banks, which are subject to inundation, and covered with willows, poplars, and other trees. In other places the mountains recede from the river, leaving between their base and the stream beautiful plains, which are covered with tall trees. These lower tracts and the declivities of the adjacent mountains are overgrown with deciduous trees; but the more elevated part of the uplands is covered with majestic pines and firs, some of which tower to the height of between 200 and 300 feet. Where the Columbia valley opens on the Columbia river, the banks are occasionally marshy, and covered with so dense a growth of shrubs and rushes as to be almost impassable. Where the elevated range of Mount Hood comes up to the river, the banks consist of stupendous precipices covered with fir and white cedar.

East of the range which contains Mount Hood the country is an inclined plain, rising gradually towards the east, south-east, and north-east, until it joins the base of the Chippewyan Mountains. This tract, which is about 150 miles wide, is an uneven plain, on which level tracts of great extent alternate with ridges of moderate elevation. The soil of the level grounds consists chiefly of gravel and sand, interspersed with bare rocks. These plains are nearly as destitute of vegetation as the country along the eastern base of the Chippewyan Mountains. The hills extend in ridges running south and north, and generally consist of an indurated clay: they exhibit few signs of vegetation, and are very rarely covered with forests, except on the more elevated parts, where they are clothed with scrub pines and cedars, aspens, a small kind of cotton-tree, and some shrubs.

The Chippewyan Mountains, which lie to the east of this desolate region, seem to consist principally of two elevated ranges running parallel to one another at a distance of less than 100 miles: in several places they are united with one another by short transverse ridges. In some places the eastern range rises to the snow-line. There occur in it several depressions, where the upper branches of the Missouri and Columbia approach near one another, and some few of them present no obstacle to the passage of wheel-carrriages. The western range does not appear to rise so high, and in several places contains depressions, which allow a passage for the waters that collect from both ranges, and constitute the principal branches of the Columbia river. Not far from the source of the Snake river, in this range, there are three high summits, called the Three Breasts, or Tétons, which stand on a common base, which is perforated by deep caverns, by which several small rivers pass under the mountains southward, and join the Snake river. The mountains of the Chippewyan range are generally barren; but the intervening valleys contain several fertile tracts, which are partly covered with high trees and partly with fine grass.

The country enclosed by the two ranges of the Chippewyan Mountains must have a great elevation, which is proved by the circumstance of the great rapidity of all the rivers which join the principal branches and tributaries of the Columbia river. Their course is in general a succession of rapids and cataracts, which sometimes continue without interruption for 50 80, or even 100 miles. The navigable parts of these rivers are of less extent than those which are quite unfit for navigation. The Long Narrows occur in the Columbia river about 180 miles from its mouth, and occupy 80 miles of its course. They begin with a perpendicular cascade of 20 feet, after which there is a rapid descent for a mile between islands of hard black rocks to another fall of 8 feet, which is divided by two rocks. About 2½ miles below this fall the river expands into a broad basin, from which the water escapes by a chasm only 45 yards wide. Through this narrow passage the whole body of the river swells and boils for some distance in the wildest confusion. Lower down there are several rapids, and the river is again compressed into a channel from 50 to 100 feet wide, which is worn through a rough bed of hard black rock, along which it rushes with great fury, and from which it escapes by the second great fall, over a ledge of rocks 20 feet high, and extending nearly from shore to shore. The river is navigable for large barges up to the Long Narrows, there being no impediment farther down. At Vancouver Fort, more than 100 miles from its mouth, the tide is still perceptible, and vessels of between 200 and 300 tons can ascend to this point.

A country which rises with a steep ascent from the sea more than three thousand feet in a distance of about 300 miles, and of which about one-half is exposed to the influence of the Pacific, must have great differences of climate. We are only imperfectly acquainted with the climate along the coast; but we know that it resembles the western countries of Europe rather than those parts of the United States which are on the Atlantic. The winters are not rigorous nor the summers sultry. There is little snow, and it generally melts while it falls: it rarely remains more than two days on the ground, except on the mountains. The winters are more characterised by rain than cold. From the middle of October to the middle of March the rains are almost incessant, and are accompanied with tremendous thunder and lightning. The winds which prevail at this season are from the south and south-east, and they usually bring rain; while those from the north and north-west bring fair weather and a clear sky. From the middle of March to the middle of October the weather is serene and delightful; only a few showers of rain fall, but in the morning the dews and fogs are very heavy. As to the interior of the country, we only know that the winters are severe, but the quantity of snow is not great; and during the summer there is frequently a want of rain, which is probably the main reason of the sterility of this part of the country.

The interior of the country is inhabited by several Indian tribes, among which the Flat-heads, on Clarke and Columbia rivers, and the Snake Indians, or Shoshonees, on Lewis river, are the most numerous. They have many horses and dogs, and live chiefly on the produce of the chace. They frequently resort to the countries east of the Chippewyan Mountains to hunt the buffalo, which is not found west of the range. The smaller tribes, which inhabit the country along the Pacific, gain their subsistance by fishing. Several kinds of fish abound in the rivers, especially sturgeon, salmon, and a smaller kind of salmon called *uthlecan*. The wild animals are the deer, black and grizzly bear, a species of antelope, the ashata or big-horn, the beaver, the sea and river otter, the musk-rat, fox, and wolf: the puma is sometimes met with. This seems to be the most northern country on the western side of America where the puma is found. On the eastern side of the United States it is met with in the Essex Mountains, in the state of New York.

The *Central Region*, which extends along the coast from the Sound of Juan de Fuca to Behring's Bay, is still less known, with the exception of the coast and the numerous islands which skirt it. Though the Hudson's Bay Company has of late years formed several establishments in the interior, and particularly south of 55° N. lat., we possess little information respecting its natural capabilities. The Chippewyan Mountains continue to form two ranges, about 100 miles from one another. The eastern range, south of 55°, is by far the more elevated, and contains many snow-capped summits, among which Mount Hooper rises to 15,690 feet, and Mount Brown to nearly 16,000 feet. Its general elevation seems to be above the vegetation of trees. It does not appear that there are any deep depressions in this part of the range. No part of the western chain attains the snow line. Between these ranges is the valley of the Upper Columbia river, which finds its way through a deep break in the western range, which it traverses with numerous rapids and cataracts. North of 55° N. lat. both ranges seem to be of nearly equal height, and both of them are in several places covered with perpetual snow. The western range constitutes one uninterrupted mass of mountains, but the eastern is broken by some narrow clefts, through which the rivers carry off the water that is collected in the valleys between the two ranges. Two large rivers, of which the southern is called the Peace river, or Unjigah, and the northern the Southern Branch of the Mackenzie river, or Turnagain, drain the valleys enclosed by the two ranges and their offsets between 55° and 60° N. lat., and after traversing the eastern range by narrow valleys, they enter the great plain east of the Chippewyan Mountains; the Peace river falls into the Slave river, and the Turnagain river into the Mackenzie river. The valleys which are drained by the upper courses of the Columbia, Peace, and Turnagain rivers are probably still more elevated than those of the southern tributaries of the Columbia river. Mackenzie experienced a great degree of cold in June on the Peace river, even at the place where it breaks through the mountain-range. Mountains which rose only 1500 feet above their base were then covered with snow. The valleys contain very little level ground along the watercourses. At a short distance from the banks of the rivers there are high rocks, from the summit of which level plains extend to some distance, but most of these river-basins have a broken surface. The rocky masses advancing in the form of ridges, from both ranges, to the very banks of the rivers, are only furrowed by narrow valleys, in which the rivers run between steep rocks; these valleys are almost entirely covered with wood. In the lower tracts along the rivers there are willows and alders, and on some detached spots there are spruce and white birch. The uplands are principally covered with pines, cypress, spruce, and a few other trees. None of these valleys are inhabited, and only a few natives resort to them in summer and in the earlier part of autumn. They abound in beaver and moose-deer, and in some tracts rein-deer are found. Mackenzie saw a humming-bird on the Peace river, near 54° 30′ N. lat., which appears to be the northern limit of this bird: swans, geese, and ducks are numerous, but fish is not plentiful.

The country which begins at the base of the western range of the Chippewyan Mountains, and extends westward for about 80 miles from the sea, occupying on an average a width of more than 100 miles, may be considered as an uneven plain. Rocky ridges of moderate elevation run through it in every direction, but they are generally at some distance from each other, and the intervening plains are of considerable extent. The surface of these plains, which in many places is level, and in others undulating and hilly, is at a considerable elevation above the sea-level, which is shown by the deep depression of the streams, and by their very rapid course. A considerable portion of this plain is covered with swamps and lakes. The smaller lakes seem to be very numerous, and some of them are of great extent. According to a vague estimate, it is said that perhaps one-fifth of this plain is covered with water. Though the bare rocks often appear on the surface, they do not occupy a large portion of the country, it being generally covered with trees of heavy growth. The climate of this plain seems to be characterised by great humidity. When Mackenzie crossed it in June and July, he had merely two or three days of fine weather in succession, and it sometimes rained several hours for many days together. To this excessive humidity of the atmosphere we may probably ascribe the vigorous vegetation of this country. The forests, which cover nearly the whole region, and consist chiefly of pine, hemlock, cypress, spruce, white birch, and poplar, contain a great number of excellent timber-trees; the underwood, which is dense, consists of many fine shrubs. These forests contain many fur-bearing animals, especially beavers and otters. Several species of deer, with the moose-deer and the ground-hog, are abundant. The natives, who appeared to Mackenzie to enjoy a greater portion of comfort than the tribes east of the Chippewyan range, live in convenient houses, and gain their subsistence mainly by fishing. The rivers abound in several kinds of fish, particularly salmon and trout.

Fraser river runs through nearly six degrees of latitude, and its course is probably 500 miles. It is called by the natives Tacoutche Tesse, at least in the upper part of its course. It rises near the source of Peace river, and runs southward, but towards its mouth it turns west, and falls into the Sound of Juan de Fuca. Though its course is rapid, it is navigable for canoes, except where it is interrupted by cataracts. There are several establishments of the Hudson's Bay Company on its banks.

Along the coast of the Pacific the country is mountainous, and occupies a width probably of 80 miles. Between the mouth of Fraser river and Smith Inlet, a distance of more than 200 miles, it appears to constitute one uninterrupted mass of high mountains, the declivities of which extend to the shores of Queen Charlotte Sound, which separates the large island of Quadra and Vancouver from the continent. Farther north it occurs in more isolated masses, the openings between which are occupied by inlets extending thirty miles into the rocky masses, and by wide valleys, through which the rivers discharge their abundant waters into these inlets. The higher part of these mountain-masses, which generally occurs between 30 and 40 miles from the sea, rises above the snow-line, and in many parts the icy masses which cover the summits form glaciers, which occupy a considerable part of the declivities. Several of these mountains appear to be of volcanic origin, but active volcanoes are not so common as in the region which skirts this coast toward the north. The shores of the Pacific are high, and rise with a steep ascent from 300 to 700 feet, and in many places still higher. At a short distance from the shores the mountains attain a great elevation. The climate along the coast is extremely mild, the rivers not being covered with ice before the middle of January; but it is also very humid, in consequence of the western and south-western winds, which blow from the Pacific nearly all the year round, and, passing over an immense expanse of water, absorb much moisture, which descends in rain when the winds reach the high mountains that extend along the shores. The vegetation is extremely vigorous. The cypress and pine trees, which cover the western declivities of the mountains, attain a greater height and size than in any other countries: some have measured above 30 feet in circumference. The natives of this tract seem to form a numerous tribe, known by the name of the Wakash Indians. Mackenzie found them living in large and commodious houses, and in the enjoyment of many comforts. They live mostly by fishing, as their rivers abound in various kinds of fish, especially salmon, which are taken in weirs constructed with great ingenuity. The sea-otter is very common along the whole of this coast, which has been visited of late years by European vessels for the purpose of procuring the skins, which fetch a high price at Canton.

The islands which skirt this coast partake strongly of the natural features of the adjacent continent. They consist of high mountains, which for the greater part of the year are covered with snow: their shores are rocky and high; and they are only partially covered with forest-trees. The most southern and largest of these islands is that of Quadra and Vancouver, which has an area of more than 13,000 square miles, or about half the area of Ireland. The strait which divides it from the continent varies between two and ten miles in width, and is called Queen Charlotte Sound. On the western side of the island, or rather on an island separated from it by a narrow strait, is Nootka Sound. [NOOTKA SOUND.] The islands which lie farther north along the coast are generally of moderate size. The largest are Aristizabali, Prince Royal, Banks, and Revillagigedo Island. About 50 miles west of Banks Island is Queen Charlotte Island, which has an area of about 10,000 square miles. Farther north is King George III. Archipelago, which comprehends a considerable number of large islands. The largest is Prince of Wales Island, on the western shores of which is Port Bucarelli, a fine and safe harbour surrounded by a range of high mountains, containing seven active volcanoes, from which fire and smoke issue in the midst of eternal ice. The largest of the other islands belonging to this archipelago are Sitka, Duke of York Island, and Admiralty Island. This chain of islands terminates at Cross Sound. North of Cross Sound a very high and lofty range runs along the shores, and its highest summit, Mount Fairweather, attains the elevation of 14,761 feet above the sea-level. This range extends to Behring's Bay. The climate of these islands is still more humid than that of the opposite coast. On the island of Sitka the harbours are open all the year round, though the small creeks which are enclosed by hills are sometimes covered with a thin coat of ice. A little snow falls in January and February, but heavy showers of rain occur daily all the year round. Thunder-storms are rare in summer, but more frequent in winter. In winter the air is so charged with electricity, that for many hours together in the darkest nights a bluish green electrical light is seen on bars of iron which are exposed to the air. The attempts which have been made to cultivate grain have not succeeded. Though maize and wheat grew well at Nootka Sound, they did not ripen. Potatoes and several kinds of vegetables succeed well. The wood which covers the lower declivities of the hills and mountains consists chiefly of different kinds of fir, cypress, and balsam poplar; they are sometimes of great size. Whales, seals, sea-lions, and otters of different kinds abound.

The *Northern Region*, or the large peninsula which stretches between 60° and 70° N. lat. from 130° W. long. between the Pacific and the Polar Sea, and terminates at about 166° W. long. on the shores of Behring's Strait and the sea of Kamtchatka, is the least known portion of the north-western coast of America. It is only the shores and their immediate vicinity which have been visited, and up to the year 1837 a part of the coast along the Polar Sea had never been seen by any European. Not far from Behring's Bay rises the high summit called Mount St. Elias, which is considered to be the highest mountain in North America, being 17,144 feet above the sea-level. It is connected by a lower ridge with the range of Mount Fairweather. At Mount St. Elias the mountain-mass, which so far north lies in a direction nearly due north-west, begins to run to the west, and continues in that direction to the shores of Bristol Bay, where it suddenly grows narrower, and forms the peninsula of Alashka or Aliaska, which is about 360 miles long, with an average width of 20 miles. It is not known to what a distance these mountains extend inland, as they have never been traversed by Europeans. Many of their summits rise above the snow-line, and several of them are active volcanoes, especially on the peninsula of Aliaska. The declivities of the mountains reach the shores of the sea, which are indented by numerous inlets.

The largest of these inlets are Prince William's Sound and Cook's Inlet, which enclose the elevated rocky peninsula of Tchougatchi. At the point where the peninsula of Aliaska is connected with the continent is the island of Kodiak, which is above one hundred miles long, and on an average fifty miles wide; it consists of rocky mountains of moderate elevation, with fine valleys between them. The climate along this coast is as humid and mild as farther to the south-east; snow does not lie long on the ground, and severe cold is not experienced. This is perhaps mainly to be attributed to the high mountains which shelter it from the north and north-east, and to the high ground of the peninsula of Aliaska, which extends west-south-west, and shelters the lower tracts from the north-west winds. Though the rocky coast, where it is exposed to the strong winds from the Pacific, is generally without vegetation, the shores of the inlets and the lower declivities of the surrounding mountains are clothed with fine timber-trees, fir, larch, poplar, silver poplar, alder, and willows. Earthquakes are common on the island of Kodiak and the adjacent coasts, as well as on Aliaska. The sea supplies the principal article of food for the natives; the most common fish are herring, cod, halibut, and salmon. Whales and seals abound. The fur-bearing animals, which have attracted the Russians to this coast, are sea and river otters, several kinds of foxes, among which the black fox is in high esteem, black, brown, and red bears, and several kinds of marmots, besides beavers, rein-deer, gluttons, lynxes, and some smaller animals. In the mountains a kind of wild goat is found.

The peninsula of Aliaska and the chain of volcanic islands which stretch from the extreme western point of the peninsula nearly to the shores of Kamtchatka, separate the sea of Kamtchatka from the Pacific. North of the peninsula is the Bay of Bristol, into which a river falls that brings down the water from the large lake of Shelekow. This lake is said to be nearly one hundred miles long, and about forty wide in the broadest part. In the vicinity of this lake the high mountains seem to terminate, or at least to remain at a great distance from the shores of the sea; for between Bristol Bay and Norton Sound the coast is low and inaccessible, the sea being shallow and the waves breaking upon the land. A considerable river, the Kuskowina, empties itself into the sea between Bristol Bay and Norton Sound; and north of its mouth is the island of Nunniwak, which is above one hundred miles long, and of moderate elevation. On the shores of Norton Sound the country is low, but rises with a gentle ascent towards the interior. Cook found it well wooded in parts; and this seems to be the most northern place on the west side of America where trees attain a considerable size. Farther north the country is low, but in many places intersected with hills of clay, sandstone, and limestone, of moderate height.

The innermost recess however of the deep bay called Kotzebue's Sound appears to reach a country of primitive formation. At the innermost recess of this bay is a hill composed of pure solid ice, about 160 feet high. Over the ice there is a covering of bluish clay, from two to three inches thick, and immediately over that a kind of turf scarcely a foot deep: it is overgrown with most luxuriant grass. The teeth and bones of the fossil elephant are found imbedded in the ice, as in the similar masses of ice which occur in the Polar Sea on the coast of Siberia. The country which surrounds the isolated hills of this region is low and level, and partly covered with swamps, and the shores in many parts are lined with narrow lakes. The soil is either sandy, or composed of an elastic bog earth, on which some small plants and shrubs thrive well near the water-courses; but at no great depth below, the ground is frozen even in the beginning of the autumn. Cape Lisburne is formed by a limestone rock about 850 feet high, and some hills extend from it to Cape Beaufort. Farther on to Icy Cape, and thence to Cape Barrow, the country is low, intersected with small lakes, and covered with swampy moss. The animals which abound in this region are several species of foxes, among which the black fox is abundant, and also several species of *viverræ* and *glires*. The dog is the only domestic animal, and the rein-deer is in a wild state. Otters and some marine animals, which occur farther south, disappear north of the Aleutian Islands, but the common seal is frequent, and the herds of morse in Behring's Strait are countless; their teeth form a considerable branch of trade. These seas contain six species of whales and four species of dolphins. The inhabitants of the shores of the Kamtchatka sea seem to belong to the Esquimaux, and greatly resemble the inhabitants of the north-eastern shores of Asia, the Tschukutskoi; their languages seem also not to differ materially: they live exclusively by fishing.

Point Barrow, the most northern point of America on this side, is a long low spit, composed of gravel and loose sand, which the pressure of the ice has forced up into numerous masses, which at a distance appear like rocks. It projects several miles into the Polar Sea. From this point eastward to the mouth of Mackenzie river the coast declines a little to the south of east. This coast is low, consisting in many places of mud, the surface of which is frozen even in summer; and in other places of mud-banks rising from ten to twenty feet, except towards the mouth of the Mackenzie river, where they attain from sixty to eighty feet. The sea is very shallow, and covered with ice, either in pieces or extending in large unbroken sheets. In many places an open channel lies between the coast-line and the sea, which may be navigated by small boats, but in other parts the heavy ice is closely packed on the shore. The country adjacent to the coast is level and low from Point Barrow to nearly 152° W. long., a distance of more than one hundred miles, and the eye does not meet with a single hill. It appears then that the whole tract between Cape Lisburne and 152° W. long. is an alluvial plain, in which ice is found all the year round at a small depth below the surface. Between 151° and 152° W. long. there is a ridge of hills at no great distance from the shore, called Pelly Mountains. It is not known if these hills form the most western range with which the Chippewyan Mountains terminate, or if they constitute an isolated range. No range of mountains or hills is visible from the shore between 151° and 146° W. lat., a distance of more than one hundred miles. But from 146° W. lat. to the mouth of the Mackenzie river four distinct ridges are seen at a distance of from twelve to thirty miles from the shore. They are probably the northern extremity of the Chippewyan Mountains, and seem to indicate that this mountain-system towards its northern extremity consists of four separate ranges, divided from each other by valleys about twenty or thirty miles wide. The two most western chains, called Romanzow chain and British chain, are covered with snow, even in summer: the two others are free from snow in summer. These chains consist of slate rocks; their summits are round and naked, and between them are narrow valleys which contain grass. No bushes nor even shrubs are met with, and the few families of Esquimaux live on the produce of their fisheries.

The countries described under this head are claimed by three powers, the United States of America, the British, and the Russians. The Americans claim the country traversed by the Columbia river. By the convention with the Russians in 1824, their claims are limited to 54° 40′ N. lat.: but they claim all the country south of that parallel to 42° N. lat. The British however claim part of this coast. The Americans rest their claim partly on the discovery of the mouth of the Columbia river by Gray in 1792, though it appears that it had been visited in 1775 by the Spaniard Eceta, who called it Entrada de Eceta. Lewis and Clarke, two Americans, first crossed the country drained by the southern affluents of the Columbia river, but the principal branch was first visited by the agents of the Hudson's Bay Company. The opposite claims of the two nations are not yet settled. The Americans have formed no permanent settlements, but many of their citizens, who are engaged in the fur-trade, visit the southern affluents of the Columbia, as the most convenient mountain-passes over the Chippewyan range are between the upper branches of the Missouri and Lewis and Clarke rivers, but they complain much of the agents of the Hudson's Bay Company, who have permanent establishments on the Fraser river, and even on the Columbia itself. The British pass the Chippewyan Mountains between the sources of the Peace and Fraser rivers, which are only separated by a portage of 817 yards, according to Mackenzie. The claims of the Russians and the British have been settled by treaties, according to which the whole of the northern peninsula west of 141° W. long. belongs to the Russians, as likewise a tract along the coast as far south as 56° N. lat., and the greater part of the islands forming King George III. Archipelago. The settlements of the Russians are more important than the British. In 1799 a Company was incorporated under the name of the Russian American Company, for the purpose of trading along the north-western coast, and of hunting the fur-bearing animals, especially the sea-otters. Their most northern settlement is at Bristol Bay, at the mouth of a river called Nushagak. The establishment on the island of Kodiak, called Alexandria, is still more important. But the principal settlement is New Arkhangelsk, on the island of Sitka, where a town, with about 1200 inhabitants, has been built on a good harbour. The number of persons who are considered as Russian subjects amounts to more than 10,000, but only about 1500 are Europeans.

(Lewis and Clarke's *Travels to the Source of the Missouri*, &c.; Irving's *Astoria;* Mackenzie's *Voyages through the Continent of North America to the Frozen and Pacific Oceans; Voyages* of Cook, Meares, Portlock, Dixon, and Vancouver; Billing's *Expedition to the Northern Part of Russia*, by Sauer and Saryschew; *Voyage of Discovery to Siberia, the Frozen Ocean*, &c.; Langsdorf's *Voyages and Travels in various parts of the World;* Kotzebue's *Voyage of Discovery into the South Sea*, &c.; Beechey's *Voyage to the Pacific and Behring's Straits;* Franklin's *Second Expedition to the Polar Sea;* Dease and Simpson's *Account of the Recent Arctic Discoveries*, in the 'London Geographical Journal,' vol. viii.)

NORTH, FREDERIC, EARL OF GUILDFORD, better known by the title of *Lord North* (as he did not succeed to the earldom until within two years of his death), was born on the 13th of April, 1733. He was educated first at Eton, and afterwards at Trinity College, Oxford. On leaving the university, he went abroad for three years, and during that time resided successively in Germany, Italy, and France, cultivating the foreign languages. Almost immediately after his return to England, he married, in 1756, Miss Ann Speke, an heiress of an antient Somersetshire family.

In 1763 Lord North was appointed one of the lords of the treasury. Two years after, on the formation of Lord Chatham's (as it was called by Mr. Burke) 'tessellated' ministry, Lord North received the office of joint-paymaster of the forces, his colleague being Mr. George Cooke. In the speech in which Mr. Burke so happily described the general composition of this ministry, he thus specially alludes to the joint appointment of Lord North and Mr. Cooke:—'I venture to say, it did so happen that persons had a single office divided between them, who had never spoke to each other in their lives, until they found themselves, they knew not how, pigging together, heads and points, in the same truckle-bed.' (*Speech on American Taxation.*) Lord Rockingham had previously offered him the chancellorship of the exchequer and the vice-treasurership of Ireland, both of which appointments he had refused. He became chancellor of the exchequer in 1769, and at the same time leader of the House of Commons, on Charles Townshend's unexpected death. This too he at first declined; but he was afterwards prevailed on (we are told) by the princess of Wales and by his father, Lord Guildford, to accept this situation. In 1770, on the duke of Grafton's retirement, he became first lord of the treasury, still holding the chancellorship of the exchequer. George III. felt himself under an obligation to Lord North for extricating him, by the acceptance of the premiership, from the embarrassment which the duke of Grafton's retirement had caused; he warmly expressed his gratitude, became greatly attached to his new prime-minister, and never forgot the obligation, nor ceased to have a regard for him, till the coalition of 1784.

It is an interesting trait recorded by his daughter, Lady Charlotte Lindsay, in her letter appended to Lord Brougham's 'Historical Sketches' (first series), that Lord North would never allow himself to be called prime-minister. 'He never would allow us to call him prime-minister, saying there was no such thing in the British constitution.'

Lord North's ministry lasted from 1770 to 1782. Being defeated on the 22nd February, 1782, in the House of Commons, on the question of the continuance of the American war, he gave way to Lord Rockingham. That war is the chief characteristic of his ministry. There are two different questions to be considered in connection with this war, the question of its justice and the question of its expediency. The ministry and the opposition joined issue on both these questions. The opposition, including, with the exception of Lord North himself, and his supports Thurlow and Wedderburn, nearly all the intellect of the House, Burke, Fox, Dunning, and latterly Pitt (who entered parliament in 1780), contended, first, that the British parliament had no right to tax the American colonies, and therefore that a war in enforcement of British taxation was unjust; and secondly, that even if parliament had the right, it was inexpedient to enforce the right by war. Lord North maintained both the justice and the expediency of the war. But every year introduced of course new elements into the question of expediency; and it is now understood that Lord North himself disapproved of the continuance of the war for at least three years before his resignation in 1782, but that he persevered in its defence only in deference to the wishes of George III. Lady Charlotte Lindsay, in the letter already quoted, says, 'Although I do not believe that my father ever entertained any doubt as to the justice of the American war, yet I am sure that he wished to have made peace three years before its termination.' This statement is not inconsistent with the fact that Lord North, in the very last speech that he ever made, defended the American war; and this circumstance again renders it improbable that he should ever have thought or admitted it to be unjust, as has sometimes been supposed.

The following remarks show the nature of George the Third's opposition to Lord North's retirement, and convey a just censure on the conduct of Lord North:—'He was long resolved to quit the helm, because George III. insisted on a wrong course being steered—that helm which he ought to have quitted as soon as his mind was made up to differ with the owner of the vessel, unless he were permitted to follow his own course, and he was only kept at his post by constant entreaties, by monthly expostulations, by the most vehement protestations of the misguided prince against a proceeding which must leave him helpless in the hands of his implacable enemies, and even by promises always renewed to let him go, would he but remain for a few weeks, until some other arrangement could be made. It is fit that this certain and important fact should be stated, and we have before us the proofs of it under the hand of the royal suitor to his reluctant servant's grace and favour, whose apparently fixed purpose of retirement he uses all these expedients to defeat, or at least to obstruct and retard, if he cannot frustrate.' (*Historical Sketches of the Statesmen of George III.*, 1st series, p. 59.)

It was at the time the general opinion that Lord Bute retained his early influence with George III., and that Lord

North, nominally prime-minister, was but a puppet in his hands. [Bute, Lord.] This opinion, which contributed greatly to the general unpopularity of Lord North's administration, has been shown by Lord Brougham to be entirely erroneous. (*Historical Sketches; Edinburgh Review* for October, 1839.)

The Rockingham ministry, which succeeded Lord North's, was soon followed by an administration under Lord Shelburne, in which Mr. Pitt was chancellor of the exchequer, and which placed Lord North by the side of his former adversary, Mr. Fox, in opposition. In a short time arose the well-known and much-abused coalition. [Fox.] In April, 1783, a ministry was formed by the duke of Portland, in which Lord North and Fox were appointed secretaries of state. This ministry ended its career in December of the same year. The universal unpopularity of the coalition, and the king's unconstitutional opposition to Mr. Fox's India Bill, killed it. We are informed by Lady Charlotte Lindsay that the coalition was principally brought about by the agency of Lord North's eldest son, and of Mr. Eden, afterwards Lord Auckland. In reply to the abuse which has been heaped upon this coalition, it may be observed, that because statesmen have once differed, they are not to be precluded from afterwards combining, when the questions on which they have differed are set at rest, and others have arisen in which they conscientiously agree; but it is not to be denied that this league, formed against the peace which Lord Shelburne had obtained, was hated by the whole country, and deeply injured the character of the parties. [Fox.]

When Lord North retired from the premiership in 1782, he had been appointed lord-warden of the Cinque Ports. He succeeded to the title of earl of Guildford and to the family estates in 1790. Two years after, he died, in the sixtieth year of his age. In the last five years of his life he was afflicted with blindness. 'Lord North, when he was out of office,' says his daughter, 'had no private secretary. Even after he became blind, his daughters, particularly the two elder, read to him by turns, wrote his letters, led him in his walks, and were his constant companions.'

Lord North was not a statesman of first-rate powers, but yet of more than respectable ability. His administration of the finances, in his character of chancellor of the exchequer, was generally approved of. And again, though he cannot lay claim to the title of a brilliant orator, he was a good speaker. He spoke clearly, sensibly, with much wit, and with an uniformly good humour, which made him the great favourite of the House.

The following are interesting passages of Lady Charlotte Lindsay's letter. After describing her father's social qualities, she observes, 'Yet I think that he had really more enjoyment when he went into the country on a Saturday and Sunday, with only his own family or one or two intimate friends: he then entered into all the jokes and fun of his children, was the companion and intimate friend of his elder sons and daughters, and the merry entertaining playfellow of his little girl, who was five years younger than any of the others. To his servants he was a most kind and indulgent master. If provoked by stupidity or impertinence, a few hasty impatient words would escape him, but I never saw him really *out of humour*. He had a drunken stupid groom, who used to provoke him, and who, from this uncommon circumstance, was called by the children "the man that puts papa in a passion;" and I think he continued all his life putting papa in a passion, and being forgiven, for I believe he died in his service.' And again: 'Lord North was a truly pious Christian; and although (from his political view of the subject) I believe that one of the last speeches he made in parliament was against the repeal of the Test Act, yet his religion was quite free from bigotry or intolerance, and consisted more in the beautiful spirit of Christian benevolence than in outward and formal observances. His character in private life was, I believe, as faultless as that of any human being can be; and those actions of his public life which appear to have been the most questionable proceeded, I am entirely convinced, from what I must own was a weakness, though not an unamiable one, and which followed him through his life—the want of power to resist the influence of those he loved.'

NORTHALLERTON. [Yorkshire.]

NORTHAMPTON. [Northamptonshire.]

NORTHAMPTONSHIRE, an inland county of England, is bounded on the north by Lincolnshire, on the north-west by Rutlandshire and Leicestershire, on the west by Warwickshire, on the south-west and south by Oxfordshire, on the south-east by Buckinghamshire and Bedfordshire, and on the east by Huntingdonshire and Cambridgeshire. Its form is very irregular; its greatest length is, from north-east to south-west, from the neighbourhood of Peterborough to that of Brackley, 68 or 69 miles; and its greatest breadth, from the neighbourhood of Daventry to Stoney Stratford, 27 miles. Its area is estimated at 1016 square miles. The population in 1821 was 162,483; in 1831, 179,336; showing an increase in ten years of 16,853, or 10 per cent., and giving 177 inhabitants to a square mile. In size it is the twenty-second of the English counties; in amount of population the twenty-seventh; and in density of population the twenty-ninth. Northampton, the county town, is on the Nene, 61 miles in a direct line north-north-west of London, or 67 miles by the mail-road through St. Alban's, Dunstable, Woburn, and Newport Pagnel.

Surface and Geological Character.—The surface of the county is undulating; the hills do not rise to a great height, but present gentle declivities separated by intervening vales watered by rivulets and rivers, and so irregularly grouped as not to admit of description. The highest land is about Daventry, where Arbury Hill rises to the height of 804 feet above the level of the sea. This and the neighbouring hills have the general appearance of a group of rounded conical knolls, and constitute by far the most varied and picturesque scenery in this part of the county. The north-eastern extremity of the county, near Peterborough, subsides into the great fen district.

The eastern border of the county, comprising the heights east of the valley of the Nene, adjacent to Huntingdonshire and Bedfordshire, is occupied by the Oxford clay, which forms the separation between the middle and lower divisions of the oolitic series. The northern part of the county; the central parts, as far west as the hills which overlook the valley of the Welland by Harringworth Park and Rockingham, and as far to the south-west as the high road to Nottingham, through Higham Ferrers, Kettering, and Rockingham; the south-eastern border, from Higham Ferrers to Towcester and Brackley; and some projecting or insulated portions beyond these limits, are occupied by the uppermost formations of the lowest division of oolites. At Collyweston and Easton, near the Welland, the slaty beds of the forest-marble are quarried for roofing-slates. They imbibe more water and retain it longer than the Westmoreland slates, but neither imbibe so much nor retain it so long as tiles do On the slope of the hills on the right bank of the Nene, at Raunds and Stanwick, near Higham Ferrers, beds resembling forest-marble are worked for ornamental purposes; these beds yield a shelly stone of a blue colour, sufficiently compact to take a tolerable polish. The principal bed of this division of the oolitic series is the great oolite. Nearly all the rest of the central part of the county is occupied by the lowermost members of the oolitic series, which extend in some places to the western borders. The predominant beds are of red or rather reddish-brown ferruginous sands, intermixed with calcareous sandstone, which is quarried in some places, though it affords but an indifferent and unsightly material for architectural purposes. The western border of the county and one or two valleys penetrating into the interior are occupied by the lias. Limestone is got in great plenty in almost all parts of the county; the principal lime-works are at Duston and Kingsthorpe, near Northampton. Good clay for making bricks and tiles is found in various places.

Hydrography and Communications.—The greater part of the county belongs to the basin of the Nene, which is the principal river in it. A small portion of the north and north-west borders belongs to the basin of the Welland; another small portion on the west side, to the basin of the Severn; and the southern extremity of the county, to the basins of the Ouse and the Thames.

The Nene is formed by the confluence of two principal streams. One of these rises near Arbury Hill, 2 miles south-west of Daventry, and flows eastward to Northampton, where it is joined by the other principal stream, 'the northern water,' from the village of Naseby. At Northampton the Nene becomes navigable and flows north-east through the county by or near Wellingborough, Higham Ferrers, Thrapston, and Oundle; below Oundle it reaches the border of the county, which it separates for some distance from Huntingdonshire. At Peterborough the navigable channel of the

Nene leaves the county altogether, but the Muscal river, or Catswater drain, which is an antient channel or arm of the river, follows the border some miles farther, till it unites with an arm of the Welland from near Croyland. The length of the Nene in this county or on the border is about 60 miles; that of the Catswater drain about 8 miles. Its principal tributaries are the Ise (24 miles long), which passes near Rothwell and Kettering, and joins the Nene near Wellingborough; and the Harper's Brook (15 miles long), and the Willow Brook (15 miles long), which rise in Rockingham Forest, in the north-west part of the county. These tributaries are not navigable.

The Welland rises at Sibbertoft in this county, 4 or 5 miles south-west of Market Harborough, and flows to the border of the county, which it separates successively from Leicestershire, Rutlandshire, and Lincolnshire. It passes near Rockingham in Northamptonshire, Market Harborough in Leicestershire, and Stamford and Deeping in Lincolnshire. Between Deeping and Croyland it quits the county. Just beyond the border of Northamptonshire there is a channel from the Welland which unites with the Catswater drain. That part of the course of the Welland which belongs to Northamptonshire may be estimated at 48 or 50 miles. The navigation commences at Stamford, from which town there is a navigable cut to Deeping. The Welland has no Northamptonshire tributaries of any moment; its principal feeders are from the other counties, which have been mentioned.

The streams belonging to the basin of the Severn are the Avon, which rises near Naseby, and has the upper part of its course in this county; and the Leam, which has a few miles of the upper part of its course on the border. The streams belonging to the basin of the Ouse are, the Ouse itself, which rises in the county near Brackley, and has part of its course on the border; and the Tow, which rises in the neighbourhood of Sulgrave, near the border of the county, west of Towcester. The streams belonging to the basin of the Thames are the Cherwell or Charwell, which rises at Charwellton, 5 miles south-west of Daventry, and some of its tributaries. All these streams are small in that part of their course which belongs to Northamptonshire.

The Carlisle and Manchester and the Halifax mail-coach road enters the county a few miles beyond Newport Pagnel, Bucks, and passes through Northampton to Market Harborough in Leicestershire. The Leeds mail-road enters the county near Souldrop in Bedfordshire, about 10 miles beyond Bedford, and passes through Higham Ferrers, Kettering, and Rockingham.

The Carlisle and Wetherby and the Edinburgh and York mail-road crosses the northern part of the county between Stilton in Huntingdonshire, and Stamford in Lincolnshire; and the Hull and Lincoln and the Louth and Boston mail-road, which branches off from that just mentioned at Norman Cross in Huntingdonshire, passes through Peterborough to Deeping.

The Grand Junction Canal enters the county near Stoney Stratford, and runs north-west, passing between Northampton and Daventry, until it joins the Oxford canal, two or three small detached portions of which are within this county. One of the summit-levels of the Grand Junction Canal is at Braunston, just within the western boundary of this county; and there are two tunnels, one at Braunston, 2045 yards long, and the other at Blisworth, between Towcester and Northampton, 3080 yards long. There is a navigable cut from near Stoney Stratford to Buckingham, the greater part of which is within this county; there is also a double railroad to Northampton.

The Grand Union Canal unites with the Grand Junction Canal at Long Buckby, not far from the Braunston tunnel; and with the Leicester Union Canal at Foxton, near Market Harborough. There is one tunnel in that part of the canal which is in this county: it is at Crick between Northampton and Lutterworth.

The London and Birmingham Railway crosses this county, following the line of the Grand Junction and Grand Union canals. The Woolverton station is just on the border of the county; and the Blisworth, Weedon, and Crick stations are within it. At Crick the railroad leaves the line of the Grand Union Canal and turns off to the left to Rugby in Warwickshire. A branch railroad from the London and Birmingham, by Northampton and Market Harborough to Leicester, has been proposed; and the projected Great Northern Railway (for part of which line, viz. from London to Cambridge, an act has been obtained) was designed to pass through the north-eastern extremity of the county from Peterborough to Deeping.

Agriculture.—The county of Northampton has many advantages in point of climate and soil, and has for a long time been comparatively well cultivated and productive. The soil is generally adapted to produce both corn and pasture of a superior quality. A small proportion only of the surface is poor from the thin staple of the soil or from a cold impervious subsoil; leaving out the natural woods, which are considerable, that which remains unproductive for want of cultivation is trifling, and could easily be improved. The climate is mild and healthy. The subsoil, being mostly rocky, allows all superfluous water to run down through it; and where a stratum of clay intervenes, the inequality of the surface allows a ready discharge of the water. The surface of the county, except a portion of low flat land north of Peterborough, may be, on an average, about 300 feet above the level of the sea; the greatest height does not exceed 500 feet, if we except the summits of some hills about Daventry, which may rise to the height of 800 feet above the sea.

The following elevations are from actual survey:—

	Elevation in feet.
River Ouse near Stoney Stratford	200
River Nen above Northampton	195
Grand Junction Canal at Blisworth and Weedon	315
Grand Junction Canal at Braunston tunnel	375
Buckley road, half a mile from Daventry	430
The summit of the hills around Daventry, supposed the highest points in the county	800

Owing to its inland situation and the absence of lofty hills, this county is not so subject to heavy and continued rains as those which lie farther west. The surface is pleasingly diversified by gentle swells and depressions interspersed with woods and plantations.

The richest soil in the county is perhaps the black mould of the fens, when they have been drained and cultivated; but the most desirable for the farmer is the brown crumbling loam of the uplands. Where this is of a sufficient depth, it will produce, with little trouble, abundant crops of wheat, beans, barley, and oats, and it is peculiarly adapted to turnips and all green crops. On such land the farmer will certainly thrive, if he does not neglect his business. The pastures are both rich and sound, and the cattle grazed in them in summer repay the capital laid out on them with good interest; while those which are kept on turnips in the yard, to be turned out in summer, or are stall-fed to bring them to a marketable state, convert the straw, which is everywhere abundant, into rich manure. These remarks indeed are only applicable to a very good soil, but they apply particularly to that hazel loam which is neither light nor heavy, which does not bake hard in drying, and although consisting chiefly of minute particles of clay, lime, and sand, does not retain too much water.

There is a considerable portion of limestone rock in the county, but there is no appearance of chalk. The calcareous portion of the soil, which, in some rich land hastily analyzed, was found to be from 10 to 15 per cent., is in a very divided state, and must greatly influence the fertility. The heavier kinds of soil, which are more retentive of water, are found to produce excellent pasture, and are accordingly left in grass, as the most profitable for the farmer, if he is well skilled in selecting cattle to graze, and has a sufficient capital. For although more food might be produced from the land by tillage, and more hands usefully employed and fed, it is very doubtful whether the farmer would be so well remunerated for his risk, trouble, and outlay, as he is by grazing cattle. As long as the price of meat is high in comparison with that of grain, which has been the case for many years past, the grazing of the rich lands of Northamptonshire, Leicestershire, and Lincolnshire will always produce the greatest rent and profit.

The implements in use in this county have been much improved of late years. The old clumsy plough, with or without wheels, which was the only one known a century ago in the midland counties, is now replaced by a neater instrument, the principal parts of which are of iron. The Rutland plough with two unequal wheels attached to the beam, one to run in the furrow last made, and the other on the unploughed surface, is in general use. It is a plough easily held, and from some experiments lately made with great care by Mr. Handley, M.P. for Lincolnshire, it appears to be of less draught than the common swing-plough without wheels. Three horses and a driver are used even in very friable soils, and a Norfolk team of two horses abreast driven by reins in the plough is a rarity in the county.

The harrows, scarifiers, rollers, carts, and waggons have nothing peculiar in them. There are some threshing-machines on large farms, but the flail is still the principal instrument in use.

The old course of husbandry was the triennial; a clean fallow, wheat, beans, and oats on the best heavy soils, and wheat, peas, and barley on the lighter. The introduction of turnips and clover has changed the system, and greatly improved the produce. But where turnips are not suited to the soil, from its compact nature, the clean fallow, at least every fourth year, is still retained. On some lands barley or oats are sown after wheat. In the improved rotations the land is frequently left three years in grass, and then ploughed up again, which brings it to the convertible system generally adopted in the north. The most common error is that of cropping the land too often after it is broken up from grass, and reducing it to too low a state before it is recruited with manure or improved by pasturage. This error is not so injurious on very rich soils, but when the soil is of inferior quality it destroys all the advantage gained by several years' lying in grass. There is a great difference between natural inherent fertility, such as that of rich loams and alluvial deposits, and that which is produced by manuring and pasturage. The first will bear much ill usage, but the latter will not.

The permanent pastures are very good in most parts of Northamptonshire, and few landlords would permit a tenant to plough up any part of them. The extent of meadow-land of this description is reckoned in the Agricultural Report at 40,000 acres; if to this be added all that has been laid down since and the artificial grasses raised on arable land, we shall find that 80,000 acres at least are devoted to feed cattle, without reckoning the clover and other artificial grasses mown for hay.

In all old pastures, ant-hills are a great nuisance: when greatly multiplied the grass on them is of no value and they take up much ground. The best mode of getting rid of them is to open them when frosty weather sets in, by cutting them in the form of a cross by a sharp-edged spade, the four angular pieces thus cut are separated from the ant-hill by the spade and turned back on the adjoining grass. The earth, with all the ants and their eggs, is then dug out and spread over the ground, the grass pared off is replaced, and if this be done in rainy weather before a frost, no ants will appear in the spot thus treated, and the whole pasture may in this manner be restored to a level and equal turf.

The fattening of cattle is a principal object of the Northamptonshire farmer. Some breed their own bullocks, but this is only when they have some improved breed of their own. Earl Spencer, the Marquis of Exeter, and many others are great breeders, and find breeding as profitable as fattening; but the majority of farmers, who have not the same advantage, prefer buying cattle reared on less valuable land, justly thinking that an animal reared on poor land and in a severer climate will thrive better and improve faster than one bred in a mild climate and a rich pasture. Hence they buy Scotch and Welsh cattle in autumn, turn them into the pastures to eat the coarse grass remaining after the fat beasts are sent to market during the winter, and finish them on grass next summer. These animals improve greatly, and if they do not come to a large size, they give at least a very good profit. Some few farmers feed the Scotch cattle during the winter on turnips; but generally those who can spare turnips for this purpose buy a larger sort of cattle in the autumn. Many Hereford long-horns and Durham short-horns are bought in spring, carried on at grass till near winter, and then finished with turnips, oil-cake, and chopped straw. They make much and rich manure; and if they pay for the food which they have consumed, the farmer is satisfied. Any profit in addition to the manure is so much clear gain. The short-horn breed has of late become a favourite stock, and has almost superseded the once famous long-horns, chiefly from the example of Earl Spencer and the Marquis of Exeter, whose breeds of short-horns cannot be surpassed. At the Oxford agricultural meeting in 1839 Lord Spencer accepted a challenge which was offered by a well known Sussex breeder, who proposed to show 100 head of Suffolk beasts against the same number of any breed. The judges, having inspected both stocks, had no hesitation in giving their award in favour of Lord Spencer's short-horns, although one of the judges was from Sussex In fact the improved short-horn breed unites as many good qualities as can well be found in any other breed; the Hereford disputes the prize of aptitude to fatten, but the Hereford cow gives so small a quantity of milk, that all the farmers in Northamptonshire who breed cattle prefer the short-horned breed. It is yet very doubtful whether the small Scotch Highland cattle do not pay fully as well for their pasture and stall-feeding as either the Hereford long-horns or short-horns, at least on land of an average quality.

The breed of sheep most common in the rich pastures of Northamptonshire is the improved Leicester: and since long wool has been in request, and sells dearer, in proportion to the weight of the fleeces, than the finest short wool, scarcely any other breeds are in repute. The South-downs, on account of the flavour of their flesh, may dispute the pre-eminence with the Leicester breed, but no other sheep can enter into competition with the latter. Some very fine flocks of breeding ewes are kept in the county, and rams are bought, or hired for the season at very high prices, from those whose chief business is to rear the best.

There are many considerable estates in Northamptonshire, but the farms are in general not very large. They are usually let from year to year, with the understanding that the tenant shall not be removed as long as he pays a fair rent and cultivates the land properly. This is very well on estates which are in settlement, but where they are liable to be sold, the tenant has no great security, and will not lay out much capital in useful improvements, of which he may not reap the benefit.

More leases have been granted of late years, and a more improved state of cultivation has been the consequence. The farm-buildings were described by Mr. Donaldson and Mr. Pitt, in their Surveys, as by no means worthy of the fruitfulness of the soil, being inconvenient both as to architecture and situation. In this respect there is now a manifest improvement. Many excellent farm-buildings and houses have been erected; and the respectability of the tenants has increased in proportion. The very large barns formerly thought indispensable to house the crop in are now much reduced. The corn is stacked in the open air, and better preserved by a covering of thatch. Frames of wood on stone or iron pillars receive the corn, which is laid with the ears inward, and forms a round or square stack ending in a cone or pyramid, which is covered with straw and well thatched. It is thus safe from vermin, and the air circulating around and through it, the grain when thrashed comes out hard and dry.

Gardens and orchards are not a remarkable feature in this county. Little or no cyder is made, barley supplying the favourite beverage. The woods are extensive, and many plantations have been made in the neighbourhood of the numerous residences of the nobility and gentry. The most considerable forest is that of Rockingham, part of which has been converted into farms from time to time. These woods have been much neglected till lately, and might have been made far more productive than they have been. The pasturage of deer and cattle, and the customary rights which existed from time immemorial, have prevented the increase of timber. The navigation of the Grand Junction Canal, which brings coals to different parts of the county, has much lowered the price of underwood for fuel; and the fall in the price of oak timber since the peace has likewise diminished the value of woods.

The following are the principal fairs held in Northamptonshire:—Broughton Green, June 24, 25, 26, general fair; Brockley, Wednesday after February 25, April 24, Wednesday after June 22, December 11, horses, cows, sheep; Brigstock, April 25, September 4, cattle; Brixworth, Whit Monday; Daventry, Easter Tuesday, June 7, August 3, October 2 and 27; Fotheringay, third Monday after July 6; Higham Ferrers, March 7, June 28, Thursday before August 5, October 11, December 6; Kettering, Thursday before Easter, Friday before Whit Sunday, Thursday before October 11, Thursday before December 21; Northampton, February 20, April 5, May 4, June 19, August 5, 26, November 28, December 19, cattle; Oundle, February 25, Whit Monday, August 21, October 12; Peterborough, July 10, October 2, horses; Rockingham, September 25, cattle, horses; Rothwell, Trinity Monday, lasts a week; Towcester, May 12, October 29, cattle; Wellingborough, Easter Wednesday, Whit Wednesday, cattle, October 29, cattle and cheese; Yardley, Whit Tuesday, horned cattle.

Divisions, Towns, &c.—The county of Northampton, at the time of the Domesday survey, contained thirty hundreds; but the number has been reduced. There are now only twenty hundreds, the names of which, with their situation in the county, their respective areas, and their population in 1831, are as follows —

Hundred.	Situation.	Acres.	Pop. 1831.
Chipping Warden . .	W.	21,370	4,697
Cleley	S.E.	26,620	7,413
Corby . . .	N.W.	59,400	10,434
Fawsley . . .	W.	49,190	14,157
Greens Norton . .	S.E.	22,080	5,333
Guilsborough . .	W.	43,260	9,719
Hamfordshoe . .	Central	16,530	8,178
Higham Ferrers . .	E.	30,430	8,236
Huxloe . . .	Central	41,790	12,837
King Sutton . .	S.	48,250	12,435
Nasaburgh (or Peterboro' Liberty) . . .	N	52,860	15,624
Navisford . . .	E.	13,090	2,735
Nobottle Grove . .	Central	34,160	8,726
Orlingbury . . .	Central	29,600	5,694
Polebrook . . .	E.	19,840	4,537
Rothwell . . .	N.W.	42.640	7,860
Spolhoe . . .	Central	19,170	21,201
Towcester . . .	Central	12,980	4,873
Willy Brook . . .	N.	27,490	5,790
Wymersley . .	E	36,060	8,857
		646,810	179,336

There are in the county, the county and market town and borough of Northampton; the city of Peterborough; the borough and market towns of Brackley and Higham Ferrers; and the market towns of Daventry, Kettering, Oundle, Thrapston, Towcester, and Wellingborough. Kingscliffe, Rockingham, Rothwell, and Weldon formerly had markets. Brackley (pop. 2107) and Peterborough (pop. 5553) are described elsewhere. [BRACKLEY; PETERBOROUGH.]

The county-town, Northampton, is locally in the hundred of Spolhoe, on the north bank of the Nene, 67 miles from London. Its origin is unknown. In the peace between Alfred and the Danes it is likely that Northampton was included in the Danish territory, and was one of the burghs, or a dependency of one of the burghs, which they formed in Mercia. In A.D. 918 or 919, and again in 921, the Danes of Northampton (or simply Hampton, Hamtonia, as Henry of Huntingdon calls it, though Florence of Worcester calls it Northamtun) with their earls Thurferth and Thurkytel, submitted to Edward the Elder. In the reign of Ethelred II. Northampton was nearly ruined by the Danes (A.D. 1010), and about the close of the reign of Edward the Confessor it suffered from the Northumbrian army under Morcar, or from the king's troops under Harold, which in consequence of civil dissensions met here. After the conquest, Simon de St. Liz, on whom the Conqueror conferred the earldom of Northampton, built a castle here: and in the following reigns several ecclesiastical councils and parliaments were held in this town. In the reigns of Richard I., John, and Henry III., there was a mint at Northampton. In the reign of Henry II. (about A.D. 1174), the townsmen, who sided with the king against his children, were, with the royal troops, defeated by Anketil Mallore, a supporter of the young princes. In the civil wars of John, Northampton castle was held for the king, and besieged in vain by the barons (A.D. 1215). Toward the close of the king's reign the castle was given to Fulke de Brent, and in a conflict between his soldiers and the townsmen a considerable part of the town was burnt. In the troubles of the close of the reign of Henry III., Northampton, held by the barons, was taken by the king (A.D. 1264). In 1265 Northampton was taken by the barons, but recovered by the king's party. In the commencement of the war of the Roses, a great battle was fought near the town (10th July, 1460), in which the Lancastrians were defeated by the earl of March (afterwards Edward IV.) and the earl of Warwick. The king, Henry VI., was taken; and the queen and the young prince of Wales escaped with difficulty. In the civil war of Charles I., Northampton was taken by Lord Brooke and fortified for the parliament. In 1675 the town was nearly consumed by a fire.

The borough boundaries enclose an area of 1520 acres divided among the four parishes of All Saints (pop. 7333), St. Giles (pop. 3025), St. Peter (706), and St. Sepulchre (4287). The borough limits extend beyond the town, and include a considerable quantity of agricultural land on the north and east. The town is pleasantly situated on a slope rising from the north bank of the Nene, over the two branches of which, within the limits of the borough, are three bridges. It consists of several streets irregularly laid out: the two principal lines of street, of which one is along the Carlisle and Manchester mail-road, intersect at right angles. One of the bridges over the Nene, a handsome stone bridge of three arches, is at the south end of that street which runs along the Carlisle road, and at the entrance of the town from London. One of the other bridges is over the Northern water, at the western end of the other principal line of street. The houses are well built, chiefly of stone; and the streets are paved, and lighted with gas. The market-place is a large open area in the centre of the town. Among the principal edifices are the shire-hall, a spacious building of elegant Grecian architecture; the county gaol; the town-hall, an antient building; the borough gaol; the theatre, a building erected early in the present century; the barracks; and the infirmary, a handsome building on the east side of the town, erected and fitted up in 1793. All Saints church is in the centre of the town, at the intersection of the principal streets; it was erected after the great fire of 1675: it is a plain building of incongruous architecture, having in the centre a cupola supported on four Ionic columns. At the west end is the original embattled tower, which escaped the fire. St. Giles's Church, near the east end of the town, is a large cross church with portions of various styles. The western doorway is Norman; part of the chancel is early English, of very good composition; the east window is of decorated English; and several of the other windows are of perpendicular character. St. Peter's, near the West bridge, is a remarkably fine and curious specimen of enriched Norman. It consists of a nave with side aisles, separated from it by piers and arches; with a square western tower. The capitals of the piers in the nave are elaborately carved, and the arches have zigzag indentations running round them. [NORMAN ARCHITECTURE.] Three of the piers have diamond shaped or spiral mouldings. The tower has some curious Norman ornaments on the outside, and opens into the nave by an arch richly ornamented with zigzag mouldings. This tower has some singular buttresses, apparently added when the belfry story, which is of later date, was built. There is a small arched crypt continued east of the present chancel, which has been probably shortened. St. Sepulchre's is on the north side of the town: it was built probably about the beginning of the twelfth century, and is one of the few round churches: it has eight circular piers with Norman capitals, and plain pointed arches: there is a chancel with a north and south aisle on the east side of the round part, and a good tower and spire of perpendicular character on the west side. There are several dissenting meeting-houses; among them is the Castle Hill meeting, which contains a mural tablet to the memory of Dr. Doddridge, who exercised his ministry and conducted an academy for the education of ministers in this town for more than twenty years. Northampton had once seven churches: two have quite disappeared; a part of the third, St. Gregory's, near St. Peter's, is used as a school-house. Of the several religious houses which existed before the Reformation, the hospitals of St. Thomas and St. John yet remain. That of St. John, for infirm poor persons, consists of a chapel and a large hall, with apartments for the inmates; that of St. Thomas is for twenty poor alms-women: both these buildings have portions of early English, decorated English, and perpendicular character. Of the castle, which was near the West bridge, there are only the earth-works; and of the town walls there are no traces.

The principal branch of trade carried on in the town is boot and shoe making, in which upwards of 1300 men are employed. The articles are sent to London and other parts of England, or are exported. Considerable business is done in currying leather; some stockings and lace are made, but the lace-making has much declined since the introduction of machinery. There are three iron-foundries. The trade of the town is facilitated by the navigation of the Nene, and by the double railroad communicating with the Grand Junction Canal. The principal market-day is Saturday; it is a large cattle-market; there are two subordinate markets in the week; there are eight yearly fairs, three of them large horse-fairs, three others for live-stock, another for general merchandise, and another for sheep and cheese.

The assizes for the county are held here, also the quarter-sessions for the division, and the court of election for members of parliament for the southern division of the county. There are races in spring and autumn, held on a course to the north of the town. Northampton is a borough by prescription; it is mentioned as a borough in Domesday Book. The governing charter is of 36 Geo. III. By the Municipal Reform Act the borough has been divided into three wards, and has six aldermen and eighteen councillors. The revenue of the corporation arising from lands, tolls, &c. is nearly 1500*l.* per annum. There are quarter-sessions for the borough held regularly; and a Court of Record for civil suits, little used; the expenses of the police and the administration of justice are defrayed by a town-rate. There are numerous charities.

The livings of All Saints, St. Giles, and St. Sepulchre are vicarages, of the clear yearly value of 350*l.*, 111*l.* (with a glebe-house), and 149*l.* (with a glebe-house), respectively; that of St. Peter is a rectory united with the perpetual curacies of Kingsthorpe and Upton, of the clear yearly value of 860*l.*, with a glebe-house.

There were in the borough, in 1833, two infant-schools, with 232 children; six dame-schools, with 108 children; four endowed schools, with about 170 children; a central national day and Sunday school for the county, with 372 children in the week and 987 on Sunday; a Lancasterian school, with 508 children: twenty-seven other day-schools, with 629 children; one day and boarding school, with 29 children; and thirteen Sunday-schools, with 2180 children. Three of the endowed schools are for boys and one for girls; the boys are clothed as well as educated; the girls are entirely supported.

Higham Ferrers is in the hundred of Higham Ferrers, 65 miles from London. The area of the parish is 2260 acres; the population in 1831 was 965, more than a fourth part agricultural. The town stands on a rocky eminence half a mile from the eastern bank of the Nene, and consists chiefly of one long street running north and south. Its elevated site renders it clean and healthy; but the houses are generally poor, and the streets are not lighted. It has a large and curious church, formerly collegiate, having two naves of equal height, with small clerestory windows in each of the outer sides, and a north and south aisle, thus presenting three rows of piers and arches, and four spaces. Some of these piers and part of the tower are of early English character, but most of the church is of later date. Some of the windows are of decorated English character and good design; others are of perpendicular character. The western entrance is much enriched with sculpture; and the church contains an antient font, some good wooden screen and stall work, and some painted glass. The upper part of the tower is of later date and is surmounted with a crocketed octagonal spire. Near the church are a grammar-school (a fine stone building), and a bead-house or alms-house, founded by Archbishop Chicheley, which has some portions of good perpendicular character, but much mutilated. There are also some remains of the antient college, a portion of which has been converted into a dwelling-house. There is a town-hall of modern erection. The principal business of the place is shoe-making; the making of lace, which formerly was much followed, has declined since the introduction of machinery into that manufacture. There are seven yearly cattle-fairs.

The town was incorporated in the reign of Philip and Mary: the borough is not quite co-extensive with the parish. The municipal officers are a mayor, seven aldermen, thirteen capital burgesses, a recorder, &c.; this corporation was left untouched by the Municipal Reform Act. The borough returned one member to parliament from its first incorporation, until the passing of the Reform Act, by which it was disfranchised. The living is a vicarage, united with the chapelry of Chelveston and Caldecott, of the clear yearly value of 245*l.*, with a glebe-house. There is a Wesleyan Methodist chapel. There were, in 1833, six dame-schools, with 37 children; the endowed grammar-school, with 57 children; one other day-school, with 26 children; and two Sunday-schools, with 246 children.

Daventry is in the hundred of Fawsley, 72 miles from London. The area of the parish (including the hamlet of Drayton) is 4090 acres; the population, in 1831, was 3646, a very small portion agricultural. This town probably rose from the decay of the neighbouring British and Roman stations of Bennavenna and Isanavatia. During the civil war of Charles I. the neighbourhood of the town was the scene of some skirmishes. In 1660, General Lambert, who had collected a force at Daventry, to oppose the designs of General Monk for the restoration of the king, was taken prisoner near the town by Colonel Inguldsby.

The town is on an eminence, and consists of two principal streets and some smaller ones, partially paved and lighted; the houses are generally neat and well built. The church is a modern building, consisting of nave, side aisles, and chancel. There are meeting-houses for the Independents and Wesleyan Methodists. The town has no manufacture, except that of whips. There is a market on Wednesday, and there are nine annual fairs, chiefly for cattle and horses. The Dissenting Academy at Northampton was removed to Daventry on the decease of Dr. Doddridge, A.D. 1752 [DODDRIDGE, PHILIP], and continued there under the charge successively of Dr. Ashworth, Mr. Robins, and Mr. Belsham, till A.D. 1789, when, on Mr. Belsham's resignation [BELSHAM, THOMAS], it was removed to Wymondley. It has since been transferred, under the designation of Coward College, to London.

Daventry is a borough by prescription; the corporation, under the Municipal Reform Act, consists of four aldermen and twelve councillors. By that Act, the town was not to have a commission of the peace, except on petition and grant. There were, before the Act, sessions held once a year. There is a small gaol, built within these few years. The corporation revenues are very trifling.

The living of Daventry is a perpetual curacy, of the clear yearly value of 344*l.*, with a glebe-house.

There were, in 1833, two day-schools, partially endowed, with 12 children; seventeen other day-schools, with 376 children; a national day and Sunday school, with 152 children, partly supported by an endowment and by subscription (some of the children are clothed); and four Sunday-schools, with 511 children.

Kettering is in Huxloe hundred, 74 miles from London. The area of the parish is 2840 acres; the population in 1831 was 4099, about one-eighth agricultural. The town is on the slope of a hill, at the foot of which runs a small brook, a feeder of the Ise. The market-place is spacious, and is surrounded by well-built houses and respectable shops. The church is a large and handsome building of perpendicular character, consisting of a nave, side aisles, and chancel, with a very fine tower and rich hexagonal crocketed spire at the west end. The west door and a four-light window over it are rich examples of the perpendicular style.

There are several dissenting places of worship. Wool stapling and wool-combing are extensively carried on in the town; there is a considerable manufacture of shoes; and that of silk shag for hats has been lately introduced; about 200 men were, in 1831, employed in these last two branches of industry. The market is on Friday, and there are three yearly fairs for live-stock and pedlery. The living is a rectory, of the clear yearly value of 786*l.*, with a glebe-house.

There were, in 1833, a free grammar-school, with a good endowment, containing 37 boys; another endowed school, with 22 girls; nine other day-schools, with 194 children; one boarding and day school, with 22 girls; two national day and Sunday schools, with 195 children in the week and 298 children on Sundays; and four Sunday schools, with 525 children. Besides these there are several schools for teaching lace-making.

Oundle is in Polebrook hundred, 81 miles from London. The area of the parish, including the hamlets of Ashton, Biggin, Churchfield, and Elmington, is 5300 acres; the population, in 1831, was 2450, nearly one-third agricultural. The town is on a slope on the left bank of the Nene, which here makes a considerable bend, nearly surrounding the town, and is crossed by two bridges on opposite sides of the town: that on the north-east side, distinguished as 'the North bridge,' over which the road to Peterborough passes, is a fine bridge of several arches; connected with it is a causeway, raised on arches, to secure a passage over the flats near the river when the waters are out. The streets are well paved and lighted, and the houses generally modern and well built. There are a commodious market-house and shambles. The church, which is large and handsome, consists of a nave with side aisles, chancel, large transepts, and a tower and spire 200 feet high. Most of the piers and arches and some of the windows are of early English character; the clerestory and several of the windows are of decorated English; the tower and spire, the south porch, part of the transepts, and several of the windows are of perpendicular character. Each part is excellent in its style. The tower has four pinnacles at the angles, and the spire is hexagonal and crocketed: they are peculiarly fine. The church contains some rich stalls, some good wood screen-work, and a few remains of antient stained glass. There are an almshouse and a grammar-school near the church. The market is on Thursday, and there are three yearly fairs for live-stock. Petty-sessions for the division are held every fortnight. The living is a vicarage, of the clear yearly value of 376*l.*, with a glebe-house.

There were, in 1833, an endowed free grammar-school, with 66 boys (28 on the foundation); an endowed charity-school for 30 boys, who are educated and clothed; another endowed school, with 12 boys; an endowed day and Sunday school in Ashton hamlet, with 14 children; two other day-schools, with about 30 children; two boarding-schools, with 85 children; a national day and Sunday school, with 123 children in the week and 175 on Sundays; and several Sunday-schools.

Thrapston is in Navisford hundred, 73 miles from London. The area of the parish is 990 acres: the population, in 1831, was 1014, above one-fourth agricultural. Thrapston is pleasantly situated on the right bank of the Nene, over which river there is a handsome wooden bridge of several arches. The houses are in general neat and well built, and there are several genteel residences in the vicinity. The church consists of nave, side aisles, chancel, and transepts, with a tower and spire at the west end. Most of the piers and arches, with a fine south door, are of early English character; the chancel and some other portions are of decorated English, and the tower and spire of perpendicular. In the chancel are three stone stalls, with rich mouldings and crocketed canopies. There are corn-mills and a paper-mill on the river· and sand-pits and stone-quarries in the neighbourhood: some whips and lace are made. The market is on Tuesday, for corn and live-stock; it is the largest market in the county for swine: there are two yearly fairs for live-stock, pedlery, and shoes, and for hiring servants.

The living is a rectory, of the clear yearly value of 348*l.*, with a glebe-house. There were, in 1833, two boarding and day schools, with 103 children; the larger of the two was partly supported by an endowment; there were also three day-schools, with 56 children, and two Sunday-schools, with 207 children. There is a Baptist meeting-house.

Towcester, in the hundred of Towcester, is 60 miles from London. The area of the parish (which comprehends the hamlets of Caldicott, Handley, and Wood-Burcot) is 2790 acres: the population, in 1831, was 2671, one-third agricultural. Some antiquaries place here the station Lactodorum of the Antonine Itinerary; at any rate the termination 'cester' indicates that it was a Roman town. Numerous coins found here, especially on an artificial mound called Berrymont Hill, north-east of the town, confirm this conclusion. Traces of the Saxon works erected by Edward the Elder (A.D. 921) to defend the town from the Danes are yet discernible. Towcester is situated on the right bank of the Tow, and consists principally of one long street on the road from London to Coventry and Birmingham: this street is paved, and is lined with well built houses. The church is a neat building in the early English style; there are three dissenting places of worship, and three almshouses. The chief trade of the place is in boots and shoes, and in lace, all of which are made here: the town also derived considerable advantage from its situation on a great public thoroughfare, but it has probably suffered by the diversion of traffic consequent on the opening of the Birmingham railway. The market is on Tuesday, and there are two yearly fairs for live-stock and general merchandise. The living is a vicarage, of the clear yearly value of 217*l.*, with a glebe house. There were, in 1833, four dame-schools, with 30 children; a day-school, with 50 boys, partly or wholly supported by an endowment; four other day-schools, with 137 children; and four Sunday-schools, with 490 children

Wellingborough is in the hundred of Hamfordshoe, 67 miles from London. The area of the parish is 4490 acres; the population, in 1831, was 4688, about one eighth agricultural. The town is on an eminence just above a little brook which flows into the Nene; and from half a mile to a mile from the left bank of the Nene itself. The town was rebuilt in 1738, after a dreadful fire. It now consists of a number of streets, irregularly laid out, the principal of which meet in the market-place: they are lighted, and, from the situation of the place on a slope, are generally clean. The houses are for the most part built of a red sand stone, on which rock the town stands. The church is large and handsome, and of various styles of architecture. A south door is Norman; the tower and spire at the west end are of early English, a fine specimen of the later period of that style, approaching in some parts to the decorated English. Some of the piers and arches of the nave, and the east window, a remarkably fine composition of five lights, with admirable tracery and mouldings, are of decorated English character; the rest of the church is perpendicular, of fine composition and execution. There are some antient screen-work and wood stall-work, and a modern font, a good imitation of antient work. There are several dissenting meeting-houses in the town. The principal manufacture of the place is that of boots and shoes. Many of the females are employed in making lace, though that branch of industry has much declined. A silk-mill has been established within a few years. The market is on Wednesday, and is a very considerable market for corn: there are two yearly fairs for live-stock, and a third for live-stock and cheese. Petty-sessions for the division are held every week in the town-hall. The living is a vicarage, of the clear yearly value of 400*l.*

There were, in 1833, sixteen infant or dame schools, with 187 children; an endowed grammar-school, with 44 boys; a 'lower school,' supported from the same endowment, with 100 boys; another free-school, with 60 children; two Lancasterian schools, taught by the same mistress, each held three times a week, for two hours and a half, and each attended by 32 girls; two other day-schools, with 48 children; and five Sunday-schools, with 797 children.

Wellingborough got its name from the wells or springs about the town. One of these, 'the red well,' a chalybeate, was formerly in high repute. Charles I. and his queen resided here, in 1626, under tents, in order to have the benefit of it.

Kingscliffe is in Willybrooke hundred, between Rockingham and Peterborough. The area of the parish is 4460 acres: the population, in 1831, was 1173. It is supposed to have received its designation from king John having had a hunting-seat here. The church is dedicated to All Saints; there are some almshouses. The market, formerly on Tuesdays, has fallen into disuse, but there is a yearly fair for cheese, linen, and turnery ware. The living is a rectory, of the clear yearly value of 525*l.*, with a glebe-house.

There were, in 1833, five day-schools (two of them endowed, another a national-school, and another partly supported by charitable contributions), with 137 children; one boarding and day school, with 31 children; and three Sunday-schools, with 87 children.

Rockingham is in the hundred of Corby, 83 miles from London. The area of the parish is 890 acres; the population, in 1831, was 296, chiefly agricultural. This place consists of one street, on the declivity of a hill running along the road, and is in the midst of Rockingham forest, antiently one of the largest forests in the kingdom. The town is said to have derived its origin from a castle built on the top of the hill by William I. for the defence of the extensive iron-works then carried on in the forest. Some of the earlier kings occasionally resided here. Many of the works were standing in Leland's time. It was fortified for the king in the civil war of Charles I., and besieged by Cromwell; at present the only remain is a grand entrance gateway, flanked on each side by a tower. Part of the church was destroyed during the siege of the castle by Cromwell; the remainder contains several sumptuous monuments. The market has been discontinued: there is a yearly fair for live-stock, clothes, and general merchandise. The living is a rectory, of the clear yearly value of 81*l.* There was, in 1833, one day-school, supported by Lord Sondes, with 40 children.

Rothwell, popularly Rowell, is in the hundred of Rothwell, 78 miles from London. The area of the parish is

4430 acres, with a population, in 1831, of 2002, including the chapelry of Orton and the hamlet of Thorpe Underwood; or excluding these, 3130 acres and 1875 inhabitants. The town is situated on the southern slope of a hill: the ruin of the market-house, begun by Sir Thomas Tresham, A.D. 1577, but never finished, is a remarkable object; it consists of a square area surrounded by large pointed arches, designed for the market, and a suite of rooms with wide square-headed windows over; the whole is ornamented with Doric pilasters, shields with arms, &c. The church has an embattled tower and a fine doorway of early English character. There is a large yearly fair for live-stock, pedlery, and leather. A few persons are engaged in weaving plush.

The living is a vicarage, united with the chapelry of Orton, of the clear yearly value of 145*l*.

There were, in 1833, three infant or dame schools, with 76 children; seven day-schools (one endowed, another a national-school, and two others supported by charity), with 238 children; and three Sunday-schools, with 431 children.

Weldon, distinguished as Great Weldon, is in Corby hundred, between Rockingham and Oundle. The parish has an area of 2350 acres, with a population, in 1831, of 338, half agricultural. Including the hamlet of Little Weldon, the area is 3680 acres, the population 778. The houses are chiefly built of stone. There are four fairs in the year for general merchandise. The living is a rectory, of the clear yearly value of 209*l*., with a glebe-house. There were, in 1833, two dame-schools, with 36 children; one day-school, with 30 children; and a national-school, with 70 children in the week and 96 on Sundays.

Braunston is a populous village in Fawsley hundred, near the union of the Grand Junction and Oxford canals, and about 3 miles north-west of Daventry. The church is large and handsome, with an octagonal crocketed spire 150 feet high. There is also near the upper end of the village a stone cross, surmounted with an entablature decorated with four busts, supposed to represent the four evangelists. Braunston had, in 1831, 1380 inhabitants.

Weedon-beck is also in Fawsley hundred, 4 miles south-east of Daventry. Its distinctive epithet 'Bec' was derived from the circumstance of a religious house being established here as a cell to the abbey of Bec in Normandie. It is sometimes also called Weedon-in-the-Street, from its situation on the Watling Street. Wulfhere, king of Mercia, had a palace here. The church is an antient building, and contains portions in the Norman and the various styles of English architecture. There are one or two dissenting places of worship. The royal military depôt at Weedon contains extensive barracks; spacious storehouses for artillery, small-arms, and ammunition; an hospital, and workshops for artisans: it is one of the finest establishments of the kind in Europe. The population of Weedon-beck, in 1831, was 1439.

Earl's Barton is in Hamfordshoe hundred, 4 miles south-west of Wellingborough: it had, in 1831, 977 inhabitants. The church is very antient, and has several peculiarities of structure. The tower is probably of Anglo-Saxon architecture, and very rude. It is divided into four stories, each of which is constructed with large but thin upright stones, disposed like the frame or wood-work of old timber-houses, and having the intervals between every two filled up with small stones, mortar, and rubble. There are a small west doorway in the lower story, and one or two small windows, unglazed, in the stories over it; and in the fourth story two large openings of several lights; the lights have semicircular heads, and are divided by stone partitions of the shape and appearance of balusters. The summit of the tower, which is embattled, is of late date. (Britton's *Architectural Antiquities*.) The southern doorway is of highly-enriched Norman workmanship.

Raunds is in the hundred of Higham Ferrers, 4 miles north-east of Higham Ferrers: it had, in 1831, a population of 1370. The church is large and handsome, with a remarkably fine and lofty tower and spire. The steeple is early English, and is one of the best specimens of that style in the county. The church has some early English piers and arches, some decorated windows, and some of perpendicular character.

Rushden, in the same hundred, is one mile and a half south of Higham Ferrers: it had, in 1831, a population of 1245. It has a cross-church, large and handsome, with a fine tower and spire of perpendicular character: the piers and arches, the transepts, and part of the chancel, are of decorated English character. The north door is of early English date, and has over it a rich porch of perpendicular character. There are in the church some early English stalls, and some remains of screen-work and of stained glass. There is an octagonal font, of early English, on a pedestal of later date. A few persons are engaged in manufactures.

Wollaston is in the same hundred, 3 miles south-east of Wellingborough. It has a handsome cross-church, with a lofty tower and spire at the intersection.

Irthlingborough is in Huxloe hundred, two miles north-west from Higham Ferrers: it had, in 1831, a population of 1262. A considerable number of the working men are employed in shoe-making. The church, which is antient, had formerly a college, consisting of a dean, five secular canons, and four clerks. The ruins of the college buildings yet remain between the tower and the body of the church. The tower is square, of early English character and good composition, with an octagonal lantern on it of later erection. The church consists of a nave, with two aisles, a transept, and a lofty and spacious chancel: there are in the church some antient tombs and stalls. In the centre of the village is a stone cross, consisting of a shaft thirteen feet high, raised upon steps. There are two dissenting places of worship.

Kingsthorpe is in Spolhoe hundred, 2 miles north of Northampton: it had, in 1831, a population of 1344. There is a town-hall in the village for the meeting of the trustees of the manor, which is a royal demesne, held in trust for the benefit of the townsmen; there are also a dissenting meeting-house, and some trifling remains of a former hospital or almshouse, incorporated in the walls of cottages of later erection. There are considerable stone-quarries, extensive lime-works, and a brick-kiln in the parish, in which a considerable number of labourers are employed. The church is spacious, partly of Norman character, partly in the later styles: it consists of a nave, north and south aisles with chapels, and a lofty western tower and spire.

Moulton, a village a mile in length, 4½ miles north-east of Northampton, had, with the extra-parochial liberty of Moulton Park, 1334 inhabitants in 1831. In its church, which consists of a nave, side-aisles with chapels, chancel, south porch, and western tower, there are some piers and arches of Norman architecture. There are two dissenting places of worship.

Hardingstone is 2 miles south-east of Northampton, in Wymersley hundred. It had a population, in 1831, of 1036. The church has some portions of early English architecture, and there is in the parish, on an eminence in a commanding situation, near the road from London to Northampton, one of the crosses erected by Edward I. to the memory of his queen Eleanor; it was, till the restoration of Waltham Cross, the most perfect of the three which remain: it is octangular, on a base of eight steps, and richly ornamented. Near this cross are the traces of a camp, said to be Danish. The river Nene borders the parish; there are commodious wharfs and warehouses on it; and the railroad from Northampton to the Grand Junction Canal passes through it.

Divisions for Ecclesiastical and Legal Purposes.—The county is almost entirely comprehended in the diocese of Peterborough, which (with the small county of Rutland) it constitutes. It is in the archdeaconry of Northampton, the only one in the diocese. A small portion of the county on the south-west border is in the diocese of Oxford. (*Maps appended to the Third Report of the Church Commissioners.*)

That part of the archdeaconry which is in this county comprehends the ten rural deaneries of—1, Peterborough; 2, Weldon; 3, Oundle; 4, Higham Ferrers; 5, Rothwell; 6, Haddon; 7, Daventree; 8, Northampton; 9, Preston; 10, Brackley. There are five deaneries in Rutlandshire: making fifteen in all.

Northamptonshire was antiently included in the diocese of Dorchester, the see of which was removed afterwards to Lincoln. The diocese of Peterborough was taken out of this in the reign of Henry VIII. It is proposed by the Church Commissioners to augment the diocese of Peterborough by the addition of the county and archdeaconry of Leicester, subtracted from Lincoln.

The county is in the Midland circuit. The assizes are held at Northampton, the first town on the circuit to which the judges proceed. The quarter-sessions are held at Northampton and Peterborough. The county gaol and house of correction is at Northampton. It comprehends eleven yards, eleven airing-rooms, twelve day-rooms, and seven work-rooms. There are borough gaols at Northampton and Peterborough. The number of prisoners committed in the year preceding Oct, 1834, was 655; in 1834, 444; and in 1836, 440.

Nine members were returned to parliament from this county before the passing of the Reform Act, viz. two knights of the shire, two members each for the city of Peterborough and the boroughs of Northampton and Brackley, and one member for the borough of Higham Ferrers. By that act the number of members was reduced to eight, Brackley and Higham Ferrers being disfranchised, and the county formed into two divisions, each returning two members. The northern division of the county consists of the liberty of Peterborough, otherwise the hundred of Nasaburgh, the hundreds of Willybrook, Polebrook, Huxloe, Navisford, Corby, Higham Ferrers, Rothwell, Hamfordshoe, and Orlingbury. The court for the election of the members is held at Kettering; and the polling-stations are Kettering, Peterborough, Oundle, Wellingborough, and Clipston. The southern division comprehends the hundreds of King's Sutton, Chipping Warden, Greens Norton, Cleley, Towcester, Fawsley, Wymersley, Spolhoe, Nobottle Grove, and Guilsborough. The court for the election of members is held at Northampton; and the polling-stations are Northampton, Daventry, Towcester, and Brackley. The extent of the borough of Northampton was unaltered by the Boundary Act: the city of Peterborough was augmented by the addition of such parts of the parish of St. John the Baptist as were not previously included in the city.

History, Antiquities, &c.—In the earliest division of our island it is doubtful whether this county was included in the dominions of the Coritani, or Coritavi (Κοριτανοι, Ptol.), who inhabited Lincolnshire, Leicestershire, and the counties to the northward; or in those of the Catyeuchlani (Κατυευχλανοι), who inhabited Buckinghamshire and Bedfordshire, and the counties to the south and south-east; or in those of the Iceni (Σιμενοι, Ptol.), who dwelt to the east. Perhaps these nations may have occupied each a portion; and the Dobuni (Δοβουνοι) of Gloucestershire and Warwickshire may have also had some parts of the western border. In the Roman division of Britain, Northampton was included in the province of Flavia Cæsariensis. Watling Street crossed in a north-west direction through or near Towcester and Daventry: the Via Devana, another Roman road, parallel to Watling Street, crossed it near Oundle and Rockingham: the Ermine Street, more northerly in its course, crossed the north-eastern extremity from Castor, on the Nene, to Stamford; and one or two other antient roads had a portion of their course in this county. Watling Street may be traced for many miles from the summit of Borough Hill near Daventry. On the London side of Weedon it is incorporated with the modern high-road. Parts of the Ermine Street are conspicuous between Castor, on the Nene, and Upton, and again in the parish of Barnack, not far from Stamford. Several Roman stations are usually considered to have been in the county, viz. the Tripontium, Bennavenna, Isanavatia, and Lactodorum of Antoninus; and the Brinavæ and Durnomagus of Richard of Cirencester.

Tripontium is now by pretty general consent fixed at or near Dow Bridge or Dove Bridge, which crosses the Avon, uniting the two counties of Leicestershire and Northamptonshire. Reynolds (*Iter Britanniarum*) fixes it at the village of Lilburn in Northamptonshire, not far from Dow Bridge, and about half a mile out of the line of Watling Street. There are the traces of a small fort, round which perhaps a town was formed. 'The area' of this fort 'contains about the fifth part of an acre. The southmost part is a square piece of ground, appearing to have been raised, and in its sides answering to the four quarters of the heavens. At the south-east and south-west angles are hillocks which have the appearance of bastions. From one angle to the other runs a bank of earth, and a like bank along the eastern and western sides. To the north-west is a large high mount, on which, according to tradition, there stood a fort or watchtower, of whose demolished walls the churches of Lilburn and Claycoton are said to have been built. Causeys, pavements, and ruins often dug up, show this town to have been formerly larger than at present.' (Bridges, *Northamptonshire*, quoted by Reynolds.) The large high mount here mentioned is called 'the round hill:' it is between Lilburn and Dow Bridge, and is artificial. There are traces of other Roman camps near Lilburn. Various Roman remains have been found in this neighbourhood, at the village of Catthorp or Calthorpe, on the Leicestershire side of the river.[*]

Bennavenna and Isanavatia (there are many various readings of both names) were most probably the same place, or were at least in the immediate neighbourhood of each other. They are supposed to have been the first a British and the second a Roman town. Bennavenna was probably on Borough Hill, a short distance east of Daventry, on which is one of the largest antient camps or forts existing in the island. The form is very irregular, following the shape of the hill. The outer circumference of the ramparts is rather more than two miles and a quarter; the diameter from north to south one mile, from east to west at the widest point three furlongs; and the whole included area about a hundred and fifty acres. The defences were scarcely in any part confined to a single ditch and rampart: in one part there were as many as four ditches and five ramparts. The ramparts have been much lowered and the ditches filled up by the plough, and in some cases quite levelled. The circumvallation at the northern end of the camp is of a much bolder character than in the other parts. The foundations of the prætorium, or residence of the Roman commandant, were discovered in 1823; and walls, tessellated pavements, and utensils of various kinds were brought to light. They are amply described in Baker's *Northamptonshire*.

The Lactodorum of the Romans, which Stukeley and Gale fixed at Stoney Stratford, has been by later antiquaries fixed at Towcester. Berrymount Hill, an artificial mount on the north-east side of the town, was probably the work of the Romans; but few other Roman antiquities appear to have been discovered. The Brinavæ or Brinavis of Richard of Cirencester may be placed at Black Ground, near Chipping Warden, a village 9 miles from Daventry on the road to Banbury, where Roman coins and a great quantity of pottery have been discovered. A rampart ran north and south near this station for some distance, having a steep side to the west and a gentle slope to the east. It was probably designed for the defence of a frontier, and has been conjectured to have extended about sixteen miles from the Charwell to the Leam. Some small part of this bank is remaining near Warden, and is called Wallow Bank. Arbury Bank, not far off, is probably a part of it; and it is likely that this defence gave name to some neighbouring villages or hamlets, as Walton (Wall-town) near King Sutton, Aston-in-the-Walls, &c.

That a Roman town or station existed at Castor is evident not only from the name, but from the Roman remains, ruined walls, tessellated pavements, urns and other vessels of pottery, and coins in great number found here. Similar remains have been found at Chesterton, or rather at Water Newton in Huntingdonshire, just across the river: either Castor or Chesterton was probably the Roman Durobrivæ mentioned in the Antonine Itinerary: the Map of Antient Britain published by the Society for the Diffusion of Useful Knowledge places Durobrivæ in Huntingdonshire, and the Durnomagus of Richard of Cirencester on the Northamptonshire side: perhaps the two may be identical, and the ruins on the Northamptonshire side the town, which grew out of the station on the opposite bank, or was dependent upon it. [HUNTINGDONSHIRE.] We learn from Tacitus that the Roman general Ostorius Scapula, proprætor in Britain in the time of Claudius, fortified the line of the Nene by a chain of posts. [BRITANNIA.]

Numerous indications of Roman residences or posts may be traced along the valley of the Nene. At Cotterstock, a little below Oundle; at Drayton House, Lowick, near Thrapston; and at Woodford, just above Thrapston—all near or upon the left bank of the river, tessellated pavements or other antiquities have been discovered. At Ringstead near Thrapston, and at Chester in Irchester parish, near Wellingborough, both on the right bank of the Nene, are the remains of camps or posts; and at the latter, fragments of tessellated pavements, coins, &c. have been dug up. At Stanwick, between these posts, fragments of a tessellated pavement have been discovered. At Heyford, on the right bank of the Nene, above Northampton, and at

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[*] In the account of Leicestershire, it is stated that Tripontium was supposed to be at Catthorp, on the Northamptonshire side of the river. It should have been Lilburn, not Catthorp, which latter is on the Leicestershire side.

Piddington, on the road from London by Newport Pagnel to Northampton, pavements have been dug up; and at Cogenhoe, on the right bank of the Nene, below Northampton, some Roman coins and an urn were found. At Weedon-Beck are the remains of a post or station, a large camp (called Castle Dykes), and other antiquities; and on Arbury Hill, in the parish of Badley, near Daventry, is a rectangular camp, generally supposed to be Roman. At Barnack, between Peterborough and Stamford, antiquities have been dug up, and at Weldon have been discovered extensive tessellated pavements, foundations, coins, and other indications of a large mansion or of a town. At Guilsborough, north-west of Northampton, and between Aynhoe and Newbottle, in the southern extremity of the county, there are camps, probably Roman.

It seems not unlikely that several of these posts belonged to the line of defence formed by Ostorius. Durobrivæ may have been the first station above the fens, which formed of themselves a sufficient defence on that side. Ringstead, Chester, Weedon-Beck, and Arbury Hill forts were probably the work of Ostorius; and the post of Isanavatia or Bennavenna we may reasonably suppose to have been fortified by him. At Isanavatia, or at Arbury Hill, at the head of the Nene, the line of defence probably turned southward, past Brinavæ, or Chipping Warden, and the bank and ditch of which there are traces in that neighbourhood may have formed part of it. At what point it turned westward and joined the Severn can scarcely be determined. Raynsbury camp, in the south part of the county, was probably a post on this line.

The county was included in the Anglo-Saxon kingdom of Mercia; and Wulfhere, king of Mercia, had a palace at Weedon-Beck. In the invasion of that kingdom by the Danes, the monastery of Medeshamstede, now Peterborough, was destroyed, and, upon the extinction of the Mercian dynasty, the county was divided between the West Saxons and the Danes, the former having all to the south-west and the latter all to the north-east of Watling Street (A.D. 880 to 883). The Danish part was probably dependent on the community of the Danish burghs; the West Saxon part was governed successively by Ethelred and his widow Ethelfleda, daughter of Alfred, upon whose death (A.D. 920 or 921), Edward the elder, king of Wessex, assumed the direct administration of the government. He fortified Towcester, which was on Watling Street, and therefore a frontier town, and reduced the Danes of Bedford and Northampton to subjection (A.D. 921). At the commencement of the reign of Edmund I., the Danes, whom Athelstan had subdued, revolted (A.D. 942); but those of the Danish burghs, including those of Northamptonshire, submitted to the supremacy of Edmund. By a subsequent treaty, all to the north-east of Watling Street was ceded by him to his Danish competitor Anlaf, but was recovered to the Anglo-Saxons by Edred. Little that is worth notice occurred in the county antecedent to the Conquest; though several towns or other places are mentioned in the Saxon Chronicle or other antient records.

Of the Anglo-Saxon period there are memorials in Brixworth church and the tower of Earls' Barton church: the former will be presently noticed; the latter has been already pretty fully described. Upon the Conquest different lordships in the county were granted to the families of St. Liz and others. Simon de St. Liz built the castles of Northampton and Fotheringay; William the Conqueror is thought to have built Rockingham Castle; and Thorold, a Norman, appointed abbot of Medeshamstede, or Peterborough (which had been rebuilt after its ruin by the Danes, King Edgar and his queen, with the archbishops of Canterbury and York, and a splendid retinue of nobles and clergy, attending at the foundation of the new building), erected a castle within the precincts of the abbey, probably for defence against Hereward le Wake, who had occupied the Isle of Ely. The defence was insufficient; the town was burned and the monastery plundered by the Danes, the allies of Hereward.

In the reign of William Rufus (A.D. 1094) a great council or parliament was held at Rockingham to determine the dispute between the king and Anselm, archbishop of Canterbury, respecting the right of investiture and obedience to the see of Rome. In the following years the principal events occurring in the county were the struggles for the town or castle of Northampton in the civil wars of Henry II., John, and Henry III. Twice in these contests the students of Oxford sought refuge from civil strife within this county. In the reign of John (A.D. 1212) the members of Magdalen College retired to Brackley Hospital, which was in their possession; and in the time of Henry III. many students who, from various causes, had left Oxford, took refuge at Northampton, where steps were taken to establish a new seminary. A similar emigration from Cambridge to Northampton occurred in the same reign, but a royal mandate compelled the students to return. Both Henry III. and Edward I. frequently resided at Northampton: and in the reigns of Edward II. and III. and Richard II. several parliaments were held here: at the last of these was voted the poll-tax, which led to Tyler's rebellion. The battle of Northampton, in the civil war of the Roses (A.D. 1460) has been noticed. Another battle was fought in this county during that contest. The men of the North, excited probably by the intrigues of the earl of Warwick, rose against Edward IV., under a leader called Robin of Redesdale (A.D. 1469). These insurgents defeated a Royalist force, under William Herbert, earl of Pembroke, at Edgecot, on the border of the county towards Oxfordshire. Four thousand of Pembroke's men fell; and himself and other leaders, being taken, were beheaded next day at Northampton. This was the last event of importance in the county before the Reformation.

Of antient ecclesiastical monastic or castellated architecture the county possesses several specimens. Brixworth church, between Northampton and Market Harborough, is one of the most remarkable. It consists of a nave, south aisle, chancel, west tower, and staircase turret on the western side of the tower. The present nave has but one aisle, and that an addition to the original building; but from the foundation of an aisle discovered on the northern side, it appears that the present nave consists of the eastern extremity of the original nave deprived of its aisles, and of a portion if not the whole of the original chancel, and that the present chancel is a subsequent addition. 'The walls are mostly built with rough redstone rag, in pieces not much larger than common brick, and all the arches turned, and most of them covered with courses of red bricks or tiles, as they may be called, precisely similar in quality and size to those found in Roman works discovered in this county; and over the balusters of the window looking from the tower into the nave these bricks are used as imposts.' (Rickman's *Gothic Architecture.*) The church has undergone great alterations; the arches opening from the original nave into its aisles have been for the most part stopped up; the staircase turret, the belfry story of the tower and a lofty spire, and an aisle on the south side of the nave added in later times; windows of various dates, sizes, and styles inserted; and other changes made at various times from the Conquest to the Reformation. It is probable that this church was erected in the time of the Romans; and if so, it is the only ecclesiastical monument of that people in the country, as well as the most antient of our ecclesiastical edifices.

Brigstock Church, between Oundle and Rothwell, is another curious church, but the antient work forms only a small proportion. The tower is of very rough masonry plastered, and has a roughly-built round staircase turret on the west side, like Brixworth. The arch into the nave has large plain blocks for imposts and a projecting stone round the arch: the tower opens into the north aisle by a semicircular-headed plain door, with a small window over it. There are several additions, as a belfry story and spire, of a later date, which present several interesting features.

Barnack church, near Stamford, has a tower probably Anglo-Saxon. The lower part has projecting stone ribs like those of the tower of Earls' Barton noticed in the preceding part of this article. The arch opening into the nave resembles that of Brigstock, but is much more ornamented, with an arrangement of the impost unlike any Norman work, but much like a rude attempt to imitate Roman mouldings.

Castor Church, near Peterborough, is a large and fine cross-church, with a Norman tower at the intersection. This tower displays almost every variety of Anglo-Norman moulding and ornament. The two upper stories present a very enriched appearance, having open arches and continued arcades round. Both the parapet of the tower and the spire are of later date. Other parts of the church, as well as the tower, present very interesting points. St. Peter's church, Northampton, described already, and Peterborough cathedral [PETERBOROUGH], have considerable portions of Norman architecture; also the parish churches of Brockhole, Castle Ashby, Cotterstock, Dodford, East Haddon, Harpole, Helpstone, Kingsthorpe, Maxey, Moulton, Peakirk, Pitsford, Polbrook, Weedon-Beck, and some others, have more or less of Norman architecture in them. Of these, Castle Ashby, Cotterstock, Maxey, Polbrook, Helpstone, and Pitsford are especially deserving of notice. Barnwell St. Andrew's, Aldwinkle All Saints, Canons Ashby, Easton, Finedon, Fotheringay (formerly collegiate), Lowick, Raunds, Rushden, St. Mary's Church at Stamford Baron, Stanwick, King's Sutton, Tichmarsh, Warmington, Whiston, Wilby, and Wollaston are also worthy of notice for their beauty or for the curious features they present. There are some ruins of the collegiate buildings adjoining to Fotheringay church.

Of St. James's abbey, Duston, near Northampton, founded by William Peverel, natural son of William the Conqueror, for Black or Austin canons (yearly revenue, at the dissolution, 213*l.* 7*s.* 2½*d.* gross, 175*l.* 18*s.* 2½*d.* clear), and of Pipewell Cistertian abbey, Great Oakley, near Rockingham (yearly revenue, at the dissolution, 387*l.* 8*s.* 0½*d.* gross, 286*l.* 11*s.* 8¾*d.* clear), only the foundations and traces of the walls are remaining. A portion of the chapel of Catesby Benedictine nunnery, near Daventry (yearly revenue, at the dissolution, 145*l.* 0*s.* 6*d.* gross, 132*l.* 16*s.* 11¼*d.* clear); a portion, supposed to be the refectory, of the Cluniac priory at Daventry (gross yearly revenue, at the dissolution, 236*l.* 7*s.* 6*d.*); the conventual church of the priory of Austin canons at Canons Ashby, between Northampton and Banbury (revenue, at the dissolution, 127*l.* 19*s.* gross, 119*l.* 0*s.* 4*d.* clear); the kitchen and a few other vestiges (now incorporated in a farm-house) of Sewardsley Cistertian priory, near Towcester (yearly revenue, at the dissolution, 18*l.* 11*s.* 2*d.* gross, 12*l.* 6*s.* 7¼*d.* clear), are the principal monastic remains. Queen's Cross at Hardingstone has been noticed. Geddington Cross, near Kettering, another of those erected by Edward I. in memory of his wife, is of triangular shape, elevated on eight steps, and divided into three compartments: the lower one solid, adorned with six shields charged with arms and other sculptured ornaments; the compartment above this consists of six pillars rising from an embattled turret, and supporting six decorated canopies; beneath these canopies are placed three statues of the queen. The upper compartment is richly adorned.

The castellated ruins are few. These are the earth-works of Northampton, Higham Ferrers, Brackley, Fotheringay, and perhaps one or two others, and the gateway of Rockingham. Barnwell Castle is a fine and interesting ruin: it consists of four massy round towers, with their connecting walls enclosing a quadrangular court: the western wall is dilapidated. The grand gateway, which still remains, is flanked by two round towers. Some of the antient walls and works of this fortress are in almost as perfect a state as when first built, particularly the entrance gate and some vaulted rooms connected with it.

There are a few antient mansions. Drayton House, Lowick, near Thrapston, is of the age of Henry VI.: it retains many of the features of an antient castle. Fawsley House, 3 miles south of Daventry, the antient seat of the Knightly family, is an incongruous pile of various dates. Northborough manor-house, between Peterborough and Market Deeping, now a farm-house, is of decorated English character, and some of its portions and details are very beautiful.

In the reign of Queen Elizabeth this county was the scene of the execution of Mary of Scotland, who was tried, condemned, and beheaded in Fotheringay Castle. This castle was entirely demolished by order of James I. when he came to the throne. This county possesses several memorials of the public men of Elizabeth's time. Burleigh or Burghley House, on the border of the county near Stamford, was built for the most part by the great Lord Burleigh, though many additions and alterations have been made by subsequent possessors. It is a vast pile, displaying magnificence rather than taste. Kirby Hall, Gretton, near Rockingham, was built by Sir Christopher Hatton, lord-keeper: it has been materially altered since. The more antient parts of Castle Ashby, about 6 miles east of Northampton, were erected by Henry lord Compton. The offices of the manor-house of Ashby St. Ledger (near Daventry) contain a small room in which the gunpowder plot in the time of James I. was concocted. The house belonged to Catesby, one of the leaders in the conspiracy.

The battle of Naseby, which decided the civil war of Charles I., was fought in this county (A.D. 1645). The king had a fortnight before taken Leicester by storm, and, marching southward by Harborough to Daventry, compelled Fairfax to raise the siege of Oxford in order to oppose him. On the approach of the parliamentarian forces under Fairfax and Cromwell to Northampton, Charles retreated to the neighbourhood of Harborough, but finding his enemies close in pursuit, he determined to turn upon them. The battle was fought at Naseby, and each side mustered about 8000 or 9000 men. The right wing of each army, the Royalists under Rupert, the Parliamentarians under Cromwell, was victorious; but while Rupert wasted his advantage by inconsiderate pursuit, Cromwell decided the day by charging the Royalist centre in the flank and rear. The victory was decisive: the Royalists had 800 killed and wounded, the Parliamentarians rather more; but they took 4000 prisoners and all the artillery, besides other spoils of the greatest importance.

After the king had surrendered himself to the Scots at Newark, and been delivered into the hands of the Parliamentary Commissioners, he was brought to Holdenby, or Holmby House, about 6 miles north-west of Northampton. From this place he was carried off by Cornet Joyce, at the head of a party of horse, and taken to the army. Holdenby House, which had been built by Sir Christopher Hatton in the time of Elizabeth, was demolished by order of the parliament, and scarcely any remains are now left.

The only struggle which attended the restoration of Charles II. took place in this county. General Lambert, who had escaped from confinement in the Tower of London, appeared at Daventry with a few troops of horse, but, being attacked by Colonels Ingoldsby and Streater, and deserted by his own men, was captured and re-committed to the Tower.

(Baker's *History of Northamptonshire*; Bridge's *History of Northamptonshire*; *Beauties of England and Wales*; Conybeare and Phillips, *Outlines of the Geology of England and Wales*; Greenough's *Geological Map of England*; Lewis's *Topographical Dictionary*; Rickman's *Gothic Architecture*; Britton's *Architectural Antiquities*; Reynolds's *Iter Britanniarum*; Palgrave's *Rise and Progress of the English Commonwealth*; Sharon Turner's *Anglo-Saxons* and *History of England in the Middle Ages*; *Parliamentary Papers*.)

STATISTICS.

Population.—Northamptonshire is chiefly an agricultural county. In 1831 it ranked the twelfth on the list of agricultural counties: its place in this respect has fluctuated since 1811, when it was the tenth on this list; and in 1821 it was the eleventh. Of 43,793 males twenty years of age and upwards, only 582 were (in 1831) engaged in manufactures, and 21,907 were occupied in agricultural pursuits; out of this latter number 17,775 were labourers. Of the 582 employed in manufactures or in making manufacturing machinery, about 200 were engaged at Kettering in making shoes and weaving silk-shag; about 60 in weaving plush, at Rothwell, Chatcombe, and Eydon; there were 130 at Middleton-Cheney occupied as frame-work knitters, and about 70 more thus employed in other parts; 80 men in making carpets and preparing worsted for that purpose, 20 of them at Spratton, 13 at Hollowell; and there were 50 weavers of miscellaneous descriptions in several villages throughout the county. In the towns of Northampton, Wellingborough, Irthlingborough, and various other places, more than 2000 men were occupied as shoe-makers, in making shoes not consumed in the respective places; but these, for the sake of uniformity, were placed under the head of men engaged in trades and handicrafts, though more strictly speaking they are manufacturers.

The population of Northamptonshire, in each of the following decennary periods, was,—

	Males.	Females.	Total.	Increase per cent.
1801	63,417	68,340	131,757	..
1811	68,279	73,074	141,353	7·28
1821	79,575	82,908	162,483	14·94
1831	87,949	91,387	179,336	10·33

showing an increase, between the first and last periods, of 47,579, or more than 36 per cent. on the whole population; being 21 per cent. below the whole rate of increase throughout England.

The following table exhibits a summary of the population of every hundred, as taken in 1831:—

HUNDREDS, CITIES, LIBERTIES, or BOROUGHS.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males twenty years of age.
Cupping Warden (Hundred) . . .	972	1,059	3	25	671	233	155	2,321	2,376	4,697	1,163
Cleley . . .	1,462	1,633	10	24	960	415	258	3,557	3,856	7,413	1,803
Corby . . .	2,171	2,362	9	62	1,253	557	552	5,149	5,285	10,434	2,573
Fawsley . . .	2,944	3,096	13	73	1,373	992	731	6,787	7,370	14,157	3,363
Greens Norton . .	1,115	1,186	5	26	750	274	162	2,638	2,695	5,333	1,385
Guilsborough . .	2,032	2,219	8	36	1,244	597	378	4,805	4,914	9,719	2,402
Hamfordshoe . .	1,637	1,753	2	48	498	906	349	4,002	4,176	8,178	1,970
Higham Ferrers .	1,555	1,833	12	21	901	678	254	4,042	4,194	8,236	2,057
Huxloe . . .	2,567	2,745	5	75	1,217	975	553	6,192	6,645	12,837	2,998
King's Sutton . .	2,529	2,705	6	48	1,678	675	352	6,132	6,303	12,435	3,092
Navisford . .	516	555	5	9	306	154	95	1,338	1,397	2,735	633
Nobottle Grove . .	1,825	1,929	8	59	1,071	470	388	4,302	4,424	8,726	2,168
Orlingbury . .	1,178	1,252	3	25	754	304	194	2,834	2,860	5,694	1,365
Polebrook . .	879	998		27	489	289	220	2,280	2,257	4,537	1,057
Rothwell . . .	1,682	1,781	6	38	897	492	392	3,872	3,988	7,860	2,038
Spelhoe . . .	1,210	1,267		28	683	322	262	2,870	2,980	5,850	1,388
Towcester . .	977	1,037	6	28	434	435	168	2,360	2,513	4,873	1,152
Willybrook . .	1,160	1,312	3	18	730	416	166	2,904	2,886	5,790	1,462
Wymersley . .	1,740	1,912	1	25	1,165	463	284	4,315	4,542	8,857	2,125
Northampton (Borough) . . .	3,091	3,191	28	120	88	2,217	886	7,619	7,732	15,351	3,846
Peterborough (Liberty) . . .	1,952	2,193	16	42	1,162	512	519	5,066	5,005	10,071	2,607
Peterborough (City) .	1,128	1,145	5	25	10	519	616	2,564	2,989	5,553	1,146
Totals . .	36,322	39,163	154	882	18,334	12,895	7,934	78,949	91,387	179,336	43,793

County Expenses, Crimes, &c.—The sums expended for the relief of the poor at the four dates of

		£		s.	d.	
1801	were	94,607,	being	14	4	for each inhabitant.
1811	..	139,675	„	19	9	„
1821	..	145,093	„	17	10	„
1831	..	150,816	„	16	9	„

The sum expended for the same purpose for the year ending March, 1838, was 77,163*l.*: and assuming that the population had increased from 1831 to 1838 at the same rate of progress as in the ten preceding years, the above sum gives an average of 8*s.* 0¼*d.* for each inhabitant. These averages are above those for the whole of England and Wales.

The sum raised in Northamptonshire for poor-rate, county-rate, and other local purposes, in the year ending 25th of March, 1833, was 169,614*l.*, and was levied upon the various descriptions of property as under:—

	£	s.
On land . .	£150,467	3*s.*
Dwelling-houses .	15,181	10
Mills, factories, &c. .	1,756	13
Manorial profits, navigation, &c.	2,209	2
Total	169,614	8

The amount expended was—

	£	s.
For the relief of the poor . .	£148,042	4
In suits of law, removal of paupers, &c.	3,742	18
For other purposes . .	19,037	5
Total money expended	170,822	7

In the returns made up in subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 166,712*l.* 19*s.*, 144,112*l.* 4*s.*, 112,531*l.* 12*s.* (not given for 1837), and 89,419*l.* respectively; and the expenditure of each year was as follows:—

	1834. £.	1835. £.	1836. £.	1837. £.	1838. £
For the relief of the poor	140,179	118,842	91,901	74,072	77,163
In suits of law, removal of paupers, &c. .	3,311	2,498	2,006	1,148	863
Payments towards the county-rate . .	22,282	9.332	7,658	not given.	9,363
For all other purposes		13,128	10,440	4,396	5,568
Total money expended	£165,772	143,795	112,005		92,957

The saving effected in the sum expended in 1838, as compared with that expended in 1834, was therefore 72,815*l.*, or not quite 44 per cent., and the sum expended for the relief of the poor in 1838 was less than that in 1834 by 63,016*l.*, or more than 45 per cent.

The number of turnpike trusts in Northamptonshire, as ascertained in 1836, under the acts 3 and 4 William IV., c. 80, were 27; the number of miles of road under their charge was 358. The annual income arising from tolls and parish composition in lieu of statute duty, in 1835, was 37,990*l.*, and the annual expenditure in the same year was as follows —

	£	s.
Manual labour . .	£11,671	2
Team labour, and carriage of materials	3,038	2
Materials for surface repairs .	6,923	5
Land purchased . . .	26	4
Damages done in obtaining materials .	456	0
Tradesmen's bills . . .	1,308	19
Salaries of treasurer, clerk, and surveyor	2,302	16
Law charges	641	16
Interest of debt . . .	3,161	7
Improvements . . .	769	19
Debts paid off . . .	2,950	4
Incidental expenses . . .	1,006	0
Estimated value of statute duty performed	2,446	2
Total expenditure	36,701	16

The county expenditure in 1834, exclusive of that for the relief of the poor, was 6801*l.* 6*s.*, disbursed as follows:—

	£	s.
Bridges, building, repairs, &c. .	£728	10
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	2,181	4
Shire halls, and courts of justice, building, repairing, &c. . .	115	9
Prosecutions	1,684	9
Clerk of the peace . . .	245	12
Conveyance of prisoners before trial .	470	12
Conveyance of convicts . .	195	0
Vagrants, apprehending and conveying	93	2
Coroner	151	18
Miscellaneous	935	10
Total expenditure	6,801	6

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 765, 927, and 1219 respectively, making an average of 109 annually in the first period, of 132 in the second period, and of 176 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 49, 54, and 51 respectively. Among the persons charged with offences there were committed for

	1831.	1832.	1833.
Felonies . .	44	48	48
Misdemeanors .	5	6	3

The total number of committals in each of the same years was 77, 72, and 53 respectively.

	1831.	1832.	1833.
The number convicted was	58	55	39
Acquitted . .	13	14	7
Discharged by proclamation	6	3	7

There were 268 persons charged in 1838 with crimes at the assizes and sessions in Northamptonshire. Of these 38 were charged with offences against the person, 24 of which were common assaults; 12 were charged with offences against property committed with violence; 191 with offences against property committed without violence; only 2 were charged with malicious offences; 1 for uttering counterfeit coin; and 24 for various misdemeanors.

Of the whole number committed, 188 were convicted, 56 were acquitted, 3 were not prosecuted, and no bill was found against 20. Of those convicted, 2 were sentenced to death, but their sentence was commuted into transportation for life; 31 were transported for various periods; 2 were sentenced to two years; 28 to one year; and 115 to six months and under; 10 were fined, and 1 was found insane. Of the whole number of offenders, 234 were males and 34 females; 104 could neither read nor write; 148 could read and write imperfectly; 15 could read and write well; and one had received superior instruction.

The number of persons registered in 1837 to vote for county members was 8457. Of these, 5620 were freeholders, 41 leaseholders, 654 copyholders, 2021 occupying tenants, and 121 annuitants: being 1 in 21 of the whole population, and 1 in 5 of the male population twenty years of age and upwards, as taken in 1831.

Northamptonshire contains three savings' banks: the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	1832.	1833.	1834.	1835.
Number of depositors . .	4,831	1,203	4,920	5,092
Amount of deposits .	£155,397	£37,873	£159,199	£160,271

The various sums in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	2,992	£21,129	3,115	£21,547	3,378	£23,598
" 50	1,413	42,414	1,600	48,463	1,667	52,168
" 100	604	42,143	637	43,915	678	46,935
" 150	192	23,122	210	24,844	181	27,890
" 200	109	19,615	100	18,051	116	19,735
Above . 200	66	19,036	70	19,475	64	18,416
	5,376	167,459	5,732	176,295	6,084	188,742

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835.

	Schools.	Scholars.	Total.
Infant schools . . .	132		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		636	
Females . .		613	
Sex not specified .		935	
			2,184
Daily schools . . .	544		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		8,471	
Females . .		5,186	
Sex not specified .		2,454	
			16,111
Schools . .	676		
Total of children under daily instruction . . .			18,23
Sunday-schools . . .	406		
Number of children at such schools; ages from 4 to 15 years:			
Males . .		11,663	
Females . .		11,668	
Sex not specified .		5,021	
			28,35

Assuming that the population between the ages of 2 and 15 years has increased in the same proportion as the whole of the population since 1821, and that the whole population has increased in the same ratio since 1831 as in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 years thus found as residing in Northamptonshire in 1833 was about 60,307.

Sixty-seven Sunday-schools are returned from places where no other school exists, and the children, 2974 in number, who are instructed therein cannot be supposed to attend any other schools; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Fifty-one schools, containing 3418 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is known to be thus far created. Making allowance therefore for this cause, which prevents accuracy, we may perhaps fairly estimate that about two-thirds of the children between the ages of 2 and 15 years are under instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls	Scholars.
Infant Schools	7	81	8	523	112	1,353	5	227
Daily Schools	111	3,630	56	3,051	345	7,256	32	2,174
Sunday Schools	39	2,267	356	24,209	—	—	11	1,876
Total.....	157	5,978	420	27,783	457	8,609	48	4,277

The schools established by Dissenters, included in the above statement, are

			Scholars.
Infant-schools . .	2	containing	84
Daily-schools . .	15	.	308
Sunday-schools . .	110	.	8,505

The schools established since 1818 are

			Scholars.
Infant and other daily schools	279	containing	8,131
Sunday-schools . .	215	.	17,245

Twenty-four boarding-schools are included in the number of daily-schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists and Roman Catholics.

Lending-libraries of books are attached to 23 schools in this county.

NORTHCOTE, JAMES, an English artist and writer on art, was born in 1746, at Plymouth, where his father was a watchmaker. Having been introduced to Sir Joshua Reynolds through Dr. J. Mudge, he went to London at the age of twenty-five to study painting under him, and was for five years not only his pupil but his inmate. This circumstance was of no small advantage to him, as it not only tended to refine his manners, but brought him into contact with the best society of the day. On quitting Reynolds he at first set up as a portrait-painter, and would no doubt have become eminent in that branch of the art, as he possessed much insight into and power of describing individual character. But his ambition prompted him to aspire to something higher than taking likenesses. He accordingly set out for Italy, where he spent about five years, and was made a member of the academies of Florence and Cortona. On his return he was encouraged by Boydell, who published many engravings after subjects painted by him, and among others that called the Village Doctress, which was for a long time an exceedingly popular print. For the Shakspere Gallery he produced two of his best works, the Murder of the Two Princes in the Tower, and Hubert and Arthur, besides some other subjects. Yet although he displayed considerable skill in composition and colouring, together with vigour of expression, his ability in art was by no means equal to his enthusiasm and his application. For nearly half a century he existed almost entirely in his painting-room in Argyle Street, and would have been content, as he himself said, to live on so for ever in what was to him all-sufficient enjoyment. In the latter part of his life he was quite a recluse, and independent both in spirit and circumstances—the latter chiefly owing to his prudence and frugality. He was apt to be somewhat cynical, though really kind-hearted. Hazlitt's 'Conversations' with him afford the best portraiture of his character and of the qualities of his mind. His literary productions are far from being inconsiderable. Many papers of his appeared in a work entitled 'The Artist,' and in 1813 he published his 'Memoirs of Sir Joshua Reynolds, with an Analysis of his Discourses,' a quarto volume, to which he afterwards added a supplement. In 1828, at the age of eighty-two, he again appeared as an author, with his 'One Hundred Fables, original and selected,' which, though of little interest as a literary performance, is a book of great attraction on account of the very numerous and exquisite wood-cuts, all which were executed after his own designs, and were superior to any embellishments of the kind that had then appeared. A second set was published after his death, according to his instructions in his will. As if to convince the world that he was not only still living, but unwearied by his long career, he published, in his eighty-fourth year, his 'Life of Titian,' a work which contains much information relative to painting and to art generally. Neither did he lay aside his pencil, but may almost be said to have died with it in his hand, since he continued to amuse himself with it till within a day or two of his death, which happened at his house in Argyle Street, July 13, 1831. Northcote was never married, but lived with his maiden sister, who survived him.

NORTHUMBERLAND, a northern county of England. It is bounded on the north by Norhamshire and Islandshire, two divisions which constitute a detached part of the county of Durham; on the east by the North Sea or German Ocean; on the south by the county of Durham, from which it is separated in one part by the Tyne, in other parts by the Stanley Burn and the Derwent, feeders of the Tyne; on the south-west by Cumberland, from which in one part it is separated by the Irthing, which flows into the Eden; and on the north-west by the Scotch counties of Berwick and Roxborough, from the former of which it is in one part separated by the Tweed. Its form, if the small detached part of Durham be taken with it, is triangular, the base, resting on the county of Durham, and the vertex being at the bounds of the town of Berwick. The length of the base, from the mouth of the Tyne to Blacklaw Mountain on the border of Cumberland, is 47 miles; that of the side from the mouth of the Tyne to Berwick bounds, 60 miles; and that of the remaining side, 70 miles. That portion of the district whose form and dimensions are here given which belongs to the county of Durham is very small.

The area of the county of Northumberland is estimated at 1871 square miles; the population in 1821 was 198,965; in 1831, 222,912, showing an increase in ten years of 23,947, or 12 per cent., and giving 119 inhabitants to the square mile. In size it is the fifth of the English counties; in amount of population the twenty-fourth; and in density of population the thirty-eighth.

Newcastle, the county town, is on the Tyne, about 250 miles in a direct line north by west of London, or 278 miles by the mail-road through Ware, Huntingdon, Stamford, Grantham, Newark, Doncaster, York, Thirsk, Northallerton, Darlington, and Durham. [NEWCASTLE.]

Surface, Geological Structure, and Hydrography.—Northumberland is a rugged county. The highest hills are on the north-west border, towards Scotland. They are commonly designated the Cheviot Hills, which name is in strictness limited to one group among them. They extend from the neighbourhood of Wooler towards the south-west. The Cheviot Hills, properly so called (2657 feet high), are near the northern extremity. Biers Hugh, Hedgehope (2347 feet high), the Hartside Hills, Standrop, Rowhope, Cawlahope, and many others are near the Cheviot, but more to the southward; Lumsden Hill (725 feet high), Carter Hill, Three Pikes, Tronting Crag, Peel Fell, Granknus, Baron's Pike, and others, are to the southward of these, approaching the Cumberland border. These hills have in several instances a conical form, and some are nearly perfect cones; they are covered with a fine green turf, and afford excellent pasture for sheep. Another range of hills, nearly parallel to the range just described, extends from the east of the junction of the Till with the Tweed southward to the bank of the Tyne. In the northern part they bear the name of the Divot Hills; in the centre they form the high lands of Eglingham Common, Rothbury Forest, the Simonside Hills (1407 feet high), and Harwood Moor; more to the south are Ottar Caps and Tone Crag. Black Heddon, near the Divot Hills, is 646 feet high. Branches from these hills extend eastward toward the sea; Rufflaw, in one of these branches near Morpeth, is 595 feet high; and Alnwick Moor is 808 feet high. The hills south of the Coquet form part of the extensive moorlands which occupy a third part of the county, and have an average elevation of from 500 to 1000 feet above the level of the sea.

South of the Tyne is a group of hills separating the valleys of the Tyne and the Wear. The Wolf Hills, part of this group, approach the right or east bank of the South Tyne. On the opposite side of the valley of that river are the high lands of Geltsdale Forest, which are partly in this county and partly in Cumberland.

The coast is low. There are no cliffs except very low ones throughout its whole range. From the mouth of the Tweed at Berwick it runs south-east to Sunderland Point. In this part are two bays: the larger, opposite Holy Island; the other, Buddle Bay, into which a little stream, the Warnburn, flows, is more to the south-east. Holy Island and the Farne Islands are noticed elsewhere. [DURHAM.]

From Sunderland Point the coast runs south by east to the mouth of the Tyne. It is marked by some headlands and bays; Beadnell Point, the headland of Dunstanborough Castle, Boulmer Bay, Alnmouth Bay, Hawksley Point, south of which is Druridge Bay, Newbiggin Point, and Seaton Road. Coquet Island lies off Hawksley Point. It is nearly a mile long from north to south, and about half a mile broad. It had formerly a religious house, a cell to Tynemouth; there was also a fortress, the ruins of which have been converted into a dwelling-house and lighthouse. It contains some rich pasture and abounds in rabbits. Coal was dug in Leland's time.

The south-eastern part of the county, bounded by a line drawn from Warkworth, at the mouth of the Coquet, by the head of the river Blyth, to the Tyne, and from thence southward to the bank of the Derwent, is included in the great coal-field of the counties of Northumberland and Durham. [COAL-FIELDS.] This coal-field is skirted on the north-west by a belt of land occupied by the millstone-grit. The thickness of this formation is probably 900 or 1000 feet at least. The prevailing rock of the series is shale, known by the provincial name of plate, with which occur various beds of sandstone, differing in hardness and texture, and, according to these differences, distinguished as freestones, hazles, whetstones, grindstones, and millstones. Beyond the millstone-grit district is a belt of land, still narrower than the foregoing, occupied by the carboniferous or mountain limestone. This is marked in Mr. Greenough's 'Map as skirting the millstone-grit, from the sea at Alnmouth to the southern border of the county, where it expands over a greater extent, occupying the valley of the Tyne and the country south of it from the border of Cumberland to below Hexham. Nearly all the rest of the county is occupied by a series of formations comprising sandstones of various kinds (one of them resembling the sandstone of the millstone-grit series), limestone, slaty clay, shale, and coal. The relative position of these beds is not ascertained. The coal worked in this formation is slate coal, and is considered inferior in quality to that of the Northumberland and Durham coal-field. Conybeare and Phillips refer these beds to the millstone-grit series.

Trap rocks occur in connection with both coal formations, either as overlying masses, resting unconformably on the subjacent strata; as dykes, irregularly intersecting the strata; or as beds, conformably interstratified and regularly alternating with the other strata. A small district along the Tweed is occupied by the new red-sandstone.

The principal mineral product of this county is pit-coal, of which the chief part raised is sent coastwise to London and to various ports of the southern and eastern counties which do not produce coal. [COAL-FIELDS; COAL TRADE.] The principal pits in the great coal-field are in the neighbourhood of the Tyne.

There are many pits in the millstone-grit and carboniferous limestone districts, and in the inferior coal formation which crops out from beneath them and overspreads so large a portion of the county. Some gypsum is obtained in the red-sandstone district, near the Tweed; and there are lead-mines in the carboniferous limestone at Allendale, near the border of Durham [ALLENDALE], and in other places. The ores of zinc abound in most of the veins producing lead. There is abundance of ironstone in the strata which occur in the coal-measures. Limestone is dug in many parts, and stone for various purposes is quarried in the principal coal-field.

The rivers of Northumberland rise for the most part in the eastern slope of the hills of the north-western boundary, and flow eastward across the county to the German Ocean. The Tweed lies to the west of this range, and belongs chiefly to Scotland. For a short distance however, near Coldstream, it skirts the border of Northumberland and of that detached portion of Durham which adjoins Berwick. The tide flows up to Norham Castle, but vessels of forty or fifty tons get up to New Waterford only, six miles above Berwick.

The Till rises in the eastern slope of the border range, near the Hartside Hills, and, under the name of the Bremish, flows first eastward, then northward; on reaching the neighbourhood of Belford it turns north-west, and, assuming the name of Till, flows into the Tweed. It receives the Roddam Burn and the Lill Burn, and the Beaumont or Glen river, the last from the west side of the hills. The Till is nearly 40 miles long.

The Aln rises at Alnham, near the foot of the border range, and flowing eastward 20 miles past Alnwick, falls into the sea at Alnmouth. The Coquet rises in the border range, and flowing first south-east, then bending to the east past Rothbury, and then flowing again to the north-east, falls into the ocean just below Warkworth, after a course of about 37 miles. The Aln and the Coquet are both navigable for a short distance, the former up to Alnwick. There is a salmon fishery at the mouth of these rivers, and the Aln abounds in trout.

The Wensbeck or Wansbeck rises in the hills which run through the centre of the county, and flows east past Morpeth, where it becomes navigable, into the German Ocean. Its whole length is 24 miles, the length of the navigation 6 miles. The Blyth rises in the same range of hills as the Wensbeck, and has a course of above 20 miles nearly parallel to that river, more to the southward. It is navigable a short distance from the mouth. The Pont is a small stream, flowing into the Blyth. The parish of Bedlington, or 'Bedlingtonshire,' between the mouths of the Wensbeck and the Blyth, belongs to the county of Durham. The Seaton Burn is a short stream, 11 or 12 miles long, to the south of the Blyth, with which it communicates near its source. It flows into the sea at Seaton Sluice, or Hartley new harbour.

The North Tyne rises from several springs, some of which are just within the Scottish border, some in Northumberland but close on the border, and after flowing southward under the name of the Keelder Burn for 10 miles, turns eastward and flows 14 miles to just below Bellingham, where it receives the river Reed from the border of the county, 22 miles long; from this point the stream flows south-east 14 miles to the junction of the South Tyne, just above Hexham. The South Tyne rises amid the hills south of Aldstone Moor in Cumberland, and after flowing 17 miles northward to Haltwhistle, turns eastward and flows 16 miles to its junction with the North Tyne. It receives the Allen and some other small streams. The united stream flows in a tolerably direct eastward course of 30 miles, past Newcastle into the sea between North and South Shields. Its whole length from the head of the North Tyne is about 70 miles. It is navigable for sea-borne vessels up to Newcastle, and for river craft a few miles higher. The salmon fishery on this river was formerly celebrated, but is now nearly if not quite destroyed. The spring-tides rise about 18 feet at the mouth of the river and about 11½ feet at Newcastle.

The salmon fishery of the Tweed is very important, and a considerable number of boxes of that fish packed in ice are sent from that river to the London market, beside what is pickled or dried. There is a fishery for salmon-trout and grilse, or small salmon, at Warkworth on the Coquet.

The vale of the Coquet is noted for the excellence of its agriculture; the vale of Tyne exhibits great variety of scenery; above Newcastle it is rich and beautiful

There are no canals in Northumberland, but there are many railroads. The most important is the Newcastle and Carlisle Railroad. It follows the valley of the Tyne and South Tyne, partly on the south, partly on the north side of the river, and passes by Hexham and Haltwhistle. Its whole length is about 60 miles, the greater part in this county. The Act was obtained in 1829 and the railway was opened in June, 1838. The number of passengers who travelled by this railroad in 1838 was 196,051. A railway from Newcastle to North Shields, above seven miles long, was opened in 1839. It is 6¼ miles long, and passes under the Shields road by a tunnel 70 yards long. The number of passengers by this railroad averages nearly 2500 daily. The Brandling Junction Railway, which unites Gateshead with South Shields and Monk Wearmouth, was also opened in 1839. Most of the other railways are short, and serve for the conveyance of coal from the different pits to the Tyne, the Blyth, the Aln, and the Tweed. Two railroads from Newcastle to Edinburgh have been projected, one near the coast by Morpeth, Alnwick, and Berwick-upon-Tweed; the other, more inland, following the valley of the Reed near Otterburn. The Great North of England Railway is to unite York with Newcastle, or rather with Gateshead on the south bank of the Tyne, opposite Newcastle. The Gateshead and Durham Railway, for which an act has been obtained, forms part of this line.

The Edinburgh mail-coach road enters the county at Newcastle, and runs northward through Morpeth, Alnwick, and Belford, to Berwick-upon-Tweed. Another road to Edinburgh branches off from this beyond Morpeth, and runs by Wooler to Coldstream. A third road to Edinburgh runs from Newcastle by the valley of the Reed to Jedburgh. The coach-road from Newcastle to Carlisle runs by Hexham and Haltwhistle.

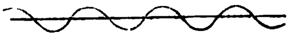
Agriculture.—The position of this county, in the north-eastern extremity of England and along the coast of the German Ocean for upwards of sixty miles, causes the climate to be considerably colder and the harvest later than in the southern and midland counties. In that part of the county which skirts the sea-shore, although it is exposed to cold easterly winds, the air is much milder and more genial than in the western and mountainous part, which, although too high and bleak for cultivation, beyond a certain elevation, produces sufficient herbage to maintain large flocks of hardy sheep, known by the appellation of the Cheviot breed.

Along the coast and for some miles inland the soil consists of a strong fertile clayey loam well adapted to the growth of wheat, beans, and clover, and there are some excellent natural meadows and pastures.

Along the banks of the Tyne and the Coquet, and along the Aln from Alnwick to the sea, the soil is chiefly a light gravel, sand, or dry loam, which is likewise the case to a great degree in the vales of the Beamish, Till, and Beaumont. In the middle and south-eastern parts of the county the soil is a moist loam on a cold impervious clay bottom, which is of inferior value until it has been improved by draining and careful cultivation. In its natural state it produces inferior pasture unfit for sheep, which are subject to the rot when turned out upon it, but it is better adapted for young cattle, which may be reared but not fattened on it. On the hills, which are in a state of nature, there is a mixture of low peat-bogs, stony and gravelly heaths, and some good dry green pasture well adapted for sheep feed.

The county of Northumberland has been one of the foremost of the English counties in adopting the improved system of agriculture, the chief feature of which is the cultivation of turnips for the rearing and fattening of cattle. Turnips accordingly occupy a large proportion of every farm the soil of which admits of this cultivation. So great has been the advantage derived from this change from the old triennial system, that many fields now yield heavy crops of this useful root which in most other parts of England would be considered as totally unfit for its cultivation. This has arisen from the early adoption of the culture in rows on elevated ridges, which has received the general appellation of the Northumberland method, and which we shall therefore describe with some minuteness.

The ground having been prepared by as many ploughings and harrowings as may be thought requisite to pulverise it and destroy the weeds, and laid quite flat, an experienced ploughman draws as straight a furrow as possible and returning lays the next furrow slice upon the first, thus completing what is usually called a *bout*. The usual width of



the furrow being nine inches, the first ridge and furrow take up 18 inches; the next furrow slice being laid over the first, the whole work takes a width of 27 inches. He then enters again at the distance of 27 inches from the land side of the first-made furrow, and completes a second bout parallel to the first. When the whole field is thus laid into narrow ridges, which, from the soil being light and crumbling, gives the section of the surface a waved appearance, such as is represented in the annexed cut, the depressions are about 6 inches below the former surface and the ridges as much above. This at once doubles the depth of the cultivated soil in the ridges. The manure is now brought on the land in small one-horse carts, the wheels of which are about 54 inches apart, so that the horse walks in one furrow while the wheels move in the two adjoining. The manure, which is chiefly common farm-yard dung, not too much decomposed, especially if the soil is inclined to clay, is laid in small heaps, drawn out of the cart by a dung-hook, or, which is better, by a boy standing on the load in the cart, who forks it out more regularly as the horse goes slowly on. It is then laid equally in the furrows by women and boys. The quantity thus laid on, depends on the supply of the yard compared with the breadth of turnips intended to be sown, for the whole is expended on this crop. In general, not less than 15 or 20 single-horse loads per acre are thought necessary to produce a good crop. Twice that quantity is often put on. This dung is evenly distributed in the furrows to the right and left of that in which it has been deposited from the cart. The ploughman now begins to cover this dung by splitting the ridges in two, laying one half to the left and the other to the right, and reversing the bouts, so that the ridges are now directly over the dung, which is completely buried. The appearance of the field after this is exactly similar to what it was after the first bouting. A roller is now drawn over the ridges, to flatten them at top, in order that they may better receive the seed, which is drilled exactly on the middle of the ridge by a machine attached to the frame of the roller and dragged after it. The roller is usually sufficiently large to roll two ridges at once, and, in that case, two drilling-machines, each guided by a man, are fixed to it, and one horse, walking in the middle furrow, draws the whole apparatus forward. Thus, two men and a horse, with a boy to lead the latter, can drill four or five acres in one summer's day. The drill barrow has a very slight coulter, hollowed out at the back part to receive the tin tube through which the seed is delivered. The simplest construction of that part which distributes the seed is a tin cylinder, or rather double cone, with holes in the circumference, through which the seed falls into the tube. The seed-box revolves on an axis turned by means of a connection with the axis of one of the wheels of the machine, which revolves with it; the other wheel turns round this axis. As long as the first-mentioned wheel goes on the ground the seed is delivered, but as soon as it is raised, so that the drill proceeds on the other wheel alone, no seed falls through, because the axis no longer turns. Thus none is lost in turning at the ends of the ridges. In very light soils another slight rolling is necessary to press in the seed; but in stiffer loams a small chain or piece of iron dragged after the coulter is sufficient to cover the seed, without rolling. By this method the seed has not only a greater depth of mellow soil to strike in, but the fermentation of the dung immediately under it acts as a hot-bed and soon brings it up; by which means it generally is so rapidly in the rough leaf, that it seldom suffers from the depredations of the fly. Experience shows that in a moist climate the ridge system produces much more certain and heavier crops than could be expected in general from the most careful broad-cast culture. As soon as the turnip has four leaves out of the ground, the rows may be thinned by the hand or by the hoe, and the plants may be left from eight to ten inches apart. The next process is stirring the ground between the rows with a light one-horse plough. This plough takes a small shallow furrow to the left of the row, within three or four inches of the young plants, and lays it in the middle of the interval between the ridges. When this has been done on both sides all over the field, there will be small ridges formed between the principal ridges on which the turnips grow. All weeds are thus buried, except between the plants in the rows, where they are taken out by the hand or hoe. Some time afterwards a narrow cultivator, like harrows with crooked tines, which are called *cats' claws* from their shape, is drawn over the last-made ridge to pulverise the earth and clear it from all remaining weeds; this is repeated more than once, if it should be thought necessary. Before the autumn rains set in, or the turnips have too wide spreading tops, a plough with a double mould-board is drawn along the middle of the intervals, and lays half of the pulverised soil on each side against the ridge on which the turnips grow; not to cover the roots and protect them from frost, as some think, but to supply fresh mellow earth for the extending fibres of the root to strike into. In heavy wet loams it may be necessary, in order to make a clean neat furrow between the rows, to let off any surface water, in the latter end of the season with a double mould-board plough, and dig out deeper water-furrows with the spade across the ridges, where they may be required by the nature of the surface. But this is not often necessary in common turnip soils. By following the above system, Swedish turnips and even common white turnips may be raised with success on the heaviest soils; and if taken up early, and stored for winter use, they will leave the land in as good a state for wheat, with one or two ploughings, as if it had been fallowed. The carts which take off the turnips will not hurt the land, for the horse walks in a deep furrow, and the wheels move in similar ones, and thus the mellow earth is not trod upon. In order that the dung, which is not yet fully decomposed, may be spread evenly for the next crop, the ridges are often made in a diagonal line across the usual line of ploughing. When the turnips are off, one bout of the plough levels each of the ridges, heavy harrows level the whole, and it can be ploughed in proper stitches for the sowing of the next crop. Sometimes wheat is sown immediately, but more frequently barley with clover-seed in spring. In the latter case the Swedish turnips may be left on the ground all winter, and taken up or fed off early in spring.

Though you may traverse the whole of Northumberland without meeting with a single field of turnips sown broad-cast, the drilling of other crops is by no means so common as in Norfolk and Suffolk, where most of the turnips, on the other hand, are still sown broad-cast. The expense of the machines for drilling corn may be one cause of this, but it seems not sufficient to account for it.

It is well known to all good farmers that all the subsequent crops depend on the success of the turnips. These are the source from which manure is provided, and no crop will keep so much cattle during winter and early spring, with so little exhaustion of the soil, as turnips. The manure abundantly put on the land to raise the turnips is a fund laid out at great interest for the benefit of the future crops; for the whole course is benefited by them, especially if they are fed off by folding sheep on them. Whether wheat or barley is sown after turnips, clover and grass-seeds are usually sown amongst it. The land being clean and in good heart, the grasses grow thickly and cover the ground well the year after. In the heavier loams, after the grasses have been once mown for hay, the land is depastured for two or three years, and then it is ploughed once and sown with oats. After oats come beans, with some manure, and wheat ends the rotation. This is considered the best course for keeping the land in a state of progressive improvement. On very rich soils another crop of beans or peas may be taken after the wheat, and then wheat or oats again. Few soils however, except the richest and deepest, will bear this exhausting course; and it is more prudent in general to return to the turnips after the first crop of wheat.

On light gravelly soils, where the clover and grasses soon fall off, the Norfolk system answers best. The turnips are fed off with sheep, or, where the crop is heavy, half the turnips are drawn for oxen and cows, and the other half fed off, or, which is a late improvement, they are cut into slices or strips by a machine, and given to the sheep with cut clover-hay in shallow troughs on the ground from which the turnips were drawn. In this way the turnips go much farther; and lambs and old ewes will thrive and fatten on them, which they could not have done in the old way for want of teeth to bite them. After turnips come barley and broad clover, with a small portion of annual rye-grass, mown once for hay and ploughed up for wheat. The next course is the same, with the variation of some substitute for the broad clover, which should not be sown on the same land oftener than once in eight years to ensure good crops. Part of the land may be in peas or tares to cut green, and part in grass-seeds without clover, according to the judgment of the farmer. There are some very heavy and wet soils in the county, which will not readily bear turnips, and where the sheep cannot be folded in winter, nor the turnips carted off without greatly injuring the land. There a fallow is unavoidable at least once in six or seven years. In other respects they are cultivated in a similar manner with the good loams. The practice of thorough draining, which is spreading rapidly, will probably soon banish clean fallows, and substitute turnips in their place, even in the most retentive soils, which will in time be converted into rich loams by the effect of cultivation, loaming, manuring, &c., as may be seen in many old gardens, of which the natural soil was once a retentive clay.

Potatoes are raised to a considerable amount on some very good sands and loams. They require land in good heart; for whatever may have been said or written to the contrary, they very much exhaust the land, and should not be repeated oftener than once in ten or twelve years on the same spot. The best land to plant potatoes in for human food is that which is broken up from two or three years' old grass. For cattle they may occupy a portion of the turnip-field, and be cultivated in similar ridges, with this difference, that the sets, or cut potatoes, are put immediately on the manure in the furrow, and covered over with four or five inches of earth by the plough. As they rise out of the ground they are moulded up by the plough; and this is repeated, with a plough made on purpose, with two very wide mould-boards, as often and as deep as the soil will allow. Thus 400 bushels, or twenty tons, of the large cattle-potatoes may be raised on an acre of good land: they are good for every kind of stock when boiled or steamed. Although the immediate profit in this way is much inferior to that of a smaller crop of more edible potatoes, sold in the market, the manure produced amply makes up for the difference, unless potatoes sell at a high price, as is the case near manufacturing towns.

The instruments of tillage are mostly of improved make. The ploughs are generally iron swing-ploughs, on the principle of the old Rotherham plough, which was copied from the Belgian plough, and improved by Small and others. The harrows, rollers, scarifiers, &c. are as in other counties. The turnip-drill has been described, and there are various improvements daily made in the construction. The best sows two rows at once, and has a roller before and one behind, thus combining all the necessary operations connected with the depositing of the seed. Single-horse carts are more common than any others, and used for all purposes, especially the conveyance of lime and other manures from a distance. Bones ground to a moderate size are now extensively used as a manure for turnips, especially on dry gravelly soils; and they have greatly improved all the crops, by securing that of the turnips, at a much less expense of farm-yard dung. Threshing-machines, moved by water, wind, or horses, are thought essential on the larger Northumberland farms; and there is no prejudice against them amongst the labourers, but on the contrary. The labourers are industrious and honest: they are mostly paid partly in grain, by the keep of a cow, and a cottage rent-free, with other advantages. [BERWICKSHIRE.] The unmarried servants are boarded on the farm, as in Scotland.

There are not many meadows, properly so called, in Northumberland, and few are artificially irrigated. Some rich upland pastures are mown annually, or every two or three years, for hay, and fed off the remainder of the time. Some are occasionally invigorated with manure, chiefly composts of earth, lime, and dung, well mixed and incorporated, which is put on in winter, when farm-work is slack, or, which is better, immediately after the hay is taken off, when it is soon washed in by the autumn rains. The hay produced from clover and artificial grasses, of which there is a considerable quantity on all well-managed farms, furnishes the great supply of winter fodder for horses, and is a useful addition to the turnips for feeding cattle.

The cattle in Northumberland are generally of good breeds, mostly short-horned. Those bought to fatten are chiefly Scotch. In noticing the cattle of this county we cannot pass over the wild breed, in the earl of Tankerville's park at Chillingham. They are mere objects of curiosity, never having been made useful for farming purposes: nor does it appear that they have been used with any advantage for crossing with domesticated breeds. They are of a light cream colour, with black muzzles. Their flesh is said to be good and succulent, when they are killed in condition, which must be done by shooting them like deer. The cows kept for the dairy are almost invariably of the short-horned Durham breed; and many remarkably fine heifers are reared in the county, some of which travel southward and supply the large dairies of the London milkmen. The calves are reared on milk at first, gradually mixed with water and meal, till they can live on grass alone and run in the pastures. The first winter they have turnips and straw, and are often sold in calf and in good condition the ensuing autumn. If they are kept over the second winter, they have the same food as in the first, with the addition of a little hay occasionally. They are then kept for private use as dairy cows, or sold with their young calf soon after calving, which is generally in April or May. Great attention is paid by some breeders to have a good bull; and very high prices are given for the use of one of a good breed and with *good points* for one season. The breeding of bulls is a separate business, and requires much experience and judgment.

Excellent farm-horses are bred in Northumberland. They are active, with clean legs, and are very muscular and hardy. Four fat horses in a plough or team, such as are seen in Kent, would be a curiosity in the northern counties. They like fat bullocks, but prefer hard wiry sinews in horses. It is not often that a plough is seen with more than two horses yoked to it, and this only for trench or subsoil ploughing, a practice which is beginning to gain ground, as the next improvement after complete draining. The horses are not permitted to be idle. The example of those who work in the collieries teaches the farmer what horses can do: and if they are worked harder than in the south, they have a larger quantity of corn given them. A horse in a single cart will go to a distance of 18 or 20 miles for lime or coals, and return in the 24 hours; and this he will do four times, and even oftener, every week. It is no wonder that they carry no unnecessary fat about them.

The sheep are chiefly of the native Cheviot breed, a useful hardy sheep with a small fleece of moderate wool. A cross between a Cheviot ewe and a long-wooled ram is said to produce a useful breed improved in the carcass and in the bulk if not the fineness of the fleece. On highly improved farms the Leicester and South-down breeds and almost every other may be found: but as many of the pastures are wet, and apt to cause rot in the sheep at particular seasons, most farmers buy them in to eat their turnips, and sell them off when fit for the market, before there is any fear of their being tainted.

The Cheviot sheep are described as follows. They have a fine open countenance with lively prominent eyes, a long body with a want of breadth at the chine and breast. They have fine clean legs without wool on them, and when fat their carcass will weigh from six to eight stones of 8lbs. the stone. The fleece is from 2½lbs. to 3½lbs. weight, of a mixed wool, which might probably be much improved by care in selecting the ewes and rams kept for breeding, as was done with the South-down sheep by Ellman in Sussex. Some pains have already been taken to improve the breed, and with good results. The principal farms in Northumberland are let on lease for 21 years to highly respectable tenants with sufficient capital. No more need be said to account for a high state of cultivation.

There are no very extensive old woods in the county, but many thriving plantations; there is a constant demand for small timber for the use of the coal-mines, which makes it profitable to cut young saplings, and the trees are not often permitted to acquire the size of large timber. The larch is a profitable and favourite tree in all young plantations, and thrives well in most situations, from the sides of the rivers to near the tops of the highest hills.

The following fairs are the principal in which cattle or agricultural produce is sold:—

Allentown, May 10, November 14, horned cattle; Alnwick, May 12, last Monday in July, first Tuesday in October, 28th of October, ditto; Belford, Tuesday before Whit-Sunday, August 23, black cattle, sheep and horses; Berwick, Friday in Trinity week, black cattle and horses; Billingham, Saturday after Sept. 15, horned cattle and sheep; Ellesdon, August 26, ditto; Haltwistle, May 14, November 22, horned cattle; Harbottle near Rothbury, September 9, ditto; Hexham, August 5, November 8, horned cattle, sheep, hogs; Morpeth, Wednesday, Thursday, Friday se'nnight before Whit-Sunday—Wednesday, horned cattle

Thursday, sheep; Friday, horses; Newcastle, August 12 and October 29, nine days each, horned cattle, sheep, hogs; North Shields, last Friday in April, first Friday in November, cattle; Ovingham, April 26, swine, fat and lean; Rothbury, Friday in Easter week, Whit-Monday, October 2, All Saints, November 1, horned cattle; St. Ninian near Fenton, July 14, hogs, September 27, black cattle and sheep; Stagshawbank, Whitsun-eve, horned cattle, horses, sheep, July 4, hogs; Tynemouth, first Tuesday in July, Warkworth near Alnwick, Old Michaelmas, if a Thursday, if not Thursday before, November 22, horned cattle; Wheelwood-bank near Wooler, Whit-Tuesday, black cattle, sheep, horses; Whittingham, August 24, black cattle, horses; Wooler, May 4, October 17, cattle, horses, sheep.

Divisions, Towns, &c.—Northumberland is divided into six wards, as follows:—

Wards, &c.	Situation.	Acres.	Pop. in 1831.
Bamborough	N.E.	69,650	10,842
Castle	S.E.	103,680	71,533
Coquetdale	Central	269,590	21,121
Glendale	N.W.	107,200	12,009
Morpeth	Central	93,530	13,312
Tindale, or Tynedale	S.W.	514,660	42,415
Newcastle, town and county of the town		2,000	42,760
Berwick-upon-Tweed		5,120	8,920
		1,165,430	222,912

It contains the assize town of Newcastle, the parliamentary and municipal borough of Morpeth, and the new parliamentary borough of Tynemouth and North Shields, and the market-towns of Allendale, Alnwick, Belford, Bellingham, Haltwhistle, Hexham, Rothbury, and Wooler. To which may be added, as places of some importance, though without markets, Alnmouth, Bamborough, Blyth, Hartley, Seaton, and Warkworth. Of these some are noticed in separate articles: ALLENDALE (pop. 5540); ALNWICK (pop. 6788); BAMBOROUGH (pop. 478); BLYTH (pop. 1769); MORPETH (pop. 3890); NEWCASTLE (pop. 42,760); TYNEMOUTH (pop. 23,206); of the rest we subjoin an account.

Belford is in the northern division of Bamborough ward, on the Edinburgh mail-road, 48½ miles from Newcastle, and 322 from London. The entire parish comprehends 9380 acres (with a population, in 1831, of 2030 inhabitants), and extends into Islandshire, a part of Durham; the township of Belford contained, in 1831, a population of 1354, about one-fourth agricultural. The town stands on a gradual slope about two miles from the sea. It consists of two principal streets; the houses are in general neat and well built. The church, or chapel, is an irregular building capable of containing 600 or 700 persons; there are two or three dissenting places of worship. There is a little weaving done; and several of the townsmen are employed in stone-quarries and coal-pits near the town. There is a market on Tuesday, at which a considerable quantity of corn is sold for exportation, and there are two small cattle-fairs in the year.

The living a perpetual curacy, of the clear yearly value of 147*l.*, with a glebe-house. There were, in 1833, in the township of Belford, five day-schools, with 181 children; three boarding-schools, with 26 children; and two Sunday-schools, with from 80 to 140 children. In the other townships of the parish were three day-schools, with 102 children, and one Sunday-school, with 42 children.

Bellingham is in north-west division of Tindale ward, 16 miles north-north-west of Hexham, and 294 from London. The parish (one of those formed by the division of Simonburn parish, A.D. 1811) comprehends the township of Bellingham, and the 'quarters' of East Charlton, West Charlton, Leemailing, the Nook, and Tarretburn, with an aggregate area of 15,540 acres, and a population, in 1831, of 1460, of whom 464 were in the town of Bellingham. The town is pleasantly situated on a declivity on the left bank of the North Tyne, and comprehended, in 1831, only 82 inhabited houses. The chapel is a small antient building with a finely groined stone roof. There are a Catholic chapel and a Burgher meeting-house. A few hands are engaged in manufacture. There is a small weekly market on Saturday; and two yearly fairs, one of them a small cattle-fair. The living is a rectory, of the clear yearly value of 194*l.*, with a glebe-house. There were in the township, in 1833, two day-shools (one of them with a small endowment), with 67 children; and in the other quarters of the parish five day-schools, with 105 children.

Haltwhistle, is in the west division of Tindale ward, 285 miles from London. The parish contains 52,930 acres, and is divided into thirteen townships. The population of the whole parish, in 1831, was 4119; that of Haltwhistle township, 1018. The town is on an eminence on the northern bank of the South Tyne, and consists of one principal street, running east and west along the road from Newcastle by Hexham to Carlisle, and of some smaller streets; the streets are neither paved nor lighted. The Haltwhistle Burn, a small stream from the north, passes the east end of the town in its course to the Tyne. The houses are poor and irregularly built. At the east end of the town is an eminence, called the Castle Banks, on which are some rude fortifications of earth of unascertained origin.

The only manufacture carried on is that of baize. There are a small market on Thursday, and two yearly fairs, chiefly for cattle. There are many coal-pits in the parish, in which 100 men are employed, besides boys. The living is a vicarage, of the clear yearly value of 593*l.*, with a glebe-house. There were in Haltwhistle township, in 1833, one endowed and three other day-schools, with 183 children, and one Sunday-school, with 143 children. In the rest of the parish there were eight day-schools, with 215 children, and three Sunday-schools, with 164 chidren.

Hexham is in the south division of Tindale ward, 278½ from London. The parish comprehends Hexham township, 4310 acres, with a population, in 1831, of 4666; and Hexhamshire, 24,060 acres, with a population, in 1831, of 1376: together, 28,370 acres, population 6042. Hexham is believed to have been a Roman station. Camden conjectured that it was Axelodunum, one of the stations of the 'Notitia,' on the line of the wall (*per lineam valli*), which later antiquaries fix near Carlisle; Horsley contended for its being the Epiacum ('Επιάκον) of Ptolemy, a town of the Brigantes, which others fix at Lanchester.

Two inscriptions on stones in the vaults of the antient church are considered as proofs that a Roman station did exist here. In the seventh century (A.D. 674) a monastery was founded here by St. Wilfrid, who erected the monastic buildings in a style of magnificence little known at that day. He built also three churches in Hexhamshire, which domain had been granted to him by the queen of Northumbria. A few years afterwards (about A.D. 678), on the division of the Northumbrian diocese into three parts, a bishop's see was established at Hexham, and continued for many years, until the bishops were driven out by the Danes, and the diocese was afterwards united to Lindisfarne. The abbey and town of Hexham were sacked by the Danes early in the ninth century; and in A.D. 875 it was again attacked, the church burnt, and the inhabitants massacred.

In the twelfth century the archbishop of York established here a priory of regular canons of St. Austin, and bestowed on them the former cathedral, and many other gifts (A.D. 1112). In the Scotch wars of Edward I. the town and part of the church were burnt, and the title-deeds of the priory lost; but by royal authority an inquisition was taken (A.D. 1297), and their various gifts confirmed by charter. The revenue of the priory, at the dissolution, was 138*l.* 1*s.* 9*d.* gross, or 122*l.* 11*s.* 1*d.* clear.

The town is pleasantly situated on an eminence, near the south or right bank of the Tyne, a little below the junction of the North and South Tyne. It consists of several streets, the principal of which are tolerably wide, but the rest are generally narrow; the streets are partially paved and indifferently lighted. The market-place is a spacious square, tolerably well paved, and surrounded with pretty good houses; on the south side of the market-place is a market-house, furnished with piazzas; part of it is appropriated as a butter and poultry market, and part to stalls for butchers' meat; at one end of the building is a 'pant,' or reservoir, the water to which is conveyed by pipes. In the market-place is an antient stone building, with a dial in front, formerly used as the town-hall of the bishops and priors of Hexham, and now used as a sessions-house. There are a bridge over the Tyne of nine principal arches, and three supplementary arches to allow passage to the waters in time of floods; a suspension-bridge over the South Tyne, near the town; and a bridge with two arches over a burn west of the town. On the top of the hill on which the town stands, not very far from the town-hall, is a square tower, used as a prison by the bishops of Hexham. But the most important building is the old priory church, now used as a parish church. It is a cruciform building with a central tower, above 100 feet high to the battlements, or 125 feet high to the top of the vane. The nave, burnt by the Scots in the time of Edward I., has never been rebuilt; the transepts are separated from the choir by a screen richly carved in the lower part and adorned in the upper part by an emblematical painting. The choir is separated from its side aisles by massive clustered pillars supporting pointed arches; above these is the second tier of arches, of Norman character, separated by massive clustered columns; and above these again, a third tier of arches, pointed, supporting the wooden roof. There is a fine east window, and in the church are several antient monuments. There is an antient crypt, which some have supposed to be part of the original Saxon church built by Wilfrid. At the west end of the church are the remains of the monastic buildings; the refectory is yet entire, and is occasionally used as a room of entertainment; it is very spacious, and has an oak roof. There are some remains of the cloisters, which show the richness and excellence of their architecture. The gateway of the abbey, supposed by many to be Saxon, is also standing. There are two Catholic chapels, a Scotch church, and two or three other dissenting places of worship in the parish.

Several manufactures and branches of trade are carried on,—spinning woollen yarn, hat-making, tanning, leather-dressing, and glove-making. The market is on Tuesday for corn and provisions; and there is a Saturday market for butchers' meat. A market for cattle is held on the alternate Tuesdays during a considerable part of the year. There are two yearly markets for horses, cattle, sheep, and swine: at the earlier of these, held in August, vast quantities of lambs are sold. The Midsummer sessions for the county are held here, and petty-sessions for the ward every month. In the western part of the town is a house of correction for the county.

The living is a perpetual curacy, of the clear yearly value of 139*l.*, in the peculiar jurisdiction of the archbishop of York.

There were, in 1833, a grammar-school, with a small endowment and 65 scholars; a school, partly supported by subscription, with 230 children; seven other day-schools, with 200 scholars; and six Sunday-schools, with about 705 children.

Rothbury is in the west division of Coquetdale ward, 304 miles from London. The parish comprehends 33,170 acres, and is divided into twenty-four townships; the population in 1831 was 2869; that of the township of Rothbury, 1014. This place is delightfully situated in a retired spot on the north or left bank of the Coquet. On the north and east it is sheltered by hills; on the west, the valley in which the town stands presents a fine prospect. Rothbury consists of three streets, wide, airy, and lined with tolerably well-built houses. The market-place contains a cross. The church, which is very antient and was formerly larger than at present, is in the form of a cross. The interior is neat and spacious, and contains an antient font and several monuments. Near the church is a school-house. The river Coquet, on the south side of the town, is crossed by a stone bridge of three arches, and on the opposite side of the river is Whitton Tower, one of the antient borderers' houses, now converted into the rectory and surrounded with plantations. Rothbury is frequented in summer by invalids, who come here to drink goats' whey and enjoy the healthy and bracing air of the place.

There is a market for provisions on Friday; there are four yearly fairs, one of them a statute fair for hiring servants, and two of them cattle-fairs. The living is a rectory, of the clear yearly value of 1106*l.*, with a glebe-house. There were in 1833, in the township, an endowed grammar-school, with 65 boys; another endowed school, with 45 girls; and three other day-schools, with 65 children. In other parts of the parish there were one endowed school, with 46 children; another school, partly supported by contribution or endowment, with 25 children; and two other day-schools, with 92 children.

Wooler is in the east division of Glendale ward, 320 miles from London. The area of the parish is 4620 acres, and it had in 1831 a population of 1926. The town consists of a number of streets and lanes, with the market-place in the centre. The country round is well cultivated, but the town is ill paved and the houses are mean. The church is a neat building, erected about the middle of the last century: there are several dissenting places of worship. The market is on Thursday, chiefly for corn; there are two yearly fairs in the town; the latter, which is held in October, is a great sheep-fair. There are also a large sheep and cattle fair in September at Fenton in the parish; and a large cattle and sheep fair at Westwood bank, near the town, on Whit-Tuesday. The living is a vicarage, of the clear yearly value of 478*l.*, with a glebe-house. There were, in 1833, a grammar-school, partly supported by contributions, with 56 children; a school of industry, supported by subscription, with 32 girls; ten other day-schools, with 259 children; and five Sunday-schools, with 324 children.

There are several entrenchments and cairns near Wooler, and the thick walls of an antient tower, probably of Norman origin, and erected for the purposes of border warfare. On a hill called Humbleton Hugh, about a mile from the town, is a circular entrenchment, with a large cairn; and on the side of the hill are a number of terraces rising one above another, the origin and purpose of which have excited much conjecture. In the plain beneath this hill is a stone pillar, commemorative of the battle of Humbleton, fought A.D. 1402.

Alnemouth or Alemouth is in the parish of Lesbury, and in the south division of Bamborough ward, 313 miles from London. The area of Lesbury parish is 4540 acres; the inhabitants, in 1831, were 976, of whom 415 were in Alnemouth township. This place may be considered as the port of Alnwick: there is a considerable export of corn as well as of other agricultural produce to the metropolis, and of wool to the manufacturing districts of Yorkshire. The harbour is inconvenient, but is capable of much improvement. Some little business is done in ship-building, and a few of the inhabitants are engaged in fishing. On an eminence at the mouth of the Alne, insulated at high-water, is an old burial-ground, in which are the ruins of a chapel. Enormous bones have been dug up in or near this burial-ground, and several stone coffins have been found. Lesbury is a village between Alnwick and Alnemouth: it contains nothing remarkable. The living is a vicarage, of the clear yearly value of 269*l.*, with a glebe-house. There were, in 1833, in Alnemouth township, two day-schools (one chiefly supported by private benevolence), with 78 children, and one Sunday-school, with 50 children: and in the rest of the parish, two day-schools (one endowed), with 96 children; a sewing-school, with 15 children; and two Sunday-schools, with 114 children.

Hartley is in Earsdon parish and in Castle ward, 10 miles north-east of Newcastle. Seaton Sluice is in the township of Hartley, about a mile to the north of the town. The area of Earsdon parish is 11,060 acres: the population, in 1831, was 6460; that of Hartley township, one of eight townships into which the parish is divided, was 1850. Sir Ralph Delaval, in the time of Charles II., constructed a haven at the mouth of the Seaton Burn, which flows into the sea in this township; and in order to prevent the harbour being filled up with mud and sand, he formed a sluice, with flood-gates, to scour the haven. This haven was improved by the late Lord Delaval, who made a new entrance by a cut through the solid rock. This improvement has rendered the harbour accessible at all times and in every state of the wind: it is capable of holding twelve or fifteen vessels of 300 tons, which can ride in safety, and enter or leave the harbour fully laden. The principal trade of the place is in the coals dug from the collieries of the parish, in which nearly 500 men are employed. There is a drawbridge over the new entrance to the harbour. There are in the township three glass-houses for the manufacture of bottles, some malt-kilns, and a brewery. There are Presbyterian and Methodist meeting-houses. Nearly opposite Hartley town is a small island, called St. Mary or Bates's Island, on which formerly stood a chapel and a hermitage. There were in the township, in 1831, three day-schools, with 154 children, and one Sunday-school, with 180 children.

Warkworth is in the east division of Morpeth hundred, about 306 or 308 miles from London. The parish has an area of 16,110 acres, divided into eighteen townships: the population of Warkworth township, in 1831, was 614; that of the whole parish 2478. The town is on the south side of the river Coquet. There are a number of good houses, the place being, from the cheapness of provisions and other necessaries, considered a desirable place of residence. The church is an elegant and spacious building, part of it of considerable antiquity: the tower and spire are above 100 feet high. There are places of worship for Methodists and Presbyterians. Immediately adjacent to the town is the antient castle, held at different periods by the descendants of Roger FitzRichard, and by the families of Raby and Percy, to the latter of which it still belongs. It is a noble pile, finely situated on an eminence above the river Coquet. The keep is an octagon, having a projecting tower in the middle of the four principal faces. The entrance is by a flight of steps in the tower on the south face. The whole building is very large, and comprehends many apartments. The great baronial hall is nearly 40 feet long by 24 wide, and 20 high; and there is another state-room of rather smaller dimensions. Just within the entrance, on the ground-floor, are eight apartments with vaulted roofs of stone, supposed to have been designed for the cattle which might be brought into the castle for protection against the inroads of the Scotch borderers. The masonry of the castle is in excellent preservation, but the roof, windows, and floors are for the most part gone. The outer walls of the castle are in many places entire; where they are so, they are 35 feet high. The gateway was a stately building, with apartments for many of the officers of the castle, but only a portion of it now remains. A mound of earth across the moat, which surrounds the whole and encloses an area of five acres, has taken the place of the antient drawbridge. Some other parts of the castle yet remain. The period at which this structure was built is not ascertained. The view from it is very extensive and beautiful. There is a bridge of two spacious arches over the Coquet at the north side of the town, having a tower at the south or town end, with an archway through which the road passes: in the middle of the bridge is a stone pillar, with the Percy arms carved on it. In the perpendicular rocks which form the north bank of the Coquet, about a mile above the bridge, is a hermitage, consisting of two apartments hewn out of the rock, with a lower and outward apartment of masonry, built up against the side of the rock, which rises about 20 feet high. The principal apartment, or chapel, is about 18 feet long, 7½ feet wide, and 7½ feet high, adorned with pilasters, from which spring the groins of the roof: at the east end is an altar, with a niche behind it for a crucifix; and near the altar is a cavity containing a cenotaph, with a recumbent female figure having the hands raised in the attitude of prayer. In the inner apartment are another altar and a niche for a couch. From this inner apartment was a door leading to an open gallery or cloister. Steps led up from the hermitage to the hermit's garden at the top of the bank. This hermitage, it has been supposed, was the abode of one of the Bertram family, who spent here a life of penitence for the murder of his brother: the Percy family, after his death, maintained a chantry priest here. There is no record to show the date of this foundation. There are several good shops in the town. There is a yearly fair in November for fat cattle and winter stock. There is a fishery of salmon and salmon trout (especially the latter) in the river. Warkworth is a borough by prescription: the principal officer is the boroughreeve or mayor. The parish yields excellent coal, freestone, limestone, and whinstone: valuable pebbles are sometimes found in the river. The living is a vicarage, of the clear yearly value of 528*l.*, with a glebe-house. There were in the township, in 1833, one infant-school, with 26 children; three day-schools, with 78 children; and two national schools, with 86 children in the week and 111 on Sundays.

There are some populous townships and parishes situated around Newcastle. The township of Byker, in the parish of All Saints (pop. 5176), and the township of Jesmond, in that of St. Andrew (pop. 1393), are now included in the parliamentary and municipal borough of Newcastle. The township of Cowpen, in the parochial chapelry of Horton, is near the south bank of the river Blyth, and not far from the port of that name. There is an extensive colliery in the parish, which employs about 300 men. 'Cowpen Square,' near the river, consists chiefly of houses built for the colliers. Long Benton parish, near Newcastle, has an area of 8760 acres, with a population, in 1831, of 6613. It contains the townships of Long Benton, Little Benton, Killingworth, Walker, and Weetslet. The village of Long Benton consists of one long street, in which are some good houses and a number of neat cottages. Upwards of 1200 men are employed in the collieries of this parish, and about 40 or 50 in iron-founding. In the township of Walker are manufactories of bricks and tiles, and of copperas. There were, in 1833, one boarding-school, with about 20 boys; nine day-schools, with about 387 children; and five Sunday-schools, with about 250 children. The parish of Wall's End, between Newcastle and Tynemouth, has an area of 2560 acres, with a population, in 1831, of 5510; it comprehends the townships of Wall's End, Howdon Pans, and Willington. The village of Wall's End is large and well built, with a spacious green in the centre; the parish church is a neat modern building. There are several places of worship in the parish for Methodists and Presbyterians. There are extensive collieries, in which upwards of 900 men are employed. At Howdon (or Howden) Pans (so called from the numerous salt-pans, now discontinued), are large docks, in which frigates and Indiamen were formerly built, but now only colliers. There is a covered ropewalk connected with the docks; and at East Howdon, close by, is a manufactory for coal-tar, varnish, and lampblack. There are staiths along the river, from which a great quantity of coal is shipped for London. There are also in the parish extensive lime-kilns and manufactories for copperas and earthenware. The parish of Wall's End takes its name from the Roman wall ending here on the north bank of the Tyne. There were, in 1833, sixteen day-schools, with about 551 children; a national-school, with about 180 children in the week and 200 on Sundays; and five Sunday-schools, with 490 children.

Ford is near the Scottish border, on the right bank of the Till, about 9 miles from Wooler. The parish comprehends an area of 12,220 acres, and had, in 1831, a population of 2110. The village consists of one irregular street, on an eminence rising from the river, over which is a bridge. Ford Castle is on the north side of the village, and was originally built in the reign of Henry III., by Sir William Heron, and was in great part rebuilt by the late Lord Delaval. Of the original structure only two towers on each flank of the present edifice remain. The castle commands a fine prospect up the valley of the Till as far as Wooler. It was antiently a border fortress of importance, and suffered severely from the Scots in an incursion in the year 1385. it was taken by James IV. A.D. 1513, just before the battle of Flodden (which was fought in this parish), and was again captured, with the exception of one tower, which held out, in 1549. Besides the parish church, there are two dissenting places of worship. Nearly 200 men are employed in the parish in the coal-pits and stone-quarries. There were, in 1833, six day-schools, with 197 children; one day and Sunday school, with 60 children in the week and 26 on Sunday; and one Sunday-school, with 15 children.

Corbridge is in the east division of Tindale ward. The parish has an area of 13,130 acres, with a population, in 1831, of 2091, of which 1292 were in the township of Corbridge. This large and populous village is on the north bank of the Tyne, over which there is a bridge of seven arches. It consists of a main street, along the road from Newcastle to Hexham, and several smaller streets. There is a spacious market-place, which formerly contained a cross. The parish church is a very antient structure, of larger dimensions formerly than at present; and at the north-east corner of the market-place is an antient tower, formerly used as a prison, and now as a lock-up house. Corbridge was formerly a place of importance and a market-town. It had four parish churches, three of them now demolished. There are traces of extensive buildings between this place and the neighbouring Roman station of Corchester. This town suffered much from the Scots, A.D. 1296 and 1311. At Stagshawbank, 2½ miles north-east of Corbridge, one of the largest sheep-fairs in the north of England is held. The living of Corbridge is a vicarage, united with the chapelry of Halton, of the clear yearly value of 482*l.*, with a glebe-house. There was in 1833 a national-school in the township, with 61 children; and in other parts of the parish there were two day-schools, with 62 children, and one Sunday-school, with 40 children.

Divisions for Ecclesiastical and Legal Purposes.—The whole county of Northumberland is included in the diocese of Durham; the district of Hexhamshire, which was till lately in the peculiar jurisdiction of the archbishop of York, has been by an order in council added to the diocese of Durham. The whole county, with the detached portions of Durham, constitutes the archdeaconry of Northumberland; and is subdivided into the five rural deaneries of Newcastle (21 benefices), Corbridge (20 benefices), Bamborough or Bamburgh (17 benefices), Alnwick (20 benefices), and Morpeth (19 benefices): making the total number of benefices, in the year 1811 (when the *Historical and Descriptive View of Northumberland*, from which we take these numbers, was published), 97. The number of benefices in Hexhamshire is 7; these are included in the number assigned above to the deanery of Newcastle, to which that district has been added.

The Dissenters of Northumberland are chiefly Presbyterians, and the Presbyterian form of church government exists among them in greater completeness than is usual in England. There were, in 1811, in the county of Northumberland, in the detached portions of Durham, and in the town of Berwick-upon-Tweed, 44 Presbyterian congregations, viz. 27 in connection with the kirk of Scotland; 11 in connection with the Scotch Seceders (viz. 5 Burghers, 4 Antiburghers, 2 of the 'Relief'); and 6 others not connected with any Presbyterian body. There were at the same time 5 Independent and 2 Baptist congregations, with a few scattered Baptist societies which met for worship but had no stated ministers. There were also 22 Catholic chapels, 11 of them attached to the residences of the Catholic gentry or supported by them. It is probable that during the last few years the number both of Catholic and Dissenting places of worship has been materially augmented.

The county is in the northern circuit. The assizes are held at Newcastle, to which the judges proceed from Durham. The quarter-sessions are held at Newcastle (Epiphany), Morpeth (Easter), Hexham (Midsummer), Alnwick and Berwick (Michaelmas). The county gaol and house of correction is at Morpeth; there are other houses of correction at Tynemouth, Hexham, and Alnwick. The number of persons committed to these various places of confinement was as follows:—

	Year ending October,		
	1834.	1835.	1836.
Morpeth . .	191	194	136
Tynemouth . .	107	89	161
Hexham . .	56	53	78
Alnwick . .	105	91	69
	459	427	444

There is a common gaol at Newcastle-upon-Tyne for the county of the town of Newcastle; to which the committals were as follows:—1834, 477; 1835, 415; 1836, 539. The county gaol, the Hexham house of correction, and the Newcastle gaol, are for debtors as well as criminals; and on the average nearly half the committals to Newcastle gaol are for debt.

Before the Reform Act, only six members of parliament were returned from Northumberland, viz. two knights of the shire, who were elected at Alnwick, and two members each for the boroughs of Newcastle and Morpeth. By the Reform Act the county was formed into two divisions, each returning two members. The northern division consists of Glendale, Bamborough, and Coquetdale wards; with Norhamshire, Islandshire, and Bedlingtonshire, parts of the the county of Durham; and Berwick bounds; all which are, for parliamentary purposes, annexed to Northumberland. The court of election for this division is held at Alnwick; and the polling-stations are Alnwick, Berwick, Wooler, Elsdon, and Morpeth. The southern division comprehends Tindale (or Tynedale) and Castle wards, and the county of the town of Newcastle. The court of election for this division is held at Hexham; and the polling-stations are Hexham, Newcastle-upon-Tyne, Haltwhistle, Bellingham, and Stamfordham. By the Reform Act, Morpeth was reduced to one member, but the new borough of Tynemouth was created, returning one member, so that the number of borough members remained as before. The boundaries both of Newcastle and Morpeth were extended; and Tynemouth was declared to include the townships of Tynemouth, North Shields, Chirton, Preston, and Cullercoats.

Berwick-upon-Tweed returned two members before and after the Reform Act; the townships of Tweedmouth and Spital were added by the Boundary Act.

History, Antiquities, &c.—In the earliest period of the history of the island the eastern side of the county and the adjacent parts of Scotland were inhabited by the Otadeni ('Ωταδηνοι, Ptol.), whose towns were Curia (Κουρία, Ptol.) and Breminium (Βρεμένιον), the latter of which was in Northumberland. On the west of the Otadeni, in Northumberland, Cumberland, and Galloway, were the Gadeni (Γαδηνοι, Ptol.), none of whose towns are mentioned by Ptolemy. The Alaunus ('Αλαυνος) of Ptolemy, which has been identified with the Tweed (Horsley) and the Coquet (*Maps of the Society for the Diffusion of Useful Knowledge*) should rather be identified with the Alne; at least if the name may be taken as a guide. The Alauna of Richard of Cirencester (Iter IV.) is evidently the same as the Alaunus of Ptolemy; and the Tueda of Richard (Iter IV.) may be safely identified with the Tweed.

There are several remains of the primitive inhabitants of the country, consisting chiefly of rude hill-forts, cairns, and Druidical monuments. In Armstrong's map of the county the forts are marked as being very numerous, especially amid the hills of the border toward Scotland. To what historical period they are to be referred is doubtful. Some may be memorials of a period anterior to the Roman conquest under Agricola; others may be referred to the struggles of the inhabitants or northern Britons with the Romans under Severus and his successors; and others to the subsequent struggle against the Northumbrian Angles.

Of these British remains, one of the most remarkable is on Yevering Bell, near Wooler, where the nearly level summit of an oblong mountain, which rises 2000 feet above the adjacent plain, is encircled with the remains of a wall built of large flat whinstones without mortar, and enclosing a considerable area. The medium breadth of the ruined wall is eight feet. There is an entrance on the south side. There is an inner enclosure, formed of stones, with a ditch inside; and this inner enclosure contains a large cairn of stones. On the sides of the hill are the remains of circular buildings; but so far ruined and the stones so scattered, as to render it impossible to ascertain their former use. There are also the traces of a grove of oaks. It has been conjectured that it was a Druidical temple.

On a hill called Humbleton Hugh, near Wooler, is an antient entrenchment, with a huge cairn. The slope of the hill consists of terraces rising one above another; these terraces are commonly supposed to be artificial, and various conjectures have been formed as to their origin and use. They are observed on the face of other hills in the neighbouring districts and also in Scotland, and are usually surmounted by hill-forts. Possibly they owe their origin to the disintegration of the strata of the rocks of which the country is composed. There is a somewhat similar fort at Cornhill near the Tweed.

Between the village of Ilderton in Coquetdale ward and Hedgehope, one of the border hills, is a Druidical monument consisting of ten large rude and unequal stones, arranged so as enclose an oval area of thirty-eight yards from east to west by thirty-three from north to south. The stones are mostly thrown down and partly buried in the earth. It is probable they were originally more numerous.

Of other forts or camps may be mentioned those at Spindleston near Bamborough; that near Alnham, by the head of the Aln; those on Bewick Hill and at Harup Burn between Alnwick and Wooler; that at Old Rothbury near the modern town of the same name; those near Craghead in Rothbury Forest, Motehill, Elsdon (where Roman inscriptions have been dug up), between Bellingham and Rothbury; and a camp near Belford, nearly square, which has usually been ascribed to the Danes.

The Romans do not appear to have attacked this part of the country until the time of Agricola, who was sent over to Britain, about A.D. 78, as governor. [AGRICOLA.] His predecessors had subdued or nearly subdued the Brigantes, whose territory probably extended to the Tyne. It appears to have been in the second year of his command (Tacit., *Agric. Vita*, c. xx.) that he formed that line of forts which extended from the German Ocean to the Solway Frith, and nearly coincided with the line of the great wall subsequently erected. Of the subjugation of the Otadeni and Gadeni by him we have no distinct account. They were perhaps brought into subjection during the second year of his command, or were among the nations whose country he ravaged in his third campaign, when he advanced into Scotland as far as the Tay. He secured his conquests by a second line of forts extending from the Forth to the Clyde.

The northern conquests of the Romans were by no means permanent. Agricola was recalled, and the Roman power languished. The Caledonians continued hostilities, and several tribes, who had submitted, revolted (Spartian., *Vita Hadriani*); and the emperor Hadrian found it expedient to abandon all the country between the two lines of forts built by Agricola, and to defend the southern part of the island by a rampart of earth. Hutton (*Hist. of the Roman*

Wall) considers that Agricola had carried a ditch and bank across the island, and that Hadrian repaired this and strengthened it by new defences. Perhaps some posts were maintained by this emperor beyond the line of the wall. In the reign of Antoninus Pius, the district between the two lines of forts formed by Agricola was reconquered by Lollius Urbicus, lieutenant of the emperor, who raised a rampart of turf (murus cespititius) across the island in the direction of the northern line. Hostilities between the Romans and the yet unsubdued natives were renewed under Marcus Aurelius, the successor of Pius, but the historians of the period give us no particulars. In the following reigns Northumberland and the rest of the country between the two walls appear to have regained their independence: the tribes who inhabited them seem to have united into one body, called by the Romans Mæatæ (*Μαιάται*), a name which is supposed to be derived from the British word 'meath,' denoting a plain. Severus was engaged in active warfare against these natives (A.D. 207-210): he lost 50,000 men, but ultimately obliged them to submit. He carried a strong wall (murus) across the island nearly in the line of Hadrian's rampart. Hostilities were soon renewed by the natives, and Severus died at York in the midst of his preparations to extirpate them (A.D. 210 or 211). Caracalla, his successor, hastily made peace with the natives; and it is likely that the independence of the country north of the wall was tacitly admitted if not recognised, though some fortified posts were probably retained by the Romans. The subsequent history of the county during the Roman period is obscure: it was probably the seat of hostilities under Constantine and Valentinian (Ammianus Marcellin., lib. xxvi. 4; xxvii. 8), under the latter of whom, Theodosius, a Roman general, recovered this and the adjacent districts, to which the name Valentia was given. When the Roman power in Britain was vigorously wielded, this province appears to have been subject to the Romans; when the administration was feeble, the natives resumed independence, and perhaps active hostility.

The most remarkable monument of the Roman dominion is the great line of defence formed and augmented by the successive labours of Agricola, Hadrian, and Severus; and sometimes called 'the Picts' Wall,' sometimes 'the Roman Wall.' Some account of these great works has been given elsewhere. [BRITANNIA, vol. v., pp. 444, 445.] We have here only to notice in connection with them the position and traces of the stations along their line (*per lineam valli*) which are in Northumberland.

The first station, Segedunum, is generally fixed at Cousen's house, Wall's End, between Newcastle and Tynemouth: there are no remains. Pons Ælii, the second station, was, in the opinion of most antiquaries, at Newcastle; but Camden was induced by the name to fix it at Ponteland, which is north of the wall, on the Pont, one of the branches of the Blythe, 7¼ miles north-west of Newcastle. Condercum, the third station, is fixed at Benwell Hill, an eminence 2 miles or 2½ miles from Newcastle; there are very distinct traces of this station above the village of Benwell. Vindobala, the fourth station, is fixed at Rutchester, or Rouchester: the ramparts of this station, which was large, are very visible. The station is situated just on the line of the wall; and that part of the station which lay beyond the wall to the north was strengthened by several towers. Some slight portions of the masonry remain. A great number of coins and other antiquities have been dug up near this station. The fifth station, Hunnum, was at Halton Chesters: it was between Hadrian's rampart and the wall of Severus. Coins, inscriptions, urns, and other antiquities have been discovered here. Cilurnum, the next station, was at Walwick Chesters, close on the right or west bank of the North Tyne. Its area is rather above the usual extent of the stations, being about eight acres. The ground within the vallum is crowded with the ruins of stone buildings, which formed apparently two streets from east to west, and a third cross street from north to south. This station is just on the line of the wall of Severus, having Hadrian's rampart on the south side of it. Procolitia, the seventh station, was on an open elevated spot at Carraw-burgh. A great part of the rampart is very entire, and the wall of Severus, which forms the north side, is in good preservation. About half a mile south-west of this station is a square fort called Brown Dykes or Broom Dykes, which appears to be of Roman origin. There was also a station at Shewing Shields, a little to the west of Procolitia. Horsley conjectures that it belonged to Hadrian's line of defence, but became useless when the wall of Severus was built. Borcovicus, the eighth station, is fixed at House Steads, 6 or 7 miles north-east of Haltwhistle. This is the most perfect and the grandest station on the whole line. It is on an elevation, with a steep or precipitous descent toward the north, and a gentler declivity toward the south: it comprehended fifteen acres, and had a large suburb on the south side. As many as twenty streets may be counted. A great number of altars, inscriptions, and other antiquities have been discovered here. There was a temple of Doric architecture; and part of a Doric capital and fragments of the shafts of columns have been discovered: a Roman altar, the inscription of which is perfect, now decorates the fireplace or mantel of a neighbouring farm-house. Between the two last-mentioned stations, Procolitia and Borcovicus, the works of Agricola and Hadrian and those of Severus separate, the former being carried along the lower ground, while the wall is carried over crags and precipices, and, from the deep declivity on the north, needs no ditch. There are one or two gaps in the craggy ridge, over which the wall is carried, by which gaps the Picts, and after them the moss-troopers of the border, frequently broke in. Vindolana, the ninth station, is generally placed at Little Chesters. The ramparts of this station are visible, but the ditch is nearly filled up: it lies a mile if not two miles south of the wall. The prætorium may be distinguished; and several antiquities have been discovered here. Æsica, the tenth station, is at Great Chesters: the trenches and ramparts are well preserved, and the prætorium is visible: there are the ruins of several buildings. Several remains of the south entrance of the station, part of the jambs, and pieces of an iron gate and hinges were found here; and a variety of broken altars and effigies have been discovered. Magna, or perhaps Magnæ, the eleventh station, is fixed at Carvoran, close to the border of the county toward Cumberland. It is a small station, and lies to the south of both the rampart of Hadrian and the wall of Severus. It is on low ground in a valley watered by two little rivers, the Tippal, which falls into the Tyne, and the Irthing, which flows into the Eden. Many antiquities have been dug up. The military roads which accompanied the course of the wall may be traced in several places. The modern turnpike-road runs in some parts on the foundation of the wall of Severus.

Beside the stations on the line of the wall, there were some other places of note in this county in the time of the Romans. The Bremenium of Ptolemy, noticed in the first *Iter* of Antoninus under the slightly varied name of Bramenium, has been fixed by Camden, Horsley, and other antiquaries, at Riechester, or Rochester, on the Reed, which falls into the North Tyne. Reynolds (*Iter Britanniarum*) contends for Newcastle, but with more zeal than success. This station appears to have been of great strength and importance, being defended by a wall of ashler-work seven feet thick, three ramparts of earth, and moats, and was probably maintained as an outpost beyond the wall. Several altars, inscriptions, coins, and other antiquities have been found here. A station, to which, on the faith of an inscription found there, the name of Habitancum is given, was fixed at Risingham, where are the remains of a small fort. A great Roman road, to which the name of the Northern Watling Street was applied, entered this county from Durham, and passing Corstopitum, near Corbridge, divided into two branches, one of which ran by Habitancum and Bremenium into Scotland, while the other ran to the west of Morpeth and Alnwick into Scotland near Berwick. At Corstopitum, or Corstoplium, now Colchester, or Corchester, near Corbridge, a Roman town or station, almost entirely levelled, many antiquities have been discovered. Some antiquaries have fixed the Curia (*Κουρία*) of Ptolemy, one of the towns of the Otadeni, here. Just before entering Scotland, the western branch of Watling Street passed a camp at Chew Green, near the head of the Coquet, supposed to be 'Ad Fines,' a station in the fifth *Iter* of Richard of Cirencester. This is a very remarkable camp, with numerous ramparts and ditches in excellent preservation. A Roman road, called 'the Maiden Way,' entered the county from near Aldstone in Cumberland, and ran north to the station Magna on the wall.

Beside these stations and places to which a name may be assigned, there are other places in which Roman antiquities have been discovered. Hexham has been noticed already. Whitley Castle, on the Maiden Way, just on the border of Cumberland, is a Roman camp, fortified with many trenches and breastworks of earth. At Old-town in Allendale are the traces of another camp or station, and many antiquities have been discovered. There are camps at Outchester, or Ulchester, near Bamborough, at Shieldikes in Rothbury Forest, and in other places. Altars, inscriptions, or other antiquities have been dug up or found at Elsdon in Redesdale (the Valley of the Reed), Simonsburn, near the North Tyne, just without the wall, at Tynemouth, and other places. Indeed, in the number of Roman inscriptions and sculptures discovered in it, Northumberland very far surpasses any other English county.

Upon the departure of the Romans in the fifth century, Northumberland became the prey of the Picts and other barbarians, who broke through the wall and ravaged the island. When the Saxons were invited to oppose these invaders, a body of them, under Octa and Ebusa, were posted with their ships at the east end of the Roman wall (perhaps A.D. 454); but it was not till near a century afterwards (A.D. 547) that a serious attempt was made at the permanent conquest of this part of the country. A considerable part of the country between the Humber and the Forth was divided into the two states of Bryneich and Deifyr; and it is probable that Northumberland was included in Bryneich, the northernmost of these. Perhaps some portions of the county may have been included in the district of Gododin, of which the bard Aneurin was chief, or in that of Reged, which was governed by Urien, the patron of the bard Taliesin. The invaders were Angles, and their leader, Ida, though he experienced a stout resistance from the natives, especially from Urien, laid the foundations of an Anglo-Saxon kingdom in Bryneich, or Bernicia. He built a castle on the coast, to which he gave the name of Bebban Burgh, since better known as Bamborough; or perhaps he seized on a Roman fort, and added to it some further defences of his own. Ida died A.D. 560. The reigns of his immediate successors were brief, and not marked by any particular events; but the power of the invaders gradually extended. One of their chieftains, named Ella, separating himself from the other Angles of Bryneich, founded the kingdom of Deifyr, or Deira, separated from Bryneich by a vast forest that occupied what is now the county of Durham; and other warriors, penetrating to the southward, established the state of Mercia, the latest founded of the Anglo-Saxon kingdoms; first a dependency of Deifyr, but at length an independent state, and the powerful competitor of Wessex for the supreme dominion of Britain. The two kingdoms of Bryneich and Deifyr were frequently united, and, when so united, constituted the great kingdom of Northumbria (we appropriate this form of the name to the kingdom, Northumberland to the county), of the history of which we shall give a sketch here. This kingdom extended along the eastern shore of the island from the Humber to the Forth, thus including a considerable portion of the lowlands of Scotland. It was bounded on the west by the British kingdoms of Strathclyde, or Vale of Clyde, and Cumbria, which extended south to Lancashire. The boundary of the Northern Angles and Cumbrian and Strathclyde Britons is not clearly ascertained, and probably varied much with the changing fortunes of the parties. The superiority of the invaders was however gradually but firmly established.

Ethelfrith or Ædelfrid, grandson of Ida, distinguished himself by his vigorous attacks on the Britons. He carried his arms into their territories, gained a great victory near Chester, and massacred the monks of Banchor, or Bangor, on the Dee in Flintshire (who had accompanied the British host into the field), and demolished their monastery. These transactions are variously dated A.D. 602 to 612 or 613. Ethelfrith was defeated and slain (A.D. 617) by Redwald of East Anglia [NORFOLK], and succeded by Edwin, of the race of Ella of Deifyr, whose history is given elsewhere. [EDWIN.]

On the death of Edwin (A.D. 633), under whom the two Northumbrian kingdoms were united, his dominions were ravaged by the combined Mercians and Britons. Osric, a kinsman of Edwin, who succeeded to the crown of Deira, or Deifyr, and Eanfrid, son of Ethelfrid, who succeeded to Bernicia, or Bryneich, restored paganism, which Edwin had renounced: they were both speedily slain by Cadwallon, or Cadwallader, the Briton, who seized both the Northumbrian kingdoms, but was himself defeated and slain by Oswald, another son of Ethelfrith (A.D. 634 or 635), in the neighbourhood of Hexham, perhaps at St. Oswald's, in the line of the Roman wall. Oswald succeeded to both the kingdoms of the north; and did much for the promotion of Christianity, which Edwin had introduced. He was recognised as Bretwalda of Britain, and his supremacy was acknowledged by what Bede calls the four tongues of Britain, the Angles, Britons, Picts, and Scots. He fell in battle against Penda the Mercian at Maserfelth, probably at or near Oswestry in Shropshire (A.D. 642). The place where he fell attests the extent of his dominions, for he was not the invader, but the invaded party. Penda, flushed with success, overran Northumbria; but Bebbanburgh resisted his attacks, and the steps which he took to burn it led to his repulse. Oswy, or Oswio, brother of Oswald, was then chosen successor to the Northumbrian crown in Bernicia, and Oswin, son of that Osric whom Cadwallon had slain, in Deira.

Oswio became more powerful than any of the sovereigns who had yet reigned over Northumbria. He subdued the greater part of the Picts and Scots, attacked Deira, and, on the death of Osric, who was killed by treachery (A.D. 651), obtained part of that country, leaving the rest to his nephew Ethelwald, the son of Oswald; and, having defeated and slain the warlike Penda (A.D. 655), possessed himself of Mercia, part of which he granted to Peada, son of Penda. The Mercians however soon revolted, and raised Wulfhere, another son of Penda, to the throne. But Oswio remained the most powerful of the Anglo-Saxon princes: he enjoyed the dignity of Bretwalda, and was addressed by Pope Vitalian as 'Rex Saxonum.' The archbishopric of York was coextensive with the dominions of Oswio, and comprehended the territory of the Picts. He died (A.D. 670), after a reign of twenty-eight years, and was succeeded by his son Ecgfrid.

Upon the accession of Ecgfrid the Picts attempted to regain their independence but were defeated with great slaughter. He wrested Lindesey (a part of Lincolnshire) from Wulfhere; and divided his kingdom, thus enlarged, into three dioceses: Bernicia, the see of which was at Hexham, afterwards at Lindisfarne; Deira, see at York; Lindesey, see at Sidnaceaster or Sidnacestre. Subsequently a bishop of the Pictish provinces was appointed. Alfwin, brother of Ecgfrid, reigned in some part of Northumbria, in subordination, it is likely, to the supremacy of Ecgfrid. Ecgfrid sent an army to Ireland, and conquered several portions of territory from the Cumbrian Britons (A.D. 684 and 685). He fell at last in battle against the Picts, whose country he had invaded (A.D. 685), and was succeeded by his brother Aldfrid, or Ealdferth, who reigned nineteen years (A.D. 685-705). He was a religious and learned prince. After him came Osrid his son, who reigned eleven years (A.D. 705-716), and died in battle, probably against the Picts, with whom both Aldfrid and Osrid had carried on hostilities. According to another account Osrid fell by assassination by the hands of Coenred, or Cenred, who succeeded him and reigned two years (A.D. 716-718), and of Osric, who succeeded Cenred, and reigned eleven years (A.D. 718-729). Ceolwulf succeeded his brother Cenred. In his reign Ethelbald of Mercia invaded and ravaged Northumbria, carrying off with him great booty. Ceolwulf was a weak prince, and the misfortunes of his reign led to treasonable plots, which induced him to abdicate the throne. Eadbert succeeded (A.D. 737), and, in a vigorous reign of twenty-one years, subdued all the neighbouring kings, Angles, Picts, Britons, and Scots. In alliance with the Picts he took Alcluid, or Dumbarton, a fortress of Strathclyde. Pepin, king of the Franks, sought his friendship. He resigned his crown (A.D. 758), and retired to a monastery. A long list of princes, whose short reigns were marked by bloodshed and treason, succeeded to the throne. The annals of Northumbria are a mere chronicle of murders, battles, revolts, and depositions, till the accession of Eanred (A.D. 809). The limited power or unambitious disposition of this prince induced him to submit without resistance to Egbert, who acquired for Wessex the permanent supremacy of the Anglo-Saxon kingdoms.

In the year 844 the Danes attacked Northumbria, and slew Redwulf, who had usurped the throne, and Alfred, who was probably coadjutor of Redwulf in the government. In 867 Northumbria was again assailed by a vast armament of these invaders, under Ingwar, or Ivar, Halfdane, and Hubba, sons of Regnar Lodbrog, who are said to have come in order to revenge the death of their father, who had perished in Britain, and most likely in Northumbria. The government of that kingdom was at that time contested by

Osbert and Ella, who, on the approach of the Danes, made peace with each other, and divided the kingdom between them. They both fell in an attempt to recover York, which the Danes had taken. That part of Northumbria which was north of the Tyne was bestowed by the invaders upon Egbert, but he was expelled by the Northumbrians, and succeeded by Ricsig, after whom came another Egbert. In this period the Danes made an entire conquest of the country, and settled in it. Halfdane became sovereign, and divided the kingdom among his followers.

It is difficult to trace the causes which led to so complete a subjugation of the north of England by these invaders. Perhaps the strength of the Northumbrian kingdom had been consumed in the domestic strife of so many years, or the dissensions which had prevailed made each party prefer the dominion of strangers to that of their rivals. It may be, too, that the ferocity engendered by a long period of anarchy had prepared the population for readier coalition with those to whose habits their own had become assimilated. However this may have been, the conquest was complete; and in the treaty which Alfred made with the invaders, Northumbria was included in the Danelagh, or Danish territory. On the death of Halfdane (A.D. 883) Guthred and Ecgbert succeeded respectively to the crowns of Deira and Bernicia, to which latter kingdom the name of Northumbria began about this time to be restricted, though we shall still use it in its more extended application.

The territory between the Tyne and the Tees was bestowed on St. Cuthbert (who had appeared in vision to Eadred, then bishop of Lindisfarne), and became thus the portion of the bishops of Durham, and the foundation of their palatinate jurisdiction. On the death of Guthred, who, though of Danish birth and lineage, appears to have embraced Christianity, the Northumbrians, Danes as well as English, appear to have submitted to Alfred. Eric, or Eohric, is recorded as the leader of those who remained pagans; but he recognised the supremacy of the West Saxon kings.

Against the successors of Alfred the Northumbrian Danes continually renewed the struggle, but always with ill success. On the accession of Edward the Elder (A.D. 901), Eric and his followers supported his competitor Ethelwald; but both Ethelwald and Eric fell in battle, and Northumbria submitted to Edward. A new invasion or insurrection of the Northmen, under Regnald, Sihtric, and Niel, or Nigel (the last two being sons of Ingwar, or Ivar), followed; and as far as we can gather from Simon of Durham, they defeated, near Corbridge, a confederate army of Scots and native Northumbrians, and seized the whole kingdom, but were compelled to acknowledge the supremacy of Edward the Elder. Nigel was killed by his own brother Sihtric before the submission of the Danes to Edward.

Sihtric married the sister of Athelstan (about A.D. 925), who had succeeded to the throne and supremacy of his father, Edward the Elder: he consented to embrace Christianity, and governed Bernicia as subordinate to him. On Sihtric's death (A.D. 926) his son and successor Guthferth, or Godefrid, endeavoured to throw off his subjection to Athelstan, by whom he was defeated and expelled (A.D. 927). Regnald governed at this time a portion of Northumbria, and one Eric obtained another considerable portion, perhaps of the dominions of the expelled Guthferth, as vassal of Athelstan, on condition of embracing Christianity and defending the dominions entrusted to him against Scots and pagan Danes.

The rising power of Athelstan, and his inveterate hostility to Guthferth, whom he compelled the king of Scotland to dismiss, provoked a general confederacy against him. He is said to have added Northumbria to his dominions, at least to have exercised a sovereignty which had not been previously claimed. Anlaf, Aulaf, or Olave, son of Guthferth, and 'king of Ireland and the Isles,' arrived in the Humber with a mighty fleet, increased by piratical adventurers from Norway and the Baltic, and accompanied by Constantine of Scotland. The Northumbrian Danes rose in favour of Aulaf, and perhaps those of East Anglia; and the Britons of Cumbria and Wales joined in the attempt to overthrow the supremacy of Athelstan, who, at this crisis, augmented his own forces by mercenary troops and auxiliaries from Rollo of Normandie. [Normandie.] The contending parties met at Brunanburh, or Brunnaburgh, probably in Northumbria (A.D. 937): the victory of Athelstan was decisive, and was commemorated in the Sagas of the north and the songs and chronicles of England. Aulaf fled, and Northumbria was incorporated in the dominions of Athelstan.

On the death of Athelstan and the accession of his brother Edmund I. (A.D. 941), Aulaf possessed himself of Northumbria and a part of Mercia. He defeated Edmund at Tamworth and Leicester, and obtained the cession of all England north of Watling Street (A.D. 943). This was the utmost extent of the Danelagh, as arranged by Alfred. The sovereignty of Aulaf seems moreover to have been independent of the West Saxon crown; and it was agreed that whichever of the two princes survived, the other should succeed to the whole. Aulaf died soon after; and Edmund seized Northumbria, driving out Aulaf II., son of Sihtric and uncle to the late Aulaf, and Regnald, son of Guthferth and brother of Aulaf I. He also conquered the Cumbrian Britons, and gave their territories to the king of Scotland on condition of securing the north against invaders.

On the accession of Edred, brother of Edmund (A.D. 947), the Northumbrians renewed their homage to the West Saxon, or, as we may now call it, the English crown; but within a year or two violated their engagements, and made a final effort for independence. Eric, whom Athelstan had set over part of Northumbria, but who had forsaken his government and turned pirate, was chosen king by them: he was however unable to retain his kingdom. Edred ravaged Northumbria (A.D. 949, 950), and the Northumbrians abandoned Eric, who was slain by treachery. The kingdom of Northumbria was now extinguished, and the regions which composed it were divided into earldoms or counties, of which Bernicia, or Northumbria north of the Tyne, was one, Deira (Yorkshire) another, and Lothian (south of Scotland) a third. It is probable that Bernicia was nearly conterminous with the present county; to this therefore, under the name of Northumberland, the rest of our notice will be confined. It may be as well to mention that Lothian was ceded (about A.D. 971) to the kings of Scotland, in feudal subjection to the English crown.

In the wars of Ethelred II. with the Danes, Bebbanburgh was stormed (A.D. 993); and some years after (A.D. 1013) the north of England passed with little resistance into the power of Sweyn, by whom it was held till his death. Canute, son of Sweyn, soon repossessed himself of it, and held it until, on the death of Edmund II., all England became subject to him. During this period the earldom of Northumberland was held by Oswulf and his descendants, Eadulf, Etheldred, or Aldred, Waltheof I., and Uchtred, the last of whom deserted from Ethelred to Canute, by whose order he was slain (A.D. 1016). His death was avenged by his son Aldred II., who slew Thorbrand, Canute's instrument in the murder; but was himself slain by Charles, son of Thorbrand. He was succeeded in his earldom by his brother Eadulf, who defeated the Britons of Strathclyde, but was killed by Siward, who became earl of Northumberland in his room.

These transactions show the anarchical state of Northumberland, the result of that practical independence which its remoteness from the seat of the supreme government secured to it. Siward held the earldom of York as well as of Northumberland (A.D. 1042-1055), and ruled with vigour and success. He formed one of the band of nobles who counterbalanced, during the reign of Edward the Confessor, the power of Earl Goodwin, or Godwin, and his family; and the share he took in the restoration of Malcolm III. Canmore to the throne of Scotland has been made generally known in the 'Macbeth' of Shakspere. On the death of Siward, his earldoms were granted to Tostig, brother of Harold, afterwards king; but his northern subjects rejected him and chose Morcar, or Morkar, son of Algar, earl of Chester, in his room (A.D. 1065). Morcar granted the earldom of Northumberland to Osulf, a descendant of the former earls, but in subordination to himself.

On the Conquest (A.D. 1066), William imprisoned Morkar and deposed Osulf from his earldom, which he conferred on Copsi, an adherent of Tostig. Osulf on this assassinated Copsi, but was himself killed by a robber soon after. The earldom was subsequently possessed by Robert Comyn, a Norman or other foreign companion of William, who was killed in a rising of the people at Durham; by Cospatric, a Saxon, whom William afterwards expelled from the earldom; by Waltheof, son of Siward, another Saxon, executed as a traitor at Winchester; by Walcher, bishop of Durham, a Norman, murdered in a tumult at Gateshead; by Alberic, a Norman; and by Robert de Moubray, a Norman. In the stout resistance offered by the men of the north of England to the Norman power, and in the fearful vengeance by which that resistance was punished, few events can be connected with the county of Northumberland, except the removal of the body of St. Cuthbert from Durham to Lindisfarne, or Holy Island. It is probable that the county was then thinly peopled and little cultivated. Its great sources of wealth, its mineral treasures, required a more peaceful time and a more advanced civilization to develop them. It may be supposed that the dissension and anarchy which had for two or three centuries pervaded the north, and the infusion of the manners of the barbarous Northmen, had thrown back the population in the scale of social improvement, or at least retarded their advance. When William (A.D. 1068 or 1069) had wasted and depopulated the more densely inhabited tract between York and Durham, he seems to have disregarded the country beyond the Tyne. We do not find that he penetrated into it, except in his way to invade Scotland (A.D. 1072), and in his return. The county, as well as Cumberland, Durham, and Westmoreland, is omitted in 'Domesday Book.' About this time it was exposed to the ravages of the Scots, who are said to have carried off so many of the inhabitants, that there was scarcely a house in Scotland without one or more English slaves.

As the Scottish princes augmented their territories and consolidated their power, and as the Anglo-Norman princes on the other hand grew in wealth and resources, Northumberland became subject to the evils and received the constitution of a border county. The earldom became merely titular, and the government of the county was given to the high-sheriff, who was entrusted with unusual powers. The county was subdivided into baronies, which were arranged in six wards and subdivided into constableries. Excursions for plunder became the occupation of the borderers on both sides of the frontier, and they alternately inflicted and endured the miseries of petty but uninterrupted warfare. Agriculture in so insecure a state was neglected, and the cattle became the chief property of the landowner. Castles and towers were erected in almost every part, and every habitation was constructed with a view to defence as well as residence. Resistance to the plunderers led to scenes of blood, and bloodshed laid the foundations of deadly feuds. The borderers acted for the most part as light cavalry, called 'prickers;' they rode small but nimble and well-trained horses. Those who acted as infantry were of excellent skill and courage. They had their places of rendezvous, to which they repaired at the signal of their beacon fires. The English borderers excelled in the use of their national weapon, the long bow; and their onset, when they closed, was signalised by the war-cry or 'slogan.' The fierce and unsettled habits caused by such a condition continued till modern times. The inhabitants of the eastern border, toward Berwick-upon-Tweed, were first brought into a more peaceful way of life; but amid the wastes and fastnesses of the western side of the county the borderers have only at a comparatively late period become assimilated to the rest of their countrymen.

In the reign of William Rufus, Northumberland was twice invaded by Malcolm III. Canmore, king of Scotland. His first invasion (A.D. 1091) was retaliated by William, and Malcolm was compelled to submit. In his second invasion (A.D. 1093), after committing great ravages, he was surprised and slain, with his eldest son Edward, while besieging the castle of Alnwick, by Robert de Moubray, earl of Northumberland. This Robert soon after conspired, with other nobles, against William; but that king crushed the conspiracy by his alertness, besieged successively Tynemouth and Bamborough castles, and took Moubray prisoner.

Upon the accession of Stephen to the throne of England, David, king of Scotland, having determined to support the claims of the empress Maud, invaded the north of England and took Wark and Norham castles, and the towns of Alnwick and Newcastle. He failed in his attempt to take Bamborough; and upon the advance of Stephen peace was made (A.D. 1135 or 1136). A short time afterwards David, taking advantage of Stephen's absence in Normandie, again broke into Northumberland, to support the claim of his son Henry to the earldom of that county; but agreed to a truce until Stephen should return and give his decision of the claim. On the refusal of Stephen to admit this, war recommenced (A.D. 1138). Wark Castle was besieged, but in vain, and the western side of the county ravaged, as far as the Tyne. On the approach of Stephen, the Scots retreated, but when the English king retired, they again advanced, and ravaged the eastern side of the county. Norham Castle was taken and demolished, and Wark a second time besieged, but with no better success than formerly; it was however blockaded. Upon David's return to Scotland, after his defeat in the battle of the Standard at Northallerton, he resumed the siege of Wark, and at length obliged the garrison by famine to capitulate (A.D. 1138). Peace was soon after concluded, and Henry's claim to the earldom admitted (A.D. 1139). This earldom was taken from the Scottish royal family by Henry II., and that of Northampton bestowed as a compensation.

In the civil strife near the close of the reign of Henry II., William the Lion, king of Scotland, supported the rebellious princes; and entering Northumberland, besieged Wark Castle, which had been restored (A.D. 1173). The siege failed, and the English in return crossed the Tweed and burned Berwick; but hostilities were suspended by a truce. On the expiring of the truce, the county was again invaded by the Scots. Harbottle and Warkworth castles were taken, and Prudhoe and Alnwick castles besieged. While before the latter, the Scottish king was surprised and taken prisoner (A.D. 1174). This event led to a peace.

In the civil troubles of the reign of John, Northumberland again was the scene of hostility (A.D. 1215). The insurgent barons were supported by the king of Scotland, who hoped to possess himself of the county. Norham Castle was vainly besieged by the Scots. Morpeth, Alnwick, and Wark were destroyed, to prevent their falling into the hands of John; and the town and castle of Berwick were taken and afterwards burned by his mercenaries, who advanced into Scotland and captured several towns. The king of Scotland received from the dauphin Louis (whose claim to the English crown he admitted) the cession of Northumberland and some other of the northern counties; but he did not succeed in gaining possession of them; and at the peace concluded about the commencement of the reign of Henry III. they remained still attached to England.

In the reign of Henry III. the Scottish king Alexander II. invaded Northumberland and advanced to Ponteland, while Henry with the English army was at Newcastle (A.D. 1244). Peace was however made without a battle.

When war broke out between Edward I. and John Baliol, king of Scotland (A.D. 1296), the king of England assembled his army at Newcastle, and marched to the relief of Wark, which was threatened by the Scots. He crossed the Tweed, took Berwick by storm, and after making a general carnage of the male inhabitants and defenders (except the garrison of the castle, which surrendered upon terms) and sending the women into Scotland, repeopled the town with English settlers. In retaliation the Scots invaded Northumberland, besieged Harbottle Castle, but in vain; ravaged the districts of Redesdale and Tindale; destroyed Corbridge; burned the town, monastery, and church of Hexham, and committed other devastations (A.D. 1296). A year after they again entered the county under Wallace, after defeating the English at Stirling and recapturing Berwick, and having established their head-quarters in Rothbury Forest, devastated the country all round; and, after a vain attempt upon Newcastle and Carlisle, returned to their own country (A.D. 1297). Early the following year the English army assembled at Newcastle, and, marching into Scotland, entered Berwick, which the Scots had deserted.

Edward II. was at Newcastle (A.D. 1310) in an expedition against the Scots; and spent the winter of 1310-11 at Berwick, which might at this time be considered as an English town. Next year, while Edward invaded Scotland, Robert Bruce ravaged Tindale and Redesdale in Northumberland. In 1312 the king and his favourite Gaveston were surprised by the insurgent barons at Newcastle, and with difficulty escaped to Tynemouth, and thence by sea to Scarborough. In the same year the Scots again invaded the county, burned Corbridge and Hexham, and made a vain attempt on Berwick. The English army was assembled at Wark (A.D. 1314), and marched to Berwick previous to the great battle of Bannockburn. After that disastrous defeat, Northumberland was ravaged almost without resistance, and the victorious Scots penetrated into Yorkshire. A part of the inhabitants of Tindale and Redesdale were obliged to swear allegiance to the king of Scotland; and the ravages of war reduced the inhabitants of the north of England to such distress, that they were obliged to eat the flesh of dogs and horses, and a quarter of wheat was sold for forty shillings, an enormous price at that time. The disorganised state of society led also to the formation of numerous bands of marauders. In 1318, Berwick, and the castles of Wark, Harbottle, and Mitford were taken by the Scots, who seized the whole county, except Newcastle and a few strongholds, and penetrated farther into England. Next year (A.D. 1319) the English, under the command of the king, made a strenuous but vain attempt to recover Berwick. In 1320 the Scots penetrated as far as Corbridge, and in 1322 they twice renewed their devastations. Hostilities were afterwards suspended by a truce, which continued till the deposition of Edward II. (A.D. 1327).

At the commencement of the reign of Edward III. the Scots renewed their ravages in this county, and the king, a boy of fifteen, who pursued them with a vast army, was unable to overtake them. In the course of the summer, the Scots took Norham Castle and attempted Alnwick, but failed. Peace soon followed, by which the town of Berwick was restored to Scotland.

In 1333 war broke out again. Edward besieged Berwick and ravaged Scotland; the Scots in return ravaged Northumberland and blockaded Bamborough, where Edward's queen was. The extremity to which the garrison of Berwick was reduced obliged the Scots to march to its relief; they were defeated at Hallidown Hill in the immediate vicinity, and the town capitulated. In 1340 and 1342 the Scots wasted Northumberland; in the latter year they were repulsed in attacks upon Newcastle and the castle of Wark. In 1346 they wasted the southern part of the county. In 1355 they surprised the town of Berwick, but failed in their attempts to take the castle, and early in the following year (1356) the town was retaken.

In the year 1372 the quarrels of the borderers brought on a severe battle at Carham, in which the Scots defeated a superior number of English. In 1378 the castle of Berwick was surprised by a few borderers and held by them against a powerful force for nine days, when it was taken. In 1384 the same castle was betrayed to the Scots, but was recovered by Percy, earl of Northumberland, the father of Hotspur. In 1385, while an English army ravaged Scotland, the Scots broke into Northumberland, ravaged it as far as Newcastle, and took and demolished Wark, Ford, and Cornhill castles. In 1387 the Scots again entered the county and ravaged it; on their return they defeated and took prisoners Hotspur and his brother Ralph, who, at the head of a more numerous army, had attacked them at Otterburn. Earl Douglas, the Scottish commander, fell in this battle, which, it has been supposed, has furnished the subject of the old ballad of 'Chevy Chase.' It is fairly and graphically described, chiefly after Froissart, in Tytler's *History of Scotland*, vol. iii., p. 53.

The early part of the reign of Henry IV. was marked by hostilities on the border. In A.D. 1400 the Scots took and demolished Wark Castle, but were defeated at Fulhopelaw in Coquetdale; another inroad in 1402 was chastised with a similar defeat, and led to the more important battle of Homeldon, or Humbleton, near Wooler, where the earl of Northumberland, his son Hotspur, and the Scotch earl of March, defeated about 10,000 Scots under the earl of Douglas, who was taken prisoner. The revolt of the Percies and the battle of Shrewsbury (A.D. 1403) arose from the king's demanding that they should deliver up the prisoners taken at Homeldon. The town of Berwick, which was held by an adherent of the earl of Northumberland in his second revolt (A.D. 1405), was surrendered to the king's forces, as were the castles in the county held by the earl or his supporters. In the reign of Henry V. (A.D. 1419), Wark Castle was taken by the Scots, and almost immediately retaken.

In the reign of Henry VI. (A.D. 1436) a severe battle was fought at Pepperdean, just within the border of the county, not far from Cornhill, between the earl of Northumberland (the son of Hotspur), or perhaps Sir Robert Ogle, and Douglas, earl of Angus, each with about 4000 men. The English were defeated. This battle has furnished, according to some, the origin of the ballad of 'Chevy Chase,' rather than that of Otterburn; but the presence of the earl of Northumberland is not noticed by some of our authorities. In 1448 war between the two countries was resumed, and the Scots burned Alnwick.

In the civil war of the Roses, most of the barons and other inhabitants of Northumberland embraced the Lancastrian party. The earl of Northumberland (the son of Hotspur) was slain in the first battle of St. Alban's, A.D. 1455, and his son Thomas Percy, lord Egremont, at that of Northampton, A.D. 1460, both fighting on that side. The next earl, son of the preceding, fell, together with his brother Sir Richard Percy, in the great battle of Towton (1461). In the year 1462, Peter de Brezé, a French captain of note, engaged by the Lancastrian party, landed with a small force in Northumberland, and was besieged by the Yorkists in Alnwick, but escaped, by the aid of the Scots, into Scotland. Next year, Margaret of Anjou, queen of Henry VI., landed near Bamborough, and took Alnwick, but withdrew on the approach of Edward IV. into Scotland. Some of her troops, being driven ashore on Holy Island, were made prisoners, and Alnwick, Bamborough, and Dunstanborough castles were taken by the Yorkists. In 1464 the queen reentered Northumberland with a numerous army. Bamborough castle was surprised, and many of her partisans took arms in her favour. But a party of her forces was defeated at Hedgley Moor, eight or ten miles north-west of Alnwick; and the main body was utterly routed near Hexham by the Lord Montacute, Yorkist warden of the Eastern March (A.D. 1464). In the battle of Hedgley Moor, Sir Ralph Percy, brother of the last earl of Northumberland, was slain; the 'Percy Cross' marks the spot where he fell. Lord Montacute received, as the reward of his victory, the title of Earl of Northumberland and the forfeited inheritance of the Percies. The Yorkists took Bamborough and wasted the Scottish border. Berwick had been delivered up by the Lancastrians to Scotland during these troubles, but was restored to England by treaty (A.D. 1482).

In the attempts of Perkin Warbeck to dethrone Henry VII., Northumberland was invaded by that pretender, in company with an army of Scots and foreigners under James IV. of Scotland. The country was cruelly devastated, but on the approach of an English army the invaders retired (A.D. 1496). Next year James renewed his invasion, but he met with little success either in his attempts to plunder or to master the strongholds of the border. He besieged Norham with vigour, but failed to take it, and soon afterwards withdrew to his own country.

In the reign of Henry VIII. a body of 3000, or, according to some, of 8000 Scots, under Lord Hume, were cut off, on their return from a marauding incursion into the county, at Millfield, near Ford Castle (A.D. 1513). The king of Scotland, James IV., eager to revenge the defeat of his subjects, entered Northumberland the same year with a numerous army, forced the garrison of Norham to surrender upon terms, and took and partly demolished Wark, Etal, and Ford castles. While he dallied with Lady Heron at Ford Castle, the earl of Surrey, the English commander, was advancing with his son Lord Thomas Howard, lord admiral of England, Lord Dacres, and other men of note and power in the north of England, and an army of about 30,000 men: the armies met at Flodden, near the spot where Hume, whose defeat the king desired to avenge, had been overthrown. The Scots were probably more numerous by nearly 10,000 men (Tytler's *Hist. of Scotland: Notes and Illustrations*), but the mismanagement of the king ensured their defeat: James fell on the field, with the greater part of the brilliant train of nobles who had accompanied him, and probably about 15,000 men. In 1523 the county was invaded by the duke of Albany, regent of Scotland, who, with his French auxiliaries, besieged Wark Castle, while the Scots, who refused to support the invasion, remained on their own side of the river. Part of the castle was taken, but the other part held out, and ultimately the assailants were driven off. In 1524 a small force of Scots renewed the invasion, but were defeated at Brauxton; and some incursions were made in various years from A.D. 1532-1558. But the advancement of the power of England, and the establishment of better arrangements along the border, combined, with the internal dissensions of Scotland, to diminish the frequency of the Scottish inroads, and to prevent any serious invasion of the realm. In the repeated and destructive ravages of the English in the south of Scotland, Berwick was the point from which the armies usually took their departure.

In the rebellion of the northern earls of Northumberland and Westmoreland against Queen Elizabeth (A.D. 1569), Alnwick and Warkworth castles, which were held by the earl of Northumberland's retainers, were taken by the queen's officers. The insurgent nobles passed through Hexham in their retreat from Durham into Cumberland. The assassination of the earl of Murray, regent of Scotland, whose vigorous administration had curbed the borderers, was followed by an incursion of the Scots into England (A.D. 1569), and one or two other incursions took place before the union of the two crowns of England and Scotland on the head of James I. Soon after that event, the office of lord warden of the marches fell into disuse, the garrison of Berwick was reduced, and the frontier lost its military character. It was long indeed before border feuds entirely died away; but they ceased to bear the character of national hostilities; and however national feeling might enter into them, they were treated as private quarrels or marauding expeditions.

Of these many centuries of strife and consequent misery this county contains many memorials. The ruins of Norham and Wark castles still overlook the Tweed, and those of Heton, Dudhowe, and Ford rise on the banks of the Till or its tributary streams. Norham is the most striking ruin: the walls of the keep are now reduced to a mere shell; the apartments in the basement are vaulted; the keep is a square tower of four stories above the vaults, built of red freestone very liable to decay. The outworks have been demolished, and part of the hill on which the castle stands has been washed away by the river. Two towers of Ford Castle remain incorporated in a more modern building. Of the others there are only the earthworks and foundations, or perhaps the vaults of the basement. Norham, Heton, and Dudhowe are in Islandshire, which belongs to Durham.

Bamborough and Dunstanborough castles are on the coast. [BAMBOROUGH.] Dunstanborough Castle is protected by steep cliffs on the north and east sides; on the south and west sides it was defended by a wall and towers, which are for the most part yet standing. The keep and other buildings of the interior, except the remains of a chapel, have disappeared. The entrance gateway on the south side is yet standing.

In the interior of the county are Alnwick [ALNWICK] and Warkworth castles, which last has been described already. Of Callaley Castle, near Whittingham, the western tower is of great antiquity: the rest of the building is more modern. Bothall Castle on the Wensbeck, Mitford, Belsay, and Harnham castles, are all near Morpeth. The picturesque ruins of Bothall, which consist chiefly of the gateway, with its flanking towers, and the outer wall of the court in which the keep stood, are on an eminence on the bank of the river. There are considerable remains of Langley Castle near Hexham, and there are ruins of Blenkinsop, Bellester, Thirlwall, and Featherstone castles, near Haltwhistle; of Staward Castle on the banks of the Allen; and of Prudhoe Castle, the antient seat of the Umfranvilles, on the south bank of the Tyne, between Newcastle and Hexham. This last is one of the finest ruins in the county; it stands on a precipitous bank of the river 60 feet high. The gateway, a lofty embattled square tower, the outer wall, and the keep are yet standing; and there are the ruins of the chapel and other buildings.

The hostility to which the county was exposed rendered it necessary for the smaller proprietors to have their dwellings strongly built; their habitations were towers, with the basement vaulted to contain the cattle of the neighbourhood when driven in for shelter. Whitton Tower near Rothbury, now converted into a rectory-house, may be taken as a specimen of these fortified dwellings. The walls are eleven feet thick at the foundation, nine feet in the kitchen, and six feet in the chambers over it. In the basement vaults is a deep well. There are the remains of other similar towers in different parts of the county.

The chief ecclesiastical antiquities of the county are noticed elsewhere. [DURHAM, County; TYNEMOUTH.] Of Hulne Abbey, for Carmelite friars, close to Alnwick, there are some remains. A tower, built by a former earl of Northumberland as a place of refuge for the monks, has been repaired, enlarged, and fitted up by a late duke of Northumberland. Brinkburn Priory near Rothbury, for regular canons of St. Augustin, has been in great part demolished. The tower of the church, part of the side walls, and several pillars and arches remain. They contain various examples of transition from the Norman to the early English styles. There are ruined churches or chapels at Old Bewick, between Alnwick and Wooler; Memmer-kirk, in Coquetdale ward, near the border of Scotland; Bothall near Morpeth; and Jesmond near Newcastle. The ruins of the last are incorporated in a farm-house and offices.

In the troubles of Charles I.'s reign this county suffered considerably. In the first campaign of Charles against the Scots (A.D. 1439), an army of 20,000 Royalists marched northward towards Berwick, but effected nothing; in the second campaign the Scots invaded Northumberland, and advanced to the Tyne. On the 16th August, 1640, they forded that river at Newburn, a few miles above Newcastle. The Royalist infantry, from panic or disaffection, fled, and the horse were defeated with the loss of 300 men. When the war between the king and the English parliament broke out, the Northumbrians chiefly embraced the king's party. William Cavendish, marquis of Newcastle, fortified Tynemouth and Newcastle, and raised a regiment of Royalists at his own charge, at the head of which he fought at the fatal battle of Marston Moor (A.D. 1644). Before that battle the Scots, under Lesley, traversed the county in their march to support the Parliamentary forces, and, returning after their victory, took Newcastle by storm. The mayor, who had retired to the castle, was obliged to capitulate. Cromwell was entertained at Newcastle after his capture of Berwick (A.D. 1648), and again on his way to Scotland, just before his victory at Dunbar (A.D. 1650).

In the rebellion of 1715, the earl of Derwentwater, Lord Widdrington, and Mr. Forster, one of the county members, with several of the gentry, took up arms for the Pretender, marched to Rothbury and Warkworth, at which places they raised the standard of King James. They then marched to Morpeth, being in number about 300, partly Scots. From Morpeth they marched to Newcastle; but finding the gates shut, marched to Hexham, where another body of Scots joined them. They subsequently received larger reinforcements from Scotland at Rothbury and Wooler, under Lord Kenmure and Brigadier McIntosh. On the approach of General Carpenter from Newcastle with a body of government troops, they retired into Scotland. The subsequent transactions of the rebellion were beyond the limits of the county. From 400 to 500 of the English rebels (including 75 noblemen and gentlemen), chiefly Northumbrians, together with about 1000 Scots, were taken at Preston. Derwentwater was beheaded, Widdrington was pardoned, and Forster escaped from Newgate. In the rebellion of 1745-46 this county took no share. The inhabitants of Newcastle armed in support of the government, but were not called upon to act.

(Hutchinson's *View of Northumberland; Historical and Descriptive View of Northumberland*, Newcastle, 1811: Greenough's *Geological Map;* Conybeare and Phillips's *Outlines of the Geology of England and Wales; Parliamentary Papers;* Rickman's *Gothic Architecture;* Turner's *Anglo-Saxons* and *History of England;* Palgrave's *Rise and Progress of the English Commonwealth;* Hutton's *Roman Wall; Beauties of England and Wales*, &c.)

STATISTICS.

Population.—Northumberland may be considered as chiefly a mining county, though a large number of persons are engaged in agricultural pursuits, and some in manufactures. It is the 37th on the list of agricultural counties. Of 53,210 males twenty years of age and upwards, 1252 were engaged, in 1831, in manufactures and in making manufacturing machinery; and of this number 200 were employed at Byker, in making glass bottles and crown-glass, 150 at Newcastle-upon-Tyne, 46 at Hartley, and 28 at Newburnhall; steam-engines and machinery for the collieries employed 79 men at Newcastle and 20 at Chirton. There were about 90 iron-founders at Sugley and Long Benton. Alkali was made by 20 men at Newsham; at Hexham there were 22 wool-combers and weavers. The spinning of woollen yarn and linen thread employed about 300 persons, scattered in the villages throughout the county. Lead-mills, shot-making, the making of chain-cables, &c., give employment to a few of the population at Slaley, Wylam, North Shields, &c. There were engaged in agricultural pursuits 14,055 men, out of which number 10,441 were labourers; 13,939 men were employed as labourers in labour not agricultural.

The population of Northumberland at each of the fou following periods, was—

	Ma.es.	Females.	Total.	Increase per cent.
180 .	73,357	83,744	157,101	..
1811	80,385	91,776	172,161	9·58
1821	95,354	103,611	198,965	15·56
1831	106,147	116,765	222,912	12·08

showing an increase between the first and last periods of 65,811, or more than 29 per cent. on the whole population, being 28 per cent. below the rate of increase throughout England and Wales.

The following table is a summary of the population of every ward, &c., as taken in 1831.

WARDS, TOWNS, &c.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Bamborough (Ward) .	2,107	2,230	15	66	1,145	513	572	5,194	5,648	10,842	2,606
Castle (Ward) . .	11,875	15,817	86	631	1,316	3,394	11,107	33,809	37,724	71,533	15,861
Coquetdale (Ward) .	3,592	4,456	17	159	1,828	1,184	1,444	10,202	10,919	21,121	5,286
Glendale (Ward) .	2,198	2,363	7	72	1,224	437	702	5,795	6,214	12,009	2,852
Morpeth (Ward) .	2,208	2,816	5	92	1,168	744	904	6,468	6,844	13,312	3,509
Tindale (Ward). .	7,508	8,628	33	297	3,282	2,128	3,218	21,082	21,333	42,415	10,832
Berwick-upon-Tweed, Town of . .	1,190	2,118	7	69	111	885	1,122	3,937	4,983	8,920	1,897
Newcastle-upon-Tyne, Town and County of the Town of .	5,048	9,936	50	121	53	4,961	4,922	19,660	23,100	42,760	10,367
Totals .	35,726	48,364	220	1,509	10,127	14,246	23,991	106,147	116,765	222,912	53,210

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the four dates of—

		£.		*s.*	*d.*	
1801	were	52,416,	being	6	8	for each inhabitant.
1811	. .	72,821	„	8	5	„
1821	. .	77,505	„	7	9	„
1831	. .	74,092	„	6	7	„

The sum expended for the same purpose for the year ending March, 1838, was 61,446*l.*; and if it be assumed that the population increased from the years 1831 to 1838 in the same ratio as in the ten years preceding 1831, the above sum gives an average of 5*s.* 1*d.* for each inhabitant. These averages are below those for the whole of England and Wales.

The sum raised in Northumberland for poor-rate, county-rate and other local purposes, in the year ending 25th March, 1833, was 99,747*l.*, and was levied upon the various descriptions of property as follows:—

On land . .	£60,921	5*s.*
Dwelling-houses .	21,765	17
Mills, factories, &c. .	12,411	1
Manorial profits, navigation, &c.	4,649	0
Total	£99,747	3

The amount expended was—

For the relief of the poor . .	£73,792	5*s.*
In suits of law, removal of paupers, &c.	4,257	14
For other purposes . .	22,461	8
Total money expended	£100,511	7

In the Returns made up for subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, and 1836, there were raised 95,655*l.* 8*s.*, 87,054*l.* 6*s.*, and 81,402*l.* 15*s.*; and the expenditure of each year, from 1834 to 1838, was as follows:—

	1834. £.	1835. £	1836. £	1837. £	1838. £
For the relief of the poor	71,983	68,405	62,809	59,363	61,446
In suits of law, removal of paupers, &c. .	4,651	3,337	3,039	2,174	2,120
Payments towards the county-rate . .	18,681	9,052	10,153	not given	6,580
For all other purposes		6,775	6,410	5,385	3,158
Total money expended	£95,315	87,570	82,403		73,364

The saving effected in the sum expended in 1838, as compared with that expended in 1834, was therefore 22,011*l.*, or 23 per cent.; and the sum expended for the relief of the poor in 1838 was less than that in 1834 by 10,537*l.*, or rather more than 14 per cent.

The number of turnpike trusts in Northumberland, as ascertained in 1836, was 14 (Acts 3rd and 4th William IV., c. 89); the number of miles of road under their charge was 479. The annual income arising from tolls and parish composition in lieu of statute duty in 1836 was 20,091*l.*, and the annual expenditure in the same year was as follows:—

	£.	*s.*	*d.*
Manual labour . .	5,546	16	0
Team labour and carriage of materials	1,706	10	0
Materials for surface repairs .	2,519	8	0
Damages done in obtaining materials	127	2	0
Tradesmen's bills . .	540	3	0
Salaries of treasurer, clerk, and surveyor	1,336	0	0
Law charges . . .	993	11	0
Interest of debt . . .	3,207	8	0
Improvements . . .	1,607	5	0
Debts paid off . . .	3,017	6	0
Incidental expenses . .	292	6	0
Estimated value of statute duty performed . . .	1,711	19	0
Total expenditure	£22,635	14	0

The county expenditure in 1834, exclusive of that for the relief of the poor, was 9,066*l.* 12*s.*, disbursed as follows:—

	£.	*s.*	*d.*
Bridges, building, repairs, &c.	3,300	10	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	2,481	10	0
Shire-halls and courts of justice, building, repairing, &c. . .	102	13	0
Prosecutions . . .	646	13	0
Clerk of the peace . .	696	14	0
Conveyance of prisoners before trial	78	8	0
Vagrants, apprehending and conveying	43	19	0
Coroner . . .	126	4	0
Miscellaneous	1,590	1	0
Total expenditure	£9,066	12	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 612, 570, and 719 respectively, making an average of 87 annually in the first period, of 81 in the second period, and of 103 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 27, 26, and 35 respectively. Among the persons charged with offences there were committed for—

	1831.	1832.	1833.
Felonies . .	20	19	27
Misdemeanors .	7	7	6

The total number of committals in each of the same years was 27, 26, and 33 respectively.

	1831.	1832.	1833.
The number convicted was . .	22	24	24
The number acquitted was . .	4	—	8
Discharged by proclamation . .	1	2	1

There were 159 persons charged with crimes at the assizes and sessions in Northumberland in 1838. Of these 18 were charged with offences against the person, 12 of which were common assaults; 19 were charged with offences against property committed with violence; 115 with offences against property committed without violence; only 1 was charged with a malicious offence; 5 for uttering counterfeit coin, and 1 for various misdemeanors. Of the whole number committed 130 were convicted, 22 were acquitted, 2 were not prosecuted, and no bill was found against 5. Of those convicted one was sentenced to death, whose sentence was commuted to transportation for 10 years; 24 were transported for various periods; 7 were sentenced to imprisonment for 2 years or above 1; 29 for 1 year or above 6 months; and 65 for 6 months or under; 4 were fined. Of the whole number of offenders, 112 were males and 47 females; 44 could neither read nor write, 86 could read and write imperfectly, 24 could read and write well, 1 had received superior instruction, and the degree of instruction of the remaining 4 could not be ascertained.

The number of persons registered to vote for the county members in 1837 was 8756. Of these, 4897 were freeholders, 258 copyholders, 3195 occupying tenants, 14 trustees, 28 mortgagees, and 364 annuitants; being 1 in 25 of the whole population, and 1 in 6 of the male population 20 years of age and upwards, as taken in 1831.

Northumberland contains 6 savings' banks; the number of depositors and amount of deposits, on the 20th of November in each of the following years, were as follows:—

	1832.	1833.	1834.	1835.
Number of depositors . .	6939	7224	6275	7356
Amount of deposits . .	£280,014	£286,572	£258,076	£295,118

The various sums placed in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	3,335	£27,905	3,611	£34,800	3,937	£33,703
,, 50	2,795	86,265	2,949	90,301	3,112	95,599
,, 100	1,286	87,364	1,403	96,756	1,436	98,370
,, 150	432	51,865	467	55,812	520	62,700
,, 200	263	43,858	275	45,951	272	45,832
Above . . 200	95	23,919	95	23,986	84	20,518
	8,206	321,176	8,805	344,506	9,361	356,715

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835:—

	Schools.	Scholars.	Total.
Infant schools	5		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		156	
Females . .		153	
Sex not specified .		176	
			485
Daily schools	625		
Number of children at such schools; ages from 4 to 14 years:			
Males . .		11,786	
Females . .		8,439	
Sex not specified .		3,870	
			24,097
Schools . .	630		
Total of children under daily instruction			24,582
Sunday-schools	218		
Number of children at such schools; ages from 4 to 15 years:—			
Males . .		7,057	
Females . .		7,070	
Sex not specified .		1,748	
			16,875

Assuming that the population has increased in the same ratio as it did in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 years would have been, in 1833, about 75,790; provided also the population between those ages had increased in the same proportion with the rest of the population since 1821. Six Sunday-schools are returned from places where no other school exists, and the children (139 in number) who are instructed therein cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Twenty schools (containing 1127 children), which are both daily and Sunday schools, are returned from various places, and duplicate entry is known to have been thus far created. Making allowance therefore, from this cause, for the want of accuracy, we may perhaps consider that not more than half of the children between the ages of 2 and 15 are under instruction.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars
Infant Schools	—	—	1	150	—	—	4	335
Daily Schools	51	2962	33	2,460	505	17,002	36	2873
Sunday Schools	1	34	208	16,235	1	40	8	566
Total...	52	2996	242	18,845	506	17,042	48	3774

The schools established by dissenters, included in the above statement, are—

			Scholars
Daily-schools . .	5,	containing	461
Sunday-schools . .	53	,,	9141

The schools established since 1818 are—

Infant and other daily schools	296,	containing	11,015
Sunday-schools . .	172	,,	13,550

Twenty-four boarding-schools are included in the number of daily-schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by dissenters, with whom are here included Wesleyan Methodists and Roman Catholics.

Lending libraries of books are attached to 57 schools in this county.

NORTHWICH, a town in the parish of Great Budworth, hundred of Northwich and county of Chester, 17 miles north-east by east from Chester, and 160 miles north-west from London, direct distances. It is situated on the banks of the Weaver, near the confluence of that river with the Dane, and its site extends over some parts of the neighbouring townships of Witton, Castle Northwich, Winnington, Marsdon, Leftwich, and Anderton, in addition to the township of Northwich. The high road from London to Liverpool passes through the town, and is there intersected by the road joining Manchester and Chester. The streets are irregular and badly paved, but lighted. Many of the houses are of considerable antiquity. The church is large, and chiefly remarkable for its semicircular choir. According to Camden (Gough, ii., p. 425) this place was called by the ancient British *Hellath du*, or the *black salt-pit*. The salt-mines in the neighbourhood are very extensive, and have been worked since 1670, if not before.

Dr. Aikin, in his 'Description of the Country Forty Miles round Manchester,' London, 4to., 1725, mentions a tradition of the inhabitants tending to prove that both the salt-mines and brine-springs were wrought during the occupation of Britain by the Romans. At the present time the productiveness of these mines probably surpasses that of any other mines in the world. The greater part of the rock-salt requires to be purified, by being dissolved in water, which is subsequently evaporated over large furnaces, before it is fit for general use. Their average annual produce is about 60,000 tons; that of the brine-springs, which are usually met with at from 90 to 120 feet beneath the surface, is about 45,000 tons. The total annual produce of the Cheshire salt-works is estimated at 156,000 tons, of which about 16,000 tons are consumed in Great Britain. Vessels of 50 to 80 tons burthen are constantly employed in transporting the salt, by means of the rivers Weaver and Mersey, to Liverpool. The reader will find much information relative to the salt-district of Cheshire in a paper by Mr. Holland, published in the first volume of the 'Transactions of the Geological Society,' and also in that gentleman's 'Survey of Cheshire,' drawn up for the Board of Agriculture. The market-day is Friday: the fairs are held 10th April, 2nd August, and 6th December. The population of the town, in 1831, was 1481. The free grammar-school spoken of in several topographical works under the head of Northwich, is the free grammar-school at Witton, an adjoining township, to which also the church above mentioned properly belongs. The school was founded in 1558, ‘by Sir John Dayn, a parson of one of the St. Bartholomews in London, and among other lands he gave unto it the Saracen's Head in the citie of Chester.’ (*King's Vale Royal*, London, 1656, fol. p. 84.) A copy of the statutes, which are curious and interesting, will be found in Carlisle's ‘Description of Endowed Grammar-Schools.’

(*Beauties of England and Wales; Population Returns*, &c.)

NORWAY, a country in Europe which comprehends the western portion of the Scandinavian peninsula, extends from 58° to 71° N. lat. Its most southern point, Cape Lindesnaes, is in 57° 58′ N. lat., and the most northern, Cape Nordkyn, in 71° 8′ N. lat. It lies between 5° and 28° E. long. Its length is about 1100 miles, but its width varies: the width is greatest near 61° N. lat., where it is about 250 miles wide, and smallest between 67° and 68° N. lat., where the deep inlets of the sea terminate at a distance of less than twenty miles from the boundary of Sweden. Its surface, according to Forsell, is nearly 134,500 square miles, or about 20,000 square miles more than the area of the British islands. On the north and west it is surrounded by the Atlantic, and on the south by the North Sea and the Skager-rack. East of it is Sweden, and towards the northern extremity is Russia.

By far the greatest part of this extensive country is covered with mountains, which constitute an immense rocky mass, called in the southern part Norrska Fiellen, and in the northern Kiölen. [NORRSKA FIELLEN.] More than three-fourths of the country are above 2000 feet higher than the sea-level, and unfit for cultivation, except in a few well-sheltered places. More than half of the remaining fourth is above 800 feet higher than the surface of the sea. About one-tenth of the surface rises to the height of 800 feet, and perhaps about one-thirtieth part is below 300 feet. The lowest tract, that which does not rise to 300 feet, is situated on both sides of the Bay of Christiania. The more elevated country, that which rises to between 300 and 800 feet, partly surrounds this low tract, and partly extends along the shores of the Skager-rack, or encloses the Bay of Trondhiem on the south and east. Cultivation is nearly limited to these two regions. In all the other parts of the country cultivation occurs only in the narrow valleys by which the rocky masses are indented. A part of the mountain-masses, calculated to amount to 3284 square miles, is always covered with snow. As to the nature of the lower country see CHRISTIANIA; CHRISTIANSAND; and TRONDHIEM.

Rivers, Bays, and Lakes.—As all the rivers of this country rise at a great elevation above the sea, and have a comparatively short course, they are not fit for navigation. Some of them however are used to float down timber, at least in a part of their course. The largest of these rivers is the Glommen-elf, which rises between 62° 30′ and 62° 40′ N. lat., on the declivities of the Rute Fiell, in two small lakes, one of which is 3000 and the other 3627 feet above the sea-level. The two small streams which issue from them fall into the lake of Oresund, which is nearly fifteen miles long, about three wide, and 2400 feet above the sea. Flowing from this lake the river passes near the town of Röraas, and running in a south-south-western direction, skirts the base of the high peak of the Tron-Fiellet, which is nearly 3600 feet high, and then turning nearly south, it enters the cultivable region, in which it continues its southern course to Kingsvinger. At this place it turns abruptly to the west, but after running a few miles in that direction it again changes to the south-south-west, and passing through the lake of Oiern, which is fifteen miles long and about three miles wide, it enters the Skager-rack near Fredrickstad. The last of its numerous cataracts occurs near Hafslund, about ten miles from its mouth; it is called the Sarpe Foss (or cataract), and is sixty feet high. Below this place the river is navigable for large boats. It is remarkable that during the high floods, after the melting of the snow in spring, a part of the water of this river is discharged into lake Wenern in Sweden, by the Wrangs-elf, at the sharp turning of the river at Kingsvinger. The whole course of the Glommen probably exceeds 400 miles. Below Kingsvinger the Glommen is joined by the Wormen-elf, the outlet of Lake Miösen, which receives its waters from the mountain-plain lying south-west of the Snee-hättan, by the river Lougen. This river originates in a series of small lakes, called Lessöevarks Vand, west-south-west of the Snee-hättan, which are more than 2000 feet above the sea, and discharge their waters by two outlets, the Romsdals-elf, which runs north-west, and the Lougen, which flows south-east. After a course of nearly 150 miles the Lougen enters Lake Miösen, which is nearly 60 miles long and from one to more than five miles wide; it is more than 420 feet above the sea-level, and lies in the middle of the best cultivated portion of Norway. The Wormen-elf runs about twenty miles with a gentle current. The Drammen-elf originates on the eastern declivity of the Norrska Fiellen in two branches, the Beina-elf and the Snarum-elf. After a rapid course of more than one hundred miles the two branches unite about forty-five miles above their influx into the Gulf of Christiania, into which the Drammen-elf enters by a wide æstuary called the Drammen Fiord. Much timber is floated down this river.

The other rivers remarkable for the length of their course are, the Louven-elf, the Skeen-elf, and the Otter or Torrisdals-elf, which run from 120 to 150 miles each; and, like the Glommen-elf and Drammen-elf, fall into the Skager-rack. No considerable river falls into the Atlantic south of the Namsen-elf, which has its mouth between 64° and 65° N. lat., and runs nearly one hundred miles through a well-wooded valley. The Alten-elf falls into the Alten Fiord, near 70° N. lat. It runs northward about one hundred miles, first through an inclined plain, but against the declivity of the plain, so that its bed sinks lower and lower below the surface of the country as it proceeds farther north. In the lower part of its course it crosses the Kiölen Mountains by an exceedingly deep and narrow valley, which at last becomes a mere fissure, into which no person has yet been able to penetrate. It issues from this fissure by the cataract of Pursoronka, fifteen miles from its mouth. The Tana-elf, which for the greatest part of its course forms the boundary-line between Norway and Russia, originates east of the source of the Alten-elf, and descends from a plain which declines towards the north-east, in which direction the river flows more than two hundred miles, until it approaches the Varanger Fiord, where it suddenly turns to the north and falls into the Tana Fiord, after a course of nearly three hundred miles. It is the least rapid of the rivers of Norway, but it flows through so sterile a region as to be entirely useless.

The numerous inlets of the sea by which the coast of Norway is indented, and which in several places extend seventy or eighty miles inland, would be of great advantage if the adjacent country possessed only a moderate degree of fertility. But on the shores of these inlets high and bare rocks rise several thousand feet; yet these inlets contain the only habitable places along the western coast, and abound in fish. The Fiords of Christiania and Trondhiem are an exception, being surrounded by fertile tracts: they are noticed under CHRISTIANIA and TRONDHIEM. The other inlets which are remarkable for their extent are the following, from south to north.

Bukke Fiord is wide at its entrance, and penetrates by two of its branches more than fifty miles inland. Hardangor Fiord is about seventy miles long; Sögne Fiord, which is narrow, and more than eighty miles long, is surrounded by the highest region of the Norrska Fiellen. There is a great number of narrow deep fiords between Sögne Fiord and Trondhiem Fiord, and of bays farther north. The largest and widest occur at the northern extremity, where the Porsanger Fiord is 150 miles long and 20 miles wide on an average. The Laxe Fiord, Tana Fiord, and Varanger Fiord are considerable, but of less extent.

Numerous lakes occur in the southern districts of Norway, on the eastern declivity of the Norrska Fiellen. Many of them are more than 2000 feet above the sea-level, and all of them are very deep. Lake Fümund, near the boundary of Sweden, is 2280 feet above the sea-level, and extends in length more than seventy miles, with an average width of more than three miles. From its southern extremity issues a river, which, under the name of Klar-elf, falls into Lake Wenern in Sweden.

Climate.—The climate differs considerably in the different districts of a country which extends over thirteen degrees of latitude, and on both sides of the polar circle, and also rises in the largest part of its surface to a mean elevation exceeding 2000 feet above the sea. The mean temperature of Christiania is 42° Fahr., or not quite 8° less than that of London. It is probable that in the valleys near Cape Lindesnaes, where the beech grows to a stately tree, the mean temperature is higher. At Bergen, it is 46° 7′, and even at Trondhiem it is 40°. The difference in the mean temperature between Christiania and Bergen may be chiefly attributed to the difference of temperature of the winter, which is severe on the eastern declivity of the Norrska Fiellen and the adjacent countries, but very mild along the western coast, on account of the prevailing western winds and frequent fogs. This is evident from the following table:—

	Mean temperature.			
	In Winter.	Spring.	Summer.	Autumn.
Christiania .	+ 25	+ 38	+ 60	+ 42
Bergen .	+ 36	+ 45	+ 58	+ 48
Trondhiem .	+ 24	+ 35	+ 61	+ 40
North Cape .	+ 24	+ 30	+ 42	+ 32

The mean temperature of North Cape is 32°, or the freezing point, but the winter is not more severe than at Trondhiem. The greatest cold at North Cape is felt when north-easterly winds blow, but the sea is always open, and the drift-ice from Spitzbergen does not approach the coast. The violence of the winds however renders this spot nearly uninhabitable. It greatly exceeds what is felt in other northern countries, and when the wind blows no person ventures to leave his dwelling. More than two-thirds of the year are boisterous, and in autumn and winter the storms are incessant, and rage with incredible fury. On the approach of winter the snow-storms frequently last for many days and weeks. They are preceded by heavy fogs, which advance from the ocean in immense masses, like impenetrable walls or moving bodies of water; but they occur only during westerly winds. The weather is fine and clear when the wind blows from the east. The longest day lasts from the 15th of May to the 29th of July, which is two months and a fortnight; the longest night, from the 19th of November to the 26th of January, which is two months and ten days. During the long nights the aurora borealis shines with uncommon brightness, so that the fishermen are enabled to carry on their ordinary occupation just as well as by daylight. (Von Buch.) Gales are very frequent along the whole of the western coast. Thunder-storms are as common there in winter as in summer, but north of 66° thunder-storms do not occur. No traces of volcanic action are known to exist, except that lava occurs on an island not far from Bergen, and on a mountain in the Bukke Fiord fire is said to appear sometimes. Earthquakes occur, though rarely.

Productions.—The forests constitute the principal wealth of Norway. Beech occurs only south of 59¼° N. lat.: oak, elm, and lime trees as far north as 63°; apples, cherries, and prunes are found as far as 64°, but they do not ripen every year. Gooseberries and hazel-nuts extend to 65° N. lat., and so far oats, peas, beans, and flax are cultivated. Hemp and rye are grown to 66° N. lat., and the ash and spruce-fir reach this point. Pines grow as far as 67° N. lat., but north of 67° only birch and juniper grow, and only barley and potatoes are cultivated. Extensive forests of fir and pine cover the eastern declivity of the Norrska Fiellen, and a great part of the hilly and rocky country east of the range; and it is from these regions that the greatest part of the timber is brought to the sea. On the lower country along the Bay of Trondhiem, and in the valley of the river Namsen, there are also great forests of fir and pine. Though agriculture is not neglected, the produce of the crops is not sufficient for home consumption.

Cattle and goats are numerous, but sheep are rare. The horses are of a small size in the southern districts, but larger to the north of Trondhiem: they are strong and hardy. Bears, wolves, foxes, gluttons, ermines, as well as rein-deer, elks, deer, and hares, abound. The lemming exists in great numbers, and in its migration destroys every plant in its way. [Muridæ, p. 501.] Different kinds of sea-fowl abound along the northern coasts, and their eggs constitute the principal food of the inhabitants of some districts during a part of the year; but they are only procured at the risk of life. In these parts the eider-duck is numerous, and the feathers are of great value for beds; a small quantity of them are exported. The sea furnishes the principal means of subsistence to the inhabitants of the western coasts; cod and herrings are most abundant, and this fishery gives occupation to many families. [Bergen.] Salmon abounds, and is finer than in any other country in the world. Lobsters are found in the greatest abundance on both sides of Cape Lindesnaes, between Hellesund east of Christiansand and Lister Fiord north-west of Lindesnaes. They are sent to the London market. [North Sea.] As to the mineral productions, see Norrska Fiellen. Salt is made from sea-water at some places along the Skager-rack, but not in sufficient quantity for home consumption.

Inhabitants.—The Norwegians, like their neighbours the Danes and Swedes, are of Teutonic origin, and speak a language which differs very little from the Swedish. It is supposed that the language of the Norwegians has undergone less change than that of their neighbours. In the most northern districts, north of 69°, there are many families of Finlanders and Laplanders: the former are here called Quäns, and the latter Finners or Finlanders. The Quäns cultivate barley and potatoes, and rear cattle. The Finners are mostly fishermen, except a certain number of families who live on their herds of rein-deer. In winter they go to Sweden.

Political Division; Population; Manufactures; Commerce; Navigation.—Norway was from an early period divided into four bishoprics: Christiania, Christiansand, Bergen, and Trondhiem; and afterwards, under the Danish dominion, the civil administration of the country was regulated in accordance with the ecclesiastical establishment, a civil governor, called Stifthauptmann, being appointed for every bishopric. But though the bishopric of Trondhiem has been divided into two, Trondhiem and Nordland, both continue to constitute one civil administration. Norway is subdivided into seventeen bailiffrics or districts, the extent and relative population of which appear in the following table, which is formed from that which is given in Forsell's 'Statistik von Schweden:'—

Names of the Districts.	Area in English square miles.	Population.	Number of Inhabitants in a sq. mile
Smaalehnenes . .	1,625	62,921	39
Aggerhuus . .	2,028	90,216	44
Hedemarkens . .	10,475	77,929	7
Christians . . .	10,367	90,903	9
Buskereds . .	5,269	76,669	11
Iarlsbergs and Laurvigs	943	54,516	58
Bradsbergs . .	6,121	63,139	10
Nedenaes . . .	4,685	45,842	10
Mandals . . .	2,247	54,252	24
Stavangers . . .	4,672	62,859	13
Söndre Bergenhuus .	6,918	104,471	15
Nordre Bergenhuus .	8,272	69,778	8
Romsdals . . .	6,532	70,174	11
Söndre Trondhiems .	7,808	77,714	10
Nordre Trondhiems .	9,541	57,791	6
Nordlands . . .	16,570	57,791	4
Finmarkens . .	30,236	33,394	1
	134,309	1,150,000	

Of this population only 124,917 individuals live in towns, and 1,025,083 are dispersed over the country. Perhaps less than half the population gain their subsistance chiefly by cultivating the ground. The remainder employ themselves chiefly in the fishing of cod, herring, salmon, and lobsters, and in preparing the produce of the forests for the market, and in working in the mines. The manufacturing industry is comparatively very small. The most numerous manufacturing establishments are saw-mills, the erection of which is much facilitated by the rapid course of the numerous rivers, even near the sea-shore. There are also several iron and copper works, potash-houses, glass-houses, powder-mills, nail-forges, and two salt manufactories. Linens and coarse woollen cloths are made by the country-people for home consumption. In Christiania and Trondhiem there are some manufactories of cloth, cotton stuffs, and tobacco; there are also a few sugar-houses and tanneries.

The foreign commerce is considerable, as the greatest part of the produce of the forests, the fisheries, and mines is sent out of the country. The timber goes almost exclusively to Great Britain, and consists of planks, deals, and masts of excellent quality, and also tar, to which lately fire-wood has been added as an important article. The produce of the fisheries goes partly to Spain and the Mediterranean, to which places the cod is sent [Bergen], and partly to the Baltic, where the herrings find a ready sale, and partly to England, especially the lobsters, which, as already observed, are sent to the London market. Iron is not exported, there being hardly sufficient for home consumption, but copper is exported from Trondhiem to Holland. Cobalt goes to Hamburg and Holland. Minor articles of exportation are furs and eider-down. This commerce is almost entirely carried on in Norwegian vessels. The inhabitants are excellent seamen, a great number of them being occupied during the greatest part of the year, and during the coldest season, in fishing off the Lofoden Islands. The country supplies all the materials for ship-building. The frugality of the Norwegians qualifies them to be the carriers for other countries, so that their vessels frequently visit countries with which they have no direct commerce.

History and Constitution.—The Norwegians first appear in history as pirates, who frequently visited and laid waste the countries bordering on the North Sea. Norway was then governed by a great number of small princes, whose ambition led them to continual wars. When there was no opportunity of satisfying their passion for war at home, they sailed to the neighbouring countries for the purpose of enriching themselves by plunder, and thus acquiring greater influence in their own country. They discovered and settled Iceland. In the second half of the ninth century (875) the small kingdoms were united under King Harold Harfagra, and from that time they became still more troublesome to their neighbours, until Norway was connected with Denmark, and then the Norwegians accompanied Sveno and Knut to the conquest of England. But the two kingdoms were soon separated again, and remained so till 1387, when Margaret became queen of Denmark and Norway. From that time till 1814 both countries remained united, and Norway was administered by a governor, appointed by the king of Denmark. By the convention of Kiel, agreed to on the 14th of January, 1814, between Denmark and Sweden, Norway was ceded to the king of Sweden. A Danish prince, Christian Frederic, who was governor of Norway at that time, and had succeeded in gaining the affections of the nation, made an attempt to constitute Norway a separate kingdom. For that purpose he called together a national assembly at Eidswold, where, on the 17th of May, the outlines of the present constitution were laid down. On the [illegible]th of August he assembled the legislative body, or Storthing, in Christiania. But the Swedes soon entered the country with an armed force, and the prince, who had assumed the title of king, was obliged to abdicate the royal dignity on the 7th of October. On the 20th of the same month the union of Norway and Sweden was determined in the Storthing, and the constitution received its present form on the 4th of November, 1814. On the 31st of July, 1815, it was promulgated as the fundamental law of the country, and was assented to by the Swedish legislature on the 6th of August. In this way both countries were united under one king, though their constitutions differ widely from one another.

The legislative body, or Storthing, is composed of the representatives of the people. They are not however elected immediately by the people, but by electors who are chosen by the citizens. In the cities 50 citizens, and in the country 100, elect one elector. The electors unite and choose the representatives, either from among themselves or other persons. The number of the representatives must not be less than 75 nor above 100: two-thirds must be chosen by the electors of the country, and the remaining third by those of the cities. The representatives must be thirty years of age and must have resided in Norway not less than ten years. The members of the state council and the persons employed in state offices cannot be representatives, nor can those who belong to the royal household: but clergymen are eligible. The king or his lieutenant opens the Storthing, immediately after which it separates into two bodies, the Lagthing (or legislative body) and the Odelsthing (assembly of landed proprietors). The Lagthing consists of one-fourth of the members of the Storthing chosen by the whole assembly. The Storthing is empowered to abolish old and to enact new laws, to impose taxes or abolish or change them, to determine the civil list of the king and the salaries of the persons employed by government, &c. Every bill must originate in the Odelsthing; it may be proposed by a member or by one of the state councillors. When the bill has passed, it is brought into the Lagthing, who may adopt or reject it. In the latter case it is returned to the Odelsthing, with the reasons for such rejection. When a bill has twice passed the Odelsthing, and has been twice rejected by the Lagthing, both bodies unite and decide the matter in question by a joint vote. If two-thirds are not in favour of the bill, it is rejected. When a bill has passed the legislative bodies, it is sent to the king, whose signature gives it the force of law. If the king does not assent, he sends the bill back, observing only that he does not think it useful. In this case the matter cannot be discussed in the same Storthing; but the following Storthing may pass the same bill, and the king has a right to reject it a second time: but if the third Storthing pass the bill, it becomes a law, whether the king sign it or not. The law by which nobility was abolished in 1821 received the king's signature after having passed in three Storthings. The Storthing meets once in three years, on the 1st February, and the session cannot last more than three months. The members are only chosen for one Storthing. The king may in the interval convoke an extraordinary Storthing, consisting of those persons who were members of the last regular Storthing.

The executive power is vested in the king. The Storthing does not interfere in any way with his arrangement of the department of war. But before the king declares war he must inform the council of state at Christiania of such proposed step. This council is composed of a minister of state, seven state councillors, and a secretary of state, all of whom must be natives of Norway. When the king is not in Norway, the minister and two of the councillors are with him, and the others, who remain in Norway, govern the country in conjunction with the governor, who must not be a Norwegian, but may be a royal prince, in which case he is called viceroy. When the king has informed the Norwegian government of his intention to declare war, he assembles the Norwegian and Swedish councillors of state, explains to them the motives which compel him to take such a step, and asks their opinion. The opinion of each member is taken down in writing, and the decision of the matter is left to the king.

The Odelsthing may examine the proceedings of the council of state, and, if there is reason for it, bring it or any member of the body to a trial. The Lagthing, united with the supreme court of justice residing at Christiania, constitutes the court which has jurisdiction in such a case.

(Von Buch's *Travels through Norway and Lapland;* Everest's *Journey to Norway, Lapland, and part of Sweden;* Laing's *Journal of a Residence in Norway;* Schubert's *Reise durch Schweden, Norwegen, Lapland, Finnland, und Ingermannland;* Forsell's *Statistik von Schweden.*)

NORWICH, a city and county of itself, in the county of Norfolk, of which county it is the capital: 97 miles north-east of London, in a direct line; 118 miles by the mail-road through Bishop Stortford, Newmarket, Bury St. Edmund's, and Thetford; or 113 miles by the other mail-road through Chelmsford, Colchester, and Ipswich. It is in 52° 7′ N. lat. and 1° 16′ E. long.

Norwich is not mentioned in history before the time of the earlier Danish invasions. It appears to have risen gradually from the decay of Caister or Castor St. Edmund's, now an inconsiderable village about three miles south of Norwich, but antiently a British and subsequently a Roman town under the name of Venta Icenorum. An old distich records that

'Castor was a city when Norwich was none,
And Norwich was built of Castor stone.'

It is probable indeed that during the time of the Romans the site of Norwich was covered by the waters of the æstuary or arm of the sea which at that time penetrated with its many ramifications the eastern coast of the island, and extended, it is likely, to or beyond the town of Venta. [Norfolk.] By the gradual accumulation of alluvial matter, islands were formed in this æstuary, and its waters were divided into several channels. It is probable that even as late as the period of the Norman conquest what is now the lower part of the city consisted of such islands. During the existence of the separate kingdom of the East Anglians [Norfolk], their kings had erected, upon what was then a promontory on the shore of this æstuary and is now the Castle Hill, a royal fortress; and as it is probable that by this time the branch of the æstuary which flowed up to Venta either was dry or had become so shallow as to be little available for navigation, the merchants and fishermen deserted Venta to seek new abodes under the protection of the castle, and thus formed a town which, from its situation relative to their former town, obtained the name of North-wic (wic, in Latin *vic-us*, a habitation, or group of habitations), the northern station or town. Norwich became a place of some importance under the Anglo-Saxon princes, and had a mint. Blomefield, in his 'History of Norfolk,' vol. ii., p. 4, notices the coins of several Saxon princes, Alfred, Athelstan, Edmund I., Edred, Edward the Martyr, and Ethelred II. The circumstance of Alfred coining money here is remarkable, as at the date of this coinage (about 872, according to Blomefield) the government of East Anglia could only have just come into his hands, upon the extinction of the East Anglian dynasty in the person of St. Edmund, and the country either was or had just been in the military possession of the Danes. In the invasion of the Danes under their king Sweyn, A.D. 1004, Norwich was taken and much injured by them. It soon however recovered from this blow, and was in the time of Edward the Confessor a flourishing town, having 1320 burgesses and twenty-five parish churches. It may be questioned if at this time it was exceeded in wealth and population by any place in England, except London, and perhaps York. In the Conqueror's time the castle of Norwich was entrusted to Ralf de Guader, earl of Norfolk; but he rebelling against the king (A.D. 1075), and being defeated, took shipping at Norwich and fled into Bretagne. His wife, who valiantly defended the castle, was obliged to capitulate. The constableship of the castle, with the earldom of Norfolk, was then conferred on Roger Bigot, or Bigod, to whom, on strong presumptive evidence, the erection of the present keep has been ascribed. On the accession of William Rufus the city was damaged by this earl Roger Bigod, who held the castle for Robert of Normandie, William's elder brother. On the peace of 1091, Roger was pardoned and retained his offices. In his time and probably by his encouragement the bishopric of the East Angles was removed from Thetford to Norwich (A.D. 1094), and the foundations of the cathedral were laid by Herbert Lozinga, or Losinga, the bishop. The Conquest and the rebellion of Guader had however materially injured the town, for at the Domesday Survey (A.D. 1086) the number of burgesses was only about half the number in the Confessor's time. Henry I. granted the citizens a charter (A.D. 1122), and soon after this the Flemings began to settle here, and introduced the worsted manufacture. The castle remained (except for a short interval in the reign of Stephen) in the hands of the Bigod family, until the reign of Henry III. Hugh Bigod, being in the interest of young Henry, son of Henry II., took the city by assault (A.D. 1174), with the aid of a body of Flemish troops. Henry II., to reward the loyalty of the citizens who had resisted this attack, restored or confirmed their privileges by a charter which is still extant, and which is one of the oldest in the kingdom. In the time of King John, Roger Bigod having joined the insurgent barons, Norwich Castle was seized by the king. Soon after John's death it was taken by the dauphin Louis, but on the peace which followed his departure, it was restored to the Bigod family, by one of whom, about A.D. 1224, the castle was surrendered to the crown. It was subsequently committed to the charge of the sheriff of Norfolk and Suffolk. In the early part of the same reign (A.D. 1220) the citizens had received authority to fortify their city, but they did not act on the permission till long after (A.D. 1294), and the fortifications were not fully completed till above a century afterwards; and in the mean time, in 1267, the insurgent barons took and plundered the place and did great damage. The walls of the city were embattled, with twelve gates and forty towers. In 1272 great disturbances broke out between the monks and clergy and the citizens, in consequence of the disputed jurisdiction of part of the city, and on account of these disturbances several citizens were executed, and the city for awhile lost its charter. In the reign of Edward III. the Flemings settled here in considerable numbers, and carried on the worsted manufacture. In the reign of Richard II. (A.D. 1381) the popular tumults which agitated nearly the whole country broke out in Norfolk, and the mob entering Norwich, and being headed by John the Litester, or Dyer, committed great outrages, until they retired to North Walsham, on the approach of Henry Spencer, the warlike bishop of Norwich. [NORFOLK.] In A.D. 1403 Henry IV. separated the city of Norwich from the county of Norfolk, and made it a county of itself. During the subsequent reigns the city does not seem to have advanced in prosperity, and in the reign of Edward VI. (A.D. 1549) it suffered from the rebels under Ket, the tanner of Wymondham. [NORFOLK.] In the earlier years of Elizabeth's reign the Flemings, who fled from the persecutions of the duke of Alva, settled at Norwich to the number of 4000, and much increased the prosperity of the town by the introduction of the bombazine manufacture. In the civil war of Charles I. Norwich sided with the parliament; and as the king had no party in this district, no contest took place. No public event of interest has occurred since that period.

The county of the city of Norwich extends about four miles from north to south, and as many from east to west; the town itself is not exactly in the centre of this district, but rather to the north-east, and extends about a mile and a half in length from north-west to south-east, and from three-quarters of a mile to a mile in breadth. It is of irregular form, and very irregularly laid out. The streets are narrow and winding; some of them follow the line of the antient walls, which are partly standing, though the ditches have been filled up and the gates pulled down. Those parts of the walls which remain are in very dilapidated condition; in other parts they have been entirely demolished and the site built upon. The town stands on a considerable space of ground for its population, the houses being much intermixed with gardens, so that it has been designated 'a city in an orchard.' The market-place is one of the most spacious in England. The streets are paved, lighted with gas, and watched under the provisions of a local act, and the principal streets have flagged footpaths. Many of the houses and other premises are well built; the best are in the market-place and its vicinity; those situated in the precincts of the cathedral are large and handsome, and are chiefly occupied as private residences. The increase of buildings has been of late years very considerable, principally on the west side of the town. The modern parts are well built. The river Wensum enters Norwich on the north-west side, and winds partly through, partly round the town, until it finally leaves it on the south-east side: it is crossed by at least ten bridges in the town or close to it. The county of the city contains forty-four parishes or hamlets, and part of a forty-fifth (Sprowston); of these, thirty-three are entirely comprehended in the town; the remaining twelve are partly or altogether in the rural portion of the county.

The most interesting of the public buildings are the castle and the cathedral. The site of the former was probably occupied by the castle of the East Anglian kings: it is a natural eminence, augmented perhaps by the earth thrown out from the excavations made at or preliminary to its re-erection by the Normans. The antient and present state of this castle was described by Mr. Wilkins of Norwich (*Archæologia*, vol. xii., pp. 145, et seq.), A.D. 1795, and more recently (A. D. 1834) by Mr. J. W. Robberds, also of Norwich. It had three nearly circular concentric lines of defence, each consisting of a wall and ditch, enclosing a ballium or court: beside these there were the keep, the only part now standing, in the innermost ballium; and a barbican, or outwork, to defend the entrance. The whole comprehended an area of not less than twenty-three acres. The outer ditch has been filled up from time immemorial, but some faint traces may yet be observed at some points. The middle ditch was more recently levelled, and the traces of it remain in the descent of 18 or 20 feet in some private yards. (Wilkins.) The inner ditch and the bridge over it still remain: the ditch is enclosed by an iron palisade, and planted with ornamental shrubs and trees, in the midst of which stands a newly-erected shire-hall, in the Tudor style. The bridge is 150 feet long, and has one arch of 40 feet span (or 43 feet, Wilkins): it is supposed to be the largest and most perfect arch remaining of what has been popularly but erroneously termed Saxon architecture. The wall of the innermost ballium has been long destroyed, but there are the remains of two round towers, part of the original gateway at the inner end of the bridge. The area of the inner ballium is level, but, from its superior elevation, commands an interesting view of the city and surrounding country. Round its verge there is a public walk, at the foot of a modern wall, faced with granite and capped with battlements of freestone, which, except where interrupted by the keep, encloses the central part of the area. In this central part is the keep, a substantial quadrangular building, the western and southern sides of which are upon the line of the enclosing wall, and are consequently open to the public walk. The keep is 110 feet 3 inches from east to west, including a small tower, through which was the principal entrance: from north to south it is 92 feet 10 inches: its height to the battlements is 69 feet 6 inches. The interior comprehended two floors, a basement 24 feet high, with walls in one part 13 feet thick, faced with flint, and almost destitute of ornament. The upper part is faced externally with stone, and is much ornamented. The building maintains its antient form externally, but the architectural ornaments are much impaired by time: the inner part has been so much altered, in order to adapt it to the purpose of a gaol, to which it has been long applied, that the original arrangement of the apartments can scarcely be traced. The entrance tower, of richly ornamented Norman architecture, known as Bigod's Tower, has lately been restored. The eastern front has also been renovated, but is partly hidden by the incongruous addition of a modern county gaol. Mr. Wilkins ascribes the erection of the keep to the Anglo-Danish king Canute; but later writers, on better ground, ascribe it to Roger Bigod.

The foundation of the cathedral was laid, A.D. 1094, by Herbert Losinga, or Lozinga, the bishop in whose time the see was removed from Thetford to Norwich; but he finished only the choir and tower: succeeding bishops added the other parts of the building: the spire was added by Bishop Percy, A.D. 1361. Lozinga laid the foundations of a Benedictine monastery at the same time as those of the cathedral; the monks of this monastery were engaged in frequent contests with the citizens, and in these conflicts the cathedral received considerable damage. The monastery was completed in 1101: its revenues at the dissolution were 1050*l.* 17*s.* 6*d.* gross, or 978*l.* 19*s.* 4*d.* clear. A few traces of the buildings remain.

The cathedral consists of a nave with side-aisles, two transepts without aisles or columns, a choir occupying part of the nave and the area under the tower, an unoccupied space east of the choir, a chancel with two side-aisles continued round the circular east end of the choir, several chapels, a tower and spire at the intersection of the transepts with the nave, and a cloister, nearly perfect, on the south side of the church. The length of the whole building from east to west is 411 feet; the breadth at the transepts 191 feet; the breadth of the nave and side-aisles is 71 feet. The cloisters, with the included space, form a quadrangle with the sides not quite parallel, but averaging between 175 and 176 feet each. The height of the tower and spire, with the weathercock, is 313 feet. The plan is almost wholly Norman; the east end and some of the chapels are circular. Compared with some other cathedrals, that of Norwich is small in size and meagre in embellishment, but it comprises many forms and features of singular and unique character. There has been a lady-chapel eastward, but it is now destroyed. The exterior of the cathedral in many parts presents a decayed appearance, from the loose and friable character of the stone of which it was built; and buildings or other incumbrances prevent it from being seen to advantage on any side except the west. The nave, central tower, and eastern portion present a continued line of Norman work of excellent character: the east end is a very fine composition: in its aisles are some good Norman groined roofs; and the tower, both inside and outside, presents one of the best specimens of ornamented Norman extant. The architecture of the nave is very bold, and the arches of the triforium are very large. There are various insertions of later styles: the destroyed lady-chapel was of early English; the spire is of decorated English or early perpendicular; the cloisters present a series of work from early decorated to perpendicular, and a considerable portion of the west front is of perpendicular character. There is a fine font, and various portions of the screen-work and several of the monuments deserve attention. The chapter-house has been destroyed. There is a good doorway, and some lavatories of good work in the cloisters.

On the north side of the cathedral and connected with it is the episcopal palace, a large and irregular edifice, built by different prelates; there are in the garden some remains of the antient hall of the palace, now in ruins. Near the west end of the cathedral is the free school (formerly the charnel-house), containing some good antient work; and not far off are two antient gates, St. Ethelbert's Gate, of decorated English character, and the Erpingham Gate, of late perpendicular; both valuable specimens of their respective styles.

The parish churches of Norwich are more numerous than in any other city in England except the metropolis; they amount to thirty-six. Some of them are valuable specimens of antient architecture. Those of St. Bennet, St. Ethelred, and St. Julian have round towers: these towers are usually considered to be of early Norman date, but their original openings have been so disturbed by alteration, that their period and style cannot be exactly ascertained. Several of the other churches retain portions of good antient work amidst much mutilation and addition. The church of St. Michael Coslany is of mixed character; part is early English and part of perpendicular character; in the latter the tracery mouldings and other embellishments are carved in stone, and the interstices filled up with flints. The churches of St. Andrew, St. George Colegate, St. Giles, St. John Sepulchre, St. Lawrence, St. Michael at Plea, St. Saviour, and St. Stephen are all handsome churches, of perpendicular character, some of them with lofty and elegant flint and stone towers. But the most conspicuous church is that of St. Peter Mancroft, a large and fine perpendicular church, with a lofty tower and handsome windows. There are some other buildings which are the remains of ecclesiastical edifices. The nave of the church belonging to the monastery of the Dominican or Black Friars is now the common hall of the city, called St. Andrew's Hall; the choir, long used as the Dutch or Walloon church, with the convent kitchen, dormitory, infirmary, and other parts, were lately used as a workhouse. St. Giles's Hospital (popularly the Old Man's Hospital) comprehends portions of the antient church of St. Helen's. There are numerous dissenting places of worship.

The Guildhall is a large old building, erected in the fifteenth or sixteenth century, and since repaired or altered; it includes convenient courts for holding the city assizes and sessions, and contains some good paintings and some other articles of interest. The new city gaol is a massive and appropriate building; there is also a bridewell; the shire-hall, in the castle ditch, is a brick building in the Tudor style, cased with cement; the new county gaol, in connexion with the castle, is a commodious building.

The following shows the increase of the population of the county of the city of Norwich in the course of the present century:—1801, 36,832; 1811, 37,256; 1821, 50,288; 1831, 61,116. The population in 1831 comprehended 529 families, chiefly engaged in agriculture, 9153 in trade and manufactures, and 4848 not included in either of the above classes. The number of houses in 1835 was 14,201, of which 13,132 were inhabited and 1069 uninhabited. The number of houses rated to the poor was 4525, of which 1271 were rated under 10*l.* a year; 1978 above 10*l.* and under 20*l.*; 768 above 20*l.* and under 40*l.*; and 508 at 40*l.* and upward. The most important trade of the town consists of the manufacture of silk and worsted into shawls, crapes, bombazines, damasks, camlets, and imitations of the Irish and French stuffs. These manufactures are chiefly carried on by hand-looms and at the habitations of the workmen. There are however some manufactories. These branches of industry have recovered of late years from the depression under which they had long laboured (of which depression 1811 was the middle point): nearly 3800 adult males were engaged in them in 1831. There are three yearly fairs, and two weekly markets, viz. on Wednesday and Saturday; the latter, which is the principal, is a great market for corn and cattle. The corn-market is held in a large handsome building, 'the Corn Exchange,' erected for the purpose, and the cattle-market is in an open area adjacent to the castle. Trade in agricultural produce, coal, and other heavy goods is carried on by means of the river chiefly in lighters of from fifteen to twenty tons burden. Since the 30th September, 1833, Norwich has been accessible to sea-borne vessels of small tonnage. To facilitate the approach, an entrance has been made from the sea into the navigable channel of the Waveney, by Lake Lothing, and a ship-canal from the Waveney to the Yare or Wensom. There is another short canal near Norwich. These various cuts with the river are navigable for vessels not exceeding ten feet draught of water. The harbour, lock, and sluice at the sea entrance of this navigation are extensive works. The assizes and quarter-sessions for the county of Norfolk are held at Norwich.

Norwich claims to be a borough of prescriptive origin. The corporation has however received many charters from successive kings. Before the late Municipal Reform Act it comprehended a governing body of a mayor, 24 aldermen, and 60 common councilmen, with the usual officers, and nearly 3500 freemen. By the Municipal Reform Act the borough was divided into eight wards, and has 16 aldermen and 48 councillors. The city has returned two members to parliament from the time of Edward I. The constituency in 1835-36 comprehended 4102 electors, freemen or 10*l.*-householders. The limits of the borough, both for municipal and parliamentary purposes, comprehend the county of the city, and have been no further altered than by the addition of some extra-parochial districts within the boundary. Norwich is the principal place of election and a polling-station for the eastern division of the county of Norfolk.

The benefices in the city amount to thirty-four: they are, with one exception, in the archdeaconry of Norwich, and are all small, only two exceeding 200*l.* yearly value; a very few are provided with glebe-houses.

There were in 1833, in the county of the city, thirty-eight infant or dame schools, with above 900 children; twelve boarding-schools, with above 300 children; and one hundred and twenty day-schools of all kinds (including national and other charity schools), with 5200 scholars; giving in all one hundred and seventy schools, with about 6400 children in them, or about one-tenth of the population of the county of the city at the time. There were forty-four Sunday-schools of all classes, giving instruction to about 4400 children.

There are several dissenting places of worship. The charitable institutions and charities are very numerous. (*Reports of Charity Commissioners.*) The Norfolk and Norwich Hospital, a large and elegant building of red brick, erected in 1771, can receive above a hundred patients. It is partly supported by a triennial musical festival in St. Andrew's Hall. The Norfolk and Norwich Lunatic Asylum is at Thorpe, about two miles from the city. There are a dispensary, an eye-infirmary, a lunatic hospital, an asylum and school for the blind, and several hospitals or almshouses for the indigent: St. Giles's hospital, the Boys' and Girls' hospitals, and Doughty's hospital are the chief of these. St. Giles's hospital (of which the management is in the corporation) has estates worth nearly 6000*l.* a year. There are a master and 165 inmates, besides servants. The free grammar-school is maintained out of this endowment.

Of institutions for the promotion of knowledge, the Norfolk and Norwich Literary Institution is the chief. It has a valuable well-selected library, for which a fine new building has been erected or is now erecting. The Norfolk and Norwich Museum is kept in the building connected with this institution, but is an entirely separate establishment. There is an annual exhibition of paintings by a society of artists. There are two newspapers published at Norwich. The Norwich Union Fire and Life Insurance Offices are institutions of considerable importance.

(Rickman's *Gothic Architecture; General History of the County of Norfolk*, Norwich, 1829; Stark and Robberds' *Scenery on the Rivers of Norfolk;* Britton's *Norwich Cathedral* and *Architectural Antiquities; Parliamentary Papers.*)

NORWICH, DIOCESE OF. Upon the establishment of Christianity among the East Angles, in the reign of Sigebert, Felix, a Burgundian (ob. A.D. 647), was made the bishop of the newly-converted people, and the see was fixed at Dunmoc or Dunmok, now Dunwich, then an important town, and perhaps the residence of the king. The limits of the diocese appear to have been those of the kingdom; and these may be considered as on the whole indicated by those of the present diocese, making some allowance for the variation which may be supposed to have taken place in the course of many centuries. The subsequent changes of the diocese are noticed elsewhere. [Norfolk.]

The diocese includes the counties of Norfolk and Suffolk, except four parishes in the latter county, viz. Hadleigh, Monks Illeigh, and Moulton, peculiars of Canterbury, and Freckingham, a peculiar of Rochester; it comprehends also sixteen parishes in the county of Cambridgeshire, which appear to have belonged to the East Anglian kingdom, while the rest of that county belonged to Mercia, and is now included in the diocese of Ely.

There was formerly but one archdeaconry for the whole diocese; there are now four, as follows,—Norwich (the original one), Norfolk (established A.D. 1200), Sudbury (A.D. 1126), and Suffolk (A.D. 1127). These four comprehend 46 rural deaneries and 1356 parishes.

It is proposed by the Church Commissioners (Third Report) to transfer the Cambridgeshire parishes, with the deanery of Fincham, in the archdeaconry and county of Norfolk, the deanery of Lynn, in the archdeaconry of Norwich and county of Norfolk, and the deaneries of Fordham, Clare, and Thingo, in the archdeaconry of Sudbury and counties of Cambridgeshire and Suffolk, to the diocese of Ely. The revenues of the bishopric were formerly very considerable, but were much diminished by Henry VIII. The net yearly income of the see was, in 1831, 5395*l.* No alteration has been proposed in the income. The bishops have always possessed greater liberties than any other bishops in England, and they sit in the Upper House not only in right of their barony, but also as titular abbots of St. Bennet in Holme. The bishop of Norwich is the only abbot in England.

The corporation of the cathedral consists of a dean and six prebendaries; there are also six minor canons (three of whom hold respectively the offices of precentor, sacrist, and librarian), a gospeller, and an epistoller. The net revenue of the church, in 1831, was 5245*l.*, of which the greater part was shared among the dean and prebendaries.

NORWICH, AMERICA. [Connecticut.]

NORWOOD, RICHARD, a mathematician of the earlier part of the seventeenth century, of whose personal history we know nothing. He is principally famous for having been one of the first who measured a degree of the meridian with any accuracy. His method was this:—in the year 1635 he measured the distance between London and York, taking the bearings as he proceeded along the road, and reducing all to the direction of the meridian and to the horizontal plane. The difference of latitude he found by observation of the solstices to be 2° 58′, and from that and his measured distance he concluded the degree to be 367,176 feet English, or 57,800 toises. This has been found to be a near approximation, but his method was necessarily not capable of much accuracy, nor did he measure the distance in the best manner: 'Sometimes,' says he, 'I measured, sometimes I *paced*, and I believe I am within a scantling of the truth.' He is the author of the following works:—1. 'Trigonometry, or the Doctrine of Triangles,' 4to., 1631, 1685; 12mo. 1651, 1667, 1669. 2. 'Fortification, or Architecture Militaire,' 4to., 1639. 3. 'The Seaman's Practice, containing the Mensuration of a Degree of the Earth,' 4to., 1637, 1655, 1667, 1668, 1678. 4. 'Epitome being the application of the doctrine of triangles in certain problems concerning the use of the plain Sea Chart,' 8vo., 1674. 5. 'Logarithmic Tables,' 12mo., n. d. He also published letters and papers, in the 'Philosophical Transactions,' on the tides, on his mensuration of an arc of the meridian, and on other subjects of minor importance.

NOSE is one of the external apertures of the respiratory system and the organ for the sense of smell. The portion of the nose by which odours are perceived lies deep back in the cavity to which the external apertures of the nostrils lead; the portion which is prominent upon the face serves merely as the apparatus for inhaling the air which is impregnated with the odour. The most essential parts of the organ are the olfactory nerves, which come off from the olfactory bulbs of the brain [Brain], and passing through numerous holes in the ethmoid bone, which is situated between the orbits and above and behind the nostrils, ramify on the extended surfaces of that bone and the turbinated bones which form on each side the chambers of the nose. The sensitive terminations of the nerves are placed on the surface of a delicate and very vascular membrane which lines the whole cavity of the nose, and which is constantly kept moist by the secretion of a small quantity of mucus, in which the odoriferous particles are caught and for a time retained.

The sense of smell varies considerably, both in degree and in kind, in different animals. It is evidently possessed by insects and many others of the lower animals, but the organs by which they exercise it are unknown. In the higher animals its degree of acuteness is in general marked by the extent of surface of the ethmoid and turbinated bones, over which the olfactory nerves are distributed. In man this surface is proportionally smaller than in other animals, in most of which, besides occupying the greater part of the interior of the face, it is increased by peculiar branchings and convolutions of the thin layers of the bones. Each species has also a sense of smell in some degree peculiar to itself; thus herbivorous animals, though possessing the most delicate power of discerning the differences of vegetable odours, have no evident faculty of discriminating those of most animal substances; while the carnivora, on the other hand, can scarcely distinguish any others than the last. Each species has a fine sensibility for those substances which are of the greatest importance to its own existence, and thus obtains at once a knowledge of their presence in places concealed from all the other senses. Man possesses the sense of smell for a very large number of substances, but not in a very acute degree for any of them. The difference appears the greater between him and other animals in consequence of the neglect of the exercise of this sense which is common (except for particular purposes) in civilised society; but the American Indians and some of the northern Asiatic tribes, by their constant practice in hunting, are said to have acquired a power of scent scarcely inferior to that of the dog.

The olfactory nerve is appropriated exclusively to the sense of smell, and is incapable of perceiving pain or any other sensation. Of the peculiarities by which in different animals it is capable of perceiving only certain odours, we know no more than of the nature of those odours themselves, of whose existence we have no other evidence than that of the sense which they affect.

The sense of smell serves as an adjunct to that of taste, and is subservient in most instances to the same purpose, of providing proper and avoiding injurious food for the sustenance of the body. By it many animals seek out their food, and all select from that which they obtain; and much of that compound sensation which we regard as taste is really due to the smell, as, for instance, the sensation of the flavour of aromatic substances, which is completely lost by closing the nostrils while we are eating them.

For the full perception of odours it is necessary that the particles charged with them should be drawn with some force into the nose, and we may stand for some time in a very strongly smelling atmosphere without perceiving it, if we breathe only through the mouth. The most acute sensation is obtained by the sudden inhalation of a large quantity, or by a succession of short and quick inspirations.

NOSTRADA'MUS, or NOTRE DAME, MICHEL, a singular personage, who appears to have enjoyed some reputation as a physician, but is now only remembered as the author of the most celebrated predictions published in modern times, was descended from a noble* family in Provence, and was born at St. Rémy, a small town in the diocese of Avignon, on the 14th of December, 1503. His father was a public notary; his paternal grandfather was astronomer and physician to Réné, count of Provence and titular king of Sicily and Jerusalem; and his maternal grandfather (from whom he acquired the elements of the sciences and mathematics) was also astronomer and physician to John duke of Calabria, the son of king Réné. After having finished his courses of humanity and philosophy at Avignon, he went to study medicine at Montpellier, but was driven away by the plague in 1522. For more than four years he travelled about in the south of France, and stayed some time at Toulouse and Bordeaux, during which period he seems to have paid particular attention to botany, and also to have undertaken the treatment of all such patients as were willing to put themselves under his care. He then returned to Montpellier, took the degree of doctor of medicine in his twenty-seventh year (1529), and then again proceeded on his travels. At Agen he remained four years, and married. Here too he became acquainted with Julius Cæsar Scaliger, with whom he appears to have been intimate, and whom he calls a Virgil in poetry, a Cicero in eloquence, and a Galen in medicine; and declares that he owed more of his scientific attainments to him than to any other person. After the death of his wife and two children whom he had by her, he left Agen, and went first to Marseille, and then (in 1544) to Salon, where he married a second time.

Two years afterwards, the plague having broken out at Aix, he was invited thither by a public deputation from the inhabitants, and was of so much service (particularly by means of a powder of his own invention, of which he has given the formula in the eighth chapter of his treatise 'Des Fards'), that he received a pension from the town during several years after the cessation of the disease. He has left upon record a curious instance of the modesty of the women of Aix, who, as soon as they perceived themselves attacked by the contagion, began to sew themselves up in their winding-sheets, in order that their naked bodies might not be seen after their death.

The next year (1547) he was sent for to Lyon on a similar occasion, and appears to have succeeded equally well. On his return to Salon, where he was less esteemed than elsewhere, he employed part of his leisure time in composing some medical works, chiefly consisting of receipts and preparations. It was about this time that he first began to represent himself as divinely inspired, and endued with the gift of prophecy. His predictions were first written in prose; but, upon revising them afterwards, he thought they would look better if expressed in verse, and accordingly he threw them all into the form of quatrains, and then arranged them in three Centuries. When this was done, he was in some doubt about the safety and propriety of publishing the work; but as the time of many of the events foretold in his predictions was near at hand, he at last resolved to print them. The first edition was published at Lyon (1555), and appeared with a dedication to his son Cæsar, then an infant. As might be expected, the work was very differently received by different persons; at home he was generally considered an impostor, but in other parts of France he was looked upon either as a person really and truly inspired by God, or else as one who held communication with the devil. However Henry II. and his superstitious mother Catherine sent for him to Paris, received him at court very graciously, made him a present of two hundred crowns, and sent him to Blois to see the king's children there, and to try to find out their future destinies. The result of this visit is not known, but it is certain that Nostradamus returned to Salon loaded with honours and presents. Encouraged by his success, he increased his quatrains to the number of a complete thousand, and published a new edition of them, with a dedication to the king, in 1558. The next year that prince received a wound at a tournament, of which he died, and it was thought that so unusual an accident could not have been omitted in Nostradamus's predictions; accordingly his book was immediately consulted, and in the thirty-fifth quatrain of the first century were found the following lines:—

'Le lion jeune le vieux surmontera,
 En champ bellique par singulier duel
Dans cage d'or les yeux lui crevera.
 Deux plaies une, puis mourir; mort cruelle.'

So remarkable a coincidence greatly increased his fame, and he was honoured shortly after with a visit from Emanuel duke of Savoy, and his wife the princess Margaret of France. Charles IX., on a progress through Provence, sent for him, and upon his complaining of the slight respect in which he was held by his fellow-townsmen, publicly declared that he should hold the enemies of Nostradamus to be his own. He afterwards presented him with a purse of two hundred crowns, together with a brevet constituting him his physician in ordinary, with the same appointment as the rest.

Nostradamus died about sixteen months after, July 2, 1566. He was buried at Salon, in the church of the Cordeliers, under a monument inscribed with an epitaph asserting in the most confident terms his prophetic skill. After his death two more Centuries were collected from his papers, &c., and added to his quatrains, and the whole work was translated into various foreign languages. Since that time his pretensions to the gift of prophecy have been variously estimated; most persons probably consider him to have been either an impostor or a lunatic, and attribute the fulfilment of some of his predictions to chance; others have accused him of magic, from which charge he is defended by Naudé, in his 'Apologie pour les grands Hommes soupçonnés de Magie;' while some of the believers in animal magnetism have classed him among other 'crisiaques' who exercised 'la faculté physique de prévision somnambulique et de prévoyance ou clairvoyance instinctive.' (*Archives du Magnétisme Animal*, t. viii.)

Even in 1806 there appeared at Paris a work by Théodore Bouys, with the following singular title: 'Nouvelles Considérations sur Nostradamus et sur ses Prédictions concernant: 1, la Mort de Charles I., Roi d'Angleterre; 2, celle du Duc de Montmorency, sous Louis XIII.; 3, la Persecution contre l'Eglise Chrétienne en 1792; 4, la Mort de Louis XVI., celle de la Reine, et du Dauphin; 5, l'Elévation de Napoleon Buonaparte à l'Empire de France; 6, la Longueur de son Règne; 7, la Paix qu'il doit procurer à tout le Continent; 8, sa puissance, qui doit être un jour aussi grande sur mer qu'elle l'est actuellement sur terre

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* According to some authorities he was of Jewish descent, and his biographers, after deciding that he was of the tribe of Issachar, applied to him the following words from 1 Chron., xii. 32—'Of the children of Issachar were men that had understanding of the times, to know what Israel ought to do.' ('Archives du Magnétisme Animal,' t. viii.)

9, enfin, la Conquête que ce Héros doit faire de l'Angleterre.' The (so called) prediction of the death of Charles I., mentioned in the above title-page, is one of the most singular in the whole collection; it occurs in the forty-ninth quatrain of the ninth century, and is as follows:

> 'Gand et Bruxelles marcheront contre Anvers;
> Sénat de Londres mettront à mort leur Roi;
> Le sel et le vin lui seront à l'envers;
> Pour eux avoir le règne en désarroi.'

In the dedication of his work to Henry II. he predicts that the Christian church will suffer from a cruel persecution: 'et durera ceste cy jusques à l'an mille sept cent nonante deux, *que l'on cuidera estre une renovation de siècle*:" the latter part of this sentence is certainly remarkable when we recollect that the French republic dated its existence from September 22, 1792; and that in all public acts time was reckoned from that day as from the commencement of a new æra.

The 'Centuries' of Nostradamus have been frequently reprinted, and numerous commentators have endeavoured to explain his predictions. The best editions are those of Lyon, 1568, 8vo., and Amsterd., 1668, 12mo. Of Commentaries (besides that of M. Bouys, already noticed) the most celebrated are: 'Commentaire sur les Centuries de Nostradamus,' par Chavigny, Paris, 1596, 8vo.; 'Concordance des Prophéties de Nostradamus avec l'Histoire,' par Guynaud, Paris, 1693, 12mo.; 'La Clef de Nostradamus,' par un Solitaire, Paris, 1710, 12mo., and an English translation, with notes, by Theophilus de Garencières, Lond., fol. 1672.

Before he wrote his 'Centuries' Nostradamus had published during several years an almanac, containing predictions about the weather, &c., besides a few other works, of which only the names are now remembered: 'Traité des Fardements,' Lyon, 1552; 'Des Confitures,' Anvers, 1557; both contained in 'Opuscule de plusieurs exquises Receptes, divisé en deux parties,' Lyon, 1572, 16mo.; 'Le Remède très utile contre la Peste et toutes Fièvres pestilentielles,' Paris, 1561, 8vo.; 'Paraphrase de Galien, sur l'Exhortation de Ménodote aux Etudes des Beaux Arts,' Lyon, 1588, 8vo.

For more particulars of the life and works of Nostradamus see 'Abrégé de la Vie de Michel Nostradamus, par Palamède Trone de Condroulet, de la Ville de Salon,' 4to., no date; his 'Life,' by Haitze, Aix, 1712, 12mo. Adelung has given him a place in his 'Histoire de la Folie Humaine,' vii. 105.

This article cannot better end than with the famous Latin distich composed on his name, which has been attributed to Jodelle and to Beza:—

> 'Nostra damus, cùm falsa damus, nam fallere nostrum est;
> Et cùm falsa damus, nil nisi nostra damus.'

NOTA'MIA. Dr. Fleming gives this name to a group of the great genus Sertularia of Linnæus. [CELLARICEA.]

NOTARY. This word is derived from the Roman name *notarius*, a person who was so called from his taking down in notes or writing (notæ) the words of a speaker. The *notarii* were in fact short-hand writers, and it is clear from many passages of antient writers that they used symbols of abbreviation. It may be sufficient to quote the two following passages:—

> 'Hic et scriptor erit felix cui litera verbum est,
> Quique notis linguam superet cursumque loquentis,
> Excipiens longas nova per compendia voces.'
> Manilius, *Astronom:*

> 'Currant verba licet, manus est velocior illis,
> Nondum lingua suum, dextra peregit opus.'
> Martial, *Epig.*, xii. 208.

It seems that they were also employed to take down a man's will in writing. The notarii were often slaves. The word is also sometimes used to designate a secretary to the princeps or emperor. (Ausonius, *Epig.*, 136; Gregor. Nazianz., in the letter inscribed τῷ Νοταρίῳ; Augustin, lib. ii., 'De Doctrina Christiana;' *Dig.* 29, tit. 1, sec. 40; Lampridius, *Alex. Sev.*, 28; see also the references in Facciolati., *Notarius.*)

In the fourth century, the notarii were called Exceptores, and were employed by the governors of the Roman provinces to draw up public documents. But the persons mentioned under the later Roman law, who corresponded most nearly to the modern notary, are called tabelliones; their business was generally to draw up contracts, wills, and other instruments. The forty-fourth Novel treats specially of the tabelliones (περὶ τῶν συμβολαιογραφῶν); and they are spoken of in various other parts of the Novels, and in the Code. (*Cod.* xi., tit. 53, &c.) It appears clear that as the word notarius is the origin of the modern term notary, so the tabellio is the person from whom were derived the functions of the modern notary public.

It is impossible to say when persons under the name and exercising the functions of notaries were first known in England. Spelman cites some charters of Edward the Confessor as being executed for the king's chancellor by notaries. (*Gloss.* tit. *Notarius.*) 'Notaries,' are mentioned with 'procurators, attornies, executors, and maintainours,' in the stat. of 27 Edward III., c. 1. They were officers or ministers of the ecclesiastical courts, and may therefore have been introduced into this country at a very early period. It is generally supposed that the power of admitting notaries to practice was vested in the archbishop of Canterbury by the 25 Hen. VIII., c. 21, s. 4. The term of service and the manner of admission to practice are now regulated by the 41st Geo. III., c. 79, which prescribes that no person in England shall act as a public notary or do any notarial act unless he is duly sworn, admitted, and enrolled in the court wherein notaries have been accustomarily sworn, admitted, and enrolled. He must also have been bound by contract in writing, or by indenture of apprenticeship, to serve as a clerk or apprentice for seven years to a public notary, or to a scrivener using his art and mystery according to the privilege and custom of the city of London, and also being a notary, who has been duly sworn, admitted, and enrolled. An affidavit of the execution of the contract must also be made and filed, as the act prescribes, in the proper court, and the affidavit must be produced and read at the time of the person's admission and enrolment as a public notary, in the Court of Faculties, which is the proper court for admitting and enrolling notaries. The proper persons for taking and filing the affidavits are the master of the faculties of the archbishop of Canterbury, in London, his surrogates or commissioners. Persons who act as notaries for reward, without being properly admitted and enrolled, are liable for every offence to forfeit and pay the sum of 50*l.*; but British consuls abroad are empowered to perform notarial acts (6th Geo. IV., c. 87, s. 20). The licence or commission for acting as a notary in England requires a stamp duty of 30*l.*, and in Scotland one of 20*l.* The annual certificate is the same as for attorneys. By the 3rd and 4th William IV., c. 70, the provisions of the act of 41st Geo. III., so far as relates to the apprenticeship for seven years, are confined to the city of London and liberties of Westminster, the borough of Southwark, and the circuit of ten miles from the Royal Exchange in the city of London; and the master of the Court of Faculties of the archbishop of Canterbury is empowered to appoint, admit, and cause to be sworn and enrolled in the Court of Faculties any attorney, solicitor, or proctor, not residing within the above-mentioned limits, to be a notary public, to practise within any district in which the master of the faculties shall see good reason for making such appointment. Notaries public who practise within the jurisdiction of the incorporated company of Scriveners of London must become members of and take their freedom of that company under the act of the 41st Geo. III.

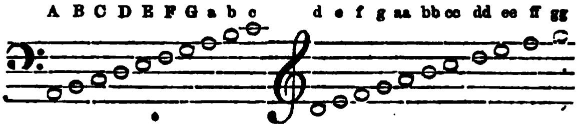
The original business of notaries was to make all kinds of legal instruments; they are often spoken of in former times as the persons who made wills (Shepherd's *Touchstone*, vol. ii., 407, Preston's ed.); but the attorney, solicitor, and conveyancer have now got possession of this part of their business. In practice their business is now limited to the attestation of deeds and writings for the purpose of making them authentic in other countries, but principally such as relate to mercantile transactions. It is also their business to make protests of bills of exchange. They also receive and take the affidavits of mariners and masters of ships. Notaries are mentioned with serjeants-at-law, barristers, solicitors, attorneys, and others (44th Geo. III., c. 98, s. 13), as the persons who may, for fee or reward, draw or prepare conveyances or deeds relating to real or personal estate, or proceedings in law or equity. A recent act (5th and 6th William IV., c. 70, s. 5) provides that in cases of such actions or suits being brought in any court of law or equity within any of the territories or dependencies of Great Britain abroad, as in the act mentioned, public notaries, with other persons named in the act, are authorised to receive solemn declarations in writing, in the form prescribed by the act; and such declarations, when certified under their signature and seal, and transmitted, shall be allowed in all such actions and suits to have the same force as if the persons making the declarations had appeared and sworn or affirmed the matters therein contained in open court, or upon a commission issued for the examination of witnesses.

NOTARCHUS. [Tectibranchiata.]

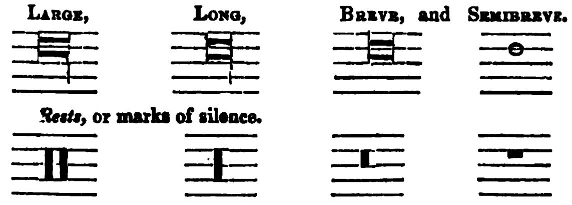
NOTATION. [Symbols.]

NOTATION, in Music, signifies the method whereby the pitch, or tune, and duration of musical sounds are represented, and by which definite periods of silence, called *rests*, are marked:—it is to music what letters and punctuation are to language.

To show the pitch, the Greeks used the letters of their alphabet, placed in various positions. [Music, p. 24.] The Romans had recourse to the majuscules of their own alphabet for the same purpose, till the latter part of the sixth century, when St. Gregory, or Pope Gregory I., employed the seven first capital Roman letters for the first septenary, beginning with the A answering to the lowest space in our base clef. For the next ascending septenary he used the corresponding small letters; and the third he denoted by the same small letters doubled. Example, explained in modern notation:—



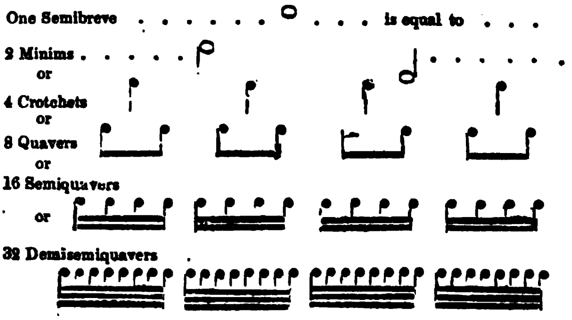
Guido, early in the eleventh century, introduced, it is commonly supposed, the use of points instead of letters, which he placed on parallel lines, giving names to the latter by means of letters, which have since been gradually transformed into those signs called clefs. [Guido; Gamut; Clef.] The dots however of Guido only marked the degrees of high and low; to Franco of Cologne we are indebted for characters which at once denoted both the tune and time of the sounds. [Music, page 26.] Of these he invented four, and their rests; namely, the



These were valued or measured by the semibreve. The breve was equal to two semibreves, the long to four, and the large to eight. [Long, &c.] The invention of the Minim, Crotchet, Quaver, and Semiquaver, is ascribed to John de Muris, a doctor of the Sorbonne, who made this important addition to notation, and also originated certain characters determining the measure, in the year 1338. The Demisemiquaver first appeared in the seventeenth century, and, about the middle of the last, was divided into halves. Latterly it has been subdivided into quarters, and even into eighths, most unnecessarily, and greatly to the perplexity of the performer, and, consequently, to the detriment of the art, by wantonly, and with an affectation at once vulgar and mischievous, throwing difficulties in the way of its attainment.

We have not been able to ascertain at what time the sharp and flat were brought into use. The sharp was at first square in form, according to Butler (*Principles*, &c., 1636). The flat was always a small *b*. The natural is, comparatively, of modern date. Till towards the close of the seventeenth century, the secondary use of the sharp was to contradict the flat, and of the flat to contradict the sharp. The natural, introduced at nearly the same time, relieved the two other characters from part of their duty. In the printed score of Lully's opera, *Persée*, dated 1684, the natural does not appear; nor even in his *Armide*, published in 1710. In Purcell's *Diocletian* (1691) sharps and flats contradict each other; but the natural is occasionally used. [Sharp; Flat; Natural.] The grouping of quavers, &c. by means of ligatures, or ties, joining the stems, is also one of the improvements made in the latter half of the seventeenth century. It does not seem to have been practised in 1653, when Lawes printed his 'Ayres,' &c. In Lully's *Proserpine* (1680) we find quavers tied at the bottom of their stems, in groups of four, but semiquavers are all detached. The use of bars became general about the middle of the seventeenth century, though this mode of division was partially adopted much earlier. [Bar; Abbreviations; Dot; Note; Time.]

NOTE, in Music, a character which, by its place on the staff, represents a sound, and by its form determines the time or continuance of such sound. There are six notes in ordinary use,—the Semibreve, Minim, Crotchet, Quaver, Semiquaver, and Demisemiquaver. To these may be added the Breve, yet met with in sacred music; and the half-Demisemiquaver, much used, and often unnecessarily, by the moderns. [Breve; Semibreve, &c.] The value, or length in time, of the Semibreve may be considered as unity; the minim is $\frac{1}{2}$, the crotchet $\frac{1}{4}$; the quaver $\frac{1}{8}$; the semiquaver $\frac{1}{16}$, and the demisemiquaver $\frac{1}{32}$. Hence is formed the following *Table of Proportions*, as it is denominated:—


One Semibreve . . . . is equal to . . .
2 Minims . . . .
or
4 Crotchets
or
8 Quavers
or
16 Semiquavers
or
32 Demisemiquavers

And hence it will also appear, that one minim is equal to two crotchets, &c.; one crotchet, to two quavers, &c., &c.

The word Note is frequently used as a synonym of sound; thus we say a high, low, loud, or soft *note*; or, the *note* A; a flat *note*, &c. Some confusion occasionally arises out of this double meaning; but the musical nomenclature is very imperfect, and any attempt to improve this or any other branch of the art meets with little support from its professors.

NOTES, BANK. [Bank—Banker—Banking.]

NOTHING. In the article Infinite will be found as much upon this word as will enable us to dispense with the consideration of the symbol 0 as the limit approached but never attained by the continual diminution of magnitude.

Among the terms used in mathematical language are *nothing*, *cipher*, and *zero*. The etymologies of the two latter terms are explained under those heads: their meanings are somewhat different. The first word, *nothing*, implies the absence of all magnitude, but its occurrence denotes either that magnitude did exist, or might have existed, or does exist under similar circumstances in other problems, or in the same problem under different points of view. Were it not for this, the word would be useless: thus we do not consider it necessary to speak of £20 generally as twenty pounds, no shillings, no pence, and no farthings. But if this £20 had been the amount of a number of sums, the symbol £20 0 0 would be useful as indicating that the results of an operation (addition) had left no quantities in places where beforehand quantity might have been expected. The term *unity* would have been useless in the same manner, except as a tacit reference to other units; anything we please is *one* of its kind, and accordingly the indefinite article (a or an), which is certainly *one* in etymology, has lost its definite monadic signification, because such signification is useless. This point is of some importance to the mathematician, as justifying a use of the symbol 0 where it might seem redundant. The 0 and 1 are frequently useful as symbols of distinction where they are not wanted as symbols of operation: in like manner, in common language, the simple phrase '*one* ox and *no* sheep,' though it implies no more of positive conception than the more simple phrase 'an ox,' may be a proper description where the second would be no such thing.

The *cipher* is 0 considered in a purely arithmetical point of view, as the mode of denoting a blank column intervening between or following columns which contain significant numbers.

The term *zero* considers 0 rather as a starting point of magnitude than as the symbol for the recognition of absence of all magnitude, and really denotes, not the entire absence of magnitude, but the arbitrary determination to reckon all magnitudes by their excess or defect from a certain zero magnitude. Thus the zero point of the thermometer does not mean that shown when there is no temperature, but a certain temperature, that of freezing water; and degrees above and below zero indicate excesses or defects of tempe rature above or below that standard. It is then perfectly proper to say that ten degrees below zero is a lower temperature than five degrees, and that both are less than zero. Whenever magnitude is considered in connection with modifications, the zero and even the nothing of such magnitude may require to be considered with similar modifications, even though all absolute magnitude is lost. Straight lines, for example, admit of consideration with reference not only to their lengths, but also to their positions and directions. Let the straight lines diminish each by an approach of one extremity towards the other, and position and direction still always distinguish each line from the others, though all be of the same linear magnitude (length): when the one extremity actually reaches the other, length is destroyed, but one indication of position still remains, the fixed extremity, or what was the fixed extremity as long as the line has length. Different points (*nothings* of length) still tell something about the positions of the different lines which left them; and there are as many *nothings* of length (distinguishable) as there are different points in space. These zeros, as it might be proper to call them, are of most essential consequence, *as zeros*, in the complete method of connecting the explanations of symbols in algebra (in the widest sense of the term) with those of the restricted or arithmetical sense. [Negative Quantities.] All direction however has disappeared when a line is reduced to a point; and considerations arising out of this, the principles of which appear in Fractions, Vanishing, will be applied in the article Tangent.

It might seem as if, in the consideration of the term *zero*, we had commenced an explanation of negative quantities, and had obtained a justification of the phrase *less than zero*, if not of *less than nothing*. This may be true to a certain extent, too limited however for the purposes of algebra, and not sufficiently expressive of the actual meaning of the words. When the distinction of positive and negative quantities is explained and adopted, the terms greater and less are no longer used in their simple arithmetical meaning, but take a wider signification, such as will allow old theorems of arithmetic to remain true under the same phraseology as before. After an express extension of signification has been accorded to these terms, it is not wonderful that uses of them should be perfectly allowable which could not be made if we retained the old significations. Those who use the extended meanings, without fully understanding and admitting them, will make a mystery of algebra: those who refuse to make the extensions, and yet charge others who do not refuse with falling into all the absurdities which extended uses without extended meanings present to *themselves*, are precisely in the condition of the honest tar who asserted that the French were such fools as not to know the difference between a cabbage and a shoe (*chou*). But those again who, professing to use extended meanings, do not take care to make their logic conformable to them, but neglect to distinguish between premises which are true of one set of meanings and not of the other, will fall into such mistakes as would be made by him who should conclude that blood is salt water, because both circulate in arms (of the human body and of the sea).

Admitting the scale of positive and negative numbers,

$$\ldots -3,\ -2,\ -1,\ 0,\ +1,\ +2,\ +3,\ \ldots$$

it is obvious that on the right of 0, on which we have quantities common to pure arithmetic and algebra, we pass from the greater to the less by moving our eyes from right to left; while on the left we have no meaning at all of greater and less yet established. Let us agree then that we are to pass from what we will call the greater to what we will call the less by passing from right to left in all cases; and there is no mystery in our meaning when we say that all negative quantities are less than 0, and that -10 is less than -5.

But is this convention a purely arbitrary one? We answer that it rather bears the character of interpretation [Interpretation] than of convention. Having new modes of quantity, with corresponding extensions of addition and subtraction, we are rather to ask what greater and less *ought* to mean than what, with liberty of choice, we shall make them mean. The great characteristics of greater and less (or more and less) in arithmetic are, that the more you add the more you get, and that the more you take away the less you leave, and *vice versâ*. The preceding extensions of greater and less are the only ones which will allow of these theorems remaining universally true. Thus

$3+(-5)=-2$, add more, and $3+(-4)=-1$, and -1 is greater than -2. Again,

$-5-(-12)=7$, subtract less, $-5-(-13)=8$,

and 8 is greater than 7.

It is however to be remembered, though no rule has been laid down upon the subject, that it may be gathered from the practice of writers that the term *smaller* does not accompany *less* in its extended meaning. The former term is particularly used in the Differential Calculus to denote an approach to 0, which in a negative quantity is algebraic increase, and in a positive quantity diminution. And many, perhaps all writers on the Differential Calculus, are lax in their use of all the comparative terms, sometimes employing them in the algebraical and sometimes only in the arithmetical sense. The inconvenience is not very great, as a student must have learned to contend with greater difficulties than those of an unexplained use of dubious terms, before he is able to make his way to the higher mathematics. But it may be useful to give him a hint that, in reading works of analysis, he would do well at first always to stop for a moment when the word greater or less occurs, and ask himself whether the problem requires and allows the extended signification or not, and to make some mark of distinction in every place. This will at once ensure the soundness of the first reading, and facilitate the second.

NOTHING, DIFFERENCES OF. This name is given to certain numbers which are used in so many different theorems that it is worth while to tabulate them, and to consider them as fundamental numbers of reference. They were first specifically noted in this point of view by the late Bishop Brinckley. We shall here confine ourselves to a description of their derivation, an expeditious mode of calculating them, a table of some of their values, and one instance of their use.

If we take a series of terms a, b, c, e, &c., and form the successive differences of a [Differences, Calculus of], the symbols Δa, $\Delta^2 a$, &c., have a meaning which refers to the excess of b above a, &c. If then a should happen to be $=0$, the symbols $\Delta 0$, $\Delta^2 0$, &c., may stand for finite quantities· for instance in—

$$\begin{array}{cccc} 0 & & & \\ & 2 & & \\ 2 & & 1 & \\ & 3 & & 0 \\ 5 & & 1 & \\ & 4 & & 0 \\ 9 & & 1 & \\ & 5 & & \\ 14 & & & \end{array} \quad \text{\&c.} \qquad \Delta 0=2, \qquad \Delta^2 0=1.$$

But as the preceding series is a set of values of $\frac{1}{2}x(x+1)-1$, in which the first term is 0 ($x=1$ gives $\frac{1}{2}1.2-1$), it would be necessary in using several series beginning with 0, to make marks of distinction between $\Delta 0$ in one series, and that in another. The most useful case is that in which whole and positive powers of 0, 1, 2, 3, &c. form the series in question: thus if we take the series of cubes,

$$\begin{array}{rcccc} 0^3= 0 & & & & \\ & 1 & & & \\ 1^3= 1 & & 6 & & \\ & 7 & & 6 & \\ 2^3= 8 & & 12 & & 0 \\ & 19 & & 6 & \\ 3^3= 27 & & 18 & & 0 \\ & 37 & & 6 & \\ 4^3= 64 & & 24 & & \\ & 61 & & & \\ 5^3=125 & & & & \end{array} \qquad \begin{array}{l} \Delta . 0^3=1 \\ \Delta^2 0^3=6 \\ \Delta^3 0^3=6 \\ \Delta^4 0^3=0, \text{ \&c.} \end{array}$$

The symbol $\Delta^m\,0^n$, whenever m is greater than n, stands for 0; when m is $=n$ it stands for $1\times2\times3\times\ldots\ldots\times n$. In all other cases the differences of 0^{n+1} may be found from those of 0^n by the following equation:—

$$\Delta^r\,0^{n+1} = r\left\{\Delta^{r-1}\,0^n + \Delta^r\,0^n\right\}$$

It is frequently useful to have the term $\Delta^r . 0^n \div 1.2.3 \ldots (r-1).r$ arranged in tables. If we wish to make this separately, we have, denoting the preceding fraction by $\Delta(r).0^n$

$$\Delta(r)\,0^{n+1} = \Delta(r-1)\,0^n + r\,\Delta(\;)\;;^{n-1}$$

The following table contains both the differences, and the differences divided, as just explained, up to those formed from the series of tenth powers; arranged so that simple differences must be looked for above or on the dotted lines, and divided differences below the dotted lines; the first by means of the left hand column and highest row; the second by the right hand column and lowest row. Thus—

$$\Delta^5\,0^6 = 126000\ , \quad \frac{\Delta^5\,0^6}{2.3.4.5} = 1050$$

$$\Delta^6\,0^7 = 15120\ , \quad \frac{\Delta^6\,0^7}{2.3.4.5.6} = 21$$

n	Δ	Δ^2	Δ^3	Δ^4	Δ^5	Δ^6	Δ^7	Δ^8	Δ^9	Δ^{10}	n
10	1	1022	55980	818520	5103000	16435440	29635200	30240000	16329600	..3628800	1
9	1	510	18150	186480	834120	1905120	2328480	1451520	..362880	1	2
8	1	254	5796	40824	126000	191520	141120	...40320	3	1	3
7	1	126	1806	8400	16800	15120	...5040	6	7	1	4
6	1	62	540	1560	1800	720	10	25	15	1	5
5	1	30	150	240	120	15	65	90	31	1	6
4	1	14	36	24	21	140	350	301	63	1	7
3	1	6	6	28	266	1050	1701	966	127	1	8
2	1	...2	36	62	2646	6951	7770	3025	255	1	9
1	..1	45	750	880	22827	42525	34105	9330	511	1	10
n	Δ^{10}	Δ^9	Δ^8	Δ^7	Δ^6	Δ^5	Δ^4	Δ^3	Δ^2	Δ	n

The only one not in the table is $\Delta^{(r)}\,0^r$ which is always unity.

The uses of these differences mainly consist in the rapidity with which transformations can be made by means of them, whether of a simple algebraical or of a trancendental kind: such as the following, n being a whole number —

$$x^n = x + \Delta^{(2)}\,0^n\,.\,x(x-1) + \Delta^{(3)}\,0^n\,.\,x(x-1)(x-2),\\ + \quad \&c.$$

$$x^2 = x + x(x-1),$$
$$x^3 = x + 3\,x\,(x-1) + x\,(x-1)\,(x-2),$$
$$x^4 = x + 7\,x\,(x-1) + 6x\,(x-1)\,(x-2)\\ + x\,(x-1)\,(x-2)\,(x-3),$$

and so on. [See also OPERATION, SERIES.]

The following works contain many properties of these numbers: Herschel, 'Examples of the Calculus of Finite Differences,' *passim*; and *Lib. Useful Knowl.*, 'Differential and Integral Calculus,' pp. 253-261, and 307-311.

NOTHU'RUS. [TETRAONIDÆ.]

NOTICE is a term used in English law with reference to various kinds of transactions. That use of it which is most important, and which it is here proposed to explain, has reference to contracts of buying and selling, and mainly so far as such contracts come under the cognizance of courts of equity. In this sense notice signifies the knowledge of a party to the contract of any fact which is connected with the contract, and may become a matter of dispute either between the parties to the contract, or between them or any of them and any other person not a party to that contract. The term notice is most commonly applied to buying and selling of land, or some interest in land, and the matter generally in dispute is, whether the interest of a person who is not a party to the contract is in any way to be affected by it.

Notice, in English law, is an ambiguous term, and has different meanings according as we contemplate the giver or the receiver of what is called notice. To give notice is to communicate something to another person: the person who receives the communication, is said *to have* notice, and when it is proved that he has had such notice, he is presumed to have knowledge of the thing communicated. Thus notice comes to have the meaning of *knowledge* when applied to him who is the receiver of the notice; and it is not always easy to avoid the ambiguity resulting from this double meaning of the word.

Notice of a fact (notice being here considered with reference to the receiver) may mean either knowledge of the fact itself, or knowledge of some other fact from which arises a legal presumption of knowledge of the fact itself. In both cases the knowledge must be proved by evidence, and the only difference in the evidence is this; in the former case a fact is to be proved, which fact, when proved, shall be considered knowledge; and in the second case a fact is to be proved, which cannot be considered as knowledge, but is a fact the establishment of which leads to a legal presumption, that is, to an inference of some fact which is considered as knowledge. If a man receive a written communication from another person of a certain demand upon him by such person, all that can be proved by evidence is that he did receive such communication; but that fact being established, all the world imputes to the receiver of such communication knowledge of the demand contained in it. The fact, in order to have any relation to the contract, must of course be such a fact as would affect the contract if it were expressly made part of it. A fact of this kind then being established, which is either knowledge or legal presumption of knowledge, the legal conclusion is, that the person who had such knowledge at the time of making the contract must be considered as having acquiesced in such fact; in other words, such fact must be considered to have the same effect as if it were expressed in and incorporated with the contract.

Notice has been divided by writers on English law into 'actual' and 'constructive.' 'Actual notice,' it is said, 'requires no definition;' and 'constructive notice, in its nature, is no more than evidence of notice, the presumptions of which are so violent that the court will not allow even of its being controverted, but it is difficult to say what will amount to constructive notice.' (Sugden's *Vendors and Purchasers*.) It is not stated by this writer what actual notice is, and since his remarks on constructive notice are equally applicable to actual notice, he has in fact made no distinction between the two kinds of notice. In addition to what has been said on the general subject of knowledge, we may take an instance of what would be called actual notice in English law. We will suppose this actual notice to be a statement in writing made by a person interested in a certain piece of land and in the course of the treaty for the purchase of it, and by him handed to the purchaser. Now it is obvious that all this, when proved, does not make the knowledge of the purchaser; but these facts, when proved, are evidence of knowledge, 'the presumptions of which are so violent' that the universal consent of mankind 'will not allow even of its being controverted.' There is then no further distinction between actual and constructive notice, considered as a matter belonging to the general subject of evidence, than what has been already stated; and the only question which can arise in any system of law is, what facts, not capable of being considered as knowledge, shall be considered, when proved, as leading to a legal presumption of such facts as may be considered knowledge.

These general principles will be better understood by their application to particular cases, in English law, of buying and selling land. But it should be premised that there are cases of what is often called notice, in English law, where no knowledge of anything is proved, but the existence of a certain thing is proved, and then notice is legally imputed to the person to be affected by it. Thus, when there is a public act of parliament, every body is legally supposed to have notice of it. But this is notice which arises from positive law, and is not presumed from the proved knowledge of another fact; it would therefore be more appropriate to give it some other name, and not to confound it, as some text writers do, with that which they call constructive notice. Another example of such notice made by positive law is, where there is a suit pending[*] which may affect the subject of sale; in this case the purchaser is also said to have notice of it, and he buys subject to what may be decreed in the suit. All conveyances by any bankrupt *bonâ fide* made and executed before the date and issuing of the fiat are valid, notwithstanding any prior act of bankruptcy committed by the bankrupt, provided the person to whom the conveyance is made had not at the time of such conveyance notice of any prior act of bankruptcy committed by the bankrupt.

Where facts are proved to be known to a man which are sufficient to make him inquire further, he is considered to know all that he might have known if he had made inquiry. For instance, if a man buys an estate which is in the possession of a tenant, notice of such possession is notice of any lease or other interest which the tenant may have in the estate; and though the seller may affect to sell the complete and immediate interest in the estate, the buyer will take it subject to the interest of the tenant. And if a tenant under a lease has some further interest in the land by agreement posterior to the date of the lease, the buyer of the land, who has notice of the tenant's possession, has constructive notice of such agreement, and therefore he buys the estate subject to all the tenant's rights. It will of course be observed that the contract of a purchaser with a seller cannot affect the previous contract, about the same land, of another person with the same seller, so far as the mutual rights and liabilities of the seller and that other person are concerned. But the question between the two persons who have dealt with the seller is, Which of the two is to have that thing which he has agreed to buy, and which of the two is to have the trouble of settling the dispute with the seller. It is determined that the subsequent contractor, who has what is called notice of the former contract, must be considered as having the benefit of his own contract, but still subject to the prior contract; and if he has bought the estate and obtained a conveyance of it, having notice of a prior contract for sale, he will be compelled to convey the estate to the person who had such prior contract with the vendor. If the prior contractor has obtained any legal estate in the land, the buyer, of course, whether he has notice or not, only obtains from the vendor such interest as he can sell.

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[*] By a recent Act, 2 Vic., c. 11, purchasers and mortgagees are not to be bound by *lis pendens*, of which they have not express notice, unless the names, &c. of the parties to be affected thereby, are registered, as the act prescribes.

That which is notice to a man's agent is notice to himself, provided the agent has the notice in the transaction in which he acts as agent. This doctrine is obviously founded on the legal identity of the principal and agent, in all matters which the principal transacts by his agent.

It seems to be determined that the mere fact of a man being witness to the execution of a deed, will not be notice to him of the contents of the deed; for the nature of that transaction called witnessing a deed is not in any way connected with a knowledge of the contents of the deed.

Sometimes a person who is entitled to a sum of money or the interest of a sum of money which is in the hands of a trustee, will fraudulently sell his interest twice over. A second purchaser, who *has* no notice of the former transaction, and *gives* notice, that is, communicates in a way that cannot be misunderstood the fact of his purchase to the trustee before the former purchaser does, is entitled to have what he has bought, in preference to the other purchaser. By *not having* notice, he purchases a good title, and acquires a right to what he has bought, equal to the first purchaser's right; by *giving* notice, he secures that which he has purchased. This is a good example of Notice, viewed under two different aspects, which should not be confounded.

Other examples of notice may be found in the text books.

It will be collected from what has been said, that cases of this kind of notice under consideration, are cases in which three persons at least are generally concerned, a seller, a buyer, and some person who is interested in disputing the buyer's title to the thing which he has bought. The term is also applied, though less frequently, to the case of a seller and buyer only; for that which may be called notice in the other case may be equally well called notice in this. The seller may not intend to conceal or misrepresent any fact, and he may think that he has said everything that was necessary, and the buyer may think that he was buying the whole of an estate when the vendor was only selling the estate subject to certain encumbrances; and the state of facts may be such as would be evidence of notice to the purchaser as against a party who had contracted with the vendor previous to himself. The question then comes, whether such state of facts is to be considered as notice to the purchaser, in the case now supposed, as against the vendor, and equally binding on him as it would be in the case of a prior contracting purchaser. It may be observed that the doctrine of notice, as between a seller and a single buyer, has been applied to the case of a lease, where it was held that notice of a lease to a purchaser was notice of its contents; but this doctrine was derived from a case wherein three parties were concerned, a seller, a lessee, and a purchaser, and it does not appear to have been considered that the question of notice between two purchasers, or two parties claiming an interest in land against a third person, is not quite the same thing as the case of a dispute between two persons only, a seller and a buyer. (*Hall* v. *Smith*, 14 Ve., 426, 437.) This kind of question however, in English law, would be more properly considered under the heads of Concealment, Suppression, or Misrepresentation, which are a species of fraud; or under the head of Mistake.

The question of notice is one of great practical importance. So far as relates to what shall be evidence of notice, it will vary greatly in different systems of jurisprudence; so far as concerns its true nature, it belongs to the general doctrine of contracts.

Notice, in English law, as relates to buying and selling of land, is treated by Sugden, in his 'Vendors and Purchasers,' but in a very unsatisfactory way, so far as concerns the general principles of notice. Notice in other cases, as in Bills of Exchange, Distress, &c., is mentioned under those heads.

NOTION, NOTIONAL. The word notional has been used by Dr. Becker, in his 'German Grammar,' in a sense which it may be useful to explain. He divides all the words of which language consists into notional words and signs of relation. By notional words he understands those which express notions, that is, things which are the objects of the understanding, such as are expressed by the words usually called verbs, nouns, and adjectives. By signs of relation he understands such as merely express a relation between the different things, the objects of the understanding, which are expressed by notional words. The signs of relation are either mere terminations, that is, final letters which modify the form of the notional word, or they are separate words, which he calls relational words. In the phrases, 'the dog barks,' 'my father's falling house,' the *s*, *'s*, and *ing*, are respectively terminations which indicate a relation between the things expressed in the several phrases. In the phrases, 'he lives *in* a town,' 'he left us *after* dinner,' *in* and *after* are relational words, that is, they connect the notions expressed by 'his living,' and 'his leaving,' respectively with the notions of 'town' and 'dinner.' Thus we may consider Notional words as the matter of language, and Relational words as giving to language its form, that is, what is commonly called its grammatical structure. It must be observed however that in many languages which possess few terminations, a considerable part of the relations which subsist among words, that is, among the notions which words express, are indicated by the order of the notional words as well as by signs of relation. This is true to some extent in all languages, but it is more particularly the case in such languages as our own.

This grammatical division of words adopted by Dr. Becker leads to the division of grammar into two main parts, etymology and syntax, the former of which respects the forms of the several words, and the latter their relations when combined in a sentence.

A notional word may either be a root or element incapable of further analysis, or it may be a form derived from such a root, as *grow*, *growth*, *long*, *length*, where the *th* is not a termination, in the sense of a sign of relation, but is a termination which modifies the notion of the word from which it is formed. A notional word may also be what Dr. Becker calls a Secondary Form, as *greatness*, *wealthy*, &c., the latter of which words exhibits the following process of development: *weal* (German, *wohl*), *wealth*, *wealthy*.

It is not intended by this division of words to affirm that some of such terminations as *ness*, &c. may not have been originally notional words. It is probable that all such terminations, and perhaps all terminations, have once been notional words, and that in the progress of usage they have become permanently attached to particular words, of which they may now for all purposes, except historical purposes, be considered a part, that is, a part necessary to give the word that meaning which it now has. Nor is it intended to affirm that words which are now merely words of relation, were not originally notional words: on the contrary, Dr. Becker admits that most of the relational words 'are derived from radical verbs, and therefore were originally notional words; they have now come to imply merely relations of notions, and do not differ in their present signification from the terminations of inflection. The use of Relational words increases in language in the same proportion as the power of inflection diminishes.'

This division of words into Notional and Relational appears to be of considerable importance. Some question however may arise whether all the words which Dr. Becker calls relational are properly placed by him in that class. Thus he considers the pronoun I as a word of relation merely, and implying *personality*. But this does not appear to us to be a correct view of the nature of that word. Interjections, he also observes, 'imply neither notions nor relations of notions, and are not necessarily connected with the sentence;' but the latter part of this proposition may be assented to without giving our assent to the former part.

NOTRE DAME. [Paris.]

NOTTINGHAM, EARL OF. Heneage Finch, whose father was recorder of the city of London, and a member of the family of the earls of Winchelsea, was born in 1621. He was educated at Westminster school, and was afterwards removed to Christ Church, Oxford. After leaving the university he became a member of the Society of the Inner Temple, London. On the restoration of Charles II. he was appointed solicitor-general, and distinguished himself in the prosecution of the regicides. He published 'An exact and most impartial Account of the Indictment, Arraignment, Trial, and Judgment of (according to law) Twenty-nine Regicides,' 4to., 1660; 8vo., 1679. In 1661 he was made member of parliament for the university of Oxford, and about the same time was created a baronet. In 1665 the diploma of LL.D. was presented to him by the university of Oxford. He took a prominent part in the impeachment of the earl of Clarendon in 1667; and in 1670 was appointed attorney-general. He succeeded the earl of Shaftesbury as lord-keeper of the great seal in 1673, and in 1675 was made lord-chancellor of England. He presided as lord high steward on the trial of Viscount Stafford, in 1680, and pronounced judgment against that nobleman in a speech of extraordinary eloquence. He was created earl of Nottingham in 1681, and died in 1682.

Besides the account of the trial of the Regicides, he published 'Speeches in both Houses of Parliament,' 1679: 'Speech at the Sentence of William Viscount Stafford,' 1680: 'Arguments upon the Decree in the Cause between the Hon. Charles Howard, Esq., Plaintiff; Henry, late duke of Norfolk; Henry, lord Mowbray, his son; Henry, marquis of Dorchester; and Richard Marriot, Esq., Defendants; wherein the several ways and methods of limiting a trust of a term for years, are fully debated,' Lond., 1685, fol.: 'An argument of the Claim of the Crown to Pardon on Impeachment,' fol.; and 8vo., 1791: there is a volume of 'Reports of Cases decreed in the High Court of Chancery during the time Sir Heneage Finch, afterwards earl of Nottingham, was Lord Chancellor,' 1725. Some valuable Chancery Reports, written with his own hand, were left by him. Lord Nottingham had a high reputation for sound judgment and integrity. It has been said of him, 'That he was a man of probity and well versed in the laws, an incorrupt judge, and in his own court could resist the strongest application even from the king himself.' 'He was,' says the anonymous author of the 'Lives of the Lord Chancellors,' 'a very eloquent person, and a most excellent orator, and a lord of that wisdom, that some have stiled him the English Roscius, the English Cicero, &c.' His character is drawn by Dryden, in his 'Absalom and Achitophel,' under the name of Amri—

> 'To whom the double blessing does belong,
> With Moses' inspiration, Aaron's tongue.'

NOTTINGHAM. [Nottinghamshire.]

NOTTINGHAMSHIRE, an inland county of England. It is bounded on the north-east and east by Lincolnshire, from which it is in one part separated by the river Trent; on the south-east and south by Leicestershire, from which it is separated in one part by the Soar; on the west by Derbyshire, from which it is separated in one part by the Erewash; and on the north-west by Yorkshire. Its form approximates to an oval. Its greatest length is from north by east to south by west, from the junction of the three counties of York, Lincoln, and Nottingham, to the village of Stanford on the Soar, 51 miles; its greatest breadth, from the border of Derbyshire between Mansfield and Alfreton, to the river Witham on the Lincolnshire border, not far from Newark, 26 miles. Its area is estimated at 837 square miles. The population in 1821 was 186,873; in 1831, 225,327; showing an increase in ten years of 38,454, or 20 per cent.; and giving 269 inhabitants to a square mile. In size it is the twenty-seventh of English counties; in amount of population, the twenty-second; and in density of population, the tenth. Nottingham, the capital, is near the Trent, 109 miles in a direct line north-north-west of London, or 124 miles by the mail-road through Woburn, Newport Pagnell, Harborough, Leicester, and Loughborough.

Surface; Geological Character; Hydrography; and Communications.—The surface of the county is undulating, except in the vale of Trent and the vale of Belvoir; but there are no very high hills. The northern boundary runs through the marshes that surround the Isle of Axholme. The east side of the county between the Witham and the Trent is for the most part flat. Beacon hill rises to the east of Newark: and a ridge of upland skirts the immediate valley of the Trent from the neigbourhood of Newark to Nottingham. The eastern side of this ridge has a very gradual slope toward the vale of Belvoir, watered by the Deven and its tributary the Smite. Quite in the south part of the county, between the Trent and the vale of Belvoir, are the Wold Hills, in which are included the Hotchley or Leak hills. On the west side of the Trent the ground rises gradually towards the Idle in the north west and the Erewash in the south-west. The western escarpment which skirts the valley of the Idle is steeper: and it may be observed of the hills generally in this county, that their western slope is steeper than the eastern. Pear-tree hill and Gringley hill (235 feet) are at the northern end of these uplands, just above the Idle, and Langton Harbour and Holland Hill (467 feet high) are between the Trent and the Erewash. West of the Idle the ground rises again, but it is intersected by the valleys through which the tributaries of the Idle flow. Near the head of the Maun, one of these tributaries, are the high lands of Shirewood or Sherwood Forest, known in tradition as the principal haunt of Robin Hood. Sutton-in-Ashfield hill, west of Mansfield, is about 600 feet high.

The strata which occupy the surface of this county succeed each other in order from east to west. The eastern and south-eastern border of the county is chiefly occupied by the lias, which is found in that part of the vale of Belvoir which lies east of the Deven and the Smite, and, passing to the west of the latter river near its source, forms the Wold hills of Nottinghamshire and Leicestershire. The vale of Trent and the uplands to the west of it are for the most part composed of rocks of the red-marl or new red-sandstone group. In the northern part of the county these formations extend to the borders of Yorkshire and Derbyshire. Just along the northern border they sink beneath the fens surrounding the Isle of Axholme, in which isle they emerge again. Langton Harbour and Holland Hill belong to this formation. The striking colour of the red-marl has given origin to many local names, as Retford on the Idle, Radford, Radcliffe, and Ratcliffe, and perhaps Ruddington, all in the neighbourhood of the Trent, and not far from Nottingham. Among the beds of this formation is a sandstone so soft as to admit of being easily excavated. The caverns near Nottingham are supposed to have given to that town (and through it to the county) its name, Snodengaham, 'the home of caverns.' There are under that town many caves, some of them cellars of comparatively modern date, but others of considerable though unascertained antiquity. There are some caverns in the face of a cliff near the river Lene, west of Nottingham castle; and there are some remarkable excavations at Sneinton close to Nottingham. These are all probably artificial, or, if originating in natural caverns, have been enlarged and modified by human labour. Gypsum occurs plentifully in this formation, and is quarried in several places. The newer magnesian or conglomerate limestone underlies the red-marl; but in some parts these formations are separated by beds of quartzose gravel, extending to the depth of 600 or 900 feet, and often consolidated into a soft pudding-stone, of which the Castle hill at Nottingham is a specimen. 'Although this gravel has been referred by some to a recent alluvial origin, it seems more probable that it is a form of the conglomerate rocks so generally attendant upon this formation. It constitutes the prevailing stratum throughout Sherwood Forest.' (Conybeare and Phillips's *Outlines of the Geology of England and Wales.*)

The beds of the magnesian limestone occupy a tract varying from 4 to 7 miles wide in the south-western part of the county, west of a line drawn from Mansfield to Nottingham. Near Mansfield the strata are arched and contorted. West of the magnesian limestone occurs the great coal-field of South Yorkshire, Derbyshire, and Nottinghamshire, of which coal-field only a small part is comprehended in this county. Between Mansfield and Nottingham the limestone immediately overlies the coal, but south-west of Nottingham the coal-measures crop out from beneath the red-marl which occupies the valley of the Trent. There are many coal-pits in the county which yield abundance of coal. The general direction of the dip of the coal-beds is eastward. The seams of coal vary from one or two to five or six feet in thickness. The quality of the coal is similar to that of Newcastle, but rather inferior.

Blue limestone, approaching to marble in texture, is quarried in the lias of Beacon hill near Newark. Good bluish stone for building is dug at Maplebeck, between Mansfield and Newark; and there are quarries of gypsum and of a reddish stone sufficiently hard for building, or suited for burning into lime, at Gotham; both in the red-marl district. There are extensive quarries of reddish stone, from which immense blocks are raised, near Mansfield, near the boundary of the red-marl and the magnesian limestone. A quarry of the limestone at Mansfield Woodhouse is worked for lime: its beauty of colour and closeness of grain would render it more valuable than Portland stone, were it not for its extreme hardness. Coarse paving-stone, much used at Nottingham, is quarried at Linby, north of that town, in the magnesian limestone district.

Hydrography, Communications, &c.—The whole county belongs to the basin of the Trent, which river first touches the south-west border of the county at the junction of the Soar, flows along the border about 3 miles to the junction of the Erewash, and then entering the county flows through it 25 miles in a north-east direction to the neighbourhood of Newark: below Newark it turns to the north, and flowing first within and then upon the border of the county 25 miles farther, to below Gainsborough (Lincolnshire), finally quits the county and flows through the marshes of the Isle of Axholme to the Humber. That part of its course which appertains to this county is about 53 miles. It is a broad river, bordered by a belt of low lands, and navigable throughout for river craft, and up to Gainsborough for sea-borne vessels of 200 tons. There was not till lately any bridge over the Trent between Newark and Gainsborough, which towns are 21 miles distant. Recently a cast-iron bridge, of four arches, each 118 feet span, has been thrown over the river at Dunham. The total length of the bridge is 536 feet.

The Idle is formed by the junction of several streams. The Rainworth Water rises in Sherwood Forest 3 miles south of Mansfield, and flows north east 12 miles to the town of Ollerton. Here it is joined on the left bank by the Maun, which rises at the village of Hardwick, and flows north-east 12 miles by Mansfield and through Clipstone park. From Ollerton the united stream, bearing the name of Maun, flows 4 miles north by east till it is joined on the left bank by the Meden, which rises at Whiteborough on the border of the county, 2 or 3 miles west of Mansfield, and flows 16 miles north-east by Church Wartop, and through Thoresby park. The river now takes the name of Idle, and flows north-east 4 miles to the neighbourhood of West Drayton, where it receives on the left bank the Wollen or Wallin, 17 miles long. This river rises in Derbyshire, and flows through the park of Welbeck abbey, where it expands into a large sheet of water, and then, after its junction with the Poulter (7 miles long), which also rises in Derbyshire, flows through Clumber park, where it again expands. From the junction of the Wallin, the Idle flows northward in a winding course of 18 miles to Bawtry, receiving on the left bank, just above that town, the Rayton or Ryton, 24 miles long, which rises in Yorkshire, and flows by Worksop and Blyth. After receiving the Ryton, the Idle flows eastward 2 miles to the border of Lincolnshire, and 7 miles more along the border, or just within it, into the Trent at West Stockwith. Below Bawtry its course is through the marshes of 'the Car,' south of the Island of Axholme. In this part it is called the Bicar Dyke, Bykersdyke, or Vicardyke, while the name of the New Idle is given to a straight navigable cut which runs north through the marshes of Thorne level into the lower part of the Trent. [AXHOLME, ISLE OF; LINCOLNSHIRE.] The whole course of the Idle, measured from the head of the Rainworth Water, the Maun, or the Meden, into the Trent at West Stockwith, is about 47 miles. It is navigable from East Retford, 12 miles above Bawtry. None of its tributaries are navigable.

The Soar has about 8 miles of its course, navigable throughout, on the border of this county and Leicestershire, to which latter it belongs. [LEICESTERSHIRE.] The Erewash rises in the county, very near the head of the Maun, and flows south-west to the border, and south-south-east along the border of this county and Derbyshire to its junction with the Trent. The Lene rises near the grounds of Newstead Abbey, 5 miles south of Mansfield, and flows 12 or 13 miles southward into the Trent near Nottingham; it passes through Newstead park, and close to the town of Nottingham. The Dover Beck rises in Sherwood Forest, and flows 10 miles south-east into the Trent. The Deven rises in Leicestershire and flows northward into the Trent through the vale of Belvoir. Of its whole course of more than 20 miles, 8 or 9 belong to this county. Its tributary the Smite, 18 miles long, and the Whipling, 10 miles long, which flows into the Smite, belong chiefly to this county. The tongue of land at the junction of the Deven and the Trent is insulated by a navigable channel communicating between these two rivers. [NEWARK.]

Those parts of the Erewash and Cromford canals which are on the east side of the Erewash belong to Nottinghamshire. [DERBYSHIRE.]

The Nottingham Canal commences in the Cromford Canal at Langley Bridge, and runs in an irregular line south-east into the river Trent at Trent Bridge near Nottingham. It has a cut from above Nottingham into the river Trent at Beeston, higher up. The Act for this canal was obtained in 1792, and the canal completed in 1802.

The Grantham Canal commences at the town of Grantham in Lincolnshire, and pursues a very circuitous course for more than 30 miles to the Trent bridge near Nottingham, close to the place where the Nottingham Canal enters the Trent. It is partly in Lincolnshire, partly in Leicestershire, and partly in Nottinghamshire. The Acts for it were obtained in 1793 and 1797: the navigation is now complete between Grantham and Nottingham; but a short cut from the main line to Bingham is still unfinished.

The Chesterfield Canal commences in the Trent near West Stockwith, and runs south-west round the base of Gringley Beacon to East Retford; and from thence westward by Worksop, and thence again south-west through Yorkshire and Derbyshire to Chesterfield. In the Yorkshire part is a tunnel more than 1½ miles long; and near Gringley Beacon is another tunnel 153 yards long. This canal was commenced under an Act obtained in 1771, and was finished in 1776 or 1777. From the Trent to Retford it will receive boats of 50 or 60 tons burthen; in other parts, only of 20 tons. From the Trent to Worksop is a rise of 250 feet, and to the summit-level is a total rise of 335 feet.

The principal coach-roads are as follows:—the Carlisle and Wetherby mail-road enters the county 10 miles beyond Grantham in Lincolnshire, and 120 miles from Hicks's Hall, London; it passes through Newark (124 miles), Ollerton (137 miles), and Worksop (146 miles), into Yorkshire. The Edinburgh and York mail-road branches off from the last at Newark, and runs through Tuxford (137½ miles), East Retford (145 miles), and Bawtry (153 miles), which last is just within the border of Yorkshire. The Halifax mail-road enters the county at Rempston, 4½ miles beyond Loughborough in Leicestershire, and 113½ from London, and passes through Nottingham (124 miles), and Mansfield (138 miles) into Derbyshire. The Leeds mail-road enters the county at Upper Broughton, 6¼ miles beyond Melton Mowbray in Leicestershire, and runs to Nottingham, where it falls in with the Halifax road.

The Mansfield and Pinxton railway runs from the town of Mansfield to the Cromford Canal at Pinxton mills, near Alfreton in Derbyshire, with a branch to the Codnor Park iron-works. This railway is above 8 miles long; at its commencement at Mansfield it is 101 feet 8 inches above the level of the Cromford Canal at Pinxton: its terminus at Pinxton is 8 feet above the canal. The Act for this railway was obtained A.D. 1817. It is chiefly used for conveying coal and lime. Branches of the Midland Counties Railway connect the London and Birmingham railway at Rugby with the towns of Leicester, Derby, and Nottingham; and the last two with each other. These branches follow the valleys of the Soar, the Derwent, and the Trent. A railway has been projected from Nottingham to Lincoln, there to join the proposed Great Northern Railway.

Agriculture.—The climate of this county is dry and healthy, and upon some of the light lands the harvest is as early as in many counties more to the south. The face of the country is undulating without rising to any great height. The high hills of Derbyshire intercept the westerly winds, and cause the clouds to discharge their moisture before they reach Nottinghamshire: the heaviest rains are when the wind comes from the east.

The county may be divided into three districts with respect to soil. In the first, sand and gravel prevail. This extends along the vale of Trent to the borders of Lincolnshire, and to the north of Nottingham along the antient forest-land and border, in a strip of land about 30 miles ong and from 7 to 10 miles broad. The next is the clay, which lies between the Trent land and the last-mentioned trip, and in a part of the southern extremity of the county towards Leicestershire. The third district is that where limestone and coal are found. This lies partly on the borders of Derbyshire, and partly on the south-east, towards Leicestershire and Lincolnshire. Gypsum of an excellent quality is found on Beacon Hill, near Newark, and at Red Hill, at the junction of the Trent and Soar.

This county, of which a great portion was once forest-land, contains many fine parks and seats. In consequence of this many domains are held in hand by wealthy proprietors, and the buildings attached to these estates are substantial and convenient. An improved state of agriculture also results from this circumstance, and crops may be seen which, to a superficial observer, might appear to proceed from a much richer soil than it is in reality. There are, no doubt, many fertile spots; but the generality of the lands are not above mediocrity, and some are very poor. The farms are of moderate size, and the tenants are mostly at will, trusting to the honour of their landlords not to remove them without sufficient cause, nor to raise the rents beyond a fair rate. The same families have continued in some farms for generations.

The old plough of the county is a swing-plough, but wheel-ploughs have been introduced, and are very generally used. The other agricultural implements are such as are used in the adjoining counties; and the increased means of communication have brought every improved instrument, such as cultivators, scarifiers, and drills, into partial use. The gentlemen's bailiffs, as everywhere else, are ready to try new inventions. The old farmers are cautious, and wait till they are satisfied of their utility, which they are often slow in acknowledging.

Before the enclosure of the forest-lands and the commutation of the forestal rights, a great portion of the land could not be cultivated to advantage or improved. The practice of leaving the land in grass for several years, and then breaking it up for a course of cropping, prevailed in most parts of the county, and being better regulated, has introduced a modified convertible system, to which the lighter soils are well adapted. Turnips are cultivated to a great extent. Along the river Trent are some very good meadows and pastures, in which bullocks are grazed to advantage. The breeds which are preferred are the Hereford and the short-horn for the best pastures, and the small Scots for inferior. There are not many dairies, although some good cheese is made here and there. The dairies are chiefly along the Soar. The sheep are mostly of the Leicester breed. Some South-downs are however met with on many farms.

Before the common fields were enclosed and divided, the system of cultivation on the clay soil was very imperfect. A fallow, often not half cleaned, and but slightly manured, was followed by a crop of wheat, which was thought abundant if it reached three-quarters per acre, and moderately good, at little more than two. Beans and peas mixed together often followed; and, in spite of sowing thick, which produced straw and little corn, the weeds were not kept down: and the crop of oats which followed was generally half smothered with weeds, which the next fallow could not eradicate. Now a better system has succeeded; and although the fallow is thought absolutely indispensable, yet the tillage is better, the crops cleaner, and the produce more abundant.

There are many hop plantations in the county, which, in some years, give a good profit to the grower. There are excellent market-gardens in the neighbourhood of Newark, Nottingham, and other towns, the sandy soil being very favourable to the cultivation of roots and vegetables. There are some good orchards on the heavier soils, but no cider is made in the county.

The remains of the old forest-trees are still to be met with in parks, where they have been preserved as ornaments; but they have been greatly thinned in the woods which still remain. A better system of forest management has been introduced of late years, and more attention is paid to the growth of navy timber. Many new woods and plantations have been made in those parts of the forests which have been granted to individuals, or allotted on enclosures. Very extensive woods have been planted on the estates of the dukes of Newcastle and Portland.

The principal fairs in Nottinghamshire are as follows:—Nottingham, March 7, April 2, October 3; Newark, Friday before the Sunday-fortnight before Easter, May 14, Whit-Tuesday, August 2, November 1, Monday before December 11; Mansfield, April 5, July 10, second Thursday in October; Warsop, May 21, November 17; Edwinstow, October 24; Worksop, March 31, October 15; Tuxford, September 25, hops; Retford, April 2, October 2, hops.

Divisions, Towns, &c.—Nottinghamshire is divided into six wapentakes and one liberty, beside the county of the town of Nottingham. The relative situation, &c. of these divisions is as follows:—

Name of Division.	Situation.	Area.	Population in 1831.
Bassetlaw wapentake:—			
Hatfield division	N.W.	111,220	19,461
North Clay division	N.E.	35,230	10,295
South Clay division	E.	38,080	7,496
Bingham wapentake	S.E.	55,760	12,442
Broxtow do.	W.	81,470	65,295
Newark do.	E.	41,910	17,111
Rushcliffe do.	S.	41,570	10,920
Southwell and Scrooby liberty	various parts	46,200	11,051
Thurgarton wapentake	Central	71,750	20,572
Nottingham town and county of town		2,610	50,680
		525,800	225,327

Each of the wapentakes consists of a north and a south division, except Bassetlaw, which has three divisions, as given above. The liberty of Southwell consists of parishes scattered through the different hundreds.

The county contains the county and corporate town of Nottingham, the borough and market towns of Newark and East Retford, and the market-towns of Bingham, Mansfield, Ollerton, Southwell, Tuxford, and Worksop. **Bingham** (pop. 1738), **Mansfield** (pop. 9426), **Newark** (pop. 9557), and **Retford (East)** (pop. 2491), are described elsewhere; of the others we subjoin an account.

Nottingham is locally situated in the southern division of Broxtow hundred, on the north bank of the river Lene, about a mile north of the Trent. The borough constituted a county of itself, and comprehended, before the new arrangement of the municipal boundaries, an area (as above) of 2610 acres, with a population of 50,680; the additions lately made, pursuant to the recommendation of the Municipal Boundary Commissioners, may be considered as having raised the area to more than 4000 acres, and the population (calculated on the census of 1831) to more than 60,000, which now probably amounts to 70,000.

The early history of this place is involved in great obscurity. The excavations from which it is said to have gained its name (in Saxon) Snotenga ham, or Snotinga-ham, which some interpret 'the home of caverns'), are supposed to have had a British origin; and Gale contended for placing here the Roman station Causennæ or Causennis, which however others place at Ancaster in Lincolnshire. Nottingham was included in the kingdom of Mercia: it was taken by the Danes, to whom it was confirmed by the treaty between Alfred and Guthrum (A.D. 878 or 880): it was one of their Mercian burghs which connected their Northumbrian and East Anglian dominions. It was taken and fortified by Edward the Elder, but the Danes afterwards regained and held it until they were conquered by Edmund I. (A.D. 942). William the Conqueror built a castle here, the government of which he conferred on his natural son William Peverel. In the troubles of Stephen's reign the town was taken and burnt by the partisans of the empress Maud; and it suffered a similar fate either in the later troubles of the same reign, or in the rebellion of prince Henry, son of Henry II., against his father. In the troubles of the reign of Richard I. the castle, which was of great strength, was the object of contest; in those of the reign of John it was held throughout by the king. The seisure of Roger Mortimer, the paramour of queen Isabella, in Nottingham castle (A.D. 1330), is an incident well known. In the civil war of Charles I., that king set up his standard at Nottingham (August, 1642), but the place came next year into the hands of the parliament, who garrisoned the castle, of which Colonel Hutchinson (whom the 'Memoirs' of his lady have made so well known) was governor. During the Protectorate the castle was dismantled; and after the Restoration the old building was replaced by the present one, which has nothing of a castle but the name. The only occurrences of any importance since have been the 'Luddite' disturbances in 1811-12, and the riot arising out of the political excitement of 1831, on which occasion the castle was burnt by the rioters.

The town is on a considerable slope on the north bank of the Lene, commanding an extensive view of the vale of Trent. It consists of a number of streets irregularly laid out but remarkably well paved. Those in the central and more antient parts of the town are narrow; but considerable improvements have been effected of late years; the streets of modern erection are broader, and there are several ranges of good buildings. The castle is on a rock at the south-west corner of the town, overlooking the Lene. The market-place is one of the largest and finest in the kingdom, surrounded with lofty buildings. The extension of the town has been checked by the right of common over the land to the north and south of it possessed by the freemen. This has led to the formation of groups of houses of considerable extent in the neighbouring parishes of Sneinton, Lenton, and Radford, which may be regarded as suburbs of Nottingham, and have been by the late alteration included in the municipal limits. These outlying portions have a population of more than 20,000. There are several bridges in the town over the arms of the Lene or over the Nottingham canal; and about a mile south of the town is 'Trent Bridge' of nineteen arches over the Trent, a very antient structure, and exhibiting, from frequent repairs, great architectural variety: connected with this bridge are a causeway over the meadows and an embankment to protect the lower part of the town in the time of floods. The Trent is here about 200 feet wide. The environs of Nottingham are very pleasant.

Among the principal buildings are 'the New Exchange' at the east end of the market-place, a brick building erected early in the last century, and repaired and beautified in 1814. The lower part is appropriated to shops, behind which are the shambles; the upper part contains a suite of noble rooms for the transaction of public business or for assemblies. The county-hall, rebuilt A.D. 1770, is a commodious and handsome building, with two convenient courts, and apartments for the judges, jury, &c. The town-hall is a spacious edifice, of which the town gaol forms the ground-floor. There are a small plain theatre; a grand stand on the race-course, which is to the north of the town, and is one of the finest in the kingdom; extensive cavalry barracks in the castle park; and a building erected as a riding-house for the yeomanry, and now used as a circus or for other public amusements.

The borough before its late enlargement comprehended the three parishes of St. Mary, St. Peter, and St. Nicholas. St. Mary's church is in the central part of the town. It is a large cross-church, with a fine tower at the intersection of the transepts, rising two stages above the roof of the church, crowned with a battlement and eight crocketted pinnacles. The western end of the church has been modernised, but in very bad taste; the rest is of perpendicular character, and presents several peculiar features: it has a very large proportion of window light, perhaps greater than any other church in England. The interior is good, and contains some fine monuments. St. Peter's church is near the market-place. It is a large church, originally of perpendicular character, but the greater part has been modernised. It has a plain western tower, surmounted by a lofty octangular crocketed spire. St. Nicholas's church is in Castlegate-street, near the castle: it is a plain brick building, with stone quoins and cornices, erected in the latter end of the seventeenth century, in place of one pulled down during the civil war of Charles I. St. James's church or chapel is on Standard hill, in the extra-parochial district of the park: it is a neat modern edifice of perpendicular character, with a low embattled tower. St. Paul's chapel, in St. Mary's parish, is a modern Grecian building with a Doric portico. The church at Lenton is very small; it was built after the dissolution of the religious houses, but some portions of a more antient building appear to have been employed in its erection. Radford and Sneinton churches are both small: the latter stands on the summit of an excavated rock, and commands an extensive view. A grant for a new church in Sneinton parish has been made by the commissioners for the erection of new churches. There are several dissenting places of worship in Nottingham, especially for Wesleyan Methodists, Independents, and Baptists. The Catholics, Jews, Quakers, Unitarians, and several other sects have each their place of worship; that of the Catholics is a handsome building of Grecian architecture. There are several charitable institutions. Plumtree hospital for poor and aged widows is a neat brick building, coated with cement, rebuilt within a few years: beside the inmates, there are several out-pensioners. Collins's hospital is for twenty-four aged widowers or widows, who have each a tenement of two or three rooms and a weekly allowance, beside coals: the hospital is a neat brick building. Lambley hospital for decayed burgesses or their widows is a neat building consisting of a centre and two wings, with a green in front. There are a number of other hospitals or almshouses. The general hospital on Standard Hill (built A.D. 1781), and the county lunatic asylum (in which other patients as well as paupers are received), are spacious and commodious buildings. Thurland Hall, an antient house of the Elizabethan period, is still occasionally used for public dinners; it was the temporary residence of James I.

The principal manufactures carried on at Nottingham are bobbin-net and lace, and cotton and silk hosiery: nearly 7000 adult males were employed in these branches of industry in and about the town in 1831. There are several mills for spinning cotton and woollen yarn, and for throwing silk, and much cotton yarn is obtained from the mills of Derbyshire. The machines for making bobbin-net and lace, which are very expensive, are let out at a weekly rent to the workmen by capitalists, who invest a considerable sum in this kind of property. Steam-power has however been introduced of late into this manufacture. There are several dye-houses; there are also white-lead works and an iron-foundry. Wire-drawing, pin-making, and the manufacture of brass fenders are carried on to some extent; malting and brewing are also carried on, and 'Nottingham ale' has a high reputation. There are several windmills on the common north of the town. There are coal-pits in Radford parish, which employ 100 adult males. The market-days are Wednesday and Saturday for corn, cattle, and general provisions; the Saturday market is one of the principal in the midland counties. There are several yearly fairs for cattle, cheese, and cloth: at one of these fairs, distinguished as 'goose fair,' a considerable number of geese are sold. The trade of the town is much promoted by its proximity to the Trent, which is navigable, and from the communication thus afforded with the various canals connected with that river. The Nottingham canal passes close to the town, and joins the Trent at Trent bridge, a mile distant.

The corporation under the Municipal Reform Act consists of fourteen aldermen and forty-two councillors. The borough in its present enlarged extent is divided into seven wards, St. Ann's, Byron, Sneinton, Exchange, Canal, Radford, and Sherwood wards. Being a county, it has two sheriffs: there are a recorder, town-clerk, and other officers. The county magistrates have concurrent jurisdiction in the borough with the mayor and aldermen. Before the enlargement of the boundary, there was a police force of 100 men appointed by the magistrates at quarter-sessions; and some watchmen were maintained by private subscription. Water is supplied by three companies in abundance and at a reasonable rate. The assizes and quarter-sessions for the county are held here; also quarter-sessions for the borough; and a Court of Record for the borough every fortnight, and a sheriff's court every month for the recovery of small debts. The borough returns two members to parliament; the sheriffs are the returning officers. Nottingham is a polling-place for the northern division of the county.

The livings of St. Nicholas and St. Peter are rectories, of the clear yearly value of 216*l.* (with a glebe-house) and 336*l.* respectively: that of St. Mary is a vicarage, of the clear yearly value of 699*l.*, with a glebe-house. The perpetual curacy of St. James, Standard Hill, is of the yearly value of 200*l.* Radford and Lenton are vicarages, of the clear yearly value of 293*l.* and 139*l.* respectively; and Sneinton, a perpetual curacy of 227*l.* (*Clerical Guide*, 1836.)

There were, in 1833, in the three parishes of Nottingham and those of Lenton, Radford, and Sneinton, five infant-schools, with 540 scholars; eight boarding-schools, with 254 children; ninety-five day-schools (in a few of which boarders also were taken), with 4477 children; and forty-four Sunday-schools, with about 7840 children. Among the day-schools in this return were included the free grammar-school, with a valuable endowment, and 52 scholars; the Blue-Coat School, with 60 boys and 20 girls; a national school, with 573 children; three Lancasterian schools, with 484 children; and four other schools, wholly or chiefly supported by charitable contributions.

There is a public library and news-room in the market-place: the library consists of about 8000 volumes, besides a valuable collection of old books, kept separate from the rest (Lewis, *Top. Dict.*, 1831), and a mineralogical cabinet: in the buildings of this institution are lecture, news, and billiard rooms, and a law library: a literary society meets in the lecture-room. There is a mechanics' institute, established in 1824, which has a considerable library.

Ollerton is in the parish of Edwinstow, in the Hatfield division of Bassetlaw hundred, 137 miles from London by Newark, and 18½ miles from Nottingham. The whole parish of Edwinstow has an area of 17,270 acres, with a population, in 1831, of 1992, nearly half agricultural: the chapelry of Ollerton had 658 inhabitants, more than a third agricultural. The town is on the banks of the Maun; it has a neat Gothic chapel of modern erection, a Methodist chapel, and some good inns. A considerable quantity of hops is grown round the town. The market, which is on Friday, is small: there are a hop-market every Tuesday in September, and a yearly cattle and sheep fair. The living of Edwinstow, united with the three chapelries of Ollerton, Palethorpe, and Carburton (all in the parish), is a vicarage, of the clear yearly value of 639*l.*, with a glebe-house. The village of Edwinstow, which is on the Maun, above Ollerton, is extremely rural. The church is a venerable Gothic building, with a lofty spire. There were in the chapelry, in 1833, three day-schools, with 95 children, and two Sunday-schools, with 142 children.

Southwell is in that part of the liberty of Southwell and Scrooby which lies between the north and south divisions of Thurgarton hundred, 132½ miles from London by Newark, or 137 by Nottingham, from which it is distant 13 miles. It is likely that there was a Roman station here, or perhaps a fortified outpost of the neighbouring station of Ad Pontem, which antiquaries generally fix on the Trent, not far off. The name 'Burgage,' given to one of the districts of the town, is probably derived from the late Latin term 'burgus' (πύργος), a tower, and the remains of a fosse on 'the Burgage Hill' probably indicate the site of the Roman fort. Several Roman bricks have been used in the antient ecclesiastical buildings. A church was established here by Paulinus, one of the early missionaries sent over to convert the Anglo-Saxons, which became collegiate, and was richly endowed by the liberality of prelates and nobles of a subsequent age. Charles I. was frequently at Southwell during the civil war, and here he surrendered himself to the Scotch commissioners. The town is on a pleasant eminence near the small river Greet, an excellent trout-stream. It is a tolerably large place, with well-paved streets and well-built houses, and comprises the burgage, or burridge, the high town or prebendage (which two divisions constitute Southwell proper), and the adjacent hamlets of East Thorpe, West Thorpe, and Normanton. The whole parish has an area of 4550 acres, with a population of 3384, less than a third agricultural.

The collegiate church at Southwell is a large and magnificent cruciform building, consisting of nave and aisles, choir, transepts, and eastern transepts, two western towers, and a central tower. The nave and transepts and the towers are Norman, of very bold character and well-executed details. The towers are richly ornamented; the central tower, which is very massive, is also Norman. The extreme length of the church is 306 feet, breadth of the nave and aisles 59 feet, breadth at the transepts 121 feet. The choir and eastern transepts are of early English character, and the chapter-house decorated English, of an early period. There are some windows, of later insertion, of perpendicular character, particularly a large western window. The arches which support the centre tower, and several of the Norman doors, are fine; and the north porch is a large and much-enriched specimen of Norman. The piers of the nave are round and short; the windows of the triforium are large, and the clerestory windows small, showing circles on the outside and arches with shafts within. The nave and transepts have a wooden flat ceiling; the aisles have a stone groined roof. The early English portions are among the finest specimens of that style in the kingdom, and are in good preservation. The chapter-house is a fine specimen of early decorated: it has no centre pillar. The organ-screen and some stalls in the church are of later decorated character, and are peculiarly beautiful, Within the last fifty years two spires which crowned the western towers have been removed, and pinnacles of an incongruous character substituted. This noble building is well situated, being surrounded by a fine open space sufficient to give every side full effect. (Rickman's *Gothic Architecture;* plates in Rastall's *Southwell*, and in Cayley and Ellis's edition of Dugdale's *Monasticon*.)

The chapter of Southwell collegiate church consists of sixteen prebendaries, who keep residence each in rotation for three months. There is a vicar-general and commissary; and there are six vicars choral, five of whom have residences assigned to them, and a sixth has a house as vicar of Southwell. The gross yearly income of the church is 2211*l.*, the net income 954*l.* The prebendaries have also separate revenues. The vicarage of Southwell is of the clear yearly value of 144*l.*, with a glebe-house.

The entrance into the 'minster-yard' is by antient gateways, of which the western has a semicircular arch. In the yard are the extensive ruins of a former palace of the archbishops of York, the patrons of the church, consisting chiefly of the chapel and great hall, which have been fitted up as a modern residence: they are covered with ivy Annual meetings of the Nottinghamshire clergy are held at Southwell, which is the mother-church of the county.

There are meeting-houses at Southwell for Methodists and Baptists, assembly-rooms and theatre, and a house of correction for the county.

The civil government of Southwell, the soke or liberty of Cum Scrooby, comprehending twenty townships, is separated from the rest of the county. The justices of the peace are appointed by the archbishop of York, but act under a commission from the crown: they hold quarter-sessions at Southwell and Scrooby. The chapter of Southwell, by their vicar, exercise all episcopal functions, except confirmation and ordination, over the peculiar of Southwell, which comprehends twenty-eight parishes. The soke and the peculiar are not coextensive.

There is little trade at Southwell, but the lace and hosiery manufacture employs from 100 to 200 workmen. (*Pop. Returns.*) There are several resident gentry. The market is on Saturday, and there are two yearly fairs.

There were in the parish of Southwell, in 1833, three boarding-schools and nineteen day-schools, with 419 scholars; and three Sunday-schools, with 408 children. Of the day-schools, four were supported by endowment; and in two others a few scholars were paid for from the proceeds of a charity. One of the boarding-schools, 'the Collegiate Grammar-school,' was partially supported by endowment.

Tuxford is in the South Clay division of the wapentake of Bassetlaw, 137½ miles from London by Newark, and about 30 from Nottingham. The parish has an area of 3000 acres; the population, in 1831, was 1113, about one-third agricultural. The town has a modern appearance, having been rebuilt after a great fire, A.D. 1702. The principal trade is derived from its situation on the great north road, or from the cultivation of hops, which are grown to a considerable extent in the neighbourhood. The church exhibits a mixture of various styles of architecture. There is a Methodist meeting-house. The market is on Monday, and there are two yearly fairs, one for cattle and other live-stock, the other for hops. The living is a vicarage, of the clear yearly value of 260*l.*, with a glebe-house. There were, in 1833, an infant-school, with 84 children; an endowed free-school, with 40 boys; and four other day-schools, with 70 children; a national day and Sunday school, with 53 children in the week and 100 on Sundays; and two Sunday-schools, with 105 children.

Worksop is in the Hatfield division of the wapentake of Bassetlaw, 146 miles from London by Newark, and 26 from Nottingham. The area of the parish is 18,220 acres; the population, in 1831, was 5566, nearly half agricultural. The town is delightfully situated in a valley near the northern extremity of Sherwood Forest, and the neighbourhood is adorned by the magnificent seats of several noblemen. The town is near the river Rayton; it consists of one long principal street, with another branching from it at right angles. The streets are in general well paved, and the houses are well built. There is a 'moot-hall,' an antient building, for the public business of the town. The church is part of that which formerly belonged to a priory of canons of St. Augustin, founded here in the time of Henry I. by William de Luvetot. Its yearly revenues, at the dissolution, were 302*l.* 6*s.* 10*d.* gross, or 239*l.* 15*s.* 5*d.* clear. The church is a large building, originally cruciform, and of Norman architecture; but in the exterior are considerable admix tures of later styles. The western door is a beautiful Norman composition: at the east end of the present church is the tower, formerly central while the whole of the church was standing. The principal gateway of the priory is yet standing; the room over it is used as a national school, and there are several other remains of the priory, some of which have been incorporated with or converted into small dwelling-houses. There are Independent, Wesleyan and Primitive Methodist, and Catholic chapels, the latter near the manor-house, which is a seat of the duke of Norfolk. The manufactures of the town are trifling, but a good deal of business is done in malting. The market is on Wednesday, and there are three cattle-fairs, beside a statute fair. The Chesterfield Canal passes near the town: it is carried over the Rayton by an aqueduct. The living is a vicarage, of the clear yearly value of 385*l*., with a glebe-house. There were in the parish, in 1833, eight boarding or day schools, with 244 children; two national schools, one of them partly supported by endowment, with 250 children; and three Sunday-schools, with 369 children.

Besides the above market-towns, there are several villages whose manufacturing industry has raised them to considerable importance. Basford is in the northern division of Broxtow wapentake, 2 or 3 miles north-west of Nottingham, near the right or west bank of the Lene. The area of the parish is 2720 acres; the population, in 1831, was 6325, about one-tenth agricultural. The village lies in a bottom, amid scenery of the richest character. The church has a handsome spire. The chief manufactures are those of hosiery, lace, and lace machinery, in which about 730 adult males are employed. There are cotton-mills, dye-houses, and bleaching-grounds, and several corn-mills. The court of the Honour of Peverel sits here; it has jurisdiction over Nottinghamshire and Derbyshire, and some places in Leicestershire: it is held twice a year for the decision of causes under 50*l*. The high-steward or his deputy presides. There is a gaol here connected with this court. The living is a vicarage of the clear yearly value of 260*l*. There were, in 1833, an infant-school, with 101 scholars; twelve day-schools, with 295 children; and ten Sunday-schools, with 1237 children. There are meeting-houses for Wesleyan Methodists, General Baptists, and Scotch Baptists.

Sutton in Ashfield is in the northern division of Broxtow wapentake, 3½ miles south-west of Mansfield. The area of the parish (including the hamlet of Hucknall under Huthwaite and the extra-parochial district of Fulwood) is 6040 acres; the population, in 1831, was 5746, about one-sixth agricultural. The village is situated on an eminence, and consists of several streets. The church is north-west of the village; it is of middling size, dedicated to St. Mary. There are places of worship for General or Arminian and Particular or Calvinistic Baptists, Independents, and Methodists. Nearly 900 adult males are employed in manufactures, chiefly of hosiery, lace, and lace machinery. There is a pottery for garden-pots and other coarse red ware. The Mansfield and Pinxton Railway passes through the parish. A customary market for provisions is held weekly in this village. The living is a perpetual curacy, of the clear yearly value of 118*l*. There were, in 1833, an infant-school, with 120 children; a national school, with 125 boys; eleven other day-schools, with about 240 children; and six Sunday-schools, with 1002 children.

Greasley is in the south division of Broxtow wapentake, 7 miles north-west of Nottingham, on the road to Alfreton in Derbyshire. The parish has an area of 8010 acres; the population, in 1831, was 4583, about one-fifth agricultural. The church of Greasley is handsome and spacious, with a lofty embattled tower. Above 800 persons are employed in manufactures, chiefly in those of hosiery, lace, and lace machinery. The Nottingham Canal passes through the parish; there are several coal-wharfs on its line. The Mansfield and Pinxton Railway passes not far from this place. The living of Greasley is a vicarage, of the clear yearly value of 134*l*., with a glebe-house. There were, in 1833, three schools, partially supported by endowments, with 96 children; one school of 30 girls, supported by private benevolence; fourteen other day-schools, with 393 children; one boarding-school, with 14 children; and ten Sunday-schools, with 885 children.

Arnold is in the northern division of Broxtow hundred, 3½ miles from Nottingham, on the road to Mansfield. The area of the parish is 4670 acres; the population, in 1831, was 4054, about one-fifth agricultural. The village is large, extending nearly a mile in length. The houses are neat and comfortable. Between 400 and 500 adult males are engaged in manufacture, chiefly of hosiery and cotton goods. On Hollyhill, in the neighbourhood of Arnold, are the remains of a Roman camp. The living is a vicarage, of the clear yearly value of 310*l*., with a glebe-house. There were, in 1833, an endowed school, with 48 boys; seven other day-schools, with 204 children; and seven Sunday-schools, with 808 children.

Bulwell is in the northern division of Broxtow wapentake: Attenborough, Stapleford, and Beeston are in the southern; Gedling is in the southern division of Thurgarton wapentake; Ruddington is in the northern division of Rushcliffe wapentake; and Radcliffe or Ratcliffe upon Trent is in the southern division of Bingham wapentake. These villages all lie within a circle of 5 or 6 miles round Nottingham, and have a population of from 1094 (Attenborough) to 2611 (Bulwell), chiefly engaged in the hosiery and lace manufacture, which employs about 300 adult males in Bulwell and Beeston, nearly as many in Gedling, and a smaller number in the other villages. Ratcliffe alone has few manufacturers in it: it gets its name from a bank or cliff of red clay in the neighbourhood. It has a wharf on the Trent for landing goods. Ruddington is in the honour of Tutbury, and within the jurisdiction of a court held at Tutbury every three weeks for the recovery of debts under forty shillings. It has an endowed free-school and an infant school. At Stapleford are a Druidical monument and a rude obelisk apparently of Saxon construction. Attenborough has some coal-pits. The Trent and the Erewash and the Nottingham Canal pass through or skirt the parish.

Warsop (population 1281), in the Hatfield division of Bassetlaw wapentake, and Kirkby-in-Ashfield (population 2032) and Mansfield Woodhouse (population 1859), in the north division of Broxtow wapentake, lie within a circle of 5 or 6 miles round Mansfield. The last two are manufacturing villages, and have upwards of 150 adult males engaged chiefly in the lace and hosiery manufacture. Kirkby in Ashfield has coal-pits and lime-pits, which employ 130 adult males, and for the produce of which the Mansfield and Pinxton Railway opens a channel. There is a parish school-house, built in 1836. Mansfield Woodhouse has a large antient church, built of stone, with a lofty tower and spire. The village contains some good houses. There are lime-kilns and freestone quarries, which employ 25 adult males. Roman antiquities of considerable interest have been found here.

Selston (population 1580), in the north division of Broxtow wapentake, and Eastwood (population 1395), in the south division, are on the western border of the county. About 100 persons are engaged in the manufacture chiefly of hosiery and lace in each parish; and there are extensive coal-works, especially in Eastwood parish. The Mansfield and Pinxton Railway passes near Selston, and the Nottingham Canal near Eastwood.

At Calverton (population 1196), in the southern division of Thurgarton wapentake, between Nottingham and Southwell, nearly 300 men are engaged in the hosiery and lace manufacture; at Sutton Bonnington, in the southern division of Rushcliffe wapentake, nearly 100; and at Hucknall-Torkard (population 2200), in the northern division of Broxtow wapentake, between Nottingham and Mansfield, upwards of 300.

Divisions for Ecclesiastical and Legal Purposes.—This county is included in the diocese and ecclesiastical province of York. It forms an archdeaconry comprising the several rural deaneries of Bingham, Newark, Nottingham, and Retford: beside the peculiar of Southwell, noticed above. The commissioners on the Established Church propose to subtract the archdeaconry of Nottingham from the diocese of York, in order to add it to that of Lincoln. The number of churches and chapels in the county is given in Browne Willis's *Cathedrals* (A.D. 1742), as 210, viz. 176 under the jurisdiction of the archdeacon of Nottingham, and 34 exempt; of which 28 are in the peculiar of Southwell, and 6 under the chapter of York. In the *Beauties of England and Wales* (A.D. 1813), the number of those under the archdeacon's visitation is given as 182, and the number of those exempt as 36; making a total of 218. In Lewis's *Topographical Dictionary* (1831) the number of parishes is given as 205, viz. 75 rectories, 89 vicarages, and the remainder perpetual curacies. In the *Geography of Great Britain and Ireland*, in the *Library of Useful Knowledge*, the number of parishes is given at 246.

The county is in the midland circuit; the assizes are held at Nottingham, to which place the judges proceed from Lincoln. The quarter-sessions are held each quarter at Nottingham, Newark, and East Retford. The jurisdiction of the soke of Southwell and Scroby has been mentioned in our topographical notice of Southwell. Some parishes are in the honour of Tutbury and subject to the court held there for the recovery of small debts. The court of the honour of Peverel, which has jurisdiction in suits under 50*l.* over Nottinghamshire and Derbyshire, and some parts adjacent, has been mentioned in our topographical notice of Basford, where the court sits.

The county gaol is at Nottingham: some new buildings have been added to it within the last few years. The county house of correction is at Southwell. The number of committals to these two places of confinement in the years from October, 1834, to October, 1835, and from October, 1835, to October, 1836, were as follows:—1834-5, Nottingham, 60 felons, 24 debtors; Southwell, 808 felons and misdemeanants: 1835-6, Nottingham, 333 felons and misdemeanants, 64 debtors; Southwell, 560 felons and misdemeanants. The great increase in the number of felons committed to Nottingham in 1835-6, and the decrease of the number committed to Southwell, were owing to the arrangements made by the magistrates of the county.

The number of members returned to parliament from Nottinghamshire before the Reform Act was eight, viz. two knights of the shire, who were elected at Nottingham, two members each for the boroughs of Nottingham and Newark, and two members returned by the burgesses of East Retford, conjointly with the freeholders of the wapentake of Bassetlaw. The admission of the freeholders took place a short time before the Reform Act by an act of parliament passed in consequence of the corruption of the burgesses. By the Reform Act the county was divided, and each division returns two members. The northern division comprehends the wapentakes of Bassetlaw and Broxtow. The court of election is held at Mansfield; and the polling-stations are Nottingham, Mansfield, and East Retford. The southern division comprehends the wapentakes of Rushcliffe, Bingham, Newark, and Thurgarton; the court of election is held at Newark, and the polling-stations are Newark upon Trent, Bingham, and Southwell. The number and distribution of borough members remained unaltered by that act.

History; Antiquities, &c.—In the earliest period of British history the county seems to have been included in the territory of the Coritani. Of these, its original inhabitants, it retains however very few memorials. There are some vestiges of a camp or fortification on a hill at Barton near the Trent, 4 or 5 miles south-west of Nottingham; and a few tumuli or barrows in different parts of the county, which are supposed to have had a British origin. To these we may add the caves in the sandstone rock at and near Nottingham, already noticed.

In the division of the island by the Romans, the county was included in the province of Flavia Cæsariensis. The Roman stations Ad Pontem, Margidunum, and Verometum, were probably in the county, and Segelocum was probably only just out of it on the Lincolnshire side of the Trent, near Littleborough. Ad Pontem was probably on the Trent near Southwell. Horsley was disposed to fix it at Farndon, a short distance above Newark, and it is probable that he is about right. Margidunum was probably near East Bridgeford, on the south bank of the Trent between Nottingham and Newark. There are the undoubted remains of a Roman camp there, and several Roman antiquities have been dug up. The foundations of Roman buildings were observed there by Stukeley. Verometum is close to the south border of the county near the village of Willoughby. There are some remains of the rampart and ditch which surrounded the station; and some foundations, mosaic pavements, coins, and other antiquities have been dug up. Of the Roman roads which connected these stations there are several traces. The Foss Way may be traced from Verometum for several miles in the direction of Newark: in several parts it is a deep ditch.

Many Roman remains have been discovered near Newark, which has probably risen from the ruins of some of the neighbouring Roman posts; and coins have been found in various other parts. But the most remarkable discovery was of the foundations of a Roman villa at Mansfield Woodhouse, in A.D. 1786. The pavement and other antiquities found are minutely described by Major Rooke, the discoverer, in the 8th volume of the 'Archæologia.'

In the Saxon period it is likely that Nottingham was possessed at first by the Northumbrian Angles. When Redwald attacked Ethelfrith of Bernicia, who had expelled Edwin from the throne of Deira, or Yorkshire, the decisive battle took place in Nottinghamshire on the banks of the Idle (A.D. 617). When the Mercians became independent of Northumbria (A.D. 626), this county appears to have been included in their dominion: it was divided between the northern and southern Mercians, who were separated from each other by the Trent.

When the Northmen, under the sons of Regnar Lodbrog, invaded England, they passed the winter (A.D. 867-868) at Nottingham, which they had taken. They were attacked in the ensuing spring by the combined force of Wessex, under the king, Ethelred I., and his brother Alfred, and Mercia under Burrhed, king of that country. Neither party being able to obtain a decisive advantage, they made a treaty by which the Northmen retired to York. A few years after they re-entered Mercia, which they conquered; and by their treaty with Alfred (A.D. 878 or 880) obtained possession of that part which was north-east of Watling Street, including Nottinghamshire. The Mercian territory thus acquired appears to have been divided between the Danish burghs, of which Nottingham was one. These burghs were compelled by Edmund I. (A.D. 942) to submit to Wessex, but they seem to have retained the constitution of their local government, probably till near the time of the Conquest. After the Conquest, the greater part of the county, together with the castle of Nottingham, was bestowed by William the Conqueror on his natural son, William Peverel. He, or one of his successors, supported Stephen in his usurpation. With his Nottinghamshire men he assisted in defeating the Scots in the battle of the Standard near Northallerton (A.D. 1138), and was taken prisoner with Stephen at the battle of Lincoln (A.D. 1141). His castle of Nottingham was taken, and the town burnt, by the partisans of the empress Maud. In the civil war carried on by the sons of Henry II. against their father, Nottingham was taken by surprise by Robert, earl of Ferrers, a partisan of the young princes. In the civil war of John's reign, the only event connected with the county was the death of that prince at Newark, October, 1216. In the early part of the reign of Edward III., Roger Mortimer was seized by the king in Nottingham Castle.

In the rebellion of Lambert Simnel (A.D. 1487) the forces of that pretender, consisting of 2000 German veterans under Martin Swart, an experienced officer, and about 6000 half armed Irishmen, were encountered by the royal army under Henry VII. in person, at East Stoke, on the right bank of the Trent, near Newark. The rebels were defeated; half of them were slain, including their leaders, the earl of Lincoln and Swart. Simnel was taken prisoner; and Lord Lovel, another leader, escaped from the fray, but was either drowned in his flight across the Trent, or was compelled to conceal himself for the rest of his days. (Carte, *Hist. England.*)

At the commencement of the civil war of Charles I. the king set up his standard at Nottingham with great ceremony (A.D. 1642). Shortly after this Nottingham came into the hands of the parliament, and continued so to the end of the war. Newark, which was held by a body of Royalists under the command of Sir John Henderson, was besieged (A.D. 1644) by a body of parliamentary forces under Sir John Meldrum and Lord Willoughby of Parham. Prince Rupert, advancing to relieve the place, surprised the besiegers by the rapidity of his march, drove part of their forces over the Trent, and compelled another portion to capitulate, with all their artillery and ammunition. In the winter of 1644-45 it was again besieged by the Parliamentarians, but without success, the garrison having been relieved by Sir Marmaduke Langdale, who was sent by Prince Rupert for that purpose. The troops at Newark, now under Sir Richard Byron, being thus relieved from siege, were of material service to the king's cause in this part, beating some parliamentary detachments and keeping their posts in a state of alarm. Among other services, a detachment from this garrison assisted at the storming of Leicester in 1645. Not long after his defeat at Naseby the king was at Welbeck, in the northern part of the county and marched northward to Doncaster, with the view of joining Montrose in Scotland. Upon the arrival of a body of Scots horse however at Rotherham, the king retired to Newark, whither Sir Marmaduke Langdale had retreated after the battle of Naseby (A.D. 1645). From Newark the king marched to Oxford, but was again at Newark in October of the same year; and it was there that he was deserted by his nephews Rupert and Maurice, and by several of his officers. In November, being pressed by the approach of the Scots under the earl of Leven, and by a body of Parliamentarians under Poyntz from the west, he withdrew to Oxford. Newark was forthwith besieged by the Scots; and in May, 1646, the king surrendered himself at Southwell to the Scotch commissioners, by whom he was conducted to the besiegers' quarters. The day after his arrival Newark was delivered up by his orders. In 1648 Cromwell was in Nottinghamshire with the troops destined to oppose the English Royalists under Sir Marmaduke Langdale and the Scots under the duke of Hamilton. Monk with his army marched through Nottinghamshire, passing through Mansfield, Southwell, and Nottingham in his way southward (A.D. 1660) to restore the king.

Of architectural antiquities Nottinghamshire is somewhat barren, and its ecclesiastical buildings are, with two or three exceptions, such as St. Mary's Church at Nottingham and Southwell Collegiate Church, already described, by no means remarkable for splendour. Balderton, Hovringham, and Mansfield churches have some Norman portions; Newark church has some slight remains of Norman: the churches of Bingham, Coddington, Hawton near Newark, and Upton St. Peter near Southwell, have considerable portions of early English: Hawton is especially worthy of examination. Of the monastic ruins the most beautiful is Newstead. Here was a priory of Black or Austin Canons, founded by Henry II. about A.D. 1170, whose yearly revenues at the dissolution were estimated at 219*l*. 18*s*. 8½*d*. gross, or 167*l*. 16*s*. 11½*d*. clear. The rest of the monastic buildings were fitted up as a residence by Sir John Byron, to whom they were granted, but the chapel was allowed to go to decay. Its front is an exceedingly beautiful specimen of early English, scarcely equalled by any other specimen in elegance of composition and delicacy of execution. Of Rufford Abbey, near Ollerton, there are some remains incorporated in a large mansion of later date, which retains the original designation. It was a Cistertian abbey, founded by Gilbert, earl of Lincoln, A.D. 1148: its yearly revenues at the dissolution were 254*l*. 6*s*. 8*d*. gross, or 176*l*. 11*s*. 6*d*. clear. Of Welbeck Abbey the only remains are some of the arches of the vaults and some walls of the superstructure, now incorporated in the mansion of the duke of Portland. The revenues of this abbey for Premonstratensian canons (founded A.D. 1153) were at the dissolution 298*l*. 4*s*. 8*d*. gross, or 249*l*. 6*s*. 3*d*. clear. Part of the cloisters and some other portions of Mattersey Gilbertine Priory, near the Idle, yet remain. There are also some remains of Thurgarton Priory for Austin canons. There is an antient castle at Newark; also a handsome cross.

(Thoroton's *Nottinghamshire*, by Throsby; *Beauties of England and Wales*; Conybeare and Phillips, *Outlines of the Geology of England and Wales*; Rickman's *Gothic Architecture*; Rastall, *History of Southwell*; Palgrave's *Rise and Progress of the English Commonwealth*; Turner's *Anglo-Saxons*; Lewis's *Top. Dictionary*; *Parliamentary Papers*.)

STATISTICS.

Population.—Nottinghamshire is chiefly a manufacturing county, a large proportion of its population is also engaged in agriculture. In 1831 it ranked the 30th on the list of agricultural counties. Of 56,582 males twenty years of age and upwards, 14,260 were engaged (in 1831) in manufactures or in making manufacturing machinery, and 16,856 were occupied in agriculture; of this latter number 11,799 were labourers. Most of those employed in manufactures were engaged in the manufacture of stockings and lace; of these there were at Nottingham, 4740; at Radford, 1300; at Mansfield, 800; at Sutton-in-Ashfield, nearly 800; at Basford, 750; at Snenton, 430; at Hucknall-Torkard, at Beeston, at Linton, and at Carlton, upwards of 300 each; at Bulwell, Greasley, and Calverton, about 280 each; at Kirby-in-Ashfield, Mansfield-Woodhouse, Stapleford, Southwell, Lambley, Ruddington, and Selston, between 200 and 100 each. In most of the places here named the manufacture of stockings, lace, frame-work machinery, and the materials of the lace manufacture, are conjoined or intermingled so as not to be distinguishable in a general description. There were 50 weavers at Newark and 19 at Hawton; sacking is made at West Retford; candle-wicks at Gamston.

The population of Nottinghamshire, as given at each time the census was taken, was as under:—

	Males.	Females.	Total.	Increase per cent.
1801	68,558	71,792	140,350	..
1811	79,057	83,843	162,900	16·06
1821	91,491	95,382	186,873	14·70
1831	110,457	114,870	225,327	20·57

showing an increase, between the first and last periods, of 84,977, or not quite 38 per cent. on the whole population; being 19 per cent. below the whole increase in England and Wales.

The following table contains a summary of the population of every hundred, as taken in 1831:—

HUNDREDS or WAPENTAKES, BOROUGHS, &c.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males twenty years of age.
Bassetlaw —											
Hatfield Division .	3,845	4,001	21	96	2,220	1,058	723	9,723	9,738	19,461	5,032
North-Clay Division	2,189	2,254	6	105	968	708	578	4,995	5,300	10,295	2,529
South-Clay Division	1,505	1,595	5	32	1,119	306	170	3,798	3,698	7,496	2,002
Bingham, North and South Divisions .	2,394	2,573	13	55	1,615	589	369	6,246	6,196	12,442	3,114
Broxtow, North and South Divisions .	12,662	13,068	191	495	1,990	8,463	2,915	32,534	32,765	65,299	16,125
Newark, North and South Divisions .	1,496	1,572	3	37	996	340	236	3,745	3,809	7,554	1,919
Rushcliffe, North and South Divisions .	2,118	2,236	5	53	1,211	713	312	5,519	5,401	10,920	2,731
Southwell and Scrooby (Liberty) . .	2,216	2,271	19	59	1,247	679	345	5,477	5,574	11,051	2,794
Thurgarton, North and South Divisions (Hundred or Wapentake)	4,082	4,259	48	272	1.813	2,034	412	10,305	10,267	20,572	5,352
Newark-upon-Trent (Borough) . .	2,022	2,087	9	62	63	1,019	1,005	4,499	5,058	9,557	2,337
Nottingham (Town and County of the Town) . . .	10,407	10,901	136	435	109	9,669	1,123	23,616	27,064	53,680	12,647
Totals . .	44,936	47,117	456	1,701	13,351	25,578	8,188	110,457	114,870	225,327	56,582

County Expenses, Crimes, &c.—The sums expended for the relief of the poor at the four dates of

		£		s.	d.	
1801	were	44,222,	being	6	3	for each inhabitant.
1811	..	88,013	„	10	9	„
1821	..	73,315	„	7	10	„
1831	..	72,717	„	6	5	„

The sum expended for the same purpose for the year ending March, 1838, was 55,003*l.*: and if it be assumed that the population had the same rate of increase between the years 1831 and 1838 as it had during the ten years preceding 1831, the above sum gives an average of 4*s.* 3*d.* for each inhabitant. These averages are below those for the whole of England and Wales.

The sum raised in Nottinghamshire for poor-rate, county-rate, and other local purposes, in the year ending 25th of March, 1833, was 116,380*l.*, and was levied upon the various descriptions of property as follows:—

On land	£75,634	14*s.*
Dwelling-houses	34,494	0
Mills, factories, &c.	4,782	13
Manorial profits, navigations, &c.	1,469	8
Total	116,380	15

The amount expended was—

For the relief of the poor	£74,762	10
In suits of law, removal of paupers, &c.	3,705	11
For other purposes	39,446	1
Total money expended	117,914	2

In the returns made up in subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, and 1836, there were raised 101,235*l.* 12*s.*, 92,912*l.* 6*s.*, 84,791*l.* 10*s.*, and the expenditure of each year from 1834 to 1838 was as follows:—

	1834.	1835.	1836.	1837.	1838.
	£.	£.	£.	£.	£
For the relief of the poor	66,030	55,182	50,366	46,562	55,003
In suits of law, removal of paupers, &c.	3,979	3,387	2,825	1,956	1,296
Payments towards the county-rate	30,522	21,191	20,276	not given.	19,545
For all other purposes		13,824	13,045	8,993	6,726
Total money expended	£100,531	93,584	86,512		82,570

The saving effected in the whole sum expended in 1838, as compared with that expended in 1834, was therefore 17,961*l.*, or more than 17 per cent.; and the sum expended for the relief of the poor in 1838 was less than that in 1834 by 10,027*l.*, or not quite 17 per cent.

The number of turnpike trusts in Nottinghamshire, as ascertained in 1836, under the acts 3 and 4 William IV., c. 80, were 22; the number of miles of road under their charge was 302. The annual income arising from tolls and parish composition in lieu of statute duty, in 1836, was 17,886*l.*, and the annual expenditure in the same year was as follows:—

Manual labour	£4,894	10
Team labour, and carriage of materials	653	13
Materials for surface repairs	2,203	3
Land purchased	87	12
Damages done in obtaining materials	105	18
Tradesmen's bills	586	5
Salaries of treasurer, clerk, and surveyor	1,394	6
Law charges	172	1
Interest of debt	4,877	4
Improvements	1,147	17
Debts paid off	420	0
Incidental expenses	294	8
Estimated value of statute duty performed	1,236	4
Total expenditure	18,073	4

The county expenditure in 1834, exclusive of that for the relief of the poor, was 15,532*l.* 11*s.*, disbursed as follows:—

Bridges, building, repairs, &c.	£273	3
Gaols, houses of correction, &c., and maintaining prisoners	3,437	12
Shire halls, and courts of justice, building, repairing, &c.	£2,418	13
Lunatic asylums	627	16
Prosecutions	1,694	14
Clerk of the peace	1,268	18
Conveyance of prisoners before trial	653	16
Conveyance of convicts	217	17
Vagrants, apprehending and conveying	264	19
Constables, high and special	151	10
Coroner	264	5
Debt, payment of, principal and interest	1,685	0
Miscellaneous	2,274	9
Total expenditure	15,232	11

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 1227, 1657, and 2255 respectively, making an average of 175 annually in the first period, of 237 in the second period, and of 322 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 103, 108, and 98 respectively. Among the persons charged with offences there were committed for—

	1831.	1832.	1833.
Felonies	95	104	93
Misdemeanors	8	4	5

The total number of committals in each of the same years was 123, 97, and 98 respectively.

	1831.	1832.	1833.
The number convicted was	101	93	87
Acquitted	18	8	22
Discharged by proclamation	7	5	4

There were 250 persons charged with crimes at the assizes and sessions in Nottinghamshire in 1838. Of these 9 were charged with offences against the person, only 1 of which was a common assault; 21 were charged with offences against property committed with violence; 216 with offences against property committed without violence; none were charged with malicious offences; and 4 were charged with various misdemeanors.

Of the whole number committed, 202 were convicted, 33 were acquitted, 2 were not prosecuted, and no bill was found against 13. Of those convicted, 1 was sentenced to death, and had his punishment commuted to one year's imprisonment; 54 were transported for various periods; 18 were imprisoned for one year; and 127 for six months or under; 1 was fined. Of the whole number of offenders, 217 were males and 33 females; 80 could neither read nor write; 145 could read and write imperfectly; 20 could read and write well; one had received superior instruction; and the degree of instruction of the remaining 4 could not be ascertained.

The number of persons registered to vote for county members in 1837 was 7010. Of these, 4419 were freeholders, 67 leaseholders, 477 copyholders, 1978 occupying tenants, 67 trustees, and 2 mortgagees: being 1 in 32 of the whole population, and 1 in 8 of the male population twenty years of age and upwards, as taken in 1831.

Nottinghamshire contains six savings' banks: the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	1832.	1833.	1834.	1836.
Number of depositors	8,078	8,597	9,150	9,723
Amount of deposits	£223,659	£236,260	£250,585	£271,075

The various sums in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	5,973	£39,903	6,487	£39,784	7,099	£48,964
„ 50	2,723	80,974	2,792	84,629	2,747	85,783
„ 100	1,224	81,929	1,224	83,683	1,249	86,532
„ 150	419	49,967	402	48,111	487	52,581
„ 200	227	37,346	243	40,448	249	41,606
Above 200	39	8,277	35	7,784	32	6,911
	10,605	298,396	11,183	304,389	11,813	322,367

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835.

	Schools.	Scholars.	Total.
Infant schools	34		
Number of children at such schools; ages from 2 to 7 years:—			
Males		578	
Females		639	
Sex not specified		355	
			1,572
Daily schools	647		
Number of children at such schools; ages from 4 to 14 years:—			
Males		9,670	
Females		7,532	
Sex not specified		2,665	
			19,867
Schools	681		
Total of children under daily instruction			21,439
Sunday-schools	366		
Number of children at such schools; ages from 4 to 15 years:			
Males		14,085	
Females		13,953	
Sex not specified		4,132	
			32,170

Assuming that the population between the ages of 2 and 15 years has increased in the same proportion as the whole of the population since 1821, and that the whole population has increased in the same ratio since 1831 as in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 years thus found residing in Nottinghamshire in 1833 was about 78,113. Twenty-three Sunday-schools are returned from places where no other school exists, and the children, 1335 in number, who are instructed therein cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Seventeen schools, containing 938 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. Making allowance for this cause therefore, we may perhaps fairly estimate that less than two-thirds of the children between the ages of 2 and 15 years are under instruction in this county.

Maintenance of Schools.

Description Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	1	78	2	109	22	569	9	816
Daily Schools	86	2,225	35	2,166	502	13,637	24	1,839
Sunday Schools	4	171	352	31,505	2	41	8	453
Total.....	91	2,474	389	33,780	526	14,247	41	3,108

The schools established by Dissenters, included in the above statement, are—

		Scholars.
Daily-schools	21, containing	1,134
Sunday-schools	168	17,659

The schools established since 1818 are—

Infant and other daily schools	301, containing	10,184
Sunday-schools	247	22,745

Twenty-eight boarding-schools are included in the number of daily-schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists and Roman Catholics.

Lending-libraries of books are attached to 50 schools in this county.

NOUN (in Grammar), the name of one of the parts of speech into which grammarians have distributed the words of a language. The noun generally expresses the subject of discourse, or the name (*nomen*) of the thing spoken of, as *horse, table, darkness*, &c.; but it may also be used as the predicate, as in the sentence, 'Tin is a metal,' where both 'tin' and 'metal' are nouns.

So far as respects the form of nouns, that is, the sounds of which they are composed, they are capable of classification in all languages. The nature of this classification may be explained from examples in our own language. Many nouns are simple roots, as *horse, ship, man, tree*; while others are formed by adding a suffix to the root or to other words. [NOTION, NOTIONAL.]

The following list of nouns, formed by suffixes, belong to the Saxon part of our language. A few examples of each suffix are given in order to show the use of each suffix more clearly:—

Er.	Ster.	Ard.	Eer.
build-er	game-ster	drunk-ard	mountain-eer
box-er	malt-ster	slugg-ard	chariot-eer
walk-er	song-ster	dast-ard	musket-eer
scoff-er	pun-ster	blink-ard	engin-eer

Some of the words in *er, ster*, and other terminations, have a corresponding feminine termination in *ess, ix*, or *stress*, as *murderess, songstress, executrix*. The termination *ix* is of Latin origin.

Ling.	Kin.	Let.
fat-ling	lamb-kin	rivu-let
first-ling	pump-kin	cut-let
dar-ling (dear-ling)	pip-kin	stream-let
fond-ling	manni-kin	is-let

These three terminations generally, but not always, give to the root the notion of smallness, and hence they belong to the class called diminutives.

Dom.	Hood.	Ness.
king-dom	boy-hood	bad-ness
wis-dom	child-hood	base-ness
prince-dom	false-hood	cold-ness
thral-dom	man-hood	dark-ness

Rick—as bishop-ric; Wick—as bail-wick.

Ship.	Th (from adjectives, with a change in the vowel).	T (mostly past participles).
friend-ship	leng-th	gif-t
hard-ship	bread-th	draf-t
partner-ship	dep-th	join-t
court-ship	streng-th	thef-t

The following terminations are of Latin and Greek origin, though most of them seem to have come through the Norman portion of our language:—

Acy.[*]	Age.[†]	An or Ian.	Ance.	Ancy.[‡]
conspir-acy	append-age	pag-an	abund-ance	depend-ency
fall-acy	band-age	artis-an	repent-ance	expect-ancy
suprem-acy	broker-age	guard-ian	resist-ance	occup-ancy
lun-acy	cord age	tragedi-an	observ-ance	vac-ancy

Ary.	Ate.	Ence.	Ency.
api-ary	advoc-ate	consci-ence	ag-ency
lumin-ary	potent-ate	consequ-ence	clem-ency
emiss-ary	prim-ate	impot-ence	curr-ency
libr-ary	gradu-ate	infer-ence	tend-ency

Ent.	Ice.	Ics.	Ion.
correspond-ent	mal-ice	eth-ics	adopt-ion
presid-ent	just-ice	opt-ics	animat-ion
stud-ent	avar-ice	mechan-ics	anticipat-ion
ag-ent	coward-ice	phys-ics	corrupt-ion

Ism.	Ist.	Ment.	Ory.
athe-ism	bapt-ist	allure-ment	audit-ory
bapt-ism	de-ist	enjoy-ment	vict-ory
critic-ism	flor-ist	entice-ment	direct-ory
fanatic-ism	fatal-ist	frag-ment	deposit-ory

Or or Tor.	Tude.	Ty.	Ure.
correct-or	alti-tude	facili-ty	depart-ure
inspect-or	forti-tude	liber-ty	fig-ure
jur-or	grati-tude	plen-ty	literat-ure
edit-or	lati-tude	civili-ty	press-ure

The preceding list contains the majority of the terminations of nouns in the English language which are not simple roots. The number, case, and gender of nouns in general are explained in the articles NUMBER, DUAL NUMBER, GENDER, ABLATIVE and ACCUSATIVE CASES.

NOUREDDIN (Malek-al-Adel Noor-ed-deen Mahmood), one of the most celebrated and powerful of the Moslem rulers of Syria in the age of the Crusades, born A.D. 1117, A.H. 511, was a younger son of Amad-eddin

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[*] Usually formed from adjectives in *ate*, as accur-ate, accur-acy.

[†] Apparently from the barbarous Latin *agium*.

[‡] Usually formed from adjectives in *ant*, as abund-ant, abund-ancy.

Zenghi, the second of the dynasty of the Atabeks of Irak and Syria. At the death of his father, who was murdered by his own Mamlukes at the siege of Jabbar, A.D. 1146, A.H. 541,* Noor-ed-deen, hastening to Aleppo with the signet of the deceased prince, secured the possession of that city and of his father's Syrian dominions; while Mesopotamia, with Moossool for a capital, fell to the lot of the elder brother Seif-ed-deen; and the feeble attempts of Alp-Arslan, a prince of the house of Seljuk, to assert his ancestral claims to the dominion of these provinces, were easily frustrated by the combined power of the two brothers. The earliest exploits of the reign of Noor-ed-deen were in continuance of the *Holy* War which his father had assiduously waged against the Latin Christians of Palestine: Josceline de Courtenay, whose capital of Edessa had been taken by Zenghi a few years previous, was signally repulsed in an attempt to recover it, and the Christian inhabitants, who had aided the enterprise, were put to the sword without mercy by command of Noor-ed-deen, who even levelled the fortifications of the town to prevent its ever again becoming a bulwark to the kingdom of Jerusalem. The recovery of this important fortress was the avowed object of the second crusade, undertaken A.D. 1148, under Louis VII. of France and the emperor Conrad: but of the mighty hosts which they led from Europe, only a miserable and dispirited remnant escaped the arrows of the Seljuki Turks in their march through Anatolia to Palestine; the project of retaking Edessa was abandoned as hopeless; the siege of Damascus, which was attacked by the crusading monarchs in conjunction with Baldwin III. of Jerusalem [BALDWIN III.], was foiled when on the eve of success by the address with which the minister of the Moslem prince Modjir-ed-deen fomented the mutual jealousies of the Christian leaders; and this vast armament, which if properly directed might have overwhelmed the rising power of Noor-ed-deen, only served by its failure to extend and confirm it. Resuming the offensive immediately after the departure of the crusaders, he invaded the territory of Antioch, and in a pitched battle (June 27, 1149) routed and slew the prince Raymond, whose head was sent as a trophy to the caliph at Bagdad; and though he sustained a severe defeat in the following year from his antient opponent Josceline de Courtenay, who surprised his camp, this disgrace was amply compensated by the captivity of that active leader, who was soon after seized while hunting by a marauding party of Turkomans, and died in confinement, while the remaining dependencies of Edessa, the fortresses of Aintab, Tellbasher, Ravendan, &c., fell almost without resistance into the power of Noor-ed-deen, whose dominions now included the whole of Northern Syria. Modjir-ed-deen† was still the nominal ruler of Damascus and the southern portion, but the government was entirely in the hands of his vizier Moin-ed-deen Anar, whose daughter Noor-ed-deen had married; and after the death of this able minister, the inhabitants, alarmed at the capture of Ascalon by Baldwin III. in 1153, and dreading an attack from the Christians, voluntarily offered their allegiance to Noor-ed-deen (1154) as the price of his protection; the weak Modjir-ed-deen resigned his power, and sought an asylum at the court of the caliph of Bagdad, which then seems to have been the usual retreat of deposed princes; while Noor-ed-deen, the circuit of whose realms now encompassed on all sides by land the Latin territories in Palestine, and extended to the frontiers of the Fatimite possessions in Egypt, fixed his capital at Damascus, which he raised from the ruinous state in which it had been left by an earthquake, and adorned with mosques, fountains, colleges, and hospitals. Several years of continual but varied warfare against the Christians followed the union of all the Moslem power of Syria under a single head; the sway of Noor-ed-deen was from time to time enlarged by acquisitions, not only from the enemies of Islam, but from the sultan of Iconium and the minor Moslem princes of Mesopotamia; but a malady which attacked him in 1159, followed by a false report of his death, might have occasioned a fatal reverse in his fortunes, but for the prudence of Ayoob (the father of the famous Salah-ed-deen, or Saladin), who controlled the impatience of his brother Assed-ed-deen Shîrakoh to take advantage of the supposed decease of their patron. The Greek emperor Manuel Comnenus was preparing at this time to attack Aleppo in concert with the Franks of Antioch; but this new enemy was diverted by negotiation, and by the release of 6000 Greek captives; and the only advantage reaped by the Christians from this crisis was the capture of the fortress of Al-Harem near Antioch. The death of Baldwin III. in 1162 released Noor-ed-deen from the ablest of his antagonists, his brother and successor, Almaric, or Amaury, being far inferior to Baldwin both in prowess and abilities; the war however was prosecuted with unabated vigour and various success: on one occasion, at the siege of Hisn-al-Akrad (the castle of the Koords), the Moslem leaguer was surprised by the Templars, and their monarch himself escaped death or captivity only by the self-devotion of an attendant; but this discomfiture was speedily retrieved by a victory in which the famous Reginald de Chatillon, prince of Antioch, was taken prisoner, and which was followed by the recapture of Al-Harem. But the state of affairs in Egypt, where the Fatimite caliphate was now tottering to its fall [FATIMIDES], opened new views of aggrandisement and a wider field of ambition to both the Christian and Moslem rulers of Syria; the descendants of Ali had become puppets in the hands of their vizier, or Emir-al-Joyush (generalissimo), who wielded all the real authority of the state: two emirs, Dargam and Shawer, had contested in arms this high dignity; and the latter, defeated and expelled from Egypt, sought refuge and aid from Noor-ed-deen. The sovereign of Damascus eagerly embraced the opportunity of obtaining a footing in Egypt, and despatched a force under Shîrakoh and his nephew Salah-ed-deen to reinstate Shawer (1163); whose rival called in the Christians of Palestine to his support: but ere Amaury could enter Egypt, Dargam had been overpowered and slain by Shîrakoh, who replaced Shawer in his former power. But Shawer, faithless alike to friend and foe, now entered into arrangements with the Franks in order to elude the fulfilment of his engagements with Noor-ed-deen; and Shîrakoh, after maintaining himself for some time in Belbeis against the joint forces of Jerusalem and Egypt, was compelled to enter into a convention with Amaury and evacuate the country. But he was soon recalled by Shawer to deliver him from the vengeance of his new allies, to whom he had proved as perfidious as to those of his own faith; Cairo was closely besieged by the Franks, and the Fatimite caliph Aded Ledini'lla sent the hair of his women, the extreme symbol of Oriental distress, to implore the succour of Noor-ed-deen (1168). Shîrakoh again entered Egypt with an army, forced Amaury to retreat, and after beheading the double traitor Shawer, installed himself in the twofold office of vizier to the Fatimite caliph, and lieutenant of Egypt in the name of Noor-ed-deen; but dying the same year, was succeeded in his dignities by his famous nephew Salah-ed-deen. [SALAH-ED-DEEN.]

While these events were passing in Egypt, Noor-ed-deen in person pushed his successes in Syria against the Christians, from whom he took Paneas and many other important places; Mesopotamia, ruled by his nephews, acknowledged his supremacy as head of the family; he was now, by his officers, absolute master of Egypt, and the fleets of Damietta and Alexandria were directed against the sea-coast of the kingdom of Jerusalem; but a religious conquest was yet wanting to complete his triumph; as a rigid adherent of the orthodox or Sooni sect of Islam, he reverenced the Abbaside caliph of Bagdad as the legitimate commander of the faithful; and the schismatic caliphate of the Fatimites, of which a phantom still remained secluded in the palace of Cairo, was an abomination which he determined to destroy. In obedience to his repeated commands, Salah-ed-deen (A.D. 1171, A.H. 567) substituted the name of the Abbasside caliph Mostadhi in the public prayers for that of Aded, who died eleven days after, in ignorance, it is said, of his deposition; the Sheah heresy was for ever abrogated in Egypt, and Noor-ed-deen, as the champion of orthodoxy, received from the gratitude of Mostadhi the direct investiture of Egypt and Syria as fiefs of the caliphate; two swords and two robes of honour were sent from Bagdad as emblems of his sway over two kingdoms; and he exchanged the title of emir, or sahib, for the higher appellation of sultan, which the etiquette of that age conceived to be attached to an immediate grant from the head of the Moslem faith. His name was recited with that of the caliph in all the mosques throughout his dominions, and even in the holy cities of Mekka and Medina, which Tooran-shah, brother of Salah-ed-deen, had reduced as dependencies of Egypt; but the power and glory of Noor-ed-deen had now attained their highest pitch, the three remaining years of his life were unmarked by any memorable achievement, and disquieted by forebodings of the future downfal of his house by the ambition of Salah-ed-deen, who, though still ostensibly acting as his lieutenant, and making public professions of loyalty and obedience, had in fact become independent master of Egypt, and eluded or disregarded all the orders of his nominal sovereign. The reluctance of Salah-ed-deen to join his forces with those of Noor-ed-deen in an expedition which the former had planned against the fortress of Karak, or Mont-Royal, at length brought these smouldering jealousies to the verge of an open rupture; and Noor-ed-deen was preparing[*] to march into Egypt to reduce or expel his refractory vassal, when an attack of quinsey terminated his life at Damascus, May 26, 1173 (Shawal 21, 569). His son Malek-al-Salah Ismail, a youth eleven years old, succeeded to the titular sovereignty of his extensive dominions; but was speedily stripped by Salah-ed-deen of Damascus and the greater part of Syria, and died eight years afterwards, reduced to the sovereignty of Aleppo and its dependencies, which were then absorbed, after an ineffectual attempt to claim them on the part of his cousins, the atabeks of Moossool, into the wide-spread realm of Salah-ed-deen. Noor-ed-deen is described by Abulfeda as tall and well proportioned in person, of olive complexion, and with little or no beard; in the estimate of his character he has had the rare good fortune to unite the suffrages of his adversaries to those of his friends: William of Tyre (‘Gesta Dei per Francos’) describes ‘Noradin’ as ‘a prudent and discreet man, who feared God according to the faith of his people;’ and the eulogies of the Moslem writers prove that the titles of Malek-al-Adel (the just prince) and Noor-ed-deen (Light of the Faith), were not idle or groundless assumptions. With the constant practice of the two princely virtues most esteemed in the East, justice and liberality, he combined the strictest attention to the duties prescribed by his faith; and while wearing neither silk nor gold, nor expending on his dress or nourishment more than the fifth which was his just share of the spoil, he distributed every month 5000 dinars among the poor, and munificently maintained the hospitals and charitable foundations throughout his dominions. The Dar-al-Adl, or chamber of justice, which he established to control the excesses of his military chiefs and their retainers, was the terror of the great and the refuge of the poor; and such was the affection which his subjects bore to his memory, that, some years after his death, his name was invoked in the streets of Damascus by an oppressed suitor, who thus obtained from the reigning monarch the redress which had been previously denied him. Abulfeda sums up his character by declaring that his virtues were both too numerous and too splendid to be comprehended within the limits of his history; and the sentence of future ages, which has placed him among the number of the Moslem saints, has ratified the judgment of his contemporaries. (Abulfeda; Abul-Faraj; De Guignes, *Histoire des Huns;* D'Herbelot, *Biblioth. Orient.;* Von Hammer, *History of the Assassins.*)

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* Abulfeda.—D'Herbelot places this event three years later, evidently confounding the death of Amad-ed-deen with that of his eldest son Seif-ed-deen Ghazi, prince of Moossool, and brother of Noor-ed-deen. Abul-Faraj dates it one year earlier than Abulfeda.

† Modjir-ed-deen is inadvertently called by Von Hammer, in his 'History of the Assassins,' the last of the Seljukides of Damascus; he was not of the Seljuki family at all, but the great-grandson of the Turkish emir Togtekin (the Doldequin of the Crusaders), who supplanted the children of Dakak the Seljukide, at Damascus, in 1103 or 1104.

NOUREDDIN (Malek-al-Afdal Noor-ed-deen Ali), the eldest of the seventeen sons of Salah-ed-deen; born A.D. 1170, A.H. 565. In the partition of his father's extensive dominions, which followed his death in 1193, Damascus and Southern Syria with Palestine fell to the lot of Noor-ed-deen; but in the dissensions which soon followed, he was stripped of his kingdom by his uncle Seif-ed-deen Abubekr (the Saphadin of Christian writers), and his brother Othman, sultan of Egypt (1196). In a poetical address to the caliph Nasser, he lamented the similarity of his own fate to that of the caliph *Ali* Ebn Abu-Taleb (his namesake) in being thus excluded from his rights by *Abubekr* and *Othman;* the caliph in his reply consoled him by the assurance that in him he should find the *Nasser* (protector) whom Ali had sought in vain; but the intercession of the caliph was unavailing to procure the restitution of any part of his territories; in 1198 however, on the death of his brother, the sultan of Egypt, Noor-ed-deen became *atabek,* or guardian, to his infant nephew Malek-al-Mansor, and attempted, by the aid of another brother, the sultan of Aleppo, to recover Damascus from his uncle; but the expedition failed, and Seif-ed-deen retaliated by invading Egypt, and expelled both the young sultan and his guardian. The unfortunate Noor-ed-deen now retired to Samosata, where he died, apparently without issue, A.D. 1224, A.H. 621. He is generally mentioned by Eastern writers under his assumed title of Malek-al-Afdal (the excellent prince).

NOUREDDIN, or NOOR-ED-DEEN ARSLAN SHAH, *atabek,* or prince, of Moossool and Mesopotamia, of the family of Zenghi, and grand-nephew of the famous Noor-ed-deen, sultan of Aleppo and Damascus, succeeded his father, Azz-ed-deen Massood, A.D. 1193, A.H. 589 (the year of the death of Salah-ed-deen). During a reign of eighteen years, he re-established in some measure the declining power of his house, and compelled the minor princes of his family, who occupied appanages on the frontiers of his territories, to acknowledge his supremacy as lord paramount. An attack with which he and his relative Kootb-ed-deen, prince of Sandjar, were threatened in 1209 from the overwhelming power of Seif-ed-deen, brother of Salah ed-deen, was averted by the mediation of the caliph of Bagdad; and Noor-ed-deen died the next year, A.D. 1210, A.H. 607, regretted by his subjects as a mild and beneficent ruler. His son Azz-ed-deen, after a reign of between seven and eight years, was succeeded by an infant son bearing the title of Noor-ed-deen Arslan II., who survived only a few months. (Abulfeda; Abul-Faraj; De Guignes.)

NOUREDDIN (Malek-al-Manssor Noor-ed-deen Ali), the second sultan of the dynasty of Tartar or Baharite Mamlukes in Egypt, was placed on the throne by the emirs after the assassination of his father, Ibek, A.D. 1257, A.H. 655, at the age of fifteen. (Makrizi. In the Latin version attached to Carlyle's edition of the ‘Maured-Allatafet,’ his age is inadvertently given as twenty-five, but the Arabic text agrees with Makrizi.) His short reign of two years was troubled by continual feuds among the Mamluke chieftains, and attempts on the part of the Ayoobite princes of Syria to recover the lost sway of their family in Egypt; and the apprehension of an irruption of the Moguls under Hulaku, who had taken Bagdad and destroyed the caliphate, showed the necessity of substituting a ruler of matured years and experience. The emir Kotuz accordingly assumed the reins of government, A.D. 1259, A.H. 657, and no more is heard of Noor-ed-deen.

NOVA SCOTIA, a British colony in North America, is situated between 43° 20′ and 46° N. lat. and between 61° and 66° 20′ W. long. It is surrounded by the sea, except at its north-western extremity, where the isthmus of Chignecto, which is nearly eleven miles across, unites it to New Brunswick. On the west side of Nova Scotia is the Bay of Fundy; on the south and east the Atlantic; on the north it is divided from the island of Cape Breton by the Gut of Canso, a strait about twenty-one miles in length, and varying from a mile to a mile and half in width; and from Prince Edward's Island by Northumberland Strait, which is about 14 miles wide at the narrowest place between Nova Scotia and the island. Its extreme length, from Cape Canso on the east to Cape St. Mary's on the west, is 280 miles. Its breadth varies from about 50 to 100 miles. It contains nearly 16,000 square miles, or almost two-thirds of the area of Ireland.

Coast.—Along the shores of the Atlantic, from Cape Canso to Cape Sable, the coast is rocky and rather high, though steep cliffs rarely occur. This coast-line is indented by numerous inlets, which penetrate into the rocky masses from three to fifteen miles, and form a great number of deep and safe harbours. The shores are lined with rocks and thousands of islets, between which and the coast during the most boisterous weather small vessels sail in smooth water, while there is a heavy sea in the open ocean. There is deep water almost without exception close to the rocks and islands and in the harbours. The most extensive of the inlets are Halifax Harbour; Margaret's Bay, which is less than two miles broad at the entrance, but widens to six miles, and is fourteen long; and Mahon Bay, separated from Margaret's by the lofty peninsula of Aspotagoen, which is about ten miles wide and twelve deep, and contains above 200 islands; and Shelburne Harbour. The coast along the south-western extremity of the province, between Cape Sable and Cape St. Mary's, resembles the southern shores. Cape St. Mary's on the south and Briar's Island on the north form the entrance of St. Mary's Bay, which is 35 miles deep and from

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[*] D'Herbelot (*Bibl. Or.*, art. ‘Noureddin’) says, ‘He entered Egypt at the head of a powerful army, carried the capital by assault, and constrained Saladin, brave as he was, to fly before him;’ but this is one of those inaccuracies which disfigure that valuable compilation.

4 to 10 broad; Briar's Island, Long Island, and a peninsula called Digby Neck, separate it from the Bay of Fundy. The coast along the Bay of Fundy, from Briar's Island to the entrance of the Basin of Mines, runs in one continuous line, without a break except the Gut of Digby, by which the Annapolis Basin is entered. The Gut is narrow but leads to one of the most beautiful harbours of America, the Annapolis Basin, which extends, with a width varying between one and four miles, ten miles parallel to the Bay of Fundy. The shores of the Bay of Fundy are less rugged than the southern shore, but still bold and generally high. As there is no harbour on this coast east of the Gut of Digby, a pier has been erected at Black Point, which affords safety to coasting vessels. The Basin of Mines is one of the two great branches in which the Bay of Fundy terminates. Its entrance is through a strait about three miles wide, with bold and abrupt shores. It widens inside from eight to sixteen miles, and extends about fifty miles to the head of Cobequid Bay. The tides at full and change rise from 50 to 60 feet, and ascend the rivers to a distance of 15 miles, The shores of the Basin are low, and large tracts of very fertile land have been gained from the sea by embankments. The shores from the entrance of the Basin of Mines to Cape Chignecto, and from Cape Chignecto along Chignecto Bay to the Boar's Back, are high and rocky, but the innermost recess of Cumberland Basin has low shores, and extensive tracts of dyke-land have been formed here likewise. Chignecto Basin is the other great branch of the Bay of Fundy. It extends about twenty miles, with an average breadth of eight miles, and then divides into two minor branches, Cumberland Basin and Shepody Bay; the latter is in New Brunswick, and the former divides New Brunswick from Nova Scotia. The northern shores, along Northumberland Strait west of Pictou Harbour, are low, and partly muddy, partly sandy, except near Pugash Bay, where they are high. East of Pictou they are much higher, and from Cape St. George they are generally rocky and bold. Chedabucto Bay is 25 miles long and from 6 to 12 wide. The entrance is between Cape Hogan on Madame Island, which belongs to Cape Breton, and Cape Canso. It is altogether free from islands and cliffs.

Surface and Soil.—The lowest depression of the country seems to occur about 63° 30′ W. long., between Halifax Harbour on the south and Cobequid Bay on the north. The summit-level of the Shubenacadie Canal, which traverses it, does not rise to the elevation of 100 feet above the sea. The country to the west of that depression may perhaps on an average be about 300 feet above the sea-level. Its surface, though far from being level, does not appear to present any great inequalities, and has a hilly character only in that part where it descends towards the west, north, and east. The ascent from the southern and rocky coast is very gradual. The most hilly and probably the most elevated district occurs towards the most western extremity, west of Lake Rossignol, in the heights called the Blue Mountains. This district seems to extend northward to the vicinity of Annapolis Basin. Along the Bay of Fundy two ridges of hills of moderate elevation enclose the valley of the Annapolis river. The southern of these ridges probably does not rise above the table-land occupying the interior. On the eastern edge of this table-land, at a distance of from eight to ten miles from the Basin of Mines, several high hills occur, as Horton Mountain and Ardoise Mountain; the latter is considered to be the most elevated land in Nova Scotia, and rises to about 700 feet above the sea. The table-land is unknown as far as concerns the qualities of the soil, no settlements having been made on it; but it appears that the greatest part of it is covered with forests, which contain timber fit for ship-building and other purposes. A great number of lakes are dispersed over its surface, among which Lake Rossignol is said to be thirty miles long. The lakes are most numerous between Annapolis and Liverpool, where they constitute a water communication across the country. The tract along the southern coast, and for several miles inland, is generally naked and barren, the soil being occupied by rocks and stones: in some places it is covered with low trees and bushes, but in general it is unfit for cultivation. In a few places, where the land has been cleared of the stones, moderate crops of barley and oats are obtained. At the head of the bays and on the lower course of the rivers there are tracts of alluvial soil which yield good crops; but these cultivable tracts constitute a very small portion of the whole, and hence the inhabitants of the scattered settlements of this country are almost exclusively occupied with fishing and preparing and bringing down the timber from the interior. The vicinity of Halifax constitutes an exception, though here also the soil is of an indifferent quality. The country contiguous to the western coast between Cape Sable and Cape St. Mary, though generally rocky and sterile, contains a much greater proportion of arable land. The country improves considerably on the shores of St. Mary's Bay, and still more along those of the Bay of Fundy. Though the elevated ridge which runs along this bay is also stony, it has a superior soil, and gives abundant crops of wheat and other grains, and has extensive orchards: its cider is much esteemed. The valley through which the Annapolis River flows is also equally fertile, but cultivation has not extended from it to the more elevated country lying south of the valley.

The country surrounding the Basin of Mines is the most fertile and the best settled portion of Nova Scotia. It contains several thousand acres of the most fertile marsh or dyke lands, which owe their origin to the extraordinary velocity with which the tides rush into the bay, depositing vast quantities of alluvial matter on the shore. Where it has been possible to exclude the tides by embankments, these tracts have been converted into the finest meadows, and may also be cultivated with advantage. There are also extensive alluvial tracts along the rivers which are very fertile; and even the uplands, which occupy the tracts between the river courses, though less fertile, repay the labour bestowed on them. A few sandy tracts occur, but they are of comparatively small extent. The peninsula which divides the Basin of Mines from Chignecto Basin has a stony soil, but a considerable degree of fertility. At the innermost corner of Cumberland Basin there are also marshes, though less extensive than those on the Basin of Mines, They are likewise partly produced by the tides, and partly by the alluvial deposit brought down by several small rivers which empty themselves into Cumberland Basin.

The eastern portion of Nova Scotia resembles in most respects the western, constituting in the interior a table-land, from 200 to 300 feet above the level of the sea, and with a slightly irregular surface. It is likewise for the most part covered with forest-trees, and contains several lakes in the eastern districts. The high lands appear to extend with undiminished elevation to the vicinity of the northern coast; but along the northern coast they terminate at 12 miles from the shores, and the interval is occupied by a long slope, broken into hills and dales. A portion of the peninsula between the Basin of Mines and Northumberland Strait is occupied by a cluster of hills, called the Cobequid Mountains. The soil of the country contiguous to Northumberland Strait, though not of first-rate quality, is rich enough to repay the labour bestowed on it. This country also contains rich mines of coal and iron. These advantages, united to a very profitable fishery, and the vast forests of timber-trees, will give some idea of the value of this country. The country adjacent to St. George's Bay, the Gut of Canso, and Chedabucto Bay, is much less fertile, and the inhabitants are mostly engaged in fishing. The coast from Cape Canso to Halifax Harbour is by far the most rugged and barren in Nova Scotia: it is also more thinly settled than the rest, and the number of agricultural settlements is very small. The scattered population are occupied in the timber-trade and fishery.

Rivers.—The number of rivers is very great, but their course is short. Nearly all of them form good harbours at their mouths, though they are generally only fit for moderate sized vessels. Most of the rivers have rapids not far from the sea, which however do not prevent them from being used to float down the timber from the interior. The most remarkable are the Annapolis River and the Shubenacadie. The Annapolis River originates in the high land which forms the southern side of the entrance of the Basin of Mines, and runs west-south-west about 90 miles. It becomes navigable about 25 miles from the Gut of Digby, which may be considered as its mouth. The Shubenacadie River rises in a chain of lakes situated north of Halifax, and beginning about two miles from that town. The most northern of these lakes is called the Great Lake: the river issuing from it runs northward 55 miles, when it discharges itself into the Basin of Mines. At its mouth it is a mile wide; the tide ascends more than 10 miles, and it is navigable for about 30 miles more. This river and its lakes supply the Shubenacadie Canal with water, by which a communication between the Bay of Fundy and Halifax has been established for ships drawing not more than eight feet of water.

Climate.—The climate is colder than that of England, but it varies considerably in the different parts of the country. Along the southern and western coast there are several harbours which are never frozen; but the harbour of Pictou, on Northumberland Strait, is usually closed by ice for four months. In Argyle Bay, at the western extremity of the peninsula, the thermometer sometimes sinks to zero, and in summer it rises, though rarely, above 80°; yet the mean annual temperature is stated to be 48°, or only two degrees less than that of London. Along the northern coast however the frost generally continues from the end of December to the beginning of April, and sometimes longer; and during this time there are very heavy falls of snow. The spring, as in the northern countries of Europe, is very short. As soon as the frost and snow disappear, the country is clothed with a vigorous vegetation, and the heat becomes sensible, though it is never oppressive, even in August, when it is greatest. The autumn is the finest portion of the year, on account of the constancy of the weather and the moderate temperature. In November or December the rains set in: these months and April are the most rainy part of the year, but in general the quantity of rain which falls is moderate. Fogs prevail on the southern shores and at the entrance of the Bay of Fundy in June, July, and August, but they do not extend far inland. The climate is everywhere very healthy.

Productions.—Wheat is grown on the better lands, but if not cultivated with care it does not succeed. The quantity grown is not sufficient for the consumption of the colony, and a considerable quantity of flour is imported. Indian corn is extensively cultivated along the Bay of Fundy, though it is not much used as an article of food. Rye, oats, barley, and potatoes are the principal articles which are raised. Turnips, beans, and buckwheat are also generally cultivated. As the cattle are housed in winter, the culture of grasses is one of the principal objects of agriculture. There are extensive orchards along the Bay of Fundy and in the country which surrounds the Basin of Mines; and the cider, which forms a considerable article of export, is inferior to none in America. Peaches and grapes ripen in ordinary seasons without any artificial aid.

Cattle and sheep are very numerous, especially in the country about the Basin of Mines and along the northern shores. Beef and butter make a considerable article of export. The fleece of the sheep, which is tolerably fine, is used for domestic purposes. Horses are not numerous, and the breed is indifferent. Hogs are tolerably numerous.

The forests are one of the sources of the wealth of the country; they consist of pine, birch, oak, hemlock, beech, ash, maple, and elm, all of which make articles for exportation: there are other trees of great beauty, but less value. The wild animals are the moose-deer, bear, tiger-cat, fox, marten, otter, mink, beaver, musk-rat, porcupine, racoon, weasel, squirrel, and hare; all of which, except the two last, have decreased very rapidly in number. The lakes and rivers abound with fish, and the sea along the coast contains abundance of cod, mackerel, herring, shad, alewives, salmon, halibut, sturgeon, sole, and some other fish of less value; lobsters, oysters, and different kinds of shell-fish are abundant. Perhaps one-third of the population subsists on the produce of the fisheries, which are carried on along the shores and on the coast of Labrador.

The eastern portion of Nova Scotia is very rich in minerals. Coal has been discovered at least in ten places between the isthmus of Chignecto and Merigomish, and the great coal-field of Pictou occupies an area of more than one hundred square miles; the seams vary in thickness from one to fifty feet; the seam at the Albion coal-mine is more than fifty feet in thickness; it consists of several distinct layers; the upper or main layer being generally thirty-six feet thick. Great quantities of coal are shipped from Pictou to the United States for the use of steam-vessels. Iron-ore abounds in the same district, but it is not worked; it is also found in abundance in the vicinity of the Annapolis Basin, on the banks of the small river called Moose, where it is worked by the Annapolis Iron Mining Company; the ore is very good. Indications of copper and lead occur along Northumberland Strait. Above 100,000 tons of gypsum are annually shipped to the United States for manure; it occurs in several places, and is extensively worked on the shores of the Basin of Mines, Cumberland Basin, and St. George's Bay. Salt-springs are numerous in the north-western district, west of a line drawn from the innermost recess of Cobequid Bay to Pictou. Slate, freestone, and grindstone are worked in several places, principally for domestic use; grindstones are annually exported to the amount of 10,000*l.* to the United States.

Population, &c.—The population of the peninsula of Nova Scotia, which in 1817 amounted to 84,913, had increased to 123,848 in 1827, since which year no census has been taken: this increase was equal to rather more than 4½ per cent. annually, some part of which was caused by immigration, but to what extent is not known. The division of the population among the different counties and districts was, in 1827, as follows:—

	Males.	Females.	Total.
Halifax County:—			
Peninsula of Halifax	6,867	7,572	14,439
District of Halifax	5,178	4,959	10,437
District of Colchester	3,921	3,782	7,703
District of Pictou	7,262	6,687	13,949
Hants County	4,520	4,107	8,627
King's County	5,293	4,915	10,208
Annapolis County	7,491	7,170	14,661
Shelburne County	6,133	5,885	12,018
Queen's County	2,187	2,038	4,225
Lunenburg County	4,846	4,559	9,405
Cumberland County	2,853	2,563	5,416
Sydney County	6,685	6,075	12,760
	63,536	60,312	123,848

The number of births in the year 1827 was 4563, or 1 in 27; the number of marriages was 945, or 1 in 131, and of deaths 1908, or 1 in 65, which last proportion, if the registers are correctly kept, indicates great salubrity in the climate.

The population of the colony is of a mixed character. It consists of four distinct classes: the Indians, or aborigines—part of the tribe of Micmacs—who do not exceed 600 in number; free negroes, of whom there are about 2000; Acadians, descendants of the French, by whom the country was partially settled before its conquest by the English, and whose numbers do not much exceed 6000; the remaining class, who form the main body of the population, are the descendants of colonists from Germany, of refugee royalists from the former British provinces of North America, and emigrants from all parts of the United Kingdom, but more especially from Scotland. The Acadians are Roman Catholics; they settle together as much as possible, preserve their religion, language, and customs, and never intermarry with their Protestant neighbours: the descendants of the other nations are so mixed together that all distinctive characteristics are lost.

Acadia was the name given to Nova Scotia and the adjacent countries when they were under the dominion of France.

The province is divided into nine counties, exclusive of the island of Cape Breton, which is included within the government. These counties, which have already been enumerated, are subdivided into 43 townships, which are not all of equal extent; their inhabitants meet together to authorise the raising of money for local purposes.

Halifax, the capital of the province, in 44° 40′ N. lat. and 63° 38′ W. long., is built on the declivity of a hill, the summit of which is 240 feet above the sea. It stands at the western side of the harbour, which is spacious, safe, and accessible at all seasons of the year. There is space within it for 1000 vessels to ride in safety. It is entered by a creek sixteen miles long, which terminates in a sheet of water called Bedford Basin, the area of which is ten square miles The mouth is protected by a small island forming two passages into the harbour, one of which, the eastern passage, can be used only by small vessels. Opposite to the town is another small island, George Island, which is strongly fortified. The town is regularly laid out, and the streets are for the most part paved or macadamised. Including the suburbs, the town is two miles long and half a mile broad; it contains 2 churches, 1 Roman Catholic chapel, and six chapels for Protestant dissenters. The 'Province Building,' in the centre of the town, is a handsome well-built edifice of freestone, 140 feet long, 70 feet wide, and 42 feet high It contains the chambers of meeting for the legislative bodies, the custom-house, the offices of the provincial govern ment, and the superior law courts. The court-house, in which the courts of Common Pleas and the Sessions of the peace are held, is a plain brick building. It contains an exchange-room for the merchants. Halifax is the principal naval station in British America, and in time of war its possession is of great importance: it contains a well-appointed naval arsenal. At the last census, in 1827, the town contained 1580 houses; since that time it has been much improved and enlarged. It is the seat of government for the province, and carries on a considerable trade with the United Kingdom, the West India Colonies, and the United States. The post-office packets which convey the correspondence between Europe and British America arrive at Halifax from Falmouth once in every month.

Opposite to Halifax, on the eastern side of the harbour, is the small town of Dartmouth; it was a thriving place during the war, but has not increased since. A steam-boat is constantly employed for the conveyance of passengers from one town to the other.

Truro, a town containing about 100 houses, mostly built of wood, stands at the head of the Basin of Mines. It contains a church and a court-house, and returns one member to the House of Assembly

Pictou, on the Straits of Northumberland, opposite to Prince Edward's Island, contains a population above 3000. There are an Episcopal, a Catholic, and two Presbyterian chapels. A considerable trade is carried on in lumber and coal; as many as 100 vessels have been loaded with timber for England in a single year. The harbour has a bar at its mouth, but within it is capacious, and has from 5 to 9 fathoms depth of water.

Dorchester is situated a mile above the navigation on Antigonish river. It has a considerable trade in proportion to its size, and contains a court-house, a Baptist, a Presbyterian, and a Roman Catholic chapel.

Guysborough stands on the western side of Milford Haven, at the head of Chedabucto Bay. It contains a court-house, an Episcopal church, Roman Catholic and Protestant Dissenters' chapels.

Amherst stands near the isthmus which divides the Bay of Fundy from Northumberland Strait. It is a small but thriving place.

Windsor, the county town of Hants, stands at the confluence of the St. Croix and the Avon, about 40 miles north from Halifax. It contains a college, an academy, an Episcopal church, a Roman Catholic chapel, and places of worship for many sects of Protestant Dissenters.

Chester is a thriving town on the north side of Mahon Bay, about 9 miles from its entrance. It contains several saw, grist, and fulling mills, and carries on a considerable lumber trade. Many of its inhabitants are engaged in the fishery.

Lunenburg, a regularly built town, contains about 300 houses and four churches and chapels. It carries on the lumber trade with the West India Colonies.

Liverpool, the shire town of Queen's county, is well built. It stands on the west side of the harbour. The inhabitants are mostly engaged in the lumber trade and fishery, which afford exports to Europe and the West Indies. Liverpool harbour is never frozen, and is accessible at all seasons of the year.

Annapolis, the county town of the county of the same name, stands on a peninsula which projects into the Gut of Digby. It has not advanced in size or population for many years. Annapolis was the capital of the province under the French, who called it *Port Royal*. It continued to be the seat of government until 1750, when Halifax became the capital of the province.

Shelburne, in the county of that name, was built by American loyalists immediately after the recognition of the independence of the United States. Within a year after it was founded, the town is said to have contained 12,000 inhabitants, but it soon began to decline, and is now almost deserted. The town stands at the northern extremity of an inlet 10 miles deep and two miles wide. The few inhabitants that remain are employed in fishing and ship-building.

Yarmouth, also in Shelburne county, on the west coast of the province, contains about 100 houses, and consists of one street nearly two miles long, but the dwellings are not placed close together.

The affairs of the province are administered by a lieutenant-governor, subordinate to the governor-general of British North America, a council of 12 members appointed by the crown, and a house of assembly, consisting of 41 members, elected by forty-shilling freeholders. The assembly is elected for seven years, but may be dissolved or prorogued at the pleasure of the lieutenant-governor: it must meet every year.

The bishop of Nova Scotia and the chief-justice of the province are ex-officio members of the council: the latter acts as its president. The laws are administered by a court of queen's bench, which holds its sittings in Halifax, and by district courts, as in the provinces of Canada. The common and statute law of England are in force, together with the statutes passed by the provincial parliament, and allowed by the queen in council.

The militia of the province, in 1836, comprised 1063 commissioned officers and 22,488 non-commissioned officers and privates.

The exports of the province consist principally of lumber and the produce of the fisheries. Of the first description of produce there were shipped, in 1836, of pine, birch, and ash timber, masts, deals, shingles, and staves, to the value of 115,620*l.*, and the shipments of cod, herrings, mackerel, salmon, and fish oil, amounted to 186,908*l.* In the same year there were exported 31,489 tons of gypsum, 42,587 tons of coals, and agricultural produce, valued at 26,063*l.* The total value of exports was 446,097*l.* The imports, which consisted principally of British manufactured goods and West India produce, amounted in value to 733,540*l.* Included in this amount there were 347,176 bushels of salt, and agricultural produce, valued at 85,558*l.*

The shipping that entered and cleared from the province in 1836 was:

	Inwards.		Outwards.	
	Ships.	Tons.	Ships.	Tons.
Great Britain	108	29,544	112	30,931
British Colonies	2,295	147,781	2,540	170,407
United States	965	97,689	902	90,399
Foreign States	36	6,119	20	2,783
	3,404	381,133	3,574	294,520

(M'Gregor's *British America*; Bouchette, *British Dominions in North America.*)

NOVA ZEMBLA, a corruption of the Russian name of Novaïa Zemlïa (new land), designates an island situated in the Arctic Ocean, between 70½° and 76½° N. lat. and 52° and 66° E. long. It extends in length from south-south-west to north-north-east nearly 400 miles, but its width, so far as it is known, does not exceed 50 miles on an average, though in our maps it still occupies double that extent from west to east. It is divided from the island of Waigats, which lies farther south, by the Strait of Kara, which is more than 30 miles wide. Zembla properly consists of several islands; at least it is known that between 73° and 74° N. lat. a strait, called Matotshkïn Shar, divides it into two islands, and it is very probable that some inlets, farther north, are likewise straits; but it has hitherto been found impossible to advance far into them, since even in the midst of summer they are closed with ice. The island south of the Matotshkin Shar has been recently surveyed by Russian seamen, but more than one-half of the eastern coast of the island north of the strait has always been found so closely beset with ice, as to prevent all farther progress. The western coast, up to Cape Nassau, the most northern point of the island, is known. It appears that the wide arm of the sea which lies between Novaïa Zemlïa and the extensive headland separating the Bay of Kara from the wide gulf into which the Oby river flows, is always encumbered in its northern part with close masses and fields of ice. No vessel, and not even a boat, has yet succeeded in making its way to the east far enough to reach the gulf of the Oby.

The land on the western side of the island is mountainous, rising from a steep and bold shore to the height of 1000 and 2000 feet. The highest mountains are near the western entrance of the Matotshkin Shar, where several summits attain more than 2000 feet above the sea-level. The most elevated mountain is on the strait itself, and is 3475 feet high. The eastern shores are comparatively level, especially towards the south. Though the heat in summer is very great, owing to the long continuance of the sun above the horizon (four months and a half at the northern extremity), the soil thaws only to the depth of between six inches and two feet and a half, and at that distance from the surface ice is always found. The vegetation, which covers some parts of the surface, consists only of lichens and mosses. White bears, foxes, walrusses or morses, and seals abound, as well as rein-deer and water-fowl. The islands are frequently visited by fishermen from Arkangel and other places in order to take the walrus. Nova Zembla first became known by the voyage of Steven Burough (1556), but had previously been visited by the Russians. The Dutchman, William Barentz, passed the winters of 1596-7 in Icy Haven, near the most northern extremity of the island. The Russian government in recent times has sent several expeditions to explore the islands, as already observed, but they have not yet completely succeeded in this object. (Barrow's *Chronological History of Voyages into the Arctic Regions*; *London Geog. Journal*, vol. viii.)

NOVACULI'NA (Benson), the name of a conchifer belonging to the *Solen* family. [SOLENIDÆ.]

NOVA'LIS, the literary name assumed by Friedrich von Hardenberg, who was born in 1772, at a family estate in Mansfeld. His father, Baron von Hardenberg, had been a soldier in his youth, and was director of the Saxon salt-works. Himself and his wife, the mother of Novalis, belonged to the religious society of Hernhuters. Novalis was the eldest of eleven children, and was very delicate in his earlier years. He was of a dreamy nature, and displayed no extraordinary talent, till a dangerous illness, which attacked him in his ninth year, and could only be cured by painful remedies, awoke him from a kind of intellectual slumber, and he appeared thenceforward as a lively and intelligent child. His diligence was great, and in his twelfth year he possessed considerable knowledge of the Latin and some acquaintance with the Greek language. He displayed a great predilection for tales (*Mährchen*), some of which he invented for the amusement of his brothers. In 1789 he attended a gymnasium, and in the following year went to study at Jena, where he remained till 1792, when he went with his brother Erasmus to the university of Leipzig. In the succeeding year he removed to Wittenberg, where his studies were completed.

At this time he became acquainted with Frederic Schlegel, and also with Fichte, whose system of philosophy, called the *Wissenschaftslehre*, he studied with ardour. On leaving Wittenberg he went to Arnstadt, to attend for the first time to practical business. He soon became acquainted with a neighbouring lady, called by his biographer Sophia von K., of whom he became violently enamoured. In 1795 he went to Weissenfels, and was made auditor of the department of which his father was director. The death of Sophia and of his brother Erasmus, both in the year 1797, was a great shock to Novalis; he however pursued his business with activity, and it is about this time that his 'Hymns to Night' are supposed to have been written.

In 1798 he was betrothed to a lady called Julia von Ch., and about this time he wrote his 'Pupils at Sais.'

Returning to Jena, he became acquainted with August Wilhelm Schlegel, and with Tieck, the romance writer, and author of the biography to which we are indebted for all the information that we have respecting the life of Novalis. In 1800 the romance 'Heinrich von Ofterdingen' was commenced by Novalis, and was, as he explains in a letter to his friend Tieck, designed to be an apotheosis of poesy. This singular work was never finished, although the plan of its conclusion is preserved. The hero, Heinrich, is an old German poet, supposed by some to be the author of the 'Nibelungen-lied,' and the purpose of the work is to show the whole world, with every profession and pursuit, on its poetical side. It would little suit most romance readers, as the story is too wild to be interesting, and is merely a thread to connect the author's own thoughts and opinions. The conclusion of the work, as given by rough notes, was to have been eccentric even for a German enthusiast. Heinrich was to have come into a land where men, beasts, minerals, and even tones and colours held converse, where the world of tales (Märchenwelt) was to become visible, and the real world to be considered as a tale. It may be observed that Novalis regarded the *Mährchen*, or popular traditions, with singular respect, and discerned in them, or fancied he discerned, a deep meaning. He was accustomed, says his biographer, to regard the most ordinary occurrence as a miracle, and the supernatural as something ordinary.

In 1800 he was subject to spitting blood, and fell into a weak state. The books which he then constantly studied were the Bible, and the works of Zinzendorf and Lavater. He loved to talk of all his projected works, and professed that he now for the first time knew what poesy was, and designed to re-write 'Ofterdingen.' On the 19th March, 1801, he died, in the presence of his friend Frederic Schlegel, before he had completed his 29th year.

Novalis is a writer who will either be read with some degree of enthusiasm or not read at all. Hence while almost idolised by the partisans of the romantic school, he is mentioned with a kind of benevolent contempt by the opponents of that school. His imagination and enthusiasm are most boundless: he darts from prodigy to prodigy with a celerity that cannot be followed, unless the reader allows himself to sympathise with the author. The effects of the ideal philosophy of Fichte, and the love of tales so predominant in the romantic school, are plainly discernible in Novalis's works. He had literally constructed an unreal world of his own, and seems to have breathed an atmosphere utterly unlike that of the actual world. A desire of combining religious fervency with philosophy is also apparent; and thus that combination of speculation and enthusiasm which is found in the writings of the Alexandrian Platonists and the Mystics was very acceptable to him. The 'Hymns to Night,' and the latter part of 'Ofterdingen,' are equally remarkable for the vast power manifested in the construction and the dimness of the construction itself, while here and there the acuteness of some remarks is not to be mistaken. The 'Pupils at Sais' is another fragment of a romance, the object of which was to reveal Novalis's views of physical science, for which and mathematics he had a great taste. If however the works above mentioned are remarkable for singular combination, his spiritual songs ('Geistliche Lieder') are no less so for their perfect simplicity and pure spirit of devotion. They are indeed complete gems of religious poetry. The posthumous works of Novalis contain numerous aphorisms, which show the direction of his studies, a most remarkable turn of thought, and a love of startling paradox, combined with singular acuteness. The whole works of Novalis were collected and edited by his friends Tieck and F. Schlegel, with a biography prefixed by the former. The edition has been reprinted at Paris, in one vol. 8vo.

NOVA'RA, the Province of, in the Sardinian territories, is bounded on the north by the province of Pallanza, on the east by the river Ticino, which divides it from Austrian Lombardy, on the south by the province of Mortara, and on the west by the provinces of Vercelli and Val di Sesia. It is about 35 miles in length and 15 in breadth, and consists in a great measure of a plain between the rivers Sesia to the west and Ticino to the east, which is crossed in its length from north to south by the Agogna, likewise an affluent of the Po. The northern part of the province extends to the hills which border on the lakes Maggiore and Orta. The population is 134,000, distributed among 93 communes. (Serristori, *Saggio Statistico d'Italia*.) The country forms part of the plain of the Po, and is very productive, especially in corn, rice, wine, hemp, and silk. Abundance of poultry and pigs are reared.

The chief town, Novara, a bishop's see, is situated on a hill at the foot of which flows the Agogna; it is fortified, and the circumference of its ramparts is nearly two miles. Seen from a distance, the town with its numerous steeples appears more considerable than it really is. It is however a place of some importance, though old looking and irregularly built: it has many churches and convents, a gymnasium, a clerical seminary, two hospitals, a library in the Chapter-house, several palaces, especially that of the noble family Bellini, a handsome square, a theatre, and 15,300 inhabitants, including its communal territory; a considerable trade is carried on in silk and agricultural produce. The church of S. Gaudenzio contains several valuable paintings. Count Prina, minister of finance of the late kingdom of Italy under Napoleon, who was murdered by the mob at Milan in 1814, was a native of Novara. Luigi Bossi, the author of the only General History of Italy existing, in 19 volumes 8vo., and of several other works, was also a native of this province. The high road from Turin to Milan passes through Novara.

The other towns of the province are—1, Borgomanero, in the north part of the province, not far from the lakes Maggiore and Orta, a well-built bustling little town, with 6400 inhabitants; 2, Oleggio, near the right bank of the Ticino, with 6900 inhabitants; 3, Trecate, in the south part of the province, with 4200 inhabitants; 4, Camere, with 3400 inhabitants; 5, Orta, on the eastern shore of the lake of the same name, with a sanctuary on the hills above, dedicated to St. Francis, is much frequented by the country-people around. The pretty lake of Orta, which is partly in the province of Novara, is ten miles in length from north to south, and little more than a mile in breadth. Its southern extremity is about 20 miles north of Novara. Its outlet is at the opposite or northern end, from which the waters flow into the Lago Maggiore, which is seven miles distant to the east. The banks of the lake of Orta are hilly and pleasant, and covered with villages, hamlets, and handsome country-houses. Many of the inhabitants of this district emigrate to foreign countries, and especially to Spain, whence some return with the savings of their industry. In the middle of the lake is the little island of S. Giulio, with a very handsome church, a palace belonging to the bishop of Novara, and some other buildings and gardens. This island was once fortified, and is mentioned in the wars of the middle ages.

The actual province of Novara is only a part of the former territorial division, called Il Novarese, which comprised the whole country between the Sesia, the Ticino, Lago Maggiore, and the Alps, including numerous alpine valleys. It was frequently a subject of contention in the Italian wars. It formerly belonged to the duchy of Milan; it was given up by Austria to the king of Sardinia by the peace of Vienna in 1735; was reunited by Bonaparte to the Milanese, and formed part of the kingdom of Italy; and was restored to the king of Sardinia in 1815. The upper part of this interesting region is known by the name of Valli di Novara.

NOVA'RA, VALLI DI, or ALTO NOVARE'SE, a geographical denomination which designates a large tract of country consisting of numerous valleys in the Lepontian Alps, which are formed by mountains extending from the sources of the Anza at the eastern foot of Mount Rosa to those of the Tosa or Toccia at the foot of Mount Gries, which belongs to the group of the St. Gothard. All the waters from these valleys flow into the Lago Maggiore. A considerable alpine stream, the Toccia or Tosa, flows through a long tortuous valley from north to south, about 45 miles in length to its æstuary in the lake. The upper part of the valley of the Tosa is called Val Formazza, and is from 3000 to 4000 feet above the level of the sea. Lower down, the valley takes the name of Valle Antigorio, which extends as far south as the bridge of Crevola, at the opening of the transverse valley Di Vedro, through which the great Simplon road passes. South of Crevola the main valley assumes the name of Val d'Ossola or Oscella, which it retains as far as its opening upon the Lago Maggiore. Several lateral valleys, descending from the high Alps, open into the valley of the Tosa from the west, called respectively Val di Vedro, Val Bugnanco, Val Antrona, and others from the east, such as the Val Vigezza, which extends upwards to the ridge which divides the Sardinian territory from the Swiss canton of Ticino. A road leads from Domo d'Ossola to Locarno by the Val Vigezza; the highest pass of it, near Centovalli, is 3000 feet above the sea.

The whole of this alpine district, including the main valley of the Tosa, and the various lateral valleys which open into it, is now constituted into one administrative province of the Sardinian states, called Ossola, from the name of the chief town, Domo d'Ossola, which is well built and cheerfully situated in a broad part of the valley: it has about 1500 inhabitants. The traveller who comes from Switzerland by the Simplon finds at Domo d'Ossola the first appearance of an Italian country, Italian manners, and Italian sky. The province of Ossola contains 33,000 inhabitants, distributed among 64 communes. (Serristori.)

South of the province of Ossola is the province of Pallanza, which also forms part of the Valli di Novara, and consists of a fine strip of land along the western coast of the Lago Maggiore and of several valleys extending on both sides of the lower Tosa. The longest valley is that of the Anza, a mountain-stream which descends from Mount Rosa, and after an eastern course of nearly 30 miles enters the Tosa near Vogogna. The upper part of this valley, which is in some parts more than 4000 feet above the sea, is called Val Macugnaga; several mountain-passes, practicable only in summer, lead from it into the Valais. The inhabitants of Val Macugnaga speak a dialect of the Swiss German, and they seem to be of a race akin to that of the Valais. Their houses are built of wood, and their country is rugged and poor. The lower or eastern part of the valley of the Anza, down to its confluence with the Tosa, is called Val Anzasca, and has quite a different appearance. The vine is cultivated here, and the hamlets are built after the Italian fashion. The women of the Val Anzasca are noted for their comeliness, and their refined appearance and manners, which are superior to those of their neighbours. Their dress is gay and fanciful, and recalls to mind that of the women of the Greek islands. The Val Stroma, south of the Val Anzasca, opens to the northern coast of the lake of Orta.

The principal towns of the province of Pallanza are—1, Pallanza, on the banks of the lake Maggiore, opposite the Borromean Islands, which has the Tribunale di Prefettura, or provincial court, a royal college, and about 2000 inhabitants. 2, Intra, north of Pallanza, which has 3300 inhabitants, and carries on some trade by boats on the lake. 3. Arona, with 2000 inhabitants. [ARONA.] The population of the province is 64,800, distributed among 98 communes.

NOVATIANS, a Christian sect which arose in the middle of the third century. Their leader Novatianus (or as Lardner prefers to call him, following the Greek writers, Novatus), was a presbyter at Rome, who, after the death of Fabian, bishop of Rome (A.D. 250), and the election of Cornelius as his successor (A.D. 251), refused to submit to the authority of Cornelius, and procured from three bishops his own ordination as bishop of Rome. Upon this Cornelius called a council at Rome, and excommunicated Novatian and his adherents, who immediately formed a distinct sect, and thus became schismatics. But Novatian is also reckoned as a heretic, on account of his opinions respecting those Christians who after baptism had fallen into open sin, whom he declared that the church had not the power to admit again to her communion, even though they should give satisfactory evidence of their repentance. In consequence of this strictness of discipline his followers obtained from the Greek writers the name of Càthari (καθαροὶ), that is, Puritans. In other points the opinions of Novatian did not differ from those of the Catholics. Some writers charge him with unsound opinions respecting the Trinity, but there is ample evidence to disprove this accusation. His later followers condemned second marriages. Novatian is highly spoken of by the ecclesiastical writers for his learning, eloquence, piety, and exemplary conduct. It is true that Cornelius accuses him of very disreputable conduct in the means by which he obtained ordination, and in other matters; but these are the statements of a violent opponent, couched in very unmeasured language, and some of them are highly improbable.

Novatian was assisted in his proceedings by Novatus, a presbyter of Carthage, whom Cyprian calls the author of the schism; and he numbered also among his followers some bishops and several presbyters. His sect spread widely, and embraced at various times some men of very high character and attainments. The Novatians were included in the severe edict which Constantine issued, about A.D. 331, against the Valentinians, Marcionites, Cataphrygians, and other heretics; but it is thought that through the influence which some of their leaders had with the emperor, they suffered little on that occasion. Under the Arian emperors they shared in common with the orthodox in the persecutions which they endured; but under the Catholic emperors they appear to have enjoyed repose on account of their orthodox opinions on the Trinity. This sect declined in importance during the fifth century.

Novatian wrote several works, of which there remain a treatise, 'Of Jewish Meats;' another, 'Of the Trinity,' or 'Of the Rule of Faith;' a letter of the Roman clergy to Cyprian, written during the vacancy of the see of Rome, after the death of Fabian, in August, 250. There is another letter to Cyprian, written in the same year, but it is not certain that Novatian was its author. Jerome gives a catalogue of Novatian's works, among which are two, 'Of Easter,' and 'Of Circumcision.' The Novatians asserted that their leader suffered martyrdom, but of this we have no proof.

(Eusebius, *Hist. Ecc.*, vi. 43; Hieronymus, *De Vir. Illust.*, chap. 70; Epiphanius, *De Hæresiis*; Lardner's *Credibility*, pt. ii., chap. 47; Mosheim's *Ecclesiastical History*, Neander's *Kirchengeschichte*.)

NOVEL. It will be as well to draw a distinction at starting between romances and novels; the one term includes all fictitious narratives of the kind called romantic, whether in prose or verse; the other is used to designate that species of romance which is most common at present.

Those who are accustomed to look upon all literary composition as depending for its changes on that prevalent tone and character of society, which are usually known by the name of the spirit of the age, will easily allow that imaginative writings are not excepted from the general rule; that they are in fact the expression of the age in which they appear. It remains then for us to find out, if possible, what relation they bear to that prevalent tone of society to which we have already alluded, as the spirit of the age.*

A comparison between the novel and other imaginative compositions, such as narrative, lyrical, or dramatic poetry, will show that while the latter depend for their effect on our tastes and sympathies as men, the former requires us to be interested in the circumstances of the plot as well as in the characters themselves. The interest excited by the 'Iliad,' and by 'Hamlet,' exists independently of our knowledge of the history of Troy or of Denmark; and hence the universal celebrity of those poems. They have been read and will be read with delight, not only by one age or country, but by all. They exhibit pictures of *humanity;* and, as such, do not depend for their popularity on the fact of their readers being interested by the customs which they describe or the scenes in which the stories are laid. It is as a man, not as a prince of Denmark, that we are interested in Hamlet. If Hector and Andromache had been natives of the South Sea Islands, we should have read the description of their parting with as much sympathy as we do now.

In novels, on the contrary, we require, in order to be fully satisfied, to be interested in the circumstances, the dress, manners, and language of the characters, as well as in the characters themselves. But these circumstances, the outward dress of the story, are precisely those parts in which the peculiarities of age and country are developed—those which render the hero of the novel an individual, not the representative of a class. If we acknowledge thus far, we shall see that the interest which the novel excites depends on more causes than that of the narrative or dramatic poem. But being a more intense, it is also a more confined interest; and thus we see why the ponderous romances of the seventeenth century have ceased to delight the world, while the 'Iliad' is as fresh to us as it was to Plato or Cicero.

This additional source of interest however is that which depends in itself on the peculiarities of the age in which any one novel or class of novels appears. Thus the stilted romance of Elizabeth's time was the legitimate offspring of a taste then very prevalent for an ideal state of pastoral life called Arcadian. The readers in that day were the higher ranks, the court, and the nobility, and the novel both led and followed their taste. In another country we find romances of chivalry particularly current when the age of chivalry was nearly passed, and when the realities of Moorish warfare had been succeeded by a fashionable enthusiasm unaccompanied by action. Such were the novels which Cervantes began by caricaturing and ended by surpassing.

Sir Walter Scott's novels are in like manner the legitimate creation of their age. Percy's 'Reliques' and some other books had given a retrospective turn to literature. Men began to find that Pope and Dryden, or even Milton, did not contain all that was worth knowing in the literature of England. A race of antiquaries sprang up, and with them an antiquarian novelist. Göthe's famous saying about Shakspere, which Carlyle has so cleverly applied to Scott,—'that Shakspere formed his characters from within outwards, Scott from without inwards,' is so true, that any one who bears it in mind while reading Scott will not fail to see that the attraction of the 'Waverley novels' depends more on the dresses and decorations than on the actors.

To quote one more instance; during the first half of the last century the great object of attention was 'the town,' by which was meant the profligate life spent by men of fashion. A glance at the poetry of that age is enough to show that Nature had small charms for the reading public, and that fashion was then everything. If we turn to the novelists, to Richardson, Fielding, and Smollett, and then to their descriptions, can anything be more obvious, than that the external dress of the novel—that by which it is distinguished from other narrative works of imagination,—depends entirely on the age in which it is written, and is in effect a tolerably faithful but somewhat exaggerated reflection of the favourite ideal objects and pursuits of the reading classes at the time.

But there is another salient feature in the novel, which it possesses in common with the poetical romance, and which distinguishes it most completely from all classical fictions. We refer to the important part played in almost all novels by that kind of love which goes by the name of romantic.

It cannot be doubted that the influence of Christianity and of the old German spirit upon the nations of modern Europe has contributed to alter the treatment and condition of women, not only in degree but in kind. To the eye of a Roman observer, one of the most remarkable peculiarities of the German nation was the veneration paid to women, and this veneration, transmitted through generations, affected in no unfavourable degree by Christian precepts, although changing in appearance with the change of ages, still exists in that gallantry of which the Romans and Greeks seem to have been wholly ignorant, and which in the romantic novel, as being a picture of human life, plays a most important part. But it is still to be remembered that it is not the passion of love as a classical author would have described it, but the passion as developed in those nations among whom romantic tales have been principally current, which thus predominates in the romantic novel.

The 'Bride of Lammermoor' is perhaps the most perfect instance of a love-tale which we possess, but that touching and exquisitely pathetic story would have been in many of its most striking features unintelligible to men who did not begin by assuming, as we all instinctively do, the existence of a feeling, partly corporeal, partly mental, partly dependent on national custom, which goes with us by the name of love. The only parallel instances in the remains of classical literature are, as far as the writer knows, some scattered passages in the 'Odyssey,' and the characters of Haemon and Antigone as described by Sophocles. It is important to insist on this feature of the novel, because it at once gives a clue to the popularity of those numerous love-tales which in our times appear in such profusion, are read, and disappear, provided always that we connect this feature, which runs through them all, with the desire which all of us possess of giving to those dreams of domestic happiness—which are the offspring of feelings which we inherit both by nature and by education—as much of reality as is possible.

The popularity of novels is one of the most curious features of our literature; and it is to be observed that it is attended with an almost entire discouragement of dramatic composition, and with a marked preference on the part of those who apparently patronise the drama, for scenic effect, in place of accurate dramatic delineation of character. There is scarcely one tragedy worth mention of a date posterior to the time of Fielding. 'Philip van Artevelde,' the offspring of our day, and, although far below it in merit, Talfourd's 'Ion,' are worth notice, as well for other reasons as because they have been accompanied by an effort, in act, to redeem the stage from serving as the mere vehicle of dramatised novels. But we cannot give to 'Philip van Artevelde' the name of a drama; indeed the author himself styles it a dramatic romance; and its length and the character of many of its incidents bring it rather under the romance than the drama. We have drawn a distinction between the romance and the novel, the former being the more comprehensive word; but we must still bear in mind that a prose novel stands in the same relation to a later age that a poetical romance does to an earlier, for poetry constitutes the only possible literature of an age of reciters; and it is not until men begin to read for themselves that prose comes into being.

There is another feature about the novels of the present day which deserves especial notice, and that is the manifold forms which they assume. We have them as naval tales, military records, love stories, political memoirs, the diaries of clergymen, lawyers, and physicians—suited in short to every class of readers. From this we see how much the demand influences the supply, even in that most incorporeal of all manufactures, book-making. That the appetite is fed by the supply is also true, but not to an extent sufficient to justify us in supposing that the one depends entirely upon the other. The manifold character of modern romantic literature as compared with that uniformity which distinguished the romances of the middle ages, when author after author exhausted his powers in adding to one bulky record of the fall of Troy, or the conquests of Alexander, is the last proof which we need bring to show that romances do really depend upon and go along with the prevailing tone of the age in which they appear.

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* Some ridicule has been cast on this expression, but apparently without much reason. The term is not used to express one simple notion, but as a means of indicating by a kind of verbal shorthand a number of notions which when expanded might fill volumes. Half the common theological forms in use are liable to the same objection (which is expressed by applying to them the name of 'cant'); but when all persons are to a certain extent agreed on what the words are to mean, it matters little what words we employ.

It is not the province of this work to enlarge on the probable or actual effects of any course of reading, but it may be as well to point out that the injury supposed to be done to the mind by novel reading is not peculiar to any one kind of study. A constant devotion to any abstract speculation notoriously deadens the taste; and too much cultivation of any one pursuit necessarily gives the corresponding part of the mind a growth disproportionate to that of the rest. The peculiar evil of novel-reading depends on the bad quality of the food devoured, which pampers our love for ideal griefs and joys, to the prejudice of all well organised efforts to grapple with the realities of life.[*]

NOVELLÆ. [JUSTINIAN'S LEGISLATION.]

NOVEMBER, the eleventh month of the Julian year, was the ninth in the year of Romulus, whence it received its name. This name was assigned to it in the Alban calendar. It originally consisted of thirty days, which were continued by Romulus and Numa. Julius Cæsar gave it another day, but Augustus reduced it again to thirty, and this number it has ever since retained.

Our Saxon ancestors called November *Blot-monath* (blood-month), the month of sacrifice, because at this season the heathen Saxons made a provision for winter, and offered in sacrifice many of the animals which were then killed. This is distinctly stated in an antient account of the Saxon months, printed in Hickes's *Thesaurus* (vol. i., p. 219). It was common at this season to slaughter oxen, sheep, hogs, &c., for the use of the ensuing winter. The stock of salted meat prepared at this time was to last through the winter months till vegetation came again sufficiently forward to enable them to resume the use of fresh provisions. Some notion of the vast extent to which the opulent provided for themselves and their retainers at this season may be formed from the contents of the larder of the elder Spenser, in 1327, which, in the month of May, contained 'the carcases of eighty salted beeves, five hundred bacons, and six hundred muttons,' the reliques of his winter provisions.

Martlemass or Martinmas beef, cured about the festival of St. Martin, the 11th of this month, was a provision formerly well and in some places still known. The Spanish proverb, 'His Martinmas is coming, when we shall be all hogs alike,' alludes to the slaughter of swine at this period.

(Pitisci, *Lexicon Antiq. Roman.*; Bosworth's *Anglo-Saxon Dict.*; Brady's *Clavis Calendaria*, 8vo., Lond., 1812, vol. i., p. 85-91.)

NOVI, The Province of, an administrative division of the Sardinian territories, which formerly belonged to the republic of Genoa, is situated on the north side of the Ligurian Apennines. The Lemmo and other mountain torrents which flow from the northern slope of the group of La Bocchetta cross the province of Novi from east to west, and flow into the Orba, which is an affluent of the Bormida. The Scrivia, a considerable stream, rises farther to the east, crosses the province of Novi in a northern direction, and then, passing by Tortona, enters the Po. The province of Novi lies chiefly among the Apennines, and is not very productive, except the most northern part, above the town of Novi, which opens into the plain of the Po, and is well cultivated, being planted with vines, mulberry, and other fruit-trees. The mountains supply pasture for cattle, and are partly covered with fine chesnut-trees. The population of of the province is 57,500, distributed among 36 communes. The principal towns are the following:—Novi, a cheerful, well-built town, is situated in a plain at the foot of the Apennines, on the high-road from Genoa to Turin and Milan: the continual transit of goods and travellers gives it an appearance of bustle. Novi has several churches, a college kept by the Fathers Somaschi, and some handsome palaces belonging to the Genoese patricians, who come here to spend part of the autumn: the population is about 10,000. The Genoese style of painting the fronts of the houses with various colours is in use at Novi. Voltaggio, at the foot of La Bocchetta, on the old road to Genoa, is a poor-looking place: it has a grammar-school and 2200 inhabitants. Serravalle, on the new and fine road by the banks of the Scrivia, had 2100 inhabitants in 1824; but the population has since increased, owing to the trade which now follows this line. Gavi is a small town with a strong castle, which commands the defile in the mountains through which the old road passed. Pozzuolo has 3000 inhabitants. Arquata has 2400 inhabitants. All these towns have communal or elementary schools.

It was in the neighbourhood of Novi that the French army, 40,000 strong, under Generals Joubert, Moreau, and St. Cyr, was attacked by the Austro-Russians under Suwarrow and Melas, on the 15th August, 1799, and completely defeated, after ten hours' continual fighting. It was one of the most obstinate and murderous battles of the wars of the French revolution. General Joubert was killed, and Generals Perignon and Grouchy were wounded and made prisoners. The French lost 10,000 men, killed, wounded, and prisoners. The Austro-Russians had about 12,000 men killed and wounded. Moreau withdrew the remains of the French army across the Apennines towards Genoa.

(Botta, *Storia d' Italia*, b. xvii.)

NOVICE, the appellation given to persons of either sex, who are living in a monastery in a state of probation previous to becoming professed members of a monastic order. Persons who apply to enter the noviciate state, on being admitted by the superior of the monastery, promise obedience to him during the time of their stay, and are bound to conform to the discipline of the house, but they make no permanent vows, and may leave, if they find that the monastic life does not suit them. The period of the noviciate must not be less than one year, and the person who enters as a novice must have attained the age of puberty. Richard, in the 'Bibliothèque Sacrée,' article 'Novice,' describes the qualities required according to the canons of the council of Trent for the admission of a novice: they are health, morality, voluntary disposition for a monastic life, intellectual capacity, &c. No married person can be admitted unless by the consent of both parties; no person who is encumbered with debts, or whose assistance is necessary for the support of his parents, is admissible. Widowers and widows may be admitted as novices, unless their labour is required for the support of their children. After the termination of the year of probation, the novice, if he (or she) persists in his vocation, and his conduct and capacity have proved satisfactory, may be admitted into the order by taking the solemn vows which are binding for life. Ducange, in his 'Glossarium,' article 'Novitius,' quotes the 34th canon of the council of Aquisgrana, A.D. 817, in which superiors of monasteries are cautioned against admitting novices with too great facility, and without a full examination of their disposition, morals, and mental and bodily qualifications. But in after-ages, as the number of monasteries was multiplied beyond measure, prudential restrictions were disregarded, and every means were resorted to in order to induce young people to enter the monastic profession, and parents often forced their children into it against their will. The misery and guilt which resulted from this practice are well known, but few perhaps have exhibited them in so vivid and fearful a light as a living Italian writer, Manzoni, in his 'Promessi Sposi,' in the episode of 'Gertrude.' It was in order to guard against such abuses and their fatal results, that the council of Trent, session 25, can. 17, prescribed that female novices, after the expiration of their novitiate, should leave the walls of the monastery and return to their friends, and be carefully examined by the bishop of the diocese, or by his vicar by him delegated, in order to ascertain that they were under no constraint or deception, that they were fully aware of the duties and privations of the monastic life, and that they voluntarily chose to enter it. These humane precautions however have been evaded in many instances; and it may be doubted whether a very young person should be allowed to bind himself for life by irrevocable vows.

NOVIKOV, NIKOLAI IVANOVITCH, born April 27th, 1744, at Tikhvensk, near Moscow, was, if not particularly eminent as a writer, one to whom Russian literature is greatly indebted, on account of what he did for the book-trade, and for printing, and for diffusing a taste for reading among his countrymen. Though his parents were wealthy, he did not receive the very best education, being brought up at home until the age of eighteen, when he entered the government service, and then first began to apply himself to study. Having thus conceived a passion for literary pursuits, he determined upon devoting himself to them exclusively, and accordingly he retired from the service. One of his first productions was his 'Zhivopisetz' (the Painter), a work somewhat on the plan of the 'Spectator,' and displaying considerable talent and satiric power in sketches of manners and characters; and which, although now become somewhat obsolete, still retains its popularity, and has been frequently reprinted; yet the later editions are not very correct. He shortly afterwards published his 'Opuit' (Specimen or Essay of a Lexicon of Russian Authors), which has preserved notices of many writers respecting whom little would otherwise now be known. These works procured him the notice of the empress Catherine, and he soon after settled at Moscow, where a wide field opened itself to him. With the consent of the government, he established in that capital a Typographical Society, having for its object the printing of useful books at a cheap rate, and diffusing them through the empire. He also set up the first circulating library; and did very much both to improve the character and increase the sale of journals and other periodicals. Neither was his attention confined to such improvements, for he helped to introduce many into the system of school-education. His activity and that of his associates was however looked upon with suspicion by many, and they were represented as favouring the principles of, if not themselves actually in league with, the philosophers and revolutionists of France. The consequence was that the society was broken up, and Novikov received a command to retire to a distant province. After the emperor Paul's accession he was permitted to return, but he from that time lived almost in retirement from the world, and devoted to mystic speculations, upon his estate at Tikhvensk, where he died, July 31 (Aug. 11), 1818.

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[*] For the distinction between a hearing and a reading age we are indebted to Mr. C. J. Vaughan's prize essay recited in Trinity College Chapel, Cambridge, December, 1837.

Novikov has been compared to Franklin, and he was certainly a very active and useful person. He is said to have possessed in a very extraordinary degree the art not only of gaining over others to his schemes, but of rendering them as eager and zealous in them as himself. Hence, notwithstanding the vast sums which his speculations required, they never were hindered by want of funds, for rich merchants and wealthy proprietors were always pressingly ready to advance whatever might be necessary. He himself was equally disinterested, his object being not to enrich himself, but that his schemes should succeed for the benefit of the public; at all events, it is certain that he died poor.

Among his own publications, in addition to those already mentioned, was a collection of historical documents and materials, entitled the 'Old Russian Library,' 1773-5, in ten volumes, and afterwards continued to twenty more.

NOVOGOROD, one of the eight governments of Great Russia, derives its name from its capital, which was formerly the residence of the most powerful of the Russian grand-dukes, whose dominions included also the present governments of Olonez, Pskow, Twer, and part of that of St. Petersburg. The government in its present limits extends from 57° 18′ to 61° 8′ N. lat., and from 30° 10′ to 39° 40′ E. long. It is bounded on the north-west by the government of Petersburg, on the north by that of Olonez, on the east by Wologda, on the south-west by Jaroslaw and Twer, and on the south-west by Pskow. The area, according to Schubert, is 54,100 square miles, or about 4000 square miles less than that of England and Wales. It is divided into ten circles, and the population in 1838 was 950,000.

Face of the Country; Soil; Climate.—Part of this government is traversed by the Waldai hills, which run through this government and Twer, and are probably in no part more than 300 feet high. The face of the country is diversified with hills, rivers, high banks, plains, valleys, marshes, and lakes. The northern part is low and swampy, and for the most part covered only with peat. In the southern part the soil is clayey or sandy, and in some places there is a black mould. There are fine pastures, and the agricultural produce amply repays the labour of the husbandman.

The Waldai chain, so called from the town of Waldai, extends on the south-east part of the government to the frontier of Twer, forming a line of detached hills about 100 miles long, which are close to each other, and almost all of them cultivated. In the narrow intervening valleys there is a pleasing mixture of wood and water scenery. The principal rivers are the Msta, which comes from Twer, and the Wolchow. The Msta has some falls at Borowitschi, but is navigable below them, and runs into Lake Ilmen. The Wolchow, which issues from Lake Ilmen, and flows into the Ladoga canal, is from 600 to 1200 feet in width, and has sufficient depth of water for barks during the whole summer These two rivers, which are connected by Lake Ilmen, complete the great water-communication between the Wolga and the Neva. The other chief rivers are, the Lovat, the Pola, and the Schelen, all of which fall into the Ilmen; the Schekona and the Wologa, which join the Wolga; and the Sias and the Buscha, which run into Lake Ladoga. The government contains 42 rivers, and 3 large and 55 smaller lakes. The Belosero, which is the largest, is above 26 miles in length and as many in breadth, and is connected by the Schekona with the Wolga. Lake Ilmen, which is 26 miles long and 16 wide, receives many large and small rivers, and is connected by the Wolchow with the Ladoga canal. Lake Wosch is 14 miles long and 8 wide. The Novogorod canal, which was completed in 1802, is a part of the great system of communication between the Neva and the Wolga. It is about 5 miles long, connects the Msta directly with the Wolga, and so avoids Lake Ilmen, the navigation of which is often dangerous on account of the frequent storms.

The climate is cold, and very much like that of the government of Petersburg, though the latter seems to be really rather milder than that of Novogorod, where the winter, in the northern circles at least, is colder, and begins a fortnight sooner and lasts a fortnight longer than in the southern circles. This low temperature has an injurious effect on the growth of many vegetables, and on the domestic animals, for whose subsistence it is difficult to provide during the long winter; but it does not affect the health of the inhabitants.

Natural Productions.—Agriculture is the chief occupation of the inhabitants, though the climate in the northern circles is unfavourable, and the frequent and early night frosts often destroy all prospect of a good harvest. The inhabitants too are rather slovenly in their operations, and have no regular system of cultivation. They however produce more than they require for their own consumption. The chief agricultural products are rye, barley, oats, some buckwheat, and great quantities of peas. Flax and hemp are cultivated, not only for home consumption, but for exportation. Turnips, cabbages, potatoes, onions, radishes, and leeks are cultivated, as well as cucumbers and pumpkins; and in the southern circles, apples and cherries are now and then grown. The country is covered with thick forests, but there are scarcely any oaks; the maple, the ash, and the willow are rare; the most common trees are pines, firs, birches, alders, elms, and much underwood. Timber is a great staple article of the government, but by no means turned to so good account as it might be; and many of the forests are inaccessible in summer on account of the swamps. The crown forests alone cover a fifth part of the whole surface. All the forests abound in berries of various kinds; they likewise contain game and beasts of prey, such as deer, elks, bears, wolves, lynxes, badgers, martens, hares, and squirrels. Owing to the length of the winter, the breeding of cattle is limited to what is necessary for the purposes of agriculture. The horses, oxen, and sheep are of the common Russian breeds; few swine and goats are kept. The fisheries on the lakes and rivers are extremely productive, and furnish an abundant supply both for home consumption and for exportation to Petersburg, Moscow, Twer, Pskow, and Jaroslaw: several of the small rivers produce pearls. The mineral products are iron, freestone, coals, slate, salt, clay, lime, and marl. The principal salt-springs are at Staraja-Russia, where from one to four millions of pounds of salt are annually made, which supply the provinces of Novogorod and Twer.

Manufactures and Trade.—There are no manufactories of any importance. In the towns there are some domestic manufactures, and in the country the people make coarse linen, soap, tallow candles, and great quantities of potash. They have likewise small furnaces in which they smelt the bog-iron found in the government, and manufacture it into small articles of iron-ware. There are some trifling distilleries. The export trade of the province is confined to its own productions, corn, hemp, flax, salt, some iron, a great quantity of timber, some furs, hides, leather, and forage, most of which goes to Petersburg. The principal place of trade is Novogorod, the capital, the commerce of which however is not very great. Most of the goods are exported by the inhabitants themselves, who visit the commercial towns and fairs to the distance of 60 or 70 miles, in caravans of 50 or 100 carts, or in sledges drawn by one horse. Great numbers of geese are sent from this government to Petersburg.

The great majority of the inhabitants are Russians, with a few families of Finns, and in the towns some Germans. The predominant religion is the Greek, under the archbishop of Novogorod, one of the highest prelates in the empire, whose diocese includes also the government of Olonez. He generally resides in Petersburg, where he is metropolitan. Among the Finns there are many Lutherans and some Lutheran churches.

NOVOGOROD (or *Novgorod*, or *Novgorod Welike*, that is, the Great New City), the capital of the above government, is situated in 58° 32′ N. lat. and in 31° 20′ E. long., 120 miles south-south-east of St. Petersburg, in a fine country on the banks of the Wolchow, where it flows out of Lake Ilmen, and on the Novogorod Canal. The city consists of three parts: the fortress, standing on a steep hill on the north side of the river, surrounded with thick walls and towers; and on the south of the river the commercial town and the Sophienstadt (St. Sophia's Town), which are connected with the fortress by a handsome stone bridge. This city is one of the most antient in the Russian empire, having been founded, according to Nestor, the historian, in the fifth century, about the same time as Kiew. In the ninth century it had its own prince, and Ruric made it the seat of government, but the court was soon afterwards removed to Kiew. Jaroslaw, his successor, gave the city considerable immunities in 1036. The governors however made themselves independent of the Russian grand-dukes. The citizens, having gradually acquired more extensive privileges, established a republic in the twelfth century, under a chief magistrate, whose office was hereditary, but whose power was limited. This new republic became very flourishing, and its territory is said to have extended to Livonia on the west and to Siberia on the east. In the thirteenth century the Hanseatic League established a factory here, which continued 200 years. Being most advantageously situated for trade, the town became extremely flourishing, and is said to have had in the fifteenth century 400,000 inhabitants, which gave rise to the saying, 'Who can resist God and the Great Novogorod?' The grand-dukes of Russia becoming jealous of its prosperity, Ivan Wassiliewitsch I. completely reduced it under his power in 1477. It was governed with great severity, and a conspiracy against him having been formed in 1570, Ivan Wassiliewitsch II. went thither in person, and caused many of the richest inhabitants to be executed. The government continued to treat the city with great rigour till the final blow was given to its prosperity by the foundation of St. Petersburg, which diverted the commerce of the Baltic into a new channel. Novogorod is now educed to comparative insignificance. It consists principally of scattered groups of mean houses, separated by ruins or by fields formerly built upon, and its population does not exceed 10,000. Yet, when viewed from a distance, it has a very striking appearance, owing to its fine situation and the gilded domes of its sixty-three churches, which remain as monuments of its antient splendour. The principal church is the cathedral, dedicated to St. Sophia, which stands in the fortress, and contains, among many other curiosities, the coffin of St. Ivan of Novogorod, to which numerous pilgrims resort, and the celebrated bronze doors, 11½ feet high and 3 feet wide, adorned with numerous igures and inscriptions, which are said to have been brought, n 988, by Wladimir the Great from Kherson, but which probably came from Germany. The other buildings are, three monasteries, of which that of St. Sergius is the principal, a fine bazaar, a new palace, a poor-house, and an orphan-chool. There are several elementary schools and a Bible Society, a considerable sail-cloth manufactory, tanneries, and soap and candle manufactories.

Other towns in the government of Novogorod are—Sta-aja-Russa, on the Polista, with 5600 inhabitants, and coniderable salt-works; Waldai, on the Waldai lake, with 200 inhabitants; Tichwin, on the Tichwinke, with 4100 inhabitants; Kirdow, with 2500 inhabitants, remarkable for the new canal opened in 1827, which joins the Scheksna with the Suchona; Belosersk, on the Scheksna; Somina, on the river of the same name, with 5000 inhabitants: before the end of the fair at Nischnei-Novogorod this is a place of great animation, fifteen or twenty thousand persons being often assembled here; and Ustjushna, or Schelesopolskaja, in a country abounding in iron; the inhabitants, 2500 in number, have considerable trade in iron and timber. All the above towns are capitals of circles of the same name (Schubert; Hassel; Cannabich; Krusenstern.)

NOWANUGGER. [HINDUSTAN, p. 213.]

NOYON. [OISE.]

NUBIA, a general and rather vague denomination which is often used to designate a vast extent of country stretching along the banks of the Nile from the southern borders of Egypt to the frontiers of Abyssinia and Sennaar. The natives however apply the name of Nouba, or Wady el Nouba, to a comparatively small tract lying between Derr and the borders of Dongola; whilst in Egypt, the natives of the countries above the cataract of Assouan, as far as Dongola, are called by the general name of Berabera, and the name of Nouba is given to the black slaves brought from Sennaar and the countries south of it. (Burckhardt.) The antient general name for the regions south of Egypt was Ethiopia above Egypt, of which the kingdom of Meroe formed an important part, and among the various people therein mentioned by the antient geographers are the Nubæ, or Nubæi Ethiopes, who are placed south of the island of Meroe, whilst the Blemmyes were nearer to the borders of Egypt, west of the Nile, and the Troglodytes lived to the eastward, near the shores of the Red Sea. The extent of information possessed by the antients concerning those regions, and especially concerning the kingdom of Meroe, is stated under ETHIOPIA.

The Nubæ, or Nubatæ, are mentioned as a nation bordering on Egypt in the time of Diocletian, who gave up to them a strip of land seven days' march in length, above the first cataract, on condition of their preventing the Ethiopians and Blemmyes from attacking Egypt. In subsequent centuries however a kingdom of the Noubas was formed, which is mentioned by the Arabian geographers as a powerful Christian country at the time of the invasion of Egypt by the Moslems. Dongola was the residence of the king of the Noubas. The country appears to have continued to profess Christianity, and to have retained its independence till the thirteenth century of our æra. Makrizi, an Arabian writer of the fourteenth century, quoting from his predecessor Ibn Selim el Assouany, who had visited the country, gives a good description of the kingdom of Nubia. He says that 'the Noubas and the Mokras were two different races, speaking two different languages, and both living on the Nile. The Noubas are the Merys, who border on the Moslemin country, and speak the Merysy language; that the ancestors of both the Noubas and Mokras were natives of Yemen, and that before the Christian creed, the two nations were Sabæans, adoring the stars, to which they had erected idols, and that they were often at war with each other, but afterwards they all became Christians, and the city of Dongola was the seat of their government.' (Extracts from Makrizi, in Appendix to Burckhardt's *Nubia*.) It is remarked by Burckhardt, that even now two different languages, both distinct from the Arabic, are spoken in Lower Nubia, namely, the Nouba and the Kenous, and that the name of Mokra still remains in the appellation of Wady Mokrat, which is three days' journey below Berber.

Soon after the invasion of Egypt by the generals of the caliph Omar, a Saracen army advanced to Dongola, and obliged Koleydozo, the king of the Noubas, to agree to pay an annual bakt, or tribute, of 360 head of slaves. This agreement was maintained with little interruption for more than five centuries, when, the Noubas having attacked and destroyed Assouan, Salah-ed-deen, the famous sultan of Egypt, sent an army against them and defeated them. In the following century Dhaher Baybar, the Mameluke sultan of Egypt, sent an army into the Nouba country, which took Dongola, ruined most of the churches, taking away the golden crosses and silver vessels, and carried away a vast number of captives. Daoud, or David, the king of the Noubas, who had provoked the war, fled, and his nephew Shekendy was made king in his stead by the Egyptian force. Shekendy agreed to pay an annual tribute of three elephants, three giraffes, one hundred camels, four hundred choice cows, and four hundred slaves. Besides this, the territory of the cataracts (probably that between the first and second cataracts), about one-fourth part of Nouba, was to belong to the sultan, and the people were to pay a capitation tax as long as they remained Christians. This convention however was not long respected, for Shekendy being driven away from the throne by a usurper named Samamoun, Sultan Seyfeddyn, Baybar's successor, sent a large force into the Nouba country, which defeated Samamoun near Dongola, and overran the country beyond that town for fifteen days' journey. The kingdom of Nouba was then given to a cousin of Samamoun, and the army returned to Egypt, carrying with them great numbers of Nouba captives, men and women, whom they sold at Cairo. Soon after the departure of the army, Samamoun recovered his kingdom, and the rival king took refuge in Egypt. The sultan of Egypt then sent an army of 40,000 men to recover the Nouba country, accompanied by 500 vessels of all sorts to ascend the Nile. The soldiers plundered and destroyed everything on their way until they reached Dongola, which they found deserted by the inhabitants. Samamoun escaped up the river, and being pursued by the Egyptians fifteen days' journey above Dongola, he fled to Aboab, in the territory of the king of Aloa, another Christian state, said to be more powerful than that of Nouba. His officers, bishops, and priests abandoned him, and obtained a safe conduct from the commander of the Moslems. The army then returned to Dongola, where a great feast was made and a banquet spread in the church of Ysous (Jesus), the principal church in Dongola. A nephew of old King Daoud was then crowned, and a body of troops left for his defence. The payment of the bakt, or tribute, was resumed, and after an absence of six months the army returned to Assouan, with great booty. No sooner had they left Nouba, than Samamoun returned in disguise to Dongola, and knocked at the door of all his officers, who, when they came out and saw him, kissed the ground in sign of allegiance. On the next morning he assembled the army and proceeded to the mansion of the new king, sent the Moslem guard back to Egypt, and seizing his rival, dressed him in an ox-skin and tied him to a post, where he was left till he died. Samamoun then wrote to the sultan of Egypt, asking his pardon, and promising to forward the bakt regularly, and in the meantime sent slaves and other presents, which were accepted. (Extract from Makrizi's 'History of the Sultans of Egypt,' in the Appendix of Burkhardt's *Nubia.*)

These events happened in the early part of the fourteenth century. After that time little is known of the history of Nubia, but it seems that the power of the kings of Dongola being broken, the country became divided into various petty states, while fresh immigrations of Bedouin Arabs took place, and Christianity became gradually extinct in all the countries between Egypt and Abyssinia. The remains of numerous Christian chapels are still seen along the banks of the Nile. The Mamelukes, and after them the Ottomans, retained possession of Lower Nubia as far as the second cataract, keeping garrisons at Ibrim, the island of Say, and Suakim. The old kingdom of Nubia ceased to exist, and instead of it rose various petty Mohammedan states, such as Sukkot, Mahass, Dongola, Berber, and others, each governed by a Melek, or chief. The name of Nouba however has remained to the tract of country north of Dongola as far as Seboua, from which place the remaining tract down to Assouan is occupied by the tribe of Kenous. Both the Noubas and Kenous derive their origin from Arabian Bedouins, who immigrated at various times and mixed with the aboriginal Christian inhabitants, who embraced their faith, while the conquerors adopted the language of the country, and to this day the Kenous and Nubian languages are spoken in all Lower Nubia, to the exclusion of Arabic, which appears again as the oral language in Dongola, from whence it continues all the way up to Sennaar. Burckhardt gives short vocabularies of the Nouba and Kensi or Kenous languages, between which there appears to be some etymological affinity.

The Noubas and Kenous are black or nearly so, but have not the negro features nor woolly hair. Many of them have the peculiar style of countenance which is often seen in the sculptures of the Egyptian temples.

The appearance of part of the country of Lower Nubia is described under **Batn el Hajar**. The districts of Sukkot and Dar el Mahass, which lie farther south, are more favoured by nature. The inhabitants of Mahass speak the Nouba language, but appear to be a distinct race from the Noubas; their countenances are much less expressive of good nature; in colour they are quite black; their lips are like those of the negro, but not the nose or cheek bones; they pretend to be descendants of the Koreysh Arabs.

The conquests of Mehemet Ali, pasha of Egypt, have of late years opened to the researches of travellers the countries of the Upper Nile, which had for ages been inaccessible to Europeans. In October, 1820, a force of about 4000 men, with ten field-pieces, assembled at Wady Halfa on the second cataract, under the command of Ismael Pasha, son of Mehemet Ali. They were accompanied by boats of various sizes for the purpose of ascending the river. They proceeded to Dongola without opposition. [**Dongola.**] The remnants of the Mamelukes, who had retired there some years before, fled to Shendy. But the country lying next above Dongola, along the great bend of the Nile, was occupied by the Sheygeia, a daring independent tribe of Arabs, possessed of an excellent breed of horses, and who lived a predatory life, and had become the terror of all the countries between the second cataract and Sennaar. They always fought on horseback, with lance, broad-sword, and shield. They had built strong castles on the hills, where they secured themselves and their booty, and obliged the native peasantry to work the fields for them, to raise food and forage to fill their stores. In short the Sheygeia exercised in the regions of the Upper Nile the same power as the Mamelukes formerly did in Egypt. The country of the Sheygeia is populous and one of the best cultivated in Upper Nubia, being irrigated by means of numerous water-wheels. The Sheygeia speak Arabic exclusively, and many of them read and write it. They have schools, and their learned men enjoy great consideration. Like other genuine Arab tribes, they strictly respect the duties of hospitality. These were the first enemies whom Ismael Pasha was to encounter on his march. They had already fought against the Mamelukes of Dongola with success. Hearing of Ismael's advance, they sent messengers to ask 'why he menaced them with war.' The pasha replied: 'Because you are robbers who live by disturbing and pillaging all the countries around your own;' to which they retorted, 'that they had no other means of living.' 'Why don't you cultivate your land,' said then Ismael, 'and live honestly?' They answered, with great frankness: 'We have been bred up to live and prosper by what you call robbery; we will not work, nor change our manner of living.' 'I will make you change it,' said the pasha. (*Narrative of an Expedition to Dongola and Sennaar*, by an American.)

In the first encounter the Sheygeia charged the advanced-guard of the pasha with great courage, but they could not withstand the regular fire of the carabines of the Osmanlees, and they dispersed themselves. They soon however made another stand in greater numbers, but the pasha having ordered up his guns, they were again defeated with great slaughter, and most of them fled across the desert to Shendy, leaving the country formerly subject to them in the hands of the conqueror. Contrary to former Turkish practice, Ismael protected their women and children from ill usage. Their chiefs afterwards demanded and obtained pardon, and some of them followed the pasha to Sennaar, and proved most useful auxiliaries. The conquests of the Sheygeia country disclosed for the first time to the eyes of strangers the temples and pyramids of Mount Barkal and Napata, the finest monuments of Upper Nubia. [**Barkal.**] From thence Ismael proceeded to Berber, which country made its submission, and there the army rested for two months. A description of the country of Berber, one of the finest on the Upper Nile, is given under **Barabra**. At Berber the pasha received the submission of some of the Mameluke beys, who had fled to Shendy, and he gave them assurance of living in peace in Egypt for the rest of their lives. He also received the forced submission of Nimir, malek of Shendy, who came in person to kiss the hand of the conqueror. The army continued its march southwards, and after eight days' march from Berber, following the west bank of the Nile, arrived at Shendy on the 9th of May, 1821.

Shendy is the principal place in the country of Atbara, the antient island of Meroe, so called because it is in a manner enclosed between the Nile on the west, the Atbara or Tacazze on the north and east, and the Dandar, Rahat, and other streams coming from the mountains of Abyssinia on the south. The interior of this vast country is little known; it is nominally divided between the states of Shendy and Halfay, which is to the south of the former, the two maleks or chiefs of which are said to be able to bring into the field thirty thousand well mounted horsemen. 'Our route from Berber,' says the American writer already quoted, who accompanied Ismael, 'led through a country consisting of immense plains of fertile soil, extending many miles from the river, and mostly covered with herbage; few mountains or hills were visible. We passed many large villages built at a distance from the river to be out of the reach of the inundation. The houses were generally built with sloping roofs of thatched straw, as the country is here subject to periodical rains.' Cailliaud, who accompanied the same expedition, observes that the periodical rains extend to the northward to between 17° and 17° 30′ N. lat.; and it is remarkable that Strabo says that Meroe, the present Shendy, which is about 17° N. lat., was the limits of the rains. The rains extend to Berber, where they last three months, beginning about March. North of that, between Berber and Assouan, there is no fixed rainy season, but heavy showers fall now and then in all seasons. The bed of the Nile in Shendy is frequently about a mile and a half broad, though the actual stream is much narrower and shallow in the dry season. The country produces dourra, some wheat, vegetables, chick peas, and other pulse. The cattle are remarkably fine. The strip of cultivable soil near Shendy is very narrow, but to the north and south of the town there are some fine arable plains. Water-wheels are common on those high banks which the inundations do not attain, but the Arab peasantry are too lazy to bestow the labour necessary to water the soil a second and third time, as is done in the elevated parts of Upper Egypt. Elephants are first seen at Abou Heraze, in the southern parts of Meroe, on the borders of Sennaar, and they have never been known to pass to the north of that district, which is bounded by a mountain-range six or eight hours in breadth, reaching close to the Nile. Burckhardt was told that tigers were frequently seen in the wadys east of Shendy, towards the banks of the Atbara, or Tacazze. In the mountains of Dender, a district towards the Atbara, six or eight days' journey south-east of the Shendy, the giraffe (zerafa, *i.e.* 'the elegant,' in Arabic) is found. Crocodiles are very numerous in the Nile about Shendy, and much dreaded; but the hippopotamus is rarely seen. (Burckhardt.)

The town of Shendy, the capital of the country, about half a mile from the east bank of the river, is large, and perhaps contains five or six thousand inhabitants; the streets are wide and airy; the houses are low, but well built of clay; there are regular market-places, where, besides meat, fowls, liquid butter, grain, and vegetables, spices from Jidda, gum Arabic, beads and other ornaments for the women are sold. Great numbers of slaves from Abyssinia, Sennaar, and Darfur are purchased at a moderate price; a handsome Abyssinian girl sells for 40 or 50 dollars.

There is another town on the opposite or western bank of the Nile, called Shendy el Gharb (Shendy on the west), which is also large and well built, and contains about six thousand inhabitants. It has three market-places, where the people of the country exchange dourra and dollars for other provisions and goods. The people of Shendy have a bad character; they are said to be fraudulent, debauched, and treacherous.

Many Arab tribes inhabit the territory of Shendy, the great part of whom still lead the Bedouin life. The merchants of the town, and especially the brokers, are mostly foreign settlers from Dongola, Sennaar, Darfur, and Kordofan. A succession of Arab meleks, or kings, of whom Cailliaud gives the series, had ruled Shendy for nearly two centuries and a half. The habits of the people are nearly the same as at Berber, but there is more wealth, in consequence of the great trade, and more well-dressed persons are seen than in the latter country.

Not far from eastern Shendy, to the northwards near a village called Assour, or Hatchour, are a number of tarabyls, or pyramids, the largest of which is about sixty feet high. Small sanctuaries with sculptures are attached to them, as to those near Mount Barkal. There are also extensive fragments of walls, columns, square pillars, and the remains of a small temple sixty feet in length, near the borders of the desert, and those of a larger one, with its propylæum. At another place called Naga, a little above Shendy, on the river side, are the remains of a Typhonium and other ruins; and farther south, at some distance from the Nile, are the remains of other temples, and of an avenue of sphinxes, and several sculptures executed in a rude and heavy style.

About twelve miles nearly due north of Naga, in a valley bordering on the desert, are the ruins of El Meçaourat, which consist of several temples of small dimensions, connected by galleries and terraces, with a number of small chambers, the whole surrounded by a double enclosure. It has been supposed that this retired spot may have been the Hieropolis, or sacred college, of the priests of Meroe, and that the city itself was near Assour. (Cailliaud, *Voyage a Meroe.*)

Halfay, which lies south of Shendy, and between it and Sennaar, is a less important state. Its melek submitted to Ismael Pasha like the others. The head town, of the same name, lies above the confluence of the White and Blue rivers, and on the east bank of the latter, in about 15° 40′ N. lat. Halfay was formerly subject to the king of Sennaar, from which it is separated by the Blue River, which is the utmost limits that can be assigned to the geographical denomination of 'Nubia.' The country beyond it is described under SENNAAR.

The monuments of Lower Nubia have been described by Gau, Burckhardt, Belzoni, and others. The most remarkable are the temples of Abousambul [ABOUSAMBUL], Dandour, and Soleb; though the last, lying above the second cataract, is considered by some writers as in Upper Nubia. A short account of these temples is given in the *British Museum*, 'Egyptian Antiquities,' published by the Society for the Diffusion of Useful Knowledge, vol. i., chaps. 7 and 8. The monuments of Upper Nubia and of Meroe have been described by Waddington, Cailliaud, and Rüppel.

The whole country, up to Sennaar and Kordofan, is now open to the investigation of European travellers, being under obedience to the Pasha of Egypt. It may be not amiss to state that the young and enterprising Ismael, who achieved the subjugation of these vast and almost unknown regions, and who carried his arms beyond Sennaar as far as 10° N. lat., met with a tragical death from treachery on his return towards Egypt in the summer of 1823. Passing through Shendy, he had the imprudence to retire with a few attendants to some distance from his camp, to enjoy, it is said, a nocturnal banquet. Malek Nimir, who was watching for an opportunity of revenge, set fire to the hut where the pasha feasted or reposed, and to the shrubs and dourra which surrounded it, and the young conqueror perished in the flames. His mutilated remains were found by the soldiers, and brought back to Cairo. His attendants were massacred by the natives, and the Greek physician to the army was first tortured by having all his teeth extracted. This man had rendered himself odious by several acts of cruelty, which Cailliaud mentions. Ismael was hardly four-and-twenty years old at the time of his death. Melek Nimir, with his accomplices, fled into Darfur.

NUCI'FRAGA. [NUTCRACKER.]

NUCLEOBRANCHIA'TA, M. de Blainville's name for his fifth order of his second section of his second subclass (*Paracephalophora Monoica*).

M. Rang, who has illustrated the anatomy of some of the families, makes the *Nucleobranchiata*, in his arrangement, the first order of Cuvier's class *Gasteropoda*, and comprises under it some of the *Heteropoda* of Lamarck and the family *Pterotrachées* of De Férussac.

The following character of the order is given by M. Rang:—

Animal furnished with a foot compressed into the form of a fin, with an acetabulum or sucker (ventouse) on its superior border. Branchiæ pectinated. Both sexes comprised in the same individual.*

Often a *shell*, which is spiral, has a very large aperture, and is vitreous and very fragile.

An *operculum* sometimes.

M. Rang observes that the Mollusks which he had already, in an anatomical memoir on the genus Atlanta, proposed to assemble under the name of *Nucleobranchiata*, borrowed from M. de Blainville, are all pelagic animals which are often met with on the surface of the sea in calm weather, swimming in an inverted position by the aid of their foot, which is compressed into a fin. They never creep, but they have the power of fixing themselves (to floating bodies only) by spreading upon them the sucker of their ventral fin, and at the same moment making a vacuum. The shells are very much sought after in collections on account of their extreme rarity.

Two families, according to M. Rang's arrangement, constitute the order *Nucleobranchiata*.

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* N.B. M. Verany, in his description of *Carinaria*, says, 'Sexes séparés comme dans les Firoles; les males ont leur organe sexuel placé antérieurement dans le côté gauche sous la nageoire dorsale, les femelles l'ont près de l'anus.'

1.

Firolidæ (*Pterotrachées*, Fér.; *Nectopoda*, Blainv.; *Urobranchia*, Latr.).

Animal elongated, straight, and horizontal; one or more fins; branchiæ forming, with the other viscera, a nucleus on the dorsal part.

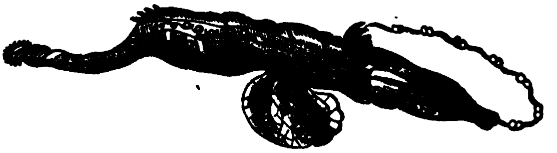
Shell sometimes present, and, when it is, incapable of containing more than a very small part of the animal.

Genera. Firola (*Pterotrachea*, Forsk.; *Firoloides* and *Sagitella*, Les.).

Generic Character.—Animal very much elongated, gelatinous and transparent, terminated behind by a tail more or less long and pointed; mouth situated at the extremity of a proboscis, and including an apparatus proper for mastication.? No tentacles, or only two tentacular rudiments carrying the eyes at their external base; one or more fins; nucleus exposed, protected only by a membrane, and always situated below and behind the ventral fin; termination of the intestinal canal and of the organs of generation in a tubercle on the right side.

No shell. (Rang.)

The author whose characters we have above given remarks that the *Firolæ* are very common animals in the seas of the warm and temperate zones, and are remarkable for their extreme transparency, which is often interrupted by golden spots. Lesueur, to whom we owe information regarding their anatomy, mentions several species, perhaps too indistinctly defined. He also divided the *Firolæ* into three genera, viz. the true *Firolæ*, the *Firoloïdes*, and the *Sagitellæ;* but the generic distinctions upon which they rest appearing to M. Rang to be insufficient even for the establishment of subgenera, the last-named zoologist does not adopt them, and he thinks that perhaps the genus *Hyptera* of M. Rafinesque ought to be included in the genus comprehending the *Firolæ*, observing however, at the same time, that details on this subject are wanting. The species indeed, he adds, are sometimes very difficult to be determined, in consequence of the mutilations to which they are subject; and it is for this reason that great circumspection should be employed in establishing new species.



Firola Frederici.

Carinaria. (See the article.)

M. Rang remarks that the mollusks which form this genus are beautiful animals, transparent as crystal, and adorned with vivid colours. They are only found on the surface of the sea in calm weather, and are most frequently mutilated in some part or other, especially in the nucleus, which makes their shells comparatively rare in collections. M. Rang states that there are four well characterised species, *Carinaria vitrea* (the most rare, and the animal belonging to which has not yet been made known), *C. fragilis*, *C. Mediterranea*, and *C. depressa;* this last, which is comparatively new, was discovered by M. Rang in the seas of Madagascar.

M. Rang's experience is, that he can offer as a constant character the presence of asperities on the mantle of these mollusks, because he has observed them upon four very distinct species (*Carinariæ Mediterranea* and *depressa*, and two other species which he has not been able to make known on account of their mutilation), whilst he never met with such asperities in the *Firolæ*, in which, instead of asperities, there are numerous spots. The difficulty, he remarks, of distinguishing mutilated *Firolæ* and *Carinariæ* at sea, obliges the observer to neglect no character which may lead to a more easy determination, and that is the reason why he calls attention to the position of the branchial comb as a probable character, which has always appeared to him to be placed before the nucleus in the *Carinariæ*, and behind it in the *Firolæ*. The position of the nucleus with reference to the ventral fin may also, in his opinion, afford a good generic character.

⁂ In the cut taken from M. Verany's figure of *Carinaria*, vol. vi., p. 294, the letter *e*, indicating the line which points out the tentaculum, has dropped out.

Atlanta. (Lesueur.)

The reader will find a short account of this form under the article headed by its name; but the description of M. Rang, who has published an anatomical memoir on this curious genus, will be a valuable addition.

Animal.—Body compressed laterally, spiral, with a large foliaceous fin, furnished with a sucker at its posterior border; head in the form of a long proboscis; two cylindrical tentacles in front of two large eyes, which are pediculated, as it were, at their base; mouth at the extremity of the proboscis; male organs of generation at the right side, implanted at the base of a very large tube, which terminates forward by the orifice of the anus; branchiæ in form of a comb, on the *plafond* of the pulmonary cavity.

Shell rolled up longitudinally, very delicate, diaphanous, strongly carinated, with the aperture notched or slit anteriorly, and with a sharp edge; spire terminated by a *bouton*, at the bottom of the umbilicus, on the right side.

Operculum vitreous, delicate, fragile, bearing the muscular impression in its centre.

Two species only are known, natives of all warm seas.

NU'CLEUS is a botanical term strictly signifying the central succulent part of an ovule, in which the embryo plant is generated. It has also been applied to the point, or circle, visible on the side of a cell of cellular tissue, from which the cell itself is supposed to have developed, and which has recently been named cytoblast.

NU'CLEUS (a small nut), a term first given to the central and condensed portion of a comet, and thence to the central part of any appearance which is transparent towards the extremities and opaque towards the centre.

NU'CULA. [POLYODONTA.]

NUDIBRANCHIA'TA, Cuvier's name for his second order of *Gasteropoda*, which he characterises as having no shell nor any pulmonary cavity, but naked branchiæ on some part of the back. They are all hermaphrodite and marine; often swim in an inverted position, with the foot at the surface concave, like a boat, aiding themselves with their mantle and tentacula as oars. M. Rang gives the following definition of the order, which he makes to consist of the following groups—*Tritonians* of Lamarck, *Polybranchiata* and *Cyclobranchiata* of De Blainville.

Animal furnished with a foot for creeping, and naked branchiæ on some part of the back, which are always symmetrical, whether they are found on the median line or occupy the sides of it; one or more pair of tentacles; both sexes in the same individual.

Shell null.

The last-named author also describes the order as consisting entirely of marine and hermaphroditic animals, some of them inhabiting the banks and creeping by means of their considerably sized foot, and others the deep sea, where they attach themselves to fuci by a narrow and elongated foot, or swim in the manner described by Cuvier.

We proceed to give some account of the families arranged under this order by M. Rang.

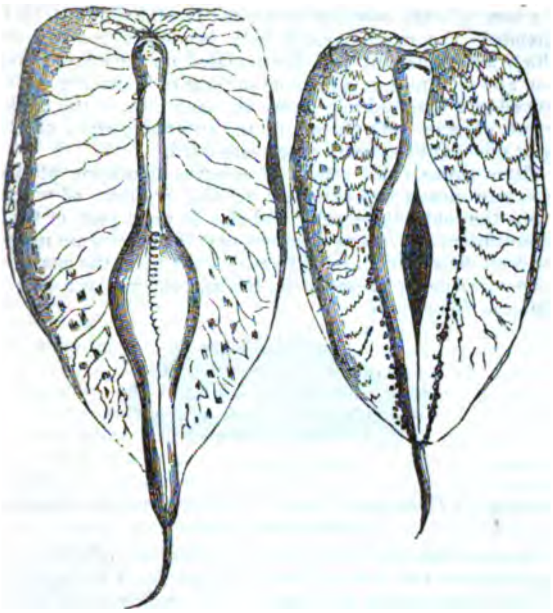
Pterosomatidæ.

M. Rang thus characterises his *Pterosomes:*—Animal very much flattened, furnished with a horizontal natatory membrane all round the body; no tentacles; branchiæ?

This family is established provisionally on a mollusk very incompletely known, on which M. Lesson founded his genus *Pterosoma*. M. Rang is of opinion that it seems intermediate between the *Nucleobranchiata* and the *Nudibranchiata*, and that it can hardly be referred to either of these orders.

Generic Character.—Animal pelagic, gelatinous, transparent, elongated, cylindrical, convex in the middle, surrounded by two natatory membranes, which are delicate, horizontal, originating at the tail, and continuing, in an oval form, beyond the head, where they unite in front of the mouth; anterior border thicker, and, as it were, truncated; posterior border narrowed and more delicate; mouth terminal, without a proboscis; eyes sessile, oblong, approximated; tail cylindrical and pointed; digestive organs appearing through the substance of the animal; branchiæ, anus, and organs of generation unknown.

This mollusk was discovered by M. Lesson in the equatorial seas, between the Moluccas and New Guinea, where it appeared abundant. It uses the membrane with which it is surrounded as a locomotive organ, and swims with great vivacity horizontally.



Pterosoma.

Glaucidæ. (*Tritoniens*, Lam.; Tétracères, Blainv.; Phyllobranches, Latr.)

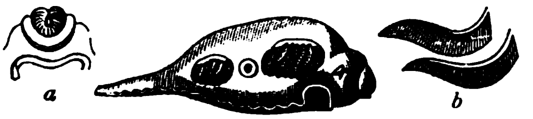
Animal furnished with two pair of tentacula, and sometimes three; branchiæ in form of strips or cirrhi.

Genera. Glaucus. (See the article.)

Laniogerus. (Blainv.)

Generic Character.—Animal with the body of nearly the same form as that of the *Glauci*, thick, and larger anteriorly, narrow and more délicate posteriorly, a gastropod, provided on each side with a series of soft laminæ finely pectinated, divided into two parts; mouth and tentacles as in *Glaucus*, as well as the termination of the digestive apparatus and that of generation.

M. Rang remarks that M. de Blainville established this genus on an individual in the British Museum, *Laniogerus Elfortii;* and the former remarks that the figure given by M. de Blainville recalls the appearance of those *Glauci* which M. Rang had preserved in spirit of wine, and which, having become more swollen, as always happens to them after death, have at the same time lost some of their branchial cirrhi.



Laniogerus Elfortii. (De Blainv.)
a, the mouth; *b*, the branchial cirrhi.

Briaræa. (Quoy and Gaim.)

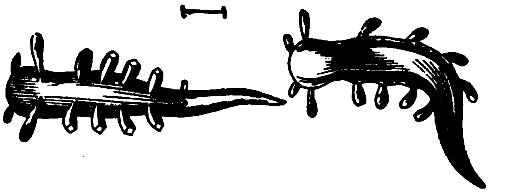
Generic Character.—Animal pelagic, gelatinous, transparent, scolopendriform, flattened, with two eyes? which are sessile, and four short tentacula, which are large and triangular, the posterior carrying at their extremity two sorts of very long filiform, elastic, and resisting antennæ; terminated behind by a tail; branchiæ disposed on each side and represented by flattened laminæ, bifurcated at their extremity, and decreasing in their length from the head to the tail, where they insensibly disappear; termination of the intestinal canal and of the organs of generation unknown.

M. Rang observes that the discovery of the genus *Briaræa* is certainly one of the most interesting of those of MM. Quoy and Gaimard. Though completely unknown, there is, he remarks, no doubt as to the place which this mollusk should occupy; for if its characters were insufficient for that conclusion, we should be led thereto by the circular form which it takes in its state of suffering, and which recals so well the genus *Glaucus* to those who have observed it alive. The only species known is *Briaræa Scolopendra*, found in the Straits of Gibraltar.

Eolidia. (Cuv.) (See the article.)

Tergipes. (Cuv., Blainv. *Æolis*, Ok.)

Generic Character.—Animal limaciform, gelatinous; head tolerably distinct and furnished with two pair of tentacula; foot entire, and occupying nearly its whole length; branchiæ in form of small clubs (massues), not numerous, disposed in two rows, one on each side of the back; termination of the intestinal canal and of the organs of generation as in the *Eolidiæ ?*



Tergipes lacinulatus.

M. Rang is of opinion that this genus is closely approximated to the *Eolidiæ*, with which, perhaps, it would be united if it was better known. Cuvier, indeed, observes M. Rang, states that each branchial organ of *Tergipes* is terminated by a small sucker, so as to serve them for a foot to creep on the back; but M. Rang thinks that this singular organization requires to be confirmed by observation on the living animal

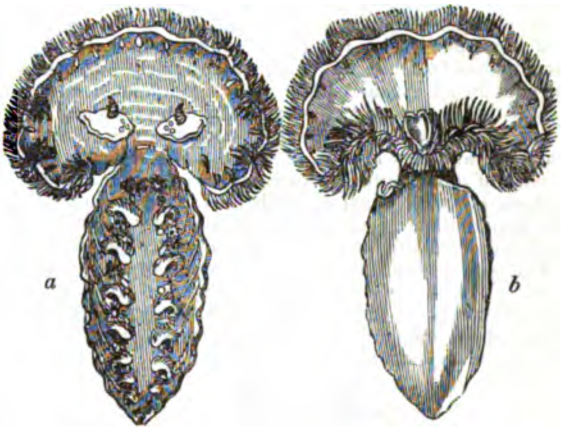
Tritonidæ. (*Tritomens*, Lam.; *Dicères*, Blainv.; *Séribranches*, Lat.)

Animal with two superior tentacles, which are capable of being retracted into a kind of sheath at their base; a membranous veil more or less extended above the mouth; organs of generation and anus distant, on the right side; organs of respiration of various forms, but disposed on two longitudinal rows

Tethys. (Linn.)

Generic Character.—Animal pelagic, gelatinous, and transparent; head distinct, and comprising a large membranous fringed veil, forming the funnel, shortened below, and from whose middle a small proboscis, terminated by the mouth, elevates itself: the tentacles, two in number, situated at the base of the veil, compressed, open at their summit to give passage to a small conical and retractile tube; foot very large; branchiæ formed by two longitudinal series of branched tufts, unequal alternately from right to left, and from front to rear; organs of generation united on the anterior portion of the right side; orifice of the anus placed more backwards.

Cuvier has thrown great light on this remarkable genus. The principal, and indeed, if we mistake not, the only recorded species, is a native of the Mediterranean, and lives far from the shore on banks of madrepore or on floating fuci, using its veil as a natatory organ.



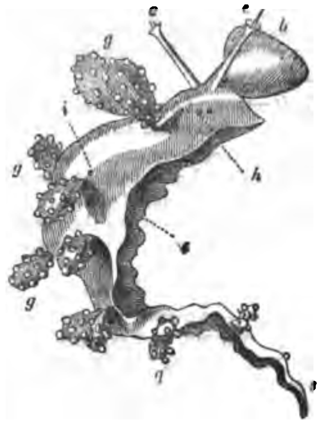
Tethys leporina.
a, seen from above; *b*, seen from below.

Melibe. (Rang.)

Animal pelagic, gelatinous, transparent, and limaciform; head distinct, and comprising a membranous veil rolled into the form of a funnel, furnished internally with cirrhi, directed to the exterior, and from the middle of which a small proboscis, terminated by the mouth, elevates itself; tentacles, to the number of two, situated at the base of the veil, very elongated, conical, and terminated by a small capsule, from which a conical and retractile organ has egress; foot as long as the animal, but very narrow, in form of a furrow; branchiæ not numerous, formed of two series of oblong club-shaped processes (massues), which are rounded at their summit, pediculated at their base, and covered with small tubercles; organs of generation united on the anterior portion of the right side; anus more backward. (Rang.)

M. Rang is of opinion that *Melibe* is doubtless very closely approximated to *Tethys*, with which he had confounded it; but subsequent observation made on the living animal has led him to the conclusion that there is a generic difference, founded on the entirely different organization of the branchiæ.

The animal, which swims very well by agitating the posterior parts of its body from side to side, lives upon the floating plants of the seas near the Cape of Good Hope, where M. Rang observed it alive for some time. The branchiæ fell on a slight touch. The species which serves for the type of the genus is *Melibe rosea.*



Melibe rosea.

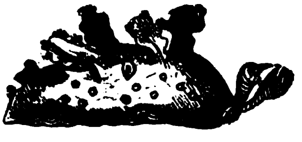
b, veil which surrounds the mouth; *e*, tentacles; *g*, branchial club-like processes; *h*, orifices of the organs of generation; *i*, orifice of the anu *l*, foot; *s*, caudal extremity.

M. Rang remarks that certain little animals found by M. Dorbigny on the coast of Rochelle, and which present as respiratory organs small club-like processes, disposed in two longitudinal and dorsal rows, may, perhaps, be added to this genus.

Scyllæa. (Lin.)

Generic Character.—Animal pelagic, gelatinous, very much compressed laterally; the head not very distinct, and of a horseshoe shape; two great tentacles in form of reversed horns (cornets), flattened, slit anteriorly, and open at the summit for giving passage to a small-pointed and retractile body; mouth at the extremity of a very small proboscis, armed with an apparatus proper for mastication; foot long and very narrow, in form of a furrow; branchiæ in form of small tufted pencils, scattered over the internal surfaces of many equal appendages (appendices pairs) of the skin, and on a caudal and median crest; orifice of the anus and of the organs of generation on the right side.

This genus is spread through all the warm seas, and is especially to be found on the *Fucus natans.* Its foot, like that of nearly all the animals of this family, is admirably contrived for embracing the leaves of these plants. Only two species appear to be recorded.



Scyllæa pelagica.

Tritonia. (Cuv.)

Generic Character.—Animal limaciform, with the head not very distinct, surmounted by two retractile tentacula, in a sort of case, carrying an arched frontal veil but little extended; the mouth armed with two lateral horny jaws, which are trenchant and denticulated on the edges; foot long and channelled; branchiæ in form of branching tufts, ranged in a longitudinal series on each side of the back; organs of generation united on the anterior portion of the right side; anus situated more backward.

These animals also attach themselves to marine plants. They are closely approximated to the *Scyllææ*, of whose habits they entirely partake, and also, in great part, of their organization. M. Rang observes that the species are not as yet well determined, though many exist upon the coast of France. Among these Cuvier has anatomically considered *Tritonia Hombergii.*

Tritonia Hombergii.

Doridæ. (*Tritoniens*, Lam.; *Cyclobranchiens*, Blainv.; *Urobranches*, Latr.)

Animal furnished with four tentacles, two of which are superior and two inferior, under the border of the mantle: organs of respiration arborescent, and forming a tuft round the anus.

The genera placed under this family by M. Rang are *Polycera, Doris,* and *Onchidoris;* these the reader will find described and figured in the article CYCLOBRANCHIATA.

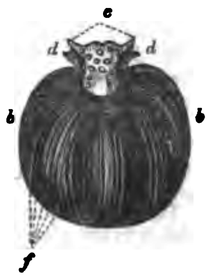
Placobranchidæ. (Rang.)

Animal with four tentacles, and furnished with two lateral membranous expansions proper for swimming, and hung (tapissées) above, as well as the whole dorsal surface, with branchial lamellæ.

Placobranchus. (Van Hasselt.)

Generic Character.—Animal oblong, cylindraceous, fleshy, with the mantle dilated on each side into two lobes or membranous fins, which are demicircular, embracing the whole length from the neck to the posterior extremity, and having the power of crossing themselves on the back, forming an internal canal open at both extremities; head not very distinct from the body, depressed, and carrying on its summit two small and approximated eyes; two pair of conical, not very elongated tentacles, the lower pair being a little flattened and triangular; mouth below slit longitudinally, and furnished on each side with a lamellar appendage; foot long, united to the mantle; branchiæ covering all the upper surface of the lobes and of the back, in the form of delicate, close-set, longitudinal lamellæ, and parting from a common centre at the anterior part; anus situated on the anterior portion of the right side; orifice of the sexual organs separated, that of the ovary a little before the anus, and that of the male organ at the base of the right tentacle.

This genus was founded on a mollusk discovered at Java by Van Hasselt a short time before his death. M. Rang, from such remarks as he could make on some specimens which were not well observed, confirms the exactness of the observations of Van Hasselt, though he is unable to add anything to his descriptions.



Placobranchus ocellatus. (Rang.)

c, upper tentacles *d*, lower tentacles, or labial appendages; *b*, lobes of the mantle serving for swimming; *f*, branchiæ.

Like the *Aplysiæ, Placobranchus* elevates and crosses the lobes upon the back, and thus forms a canal open at both ends, in which the ambient element circulates, so as to impinge on the branchiæ with which it is hung. The species which serves for the type, *Placobranchus ocellatus*, is rather more than two inches long.

NUISANCE, or **NUSANCE**, is a term in English law derived immediately from the French *nuire*, and ultimately from the Latin *nocere*, ‘to hurt;’ and, conformably to its etymology, it signifies an unlawful act or omission which occasions annoyance, damage, or inconvenience to others. Nuisances may consist of injurious acts done, or of omissions to perform duties prescribed by law, and are of two kinds, *common* or *public* nuisances, which affect all the king's subjects, and *private* nuisances, which injure individuals. Instances of the former are, annoyances in highways, public bridges, or navigable rivers, which are produced by rendering the passage inconvenient or dangerous, either positively by actual destructions, or negatively by omitting to repair in cases where the law imposes the duty of repairing.

Noxious processes of trade or manufacture in towns are common nuisances by reason of the danger to the health of the inhabitants; and brothels, disorderly alehouses, gaming-houses, and unlicensed stage-plays are held to be common nuisances, both on account of the injury done by them to public morals and of the danger to the public peace by drawing together numbers of dissolute and irregular persons. The remedy for a public nuisance is by presentment or indictment; and the offender, upon conviction, may be punished by fine and imprisonment. It is said also that in the case of a positive obstruction to the free enjoyment of a public right, it may form part of the judgment that the offender shall remove the nuisance at his own cost; ‘and it seemeth to be reasonable,’ says Hawkins (book i., ch. 75, sect. 15), ‘that those who are convicted of any other common nuisance should also have the like judgment.’

Private nuisances are annoyances which affect individuals only. Thus, if my neighbour builds a house so near to mine that he obstructs my antient lights, or throws the water from his roof upon my house or land, this is a private nuisance; so also if he keeps noisome animals, or sets up an offensive trade or hazardous manufactory so near to my dwelling-house that the free enjoyment of my property is interrupted either by injury to my health or comfort, or the apprehension of danger. The remedy for a private nuisance is an action upon the case, in which damages may be recovered according to the injury sustained.

NULLI'PORA. Lamarck designated by this term certain species of Linnæan Milleporæ on whose surface no distinct pores are visible. Since the investigation of Schweigger on one of the most conspicuous species (Millepora polymorpha, Linn.), many naturalists appear to be satisfied that these mucoso-calcareous bodies, much as they resemble Madrepores and Millepores in general form, are not of animal origin. Of this opinion is Blainville, and consequently, in his system, the Nullipores are rejected from the place so long assigned them by Linnæus, Pallas, and Lamarck.

NUMA POMPI'LIUS, the second king of Rome, was, according to tradition, a native of the Sabine town of Cures. On the death of Romulus the senate at first chose no king, and took upon itself the government of the state; but as the people were more oppressively treated than before, they insisted that a king should be appointed. A contest however arose respecting the choice of the king between the Romans and Sabines, and it was at length agreed that the former should choose a king out of the latter. Their choice fell upon Numa Pompilius, who was revered by all for his wisdom and knowledge, which, according to a popular tradition, he derived from Pythagoras.

Numa would not however accept the sovereignty till he was assured by the auspices that the gods approved of his election. Instructed by the camena, or nymph, Egregria, he founded the whole system of the Roman religion; he increased the number of augurs, regulated the duties of the pontifices, and appointed the flamines, the vestal virgins, and the Salii. He forbade all costly sacrifices, and allowed no blood to be shed upon the altars or any images of the gods to be made. To give a proof that all his institutions were established by divine authority, he is said to have given a plain entertainment in earthenware dishes to the noblest among his subjects, during which, upon the appearance of Egregria, all the dishes were changed into golden vessels and the food into viands fit for the gods.

Numa also divided among his subjects the lands which Romulus had conquered in war, and secured their inviolability by ordering land-marks to be set on every portion, which were consecrated to Terminus, the god of boundaries. He divided the artisans, according to their trades, into nine companies, or corporations. During his reign, which lasted thirty-nine years, no war was carried on; the gates of Janus were shut, and a temple was built to Faith. He died of gradual decay, in a good old age, and was buried under the hill Janiculum; and near him, in a separate tomb, were buried the books of his laws and ordinances.

Such was the traditional account of the reign of Numa Pompilius, who belongs to a period in which it is impossible to separate truth from fiction. According to Niebuhr and the writers who adopt his views of Roman history, the reign of Numa is considered in its political aspect only as a representation of the union between the Sabines and the original inhabitants of Rome, or, in other words, between the tribes of the Titienses and the Ramnes.

(Livy, i., 18-21; Dionysius of Halicarnassus, ii., 58-76; Cicero, *De Republica*, ii., 12-16; Plutarch's *Life of Numa;* the *Histories of Rome*, by Niebuhr, Arnold, and Malden.)

NUMA'NTIA, a celebrated town of the Celtiberi in Spain, was situated on the river Durius (Douro), at no great distance from its source. (Strabo, iii., p. 162; Appian, *Rom. Hist.*, vi. 91.) It appears to have been the capital of the Arevaci (Appian, vi. 46, 66, 76; Ptolem., ii. 6); but Pliny states that it was a town of the Pelendones, a people who lived a little to the north of the Arevaci.

Numantia was situated on a steep hill of moderate size. According to Florus (ii. 18), it possessed no walls, but it was surrounded on three sides by very thick woods, and could only be approached on one side, which was defended by ditches and palisades. (Appian, vi. 76, 91.) It was twenty-four stadia in circumference. (Appian, vi. 90). Its position has been a subject of considerable dispute; but it appears most probable that it was situated near the modern town of Soria.

Numantia is memorable in history for the war which it carried on against the Romans for the space of fourteen years. (Flor., ii. 18.) Strabo states that the war lasted twenty years; but he appears, as Casaubon has remarked, to include in this period the war which was carried on by Viriathus. (Strabo, iii. 162; and Casaubon's note.) The Numantines were originally induced to engage in this war through the influence of Viriathus. They were first opposed by Quintus Pompeius, the consul, B.C. 141, who was defeated with great slaughter (Oros., v. 4), and afterwards offered to make peace with the Numantines on condition of their paying thirty talents of silver. This negotiation was broken off by M. Popillius, who succeeded Pompeius, B.C. 139. Popillius however did not meet with any better success than his predecessor; he was ignominiously defeated, and obliged to retire from the country. His successors, Mancinus, Æmilius, Lepidus, and Piso, met with similar disasters; till at length the Roman people, alarmed at the long continuance of the war, appointed Scipio Africanus consul, B.C. 134, for the express purpose of the conquest of Numantia. After levying a large army, he invested the town; and having in vain endeavoured to take it by storm, he turned the siege into a blockade, and obtained possession of the place (B.C. 133), at the end of a year and three months from the time of his first attack. The Numantines displayed the greatest courage and heroism during the whole of the siege; and when their provisions had entirely failed, they set fire to the city, and perished amidst the flames.

(Appian, *Rom. Hist.*, vi.; Flor., ii. 17, 18; Livy's *Epitomes;* Plutarch's *Life of Marius;* Eutrop., iv. 17; Vell. Pat., ii. 4.)

NUMBER. The general considerations which this word would suggest cannot be treated independently of those required in treating the notion of ratio in general. As this will form a part of the subject of PROPORTION, we refer to that article as the continuation of the present one.

The notion of number is suggested by repetition or succession; and it is customary to call the actual things repeated, considered as a collection, a concrete number; while the notion formed from comparing the collection with one of the things collected is called an *abstract* number. This abstract number arises from repetition of objects, in which the attention is directed to the repetitions as repetitions, and not to the objects as distinguished from any other objects. It is therefore a number of times, not a number of things. [Multiplication.]

If we never numbered any things capable of division into parts like themselves, our notion of number would rest in what is now called *whole* number. If the intellect were taught to count by the beating of a clock, and never came in contact with any other magnitude except that of the intervals between the beats, it is difficult to see how the idea of fractions would be obtained. But when we come to put together continuous magnitudes, which might increase or decrease without any alteration except that of magnitude, such as lines, surfaces, &c., we then begin to see that the unit is purely arbitrary, considered as a magnitude, so that the consideration of smaller or larger units, and the reduction of processes from one unit to another, become necessary. Hence the doctrine of fractions, and finally that of Incommensurables.

The unit of magnitude and the unit of repetition are as distinct as concrete and abstract number. A given magnitude being chosen, we may fix our own ideas of other magnitudes and convey them to other persons by describing the repetitions of the given unit which will severally give the other magnitudes: but it is incorrect to say that in arithmetic we can operate upon magnitudes represented by numbers; the operations are performed by our minds upon notions of repetition, not of magnitude. Any question of numbers arising out of geometry might, so far as the pure arithmetical processes are concerned, as well have the prototypes of its numbers in collections of beats of a clock or motions of the arm, as in repetitions of lengths or areas. It is not true that such simple successions would suggest as many problems as geometry or commercial business; but that is a distinct consideration.

Discussion formerly took place upon the question whether 1 represents a number; it being asserted that *number* must be *more than one*. The settlement of such a question depends upon convention entirely, and is very easy. In the common sense of the word neither 1 nor 2 are numbers: a number of men, or of pebbles, would suggest the idea of more than two: in fact, number means indefinitely many; more than the eye can decide on without counting; *several*, that is to say, as many as require the *severing* which takes place in counting. With different persons this commencement of number, vulgarly speaking, may be different; all persons discern *three* without counting, and probably *four*; but it is certain that *five* must be severed by most persons, and *six* probably by all. Those who watch the progress of children can easily see that their scales of reckoning are successively one and more; one, two, and more; one, two, three, and more.

In the common playing-cards we decide by forms, not by numbers; and were not the nine distinguished from the seven by the different positions of the odd spot, there would be continual mistakes.

In mathematical language, every numerical symbol is called number, including 0, 1, fractions, whole numbers, and even *infinity*.

The talent of easily combining and remembering numbers, or of calculation, is a perfectly distinct thing from that of mathematical invention, reasoning, or application; though the two are frequently confounded. Taking mathematicians of the highest order, some have been singularly gifted in this respect, some distinguished in neither way, and some more than commonly deficient.

A very deceptive mode of speaking is common with regard to numbers, which divides them into *cardinal* and *ordinal*. Thus *one, two, three*, &c. are cardinal numbers, while *first, second, third*, &c. are ordinal. The real distinction is that of numeral *nouns* and numeral *pronouns*, to the latter of which the term ordinal might properly be applied. That first, second, third, &c. are really pronouns is obvious if we consider that, so far as they go, *this, that*, and *the other* would supply their places. The so-called cardinal numbers denote collections; the ordinal numbers point out only the places of the several units of which a collection is composed. Even *one*, when its force is simply selective or distinctive, is a pronoun, as in 'one or another.' [Arithmetic; Magnitude; Proportion; Quantity; Unit.]

NUMBERS, APPELLATIONS OF. Various names have been given to classes of numbers, each expressive of properties common to all in its class: they are pointed out in the following list:—

The whole scale, 1, 2, 3, &c., is called that of *natural* numbers; it is subdivided into the scale of *odd* numbers, 1, 3, 5, &c., and *even* numbers, 2, 4, 6, &c. These again are subdivided into *oddly odd* numbers, 3, 7, 11, &c.; *evenly odd* numbers, 1, 5, 9, &c.; *oddly even* numbers, 2, 6, 10, &c.; and *evenly even* numbers, 4, 8, 12, &c. These latter appellations are not in universal use, though they are very convenient. Thus with reference to division by two and by four, all numbers have names; but not with reference to any higher numbers. The expression of a number which divided by m leaves a remainder n (namely, $mx + n$, where x is a whole number) is so simple, that it is more easily written than described. When 0 is included in the list, it is considered as divisible without remainder by every number.

The division of numbers into *square* numbers, 1, 4, 9, 16, &c.; *cube* numbers, 1, 8, 27, 64, &c.; *fourth powers*, 1, 16, 81, 256, &c., and so on, may be carried to any extent.

A *prime* number is any one of the list 1, 2, 3, 5, 7, 11, 13, &c., no one of which is divisible by any number except unity and itself. A *composite* number is any one which is not prime.

A *figurate* number is any one out of any of the following series, the first excepted, which is only introduced as a basis.

	1	2	3	4	5	6	&c.
I.	1	3	6	10	15	21	&c.
II.	1	4	10	20	35	56	&c.
III.	1	5	15	35	70	126	&c.
IV.	1	6	21	56	126	252	&c.
V.	1	7	28	84	210	462	&c.
&c.				&c.			&c.

Each number is the sum of the numbers in the preceding row: thus 84 is the sum of 1, 6, 21, and 56, and 84 is the fourth number of the fifth order of figurate numbers. The nth number in the first order is $n\frac{n+1}{2}$, in the second order $n\frac{n+1}{2}\frac{n+2}{3}$, in the third $n\frac{n+1}{2}\frac{n+2}{3}\frac{n+3}{4}$ and so on.

Polygonal numbers, as their name imports [Polygon], may be subdivided into triangular, quadrangular, pentagonal, hexagonal, &c. To find the numbers which bear the name of an n-sided figure, form a series beginning with 1 and consisting of terms increasing in arithmetical progression, with a common difference $n-2$: and form the sums of terms of these series in the manner described. Thus for decagonal numbers, we have—

1	9	17	25	33	41	&c.
1	10	27	52	85	126	&c.

and the decagonal numbers are 1, 10, 27, &c. The mth number of the n-sided order of figures is

$$1 + nm\frac{m-1}{2} - (m-1)^2$$

The following are some of the polygonal numbers:—

Triangular	1	3	6	10	15	21	&c.
Quadrangular	1	4	9	16	25	36	&c.
Pentagonal	1	5	12	22	35	51	&c.
Hexagonal	1	6	15	28	45	66	&c.

Pyramidal numbers are formed by summing the polygonal numbers; thus to find pentagonally pyramidal numbers, take the pentagonal numbers—

1	5	12	22	35	51	&c.
1	6	18	40	75	125	&c.

Numbers were once considered as *abundant, perfect*, and *defective*. An abundant number was one in which the sum of all its divisors (unity included, but not itself) exceeds the number: thus 12 is an abundant number, because $1 + 2 + 3 + 4 + 6$ is greater than 12. A perfect number was one in which the sum of all the divisors was equal to the number: thus 6 is $1 + 2 + 3$, and is a perfect number, as is 28, or $1 + 2 + 4 + 7 + 14$. A defective number was one in which the sum of the divisors is less than the number, as 10, in which $1 + 2 + 5$ is less than 10. Whenever $2^n - 1$ is a prime number, then $2^{n-1}(2^n - 1)$ is a perfect number; thus $2^7 - 1$, or 127, is a prime number, whence $2^6 (2^7 - 1)$, or 64×127, or 8128, is a perfect number.

Amicable numbers are those each of which is equal to the sum of all the divisors of the other. Such are

284 and 220
17296 and 18416
9363583 and 9437056.

Other names have been invented descriptive of classes of numbers; but the preceding are those which most often occur in the past history of mathematics. With the exception of SQUARE, CUBE, PRIME, *even*, and *odd*, the preceding appellatives rarely appear in modern works.

NUMBERS, FIGURATE AND POLYGONAL. [NUMBERS, APPELLATIONS OF.]

NUMBERS, THEORY OF. The theory of numbers is in fact the science of whole or integer numbers, and its most general problem is: 'Given any equation whatsoever involving two or more unknown quantities, or any number of equations between a greater number of unknown quantities, to determine every possible solution in which the values of the unknown letters are whole numbers.' It may also be considered that the science extends to the determination of all solutions which contain nothing but rational or commensurable fractions, all surd quantities or incommensurables being excluded. If, for example, the equation $x^2 + y^2 = 1000$ were to be solved, x and y being whole numbers or rational fractions, let the rational fractions reduced to a common denominator be $p : z$ and $q : z$; then the equation becomes $p^2 + q^2 = 1000\,z^2$; and if all possible whole values of p, q, and z be found, all the fractional solutions of the former equation can be exhibited.

Connected with the science before us is a very large quantity of properties of numbers, of which it must be said that they can be proved easily enough, but cannot be explained. Usually in retracing the steps of an algebraical demonstration, we can easily connect the result with common and self-evident notions, which seem both to justify the conclusion, to render it natural, and destroy much of the curiosity, and even interest, with which it is looked at by a person used to algebra, who hears of the conclusion for the first time. In the theory of numbers it seems to us that the curious character of the conclusions is not so much lessened by the demonstrations, and perhaps this may be the reason why the science becomes a sort of passion, as Legendre remarks, with most of those who take it up. The instances given by the writer just cited, in his preface, will show the sort of properties which we speak of. If c be any prime number, and N any other number not divisible by c, then $N^{c-1} - 1$ is always divisible by c. Then $2^6 - 1$, or 63, is divisible by 7. Again, if any prime number divided by 4 leave a remainder 1, it is the sum of two square numbers: thus 13 is the sum of 9 and 4, 17 of 16 and 1, 29 of 25 and 4, &c.

The theory of numbers is not of much immediate practical utility in the applications of mathematics, which generally involve continuously increasing magnitude, and in which therefore the introduction of whole numbers is matter of convenience, and not of necessity. Again, the data of such applications are usually only approximate, so that an answer in whole numbers, should such a thing occur, is not exact, and possesses no particular interest. Hence this theory is little studied by a very large class of mathematicians, among whom it is not uncommon to meet with a person deeply versed in the higher analysis, who does not even know the principal results obtained by Gauss or Legendre. The subject is, in fact, an isolated part of mathematics, which may be taken up or not, at the choice of the student. It may possibly at some future time be connected with ordinary analysis, that is to say, the determination of the *integer* solutions of a set of equations may not be so distinct a thing from that of a mere solution, integer or not, as it is at present. In fact, a hint given by M. Libri, in a tract presently to be cited, does give completely the means of assimilating the expression of a problem in this theory to that of one in ordinary analysis. Suppose, for example, it is required to solve in whole numbers the equation $x^2 + y^2 = x^3$. Let π represent two right angles; then it is well known that $\sin \pi x = 0$ when x is a whole number, and never else; so that 'required a solution of $x^2 + y^2 = x^3$ in whole numbers' is precisely the same problem as 'required any solution of the three equations $x^2 + y^2 = x^3$, $\sin \pi x = 0$, $\sin \pi y = 0$.'

The earliest consideration of the theory of numbers may have been made in India [VIGA GANITA]; but the earliest treatise is probably that of Diophantus, which consists of nothing else but problems of this science, insomuch that the theory itself has been sometimes called the Diophantine analysis. The subject then rested, without making any progress, until the time of Bachet de Meziriac and FERMAT, the editor and commentator of Diophantus. The subject rested again until the time of the man who literally left no part whatever of mathematics unaugmented, Euler. After him, Lagrange, Legendre, and Gauss applied themselves contemporaneously to this theory. The works of the two latter are the separate treatises on this particular science, in which the advanced mathematical student must look to know its present state. Various Memoirs of MM. Cauchy and Libri may also be mentioned; one in particular by the latter (in the 'Mémoires de Mathématique et de Physique,' vol i., Florence, 1829), in which the subject is made to have more resemblance than usual to ordinary analysis.

The 'Disquisitiones Arithmeticæ' of Gauss (Brunswick, 1801) were translated into French by M. Poullet-Delisle (Paris, 1807). The 'Théorie des Nombres' of Legendre (third edition, Paris, 1830) has the advantage of coming later than that of Gauss (which itself came after the first edition of Legendre's), and of using methods and notations which are more familiar to the mathematician. Both are works of great originality: that of the German is condensed, and full of historical information; that of the Frenchman easier to follow, but, like most French works, deficent in precise historical reference. It is not a little singular that the two great writers on this subject should have been the men who, independently of each other, introduced the method of LEAST SQUARES.

For a notice of one prominent discovery of Gauss, see POLYGON and ROOT.

The beginner in algebra may obtain some command over equations of a simple character, not exceeding the second or third degree, by a method which is, we believe, due to Playfair, or which, at least, is published in the collection of his works. Let the equation be, for instance, $ay^2 + bxy + x^2 = z^2$, in which x, y, and z are to be whole numbers. Throw the equation into a form which admits of both sides being reducible into factors; for instance,

$$y(ay + bx) = (z - x)(z + x).$$

If then $z - x = vy$, we have $z + x = (ay + bx) : v$, which equations give

$$x = \frac{(a - v^2)\,z}{a - bv + v^2} \qquad y = \frac{(2v - b)\,z}{a - bv + v^2}$$

Assuming v at pleasure, z may be easily taken so as to make both x and y whole numbers; and the same method will succeed in many equations.

NUMBERS OF BERNOULLI. This name is given to certain numbers (we here see the mathematical use of the word, for they are all fractions) first used by James Bernoulli, in his 'Ars Conjectandi.' They are in fact (though not so considered by Bernoulli) the coefficients of the powers of x in $1 : (\varepsilon^x - 1)$. We should hardly have given them a place here, as our list of such ultimate references in mathematics is by no means complete, if it were not that they only appear to a sufficient extent in one English work that we know of (Peacock's Examples). Let

$$\frac{1}{\varepsilon^x - 1} = \frac{1}{x} - \frac{1}{2} + \frac{B_1 x}{2} - \frac{B_3 x^3}{2.3} + \ldots.$$

a form which it is shown to take. Then B_1, B_3, B_5, &c. are what are called the numbers of Bernoulli, and the following list will show twenty-five of them, the first column being the index of B, the second the numerator of the fraction, and the third its denominator. As far as B_{29} these are taken from Euler's Differential Calculus, all the rest (and the logarithms) from Grunert's Supplement to Klugel, which professes to take the additional numbers from a work of H. A. Rothes, and the logarithms from Eytelwein's work on the higher analysis:—

No.	Numerator.	Denominator
1	1	6
3	1	30
5	1	42
7	1	30
9	5	66
11	691	2730
13	7	6
15	3617	510
17	43867	798
19	174611	330
21	854513	138
23	236364091	2730
25	8553103	2
27	23749461029	870
29	8615841276005	14322
31	7709321041217	510
33	2577687858367	6
35	26315271553053477373	1919190
37	2929993913841559	6
39	261082718496449122051	13530
41	1520097643918070802691	1806
43	27833269579301024235023	690
45	596451111593912163277961	282
47	5609403368997817686249127547	46410
49	495057205241079648212477525	66

Thus the coefficient of $x^{15} : 1.2.3\ldots 15$ in the development of $1 : (\varepsilon^x - 1)$ is 3617 : 510, or B_{15}. The logarithms of the first eighteen numbers are as follows —

No.	Logarithm.
1	0·2218487496 − 1
3	0·5228787453 − 2
5	0·3767507096 − 2
7	0·5228787453 − 2
9	0·8794260688 − 2
	0·4033154004 − 1
13	0·0669467896
15	0·8507783387
17	1·7401350433
19	2·7235576597
21	3·7918359878
23	4·9374188514
25	6·1539724516
27	7·4361345055
29	8·7792940212
31	10·1794459554
33	11·6330790754
35	13·1370898829

The higher numbers may be approximately verified by the following rule. Let π be the ratio of the circumference of a circle to its diameter; then

$$B_{2x-1} = 2\,\frac{1.2.3\ldots\ldots 2x-1.2x}{(2\pi)^{2x}} \text{ nearly}$$

We shall have some occasion to point out the uses of the numbers of Bernoulli in the article SERIES, in which also misprints, if any should occur, in the preceding tables will be noted. The theory of these numbers will be found in Peacock's translation of Lacroix, Euler's 'Differential Calculus,' Lacroix's 'Differential Calculus,' 3 vols., and in a very elaborate article ('Bernoullische Zahlen') in the work of Grunert already cited.

NUMBERS, THE BOOK OF, one of the books of the Pentateuch. In Hebrew it has two titles, וַיְדַבֵּר, *and he spake*, which is the first word of the book, and בְּמִדְבַּר, *in the desert*, which is the fifth word in the first verse, and which applies to the whole book, inasmuch as the events which it records took place in the desert. Its title in the Septuagint is 'Αριϑμοί, *Numbers*, because it contains the censuses of the people of Israel (chaps. i.-iii., and xxvi.).

The first four chapters of this book consist of separate accounts of commands given by God to Moses, while the Israelites were encamped at the foot of Sinai, respecting the census and the classification of the people, and the duties of the priests and Levites. The succeeding chapters (v.—x. 10) contain various laws, most of which are additions to those before given in the books of *Exodus* and *Leviticus;* and the rest of the book is occupied with the narrative of the journeys of the Israelites, from the time of their leaving Sinai to their second arrival at the Jordan, and their encampment in the plains of Moab. The time over which the book extends is from the first day of the second month of the second year after the departure from Egypt, to the first day of the eleventh month of the fortieth year of the same epoch. This part of the book also contains various enactments.

We learn from the last verse of the last chapter that this book was written by Moses 'in the plains of Moab by Jordan near Jericho,' and consequently just before his death. Vater has attempted to show that it is composed of short narratives written by different persons (vol. iii., p. 452, &c.), and De Wette adduces several passages which appear to disagree with each other, and with the parallel passages in the book of *Exodus*. (*Lehrbuch d. Hist. Krit. Einleitung in d. A. T.*, p. 180.)

This book is quoted or referred to in the New Testament (compare *Numb.*, xx. 11, with 1 *Cor.*, x. 4, and *Numb.* xxi. with *John*, iii. 14). The passage in chap. xxiv. 17-19, is generally understood as a prediction of the Messiah.

(Rosenmüller's *Scholia in Vet. Test.*, the *Introductions* of Eichhorn, Jahn, De Wette, and Horne; Graves's and Vater's *Commentaries on the Pentateuch.*)

NUME'NIUS. [SCOLOPACIDÆ.]

NUMERAL CHARACTERS. There are three simple and obvious modes of constructing symbols of number. 1. By arbitrary invention. 2. By the choice of letters of the alphabet. 3. By a system of repetitions of a single unit, as I, II, III, IIII, &c., with marks of abbreviation Some may doubt whether the first and third were ever really employed; but it is not known that we can assign to the Indian numerals any other origin than the first, and the third explains the Roman system with a degree of consistency which is most extraordinary, *if* it be only accidental coincidence.

Distinct numeral characters are found to have existed or to exist among the Chinese, Indians, and Arabs, &c., Phœnicians, Palmyrenes, Hebrews, Egyptians, Greeks, and Romans; and others are given as in antient use among the Mexicans. Various representations of these will be found in the 'Encyclopædia Metropolitana,' article 'Arithmetic.' We shall here confine ourselves to the simplest explanation of those systems which will be wanted by the student of antient literature. Of these, as it should seem, the Indian system may belong (though it may be doubted) to the first class; the Hebrew and the common Greek system to the second; the Roman, Phœnician, Palmyrene, antient Greek, Egyptian, and Chinese, to the third class.

The system received from the Hindus through the Arabs, and now adopted throughout Europe, has been gradually much altered in the forms of the symbols. [ARITHMETIC.]

The Hebrews used the letters of their own alphabet, giving the finals a separate and particular value, as follows:—

Letter	א	ב	ג	ד	ה	ו	ז	ח	ט	י
Numeral Signification ..	1	2	3	4	5	6	7	8	9	10
	כ	ל	מ	נ	ס	ע	פ	צ	ק	
	20	30	40	50	60	70	80	90	100	
	ר	ש	ת	ך	ם	ן	ף	ץ		
	200	300	400	500	600	700	800	900		

The use of the final letters as signifying numbers is of newer date than the rest; the old system required the junction of subordinate numbers to express 500, 600, &c. Numbers not expressed above were made by juxta-position of letters denoting other numbers, according to a decimal subdivision, as among the Greeks; the only exception being 15, which, as 10+5 or יה made a word signifying the Creator, they wrote as 9+6, or טו. In a language like the Hebrew it would be impossible to prevent every combination of numbers from also standing for a word or words; and the Oriental nations accordingly have frequently expressed dates by sentences. Thus 'Hooshung Shah is no more,' rendered into Persian, expresses, in the numeral force of the letters, the year 837 of the Hegira, the date of the death of that prince.

The Greeks, in some enumerations, have three distinct methods of expressing numbers; but the first of them, which consists in the use of the letters of the alphabet to denote the successive books of a work, as in the Iliad, is as much a method of naming as of counting. Something more to the point is the old system which occurs on inscriptions, in which the unit is represented by a single mark, five by Π (the initial of ΠENTE), ten by Δ (that of ΔEKA), and 100 by H (that of HEKATON). And in all cases five of any symbol are written by inclosing the symbol in Π: thus $\boxed{\Delta}$ is five tens, and $\boxed{\mathrm{H}}$ is five hundreds. Thus 879 is $\boxed{\mathrm{H}}\mathrm{HHH}\boxed{\Delta}\Delta\Delta\Pi\mathrm{IIII}$. This antient Greek method, as found on inscriptions (which, according to Heilbronner, is alluded to in a written work by Herodian only), is supposed to be as old as the time of Solon. The Egyptian hieroglyphic system is on the same principle, but without abbreviations; the symbol of ten resembling that just given for five.

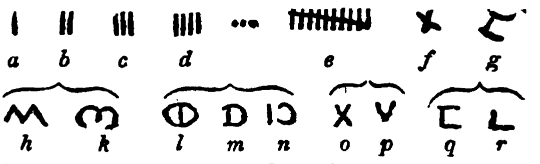
In describing the later Greek notation, we leave out of view the extensions made by the mathematicians, the principle of which is described in ARITHMETIC. It appears most distinctly that the system was made either at a time when the Greek alphabet was in possession of more letters than it permanently retained, or that it was introduced into Greece by communication with some nation (the Phœnician, perhaps) which had some additional letters. The *Vau* of the Hebrew and Phœnician, which stands for six, and is wanting in the Greek alphabet, appears in their numeral system under the name of ἐπίσημον βαῦ, and is expressed by a symbol resembling ϛ, not very unlike the Vau turned the other way. The Koph and Tsaddi appear under the names of ἐπίσημον κοππὰ and ἐπίσημον σαντι, with symbols expressed in our types by ϟ and ϡ; but the former is one behind its place in numeral signification, being 90 among the Greeks and 100 in the East: the latter takes the same numeral place as the final Tsaddi in the Hebrew system. The word *air* will be a useful guide to the letters beginning the several scales, as follows:—

Letter	α	β	γ	δ	ε	ϛ	ζ	η	θ
Numerical Signification	1	2	3	4	5	6	7	8	9
	ι	κ	λ	μ	ν	ξ	ο	π	ϟ
	10	20	30	40	50	60	70	80	90
	ρ	σ	τ	υ	φ	χ	ψ	ω	ϡ
	100	200	300	400	500	600	700	800	900
	α͵	β͵	γ͵	δ͵	ε͵	ϛ͵	ζ͵	η͵	θ͵
	1000	2000	3000	4000	5000	6000	7000	8000	9000

The Roman notation, including all the varieties which occur in printed works, is as follows·—

1	I
2	II
3	III
4	IIII, IV
5	V
6	VI
7	VII
8	VIII, IIX
9	VIIII, IX
10	X
11	XI
12	XII
13	XIII, XIIV
14	XIIII, XIV
15	XV
16	XVI
17	XVII
18	XVIII, XIIX
19	XVIIII, XIX
20	XX
30	XXX
40	XXXX, XL
50	L
60	LX
70	LXX
80	LXXX, XXC
90	LXXXX. XC
100	C
200	CC
300	CCC
400	CCCC
500	D, IƆ
600	DC, IƆC
700	DCC, IƆCC
800	DCCC, IƆCCC
900	DCCCC, IƆCCCC
1000	CIƆ, M, ↀ, Ī
2000	CIƆCIƆ, IICIC, IIM
5000	IƆƆ, V̿
10000	CCIƆƆ
50000	IƆƆƆ
100000	CCCIƆƆƆ
1000000	CCCCIƆƆƆƆ

The grammarian Priscian would have it that I denoted unity, because the Greek word μια, with μ cut off, has ι for its first letter; that V is five, as being the fifth vowel, and X ten, as being the tenth consonant, of the Greek alphabet. Any explanation of this system which endeavours at an alphabetical deduction must, as far as has yet been seen, fail entirely in giving a probable origin. The following scheme however contains suggestions of some antiquity, and certainly, as before remarked, is either a true explanation or a most extraordinary coincidence:—



Imagine a person used to decimal counting by means of the fingers having recourse to simple counting by making a mark for each successive unit, as in *a*, *b*, *c*, &c. At ten he might be expected to make some symbol that his *handful* was completed, and the drawing a mark through the whole ten unit symbols, as at *e*, would do very well. This he might abbreviate, as at *f*, retaining only the symbol of a unit and that of the line drawn across. The handful of tens, or one hundred, might be represented by retaining only the unit symbol and two ligatures, namely, that of the tens and that which made all the ten tens into one symbol, as at *g*. The ten hundreds would require a unit with three ligatures, or four strokes altogether, which, if they were written without taking the pen off, might be made as at *h*, which might degenerate into *k*, and finally into *l*. Again, by cutting *l* into two halves, we have *m* or *n*, which might suggest themselves as proper representatives of half a thousand, or five hundred. Similarly bisection of *f* and *g* or of *o* and *q* would suggest *p* and *r* as proper symbols for the halves of ten and one hundred. The symbol *a* has a resemblance to I, *f* to X, *g* to C, *h* to M, *m* to D, *p* to V, and *r* to L.

We cannot find any precise information upon the time of the commencement of the principle of local value which prevails to a certain extent throughout the Roman system, namely, that a smaller symbol before a larger one, in numbers less than one hundred, denotes a subtraction, after it an addition. This principle does not appear in the Phœnician or Palmyrene notations, which otherwise much resemble the Roman in their principle of notation, though they approximate to pure vicenary scales, both adopting distinct symbols for twenty.

The Chinese use three systems: the first, not very simple, and antient; the second, intentionally complicated, and employing symbols of words to denote numbers, is introduced in deeds and other instruments, to render alteration difficult; the third, a simplification of the first, supposed to have been made by the Jesuit missionaries.

For further information on the subject of this article, with abundant references, see the article 'Arithmetic' in the 'Encyclopædia Metropolitana,' by Dr. Peacock.

NUMERATION is a term generally applied to the art of representing numbers by distinct names and symbols, a sense in which the word is used by the oldest writers. Every treatise on arithmetic must necessarily begin with something on this art of counting and representing the results of counting, on the goodness of which, slight and easy as any method may appear to which we have been habituated from childhood, the progress of the arts of life, to say nothing of the mathematical sciences, is in no slight degree dependent. The time is gone by for a formal eulogy upon the benefits of any fundamental method of expression; we will therefore content ourselves with quoting a part of that which is found in the first English work on arithmetic, Robert Recorde's 'Grounde of Artes' (1551, perhaps 1540). We quote this also because it is an instance (the only one we ever met with in a mathematical work) of the species of doggrel comic verse afterwards in use on the stage (see the 'Comedy of Errors'), which has a sort of measure and rhyme, though printed in the form of simple prose in the work from which we cite (we put the syllables which are meant to rhyme in italics). '*Master*. Wherefore in all great workes are clerks so much desi*red*? Wherefore are auditors so richly *fed*? What causeth geometricians so highly to be *inhaunsed*? Why are astronomers so greatly *advanced*? Because that by number such things they *find*, which else would far excel man's *mind*. . . . . *Master*. Exclude number, and answer to this question: How many years old are you? *Scholar*. Mum. *Master*. So that if number want, you answer all by *mummes*? How many miles to London? *Scholar*. A poak full of *plums*. . . . . . *Master*. If number be lacking, it maketh men *dumb*, so that to most questions they must answer *mum*. *Scholar*. This is the cause, sir, that I judged it so *vile*, because it is so common in talking every *while*; for plenty is not dainty, as the common saying *is*. *Master*. No; nor store is no sore, perceive you *this*? The more common that the thing is being needfully *required*, the better is the thing and the more to be *desired*. But in numbring, as some of it is light and *plain*, so the most part is difficult and not easie to *attain*.'

The earliest method of signifying a large number must have been such a one as the scholar uses above, when he designates a large number of miles as a 'poak full of plums,' namely, the similitude of some visible or well-known collection of units. The fingers of the hand, or of both hands, or the united number of fingers and toes, furnished natural collections of reference on which the various quinary, decimal, and vicenary scales in existence have proceeded. The transition from counting by tens to counting by dozens might have been caused by the facility of subdivision which the number twelve possesses, though we rather doubt this explanation, at least unless we assume that the division of the Roman *As* into twelve *unciæ* is to be explained on the same principle. From this we think came the method of reckoning by dozens to be introduced throughout Europe, as would that by thirteens, if the Roman coin or weight had been so divided.

Our present numerative system is stated by writers to employ the words unit, ten, hundred, thousand, million, billion, trillion, quadrillion, quintillion, sextillion, septillion, octillion, nonillion, &c. But the greater part of this is pure statement; for the terms billion, trillion, &c., though defined by arithmetical writers, have never found their way into common use, the want of such large numbers having never been experienced. The French indeed have naturalised the term *milliard*, meaning one thousand millions, in matters of public debt and revenue, which only shows how little the term *billion* has been used among them, since, according to their writers, the milliard and billion are the same things. Tonstal expressly says, that in his time (Henry VIII.) the common reckoning from millions was made by millions of millions, &c., and the word *millio* is noted as a vulgarism by him (neither is it among the recognised barbarisms of Ducange). Recorde uses nothing more than millions repeated; so that it seems the billions and higher denominations were never anything but a fancy of arithmetical writers, conceived after the time when elementary works ceased to be written in Latin. The probability of this is increased by their meaning different things in different countries: with us the billion is a million of millions, a trillion is a million of billions, and each denomination is a million of times the one preceding; with the French and the other continental nations the billion is a thousand millions, and each denomination is a thousand times the preceding. According to English writers, the number 1,234567,891234,567891 is one trillion, 234567 billions, 891234 millions, and 567891: according to the French writers, it is one quintillion, 234 quadrillions, 567 trillions, 891 billions, 234 millions, 567 thousands, and 891. For common purposes the denominations higher than a million may be abandoned, it being remembered that all the figures on the left, after six are taken off on the right, are so many millions, and all above twelve figures so many millions of millions. In writing, round numbers of millions should be written as such, thus, 638 millions, not 638,000,000: in computation it is of course a different thing. Some authors seem to think it very scientific to parade ciphers, sometimes by the dozen, and so it is, no doubt, since it shows they know how many ciphers go to a million or a million of millions; but no reader likes to stop and examine 000,000,000,000, when the words 'million of millions' would have done equally well.

The decimal system, made complete, supposes a point always to be placed at the end of the units, to separate them from the fractions which may follow. When there are no fractions, the point is useless, as in 675· or 675·000, which is 675. The numbers on the right of the point, successively denoting tenths, hundredths, thousandths, &c. of a unit [Fractions], are in denominations which have not received distinct names. The modern French call them decimes, centimes, &c.; and the attempt has before now been made (see Wybard's 'Tactometria' 1650), to introduce centesms, millesms, &c. into English, but with no success.

The principle of *local value* [Arithmetic], which distinguishes our system of numeration from that of the Greeks and Romans, is applicable to any system, whether decimal or not. If 10 stand for *ten*, that is, if units in the second column are ten times in value those of the first column, nine numeral symbols besides the cipher are requisite; but if 10 had signified fifteen, it would have been necessary to have fourteen distinct symbols of number besides the cipher, since 10, 11, &c. now stand for sixteen, seventeen, &c. In such an explanation, the frame-work of our numerical language (being decimal) is not well calculated to give an easy comprehension of the change: we should rather invent a word for fifteen, or five and ten, say A; whence A-one, A-two, &c. would be the spoken sounds answering to what we now call sixteen, seventeen, &c.; while ten, eleven twelve, thirteen, and fourteen would require new names not connected in etymology with *ten*.

The method of reducing a number, decimally expressed to another in which the *radix* or base of the system (as ten is that of the common one), is *a*, is as follows: divide the number successively by *a*, expressed in the decimal system; the remainders give the units, *as*, *aas*, &c. of the new expression. Thus if 12376 is to be expressed in the *quinary* system, whose base is 5, we should have the following process:—

5)12376	Rem.	Number required, 344001.
5)2475	1	Decimal.
5)495	0	$3\times5^5 = 9375$
5)99	0	$4\times5^4 = 2500$
5)19	4	$4\times5^3 = 500$
5)3	4	$1 = 1$
0	3	12376

This exhibits both the reduction to the quinary system and the restitution of the decimal expression; but if the number had been given in the quinary system, it might have been reduced to the decimal system by the same rule, the new base ten being, in the old or quinary system, represented by 20, and the rule of division being performed by the use of five in the same manner as ten is used in the decimal system.

20)344001	Rem	Number required, 12376.	
20)14422	11 or 6	Decimal.	Quinary.
20)443	12 or 7	$1\times(10)^4 =$	310000
20)22	3	$2\times(10)^3 =$	31000
20)1	2	$3\times(10)^2 =$	2200
0	1	$7\times10 =$	240
		$6 =$	11
			344001

The quinary being supposed the old system, as soon as we come to the remainder 11, we have to invent a new symbol (say 6), since 11, in the *new* system, is to stand for eleven. For further examples, see the 'Library of Useful Knowledge: Treatise on the Study of Mathematics.'

In teaching the elements of numeration by the abacus [Abacus], it is desirable that exercise should be given in several different systems, were it only to prevent the formation of that impression which so many students long retain, that the decimal system is natural and necessary. The want of words for the denominations will be the only difficulty; this may be got over by using the letters A, B, C, &c., to represent them. Thus if the system be quinary, A counts as one ball on the second row or five on the first, B as one ball on the third row, five on the second, or twenty-five on the first, and so on. All the balls on the second row may be marked A, those on the third B, &c.

NUMERATOR (or Numberer), the part of a fraction which states how many of the aliquot parts of a unit are taken, such as are described by the denominator. Thus $\frac{3}{7}$ being three, not of units, but of sevenths of a unit, 3 is the numerator.

NUMERIA'NUS, MARCUS AURELIUS, succeeded to the throne conjointly with his elder brother Carinus, after the death of their father, at the beginning of A.D. 284. Numerianus was with the army in Mesopotamia at the death of Probus; but instead of following up the advantages which his father had gained over the Persians, he was compelled by the army to abandon the conquests which had been already made, and to retreat to Syria. During the retreat a weakness of the eyes obliged him to confine himself to the darkness of a litter, which was strictly guarded by the Prætorians. All orders were issued by Arrius Aper, the præfect of the Prætorians, who was the father-in-law of the emperor. The absence however of Numerianus excited the suspicion of the soldiers; and when the army, after a march of eight months, arrived at Chalcedon on the Bosporus, they insisted upon seeing their prince, and accordingly burst into the imperial tent, where they only found the dead body of Numerianus. Suspicion naturally fell upon Arrius; and an assembly of the army was accordingly held, for the purpose of avenging the death of Numerianus and electing a new emperor. Their choice fell upon Diocletian, who immediately after his election put Arrius to death with his own hands, without giving him an opportunity of justifying himself, which might perhaps have proved dangerous to the new emperor.

The virtues of Numerianus are mentioned by most of his biographers. His manners were mild and affable; and he was celebrated among his contemporaries for his eloquence and poetry. He successfully contended with Nemesianus for the prize of poetry, and the senate voted to him a statue, with the inscription, to 'Numerianus Cæsar, the most powerful orator of his times.'

(Vopiscus, *Numerianus*, Aurelius Victor, *De Cæsaribus*, c. 38; Eutropius, ix. 12; Zonaras, book xii.)

Coin of Numerianus.
British Museum. Actual Size.

NUMERICAL, as opposed to literal, in algebra, applies to an expression in which the coefficients of a letter are all numbers, and not letters. As opposed to algebraical, it applies to the magnitude of a quantity, considered independently of its sign. Thus −7 is said to be numerically greater than −5, though algebraically less. [Nothing.]

NUMESIA'NUS, or **NOMISIANUS**, a physician, born at Corinth, who deserves to be recorded as one of Galen's tutors (Galeni *Anatomic. Administrat.*, lib. i., cap. 1), who informs us in another place (*Comment. in Hippocr.*, libr. 'De Naturâ Hominis,' Comment. 2), that Pelops, another of his tutors, was also one of this physician's pupils. He lived in the second century after Christ.

NU'MIDA. [Pavonidæ.]

NUMI'DIA was originally bounded on the east by the dominions of Carthage; on the west by the Mulucha, or Molocath (Sallust, *Jug.*, 19, 92; Strabo, p. 827. Casaubon), the modern *Mulwia*, or *Mohalou;* on the north by the Mediterranean, and on the south by the Gætuli. The Roman province of Numidia was of much smaller extent, being bounded on the west by the Ampsagas (*Wadi-al-Kebir*), and on the east by the Tusca (*Zain*, Shaw), and thus corresponded to the eastern part of Algiers.

The Numidians were originally a nomade people, whence they were called by the Greeks Nomades (Νομάδες), and their country Nomadia (Νομαδία, Polyb., xxxvii. 3; compare Sallust, *Jug.*, 18; Plin., *Hist. Nat.*, v. 2). This name seems to have been originally applied not merely to the inhabitants of the country to which the name of Numidia was afterwards restricted, but to all the nomade tribes of northern Africa; thus Appian (*Bell. Civ.*, ii. 44) mentions the Maurusii (Mauri) as nomades. But when the Greek and Roman writers speak of the Numidians, the term is usually limited to the two great tribes of the Massæsylii and Massylii, the former of whom extended along the northern part of Africa from the Mulucha on the west to the Ampsagas on the east, and the latter from the Ampsagas to the territories of Carthage.

When the Romans first became acquainted with the Numidians, which was during the course of the second Punic war, Syphax was king of the Massæsylii and Gala king of the Massylii. Gala had a son of the name of Masinissa, who possessed extraordinary powers both of mind and body. He was brought up at Carthage, and was so highly esteemed by Adherbal, that he promised to the young Numidian his daughter Sophonisbe in marriage. Before the marriage took place, Masinissa accompanied Adherbal into Spain, where he served with great credit in the war against the Romans. But during his absence, the Carthaginians, without the consent of Adherbal, gave Sophonisbe in marriage to Syphax, in order to secure his co-operation against the Romans. (Appian, *Hist. Rom.*, viii. 10.) This induced Masinissa to make a secret alliance with Scipio in Spain; but the Carthaginians, having obtained information of his proceedings, used every means to ruin his power. His father Gala had died during his absence in Spain, and the government had been usurped by one Mezetulus, who received the support of the Carthaginians. Masinissa however, on his return to Numidia, defeated Mezetulus; but he had scarcely obtained possession of the government, before he was attacked by Syphax, and compelled to leave his kingdom and retire to the neighbourhood of the lesser Syrtis, where he remained with a small body of adherents till the arrival of Scipio in Africa. (Liv., xxix. 29-33.) He accompanied Scipio during the remainder of the war, and in many engagements rendered essential service to the Roman arms. It was principally owing to the courage of Masinissa that Adherbal and Syphax were defeated, and that the latter fell into the hands of Scipio (B.C. 203). On this occasion Masinissa obtained possession of Sophonisbe; but finding that his connection with her did not meet with the approval of Scipio, who feared lest the daughter of Adherbal might withdraw him from his alliance with the Romans, he is said to have sent poison to Sophonisbe, and recommended her to destroy herself.

The great services of Masinissa did not pass unrewarded by the Romans. At the conclusion of the second Punic war he obtained all the dominions of Syphax and a considerable part of the Carthaginian territory, so that his kingdom extended from the Mulucha on the west to the Cyrenaica on the east, and completely surrounded the small district which was left to the Carthaginians on the coast. (Appian, viii. 106.) Masinissa laid the foundations of a great and powerful state in Numidia. He introduced the arts of agriculture and civilised life, amassed considerable wealth, and supported a well appointed army. He died at the age of 90, B.C. 149. (Appian, viii. 106; Strabo, p. 833; Polyb., xxxvii. 3.)

Masinissa left three sons, Micipsa, Mastanabal, and Gulussa. The two latter died soon after the death of their father, but Micipsa lived to B.C. 118, and bequeathed the kingdom to his two sons Adherbal and Hiempsal and to his nephew Jugurtha, who was an illegitimate son of Mastanabal. Jugurtha however, not content with a divided sovereignty, murdered Hiempsal, and obliged Adherbal to fly to Rome, where he appealed to the senate against the usurpation of his cousin. Many of the senators however were bribed by Jugurtha, and a commission was sent to Africa in order to divide Numidia between Adherbal and Jugurtha. The commissioners awarded the better part of the country to Jugurtha; but scarcely had they left Africa, before he again attacked Adherbal, defeated him in battle, besieged him in Cirta, and having obliged him to surrender, put him to a cruel death. When this news reached Rome, war was declared against Jugurtha, which, after being carried on with various success, was at length terminated by the capture and death of Jugurtha B.C. 106. [Jugurtha.]

After the death of Jugurtha, the kingdom of Numidia appears to have been given to Hiempsal II. (Hirtius, *Bell. Afr.*, 56), who was probably the nephew of Hiempsal the son of Micipsa. Hiempsal II. was succeeded, about B.C. 50, by his son Juba I., who took an active part in the civil wars against Cæsar. [Juba.] On the death of Juba I., B.C. 46, Numidia was reduced to the form of a Roman province by Cæsar, who intrusted the government of it to the historian Sallust. (Dion Cassius, xliii. 9.)

The chief town in Numidia was Cirta (the modern Costantina, or Constantinah), which was the principal residence of Syphax, Masinissa, Micipsa, and Juba. [Costantina.] Hippo Regius, the second town in the province, was situated near the coast about a mile and a half south of Bona. [Bona.] It was founded by the Phœnicians (Sallust, *Jug.*, 19), and is well known as the see of St. Augustin. It was called Hippo Regius to distinguish it from Hippo Zarytus in the province of Africa. It was a favourite place of residence with the Numidian kings. (Sil. Italic., iii. 259.) At the mouth of the Tusca was the small town of Tabraca, the name of which is still retained in the island of Tabarkah at the mouth of the river. South of Tabraca, probably on the Tusca, was the important town of Vaga, or Vacca (*Beja ?*), which is described by Sallust as the chief commercial town in Numidia. (Sallust, *Jug.*, 47.) South-west from Vacca was Tagaste, a free state according to Pliny (v. 4), and celebrated as the birth-place of St. Augustin.

The position of Zama, near which the memorable battle was fought between Scipio and Hannibal, B.C. 201, is uncertain. Some writers have considered it the same as the modern Zamorah, which is situated south-west of Setif; but others, with more probability, identify it with the modern Zainah, south-east of Setif. We learn from Livy that Zama was five days' journey from Carthage (Liv., xxx. 29), which distance would better agree with the position of Zainah than with that of Zamorah. Zama was strongly fortified, and was occasionally the residence of the Numidian kings. (Sallust, *Jug*., 56, 60, 61.) Juba fled to this town, after he had been defeated by Cæsar at Thapsus, but the inhabitants refused to admit him within the walls. (Hirtius, *Bell. Afr*., 91.) Strabo relates that Zama was destroyed by the Romans (p. 829); but it is mentioned by Pliny (v. 4) as one of the free towns of the province; and the name of the bishop of Zama occurs in the councils of the African church.

An account of the principal places in the western part of the antient kingdom of Numidia, which was afterwards included in the province of Mauritania, is given under MAURITANIA. The physical features of the country are described under ALGIERS and COSTANTINA. The best account of Numidia is in Shaw's *Travels*.

NUMISMATICS, NUMISMATOGRA'PHIA, or **NUMISMATOLOGY,** the science of coins and medals. [COINS; MEDALS.]

NUMMULITE. [FORAMINIFERA.]

NUN. [MONACHISM.]

NUNCIO (*Nunzio*, in Italian; *Nuntius*, in Latin) signifies a messenger, but is used more particularly to designate the ambassadors sent by the pope to foreign courts. The nuncio is generally a prelate of the court of Rome; if a cardinal, he is styled 'legate.' Previous to the council of Trent, the papal nuncios in foreign countries acted as judges, in the first instance, of matters which were within ecclesiastical jurisdiction; but since that time they have acted as judges of appeal from the decisions of the respective bishops, in those countries only which are subject to the decretals and discipline of the council of Trent. In other kingdoms and states, such as France, Austria, Tuscany, &c., which, though Catholic, hold themselves independent of the court of Rome in matters of discipline, the nuncio has no jurisdiction whatever, and has merely a diplomatic character, like the minister of any other foreign power. (Père Richard, *Bibliothèque Sacrée*, art. 'Nonce.')

NUNCUPATIVE WILL. [WILL.]

NUÑEZ, or **NO'NIUS, FERNAN,** was of the house of Guzman. He is also called 'El Pinciano,' from Pintia Vaccæorum, the former name of Vallisoletum, now Valladolid, where he was born in the latter half of the fourteenth century. Although a knight of the military order of Sant' Iago, he devoted all his ardour to literary pursuits and the diffusion of learning through Spain, where he promoted the study of the Greek, after that of the Latin language had been rendered easy by Nebrisensis (Antonio Lebrija or Nebrija). Among the many eminent literary persons who followed Nebrija's steps, Pinciano stood conspicuous, even before he went to Italy to receive further instruction from Philippus Beroaldus and Govian, a celebrated Greek refugee. On his return to Spain, Nuñez brought back numerous Greek books with him; and Cardinal Cisneros, who admired his talents, appointed him and Demetrius the Cretan professors of Greek at his university of Alcalá, and moreover entrusted to him and to Lope de Astuñiga the Latin version of the 'Septuagint.' Endowed with a lofty spirit and a high patriotic feeling, which were fostered by the writings of antiquity which he expounded, he fought in 1521 with the unsuccessful Commons of Castile against the tyranny of Charles V., or rather his courtiers, a set of unprincipled foreign adventurers, who took advantage of the young prince's vanity and inexperience. Being obliged to leave Alcalá, he took refuge at Salamanca, in which university he taught Greek, Latin, rhetoric, and the natural history of Pliny.

He died in 1553, above the age of eighty, at Salamanca, and left to that famous seminary his select library. He wrote for himself the following epitaph:—'Maximum vitæ bonum mors!'

Among his other great qualities he had that of being very abstemious, but although he abstained from wine, he was fond of inviting his friends and pupils to his table.

Besides the share that he had in the 'Complutensian Polyglot,' Nuñez published 'Annotationes in Senecæ Philosophi Opera,' the text of which writer he restored; 'Observationes in Pomp. Melam;' 'Observat. in Hist. Nat. C. Plin.,' which have often been reprinted; 'Glosa sobre las Obras de Juan de Mena,' which is full of classical learning; 'Letters to Zurita;' 'Refranes y Proverbios Glosados,' which he left incomplete in the midst of his infirmities, a valuable book to the commentator of Cervantes, as Nuñez was well acquainted with Spanish proverbs, and skilful in applying them.

Gomez de Castro, or Gomecius, in his work 'De Rebus Gestis Fran. Ximen.,' Erasmus, Lucius Marinæus Siculus, Lipsius, Nicol. Antonius, Isaac Vossius, Mayans, Teissier, and others, expatiate on the high talents and virtues of Fernan Nuñez de Guzman.

This writer must not be confounded with *Alonzo Lopez Pinciano*, Médico Cesáreo (physician to Charles V.), who attempted the epic in his 'El Pelayo,' and wrote in a series of letters the 'Philosophia Antigua Poëtica,' an extraordinary performance for the age, both as to substance and expression. It appeared at Madrid for the first time in 1596. This second Pinciano was the first modern scholar who ventured to think for himself on the subject of poetic art; he established a philosophical system, and went farther than his master Aristotle. By a careful and minute study of all the writings of that philosopher, he discovered that his 'Poetic' was but a fragment, for Aristotle refers repeatedly in his other works to a second part of the same 'Poetic,' which is lost; a fact which had escaped the notice of all previous commentators.

Pinciano endeavoured to restore dignity to poetry, and to develop its true character; he treats minutely of the senses, of the affections, the faculties of the understanding, and the pleasures of cultivated minds. He defines moreover poetical imitation more precisely than the Greek philosopher. His style however cannot now be considered as a model either of written or conversational language.

NUÑEZ, PEDRO. [VERNIER.]

NUREMBERG. [NURNBERG.]

NÜRNBERG, a very antient city of Bavaria, in the circle of the Rezat, and formerly one of the most flourishing members of the Hanseatic League, is situated in 49° 27′ N. lat. and 11° 4′ 15″ E. long. Nürnberg stands in an extensive and sandy but highly cultivated plain, 945 Paris feet above the level of the sea, on both banks of the river Pegnitz, which divides the city into two unequal parts: the smaller and northern is called the Sebaldus side, and the southern and larger the Lawrence side. The Pegnitz forms three islands within the walls, which are connected with each other and the city by seven stone and nine wooden bridges, and one suspension-bridge, which was commenced in 1824.

Though Nürnberg cannot be considered, properly speaking, as a fortified town, it is surrounded by an old wall, which has eight gates and a great number of round and square towers (Stein says 365, Hassel 119), and a moat nearly 200 feet broad. The circuit within the walls is three miles and a half, within which space there are many squares or markets, and gardens. The streets are in general broad and well paved, but crooked and irregular. The houses are very old-fashioned, retaining externally, with little alteration, the old Gothic style, and their internal arrangements recalling to mind the mode of private life of past ages. The fronts of the houses are often adorned with paintings: they are narrow, but often very deep, with a back front in a parallel street. One of the most remarkable antient buildings is the old fortress called the Reichsfeste, which was probably erected in the tenth century, under the emperor Conrad I., and the care of which was confided in the middle ages to the burggraves of Nürnberg, the ancestors of the house of Hohenzollern. This fortress stands on a pretty steep eminence, and the exterior, having received no modern additions, is an excellent specimen of the antient style. It contains a gallery of 549 pictures in 10 apartments, and many paintings on glass. The town-hall, one of the finest in Germany, is 275 feet wide, and contains, among other curiosities, a number of paintings by Albert Dürer, Hirschvogel, and others. Almost all the churches, 8 Lutheran, 1 Calvinist, and 1 Roman Catholic, are worthy of observation for their architecture and the works of art which they contain. That of St. Sebaldus contains the tomb of the saint adorned with fine statues of the twelve apostles, a noble altar, the celebrated crucifix by Veit Stoss, and painted-glass windows of extraordinary beauty. The church of St. Lawrence is a fine Gothic edifice, and is extremely rich in old German paintings. To each of these churches a Latin school is attached. The church of St. Ægidius, which was built in the Italian style at the beginning of the eighteenth century (1711-18), has a fine altar-piece by Vandyck. Near this church is the gymnasium, in front of which the city erected, in 1826, the statue of Melancthon, by whom that institution was opened in 1526. The church of St. Clara has paintings on glass, of the year 1278. In that of the Holy Ghost the regalia of the empire were formerly kept, by order of the emperor Sigismund in 1424, and likewise many pretended relics of the Passion of our Saviour. The former Dominican church contains the city library of 20,000 volumes, with a collection of the works of Melancthon and of works written at the time of the Reformation. Nürnberg is remarkable for its numerous and well-conducted public institutions of every kind, such as the gymnasium, the Polytechnic Institution, a great number of schools for all classes; 15 free-schools, in which the children are supplied with books, clothing, and bread gratis; a seminary for teachers; a society for the promotion of manufactures, which has founded a school of industry for above 300 girls, and a Sunday drawing-school for the sons of mechanics, in which there are nearly 400 pupils; a Bible Society, and a great many collections, both public and private, of works of art, antiquities, &c.

Before the trade with the East Indies took a new direction, after Vasco de Gama had doubled the Cape of Good Hope, Nürnberg was one of the most important commercial cities in Europe. It forwarded to the North the rich productions of India, which it received from Italy; nor was this the only source of its prosperity. The residence of the burggraves (from the year 1060) and occasionally that of the emperors was a great advantage, and, above all, its manufactures brought a great influx of wealth. Nürnberg was celebrated four hundred years ago for working in brass, iron, and other metals, and for the manufacture of a long list of articles comprised under the general denomination of Nürnberg wares, musical and mathematical instruments, hardware, and toys of all kinds, both of metal and wood. Public and private wealth accumulated, and not only the useful but the fine arts flourished; so that the history of the arts in Nürnberg is a very important part of that of the fine arts in general, especially of painting and engraving. The altered course of the East India trade, the attention of other states to the advantages of commerce, the ravages of the Thirty Years' War, dissensions between the nobility and the citizens, and an increasing load of debt, caused Nürnberg gradually to decline. Yet its trade is still considerable, especially in articles of its own manufacture in iron, steel, and brass; and in hardware of all kinds, turnery, looking-glasses, musical instruments, paper, engravings, painters' colours and pencils, glass, porcelain, watches, calicoes, carpets, and other articles too numerous to mention. The extraordinary cheapness of the Nürnberg toys, most of which are however made by the country-people in the hilly and wooded tract between Franconia and Thuringia, causes the trade in them to be very extensive and important. There is now an annual fair, at which a great deal of business is done.

Nürnberg is first mentioned in history in 1050, and obtained its first charter in 1219. As a free city of the circle of Franconia, celebrated for its industry and commerce, and for great services to the emperor and the empire, it retained its freedom among all the changes made in Germany in 1803. It had a territory, for the most part well cultivated, nearly 500 square miles in extent, with 40,000 inhabitants, and a revenue of 800,000 florins; but the public debt amounting, in 1797, to nine millions of florins, the revenue was not sufficient to pay the interest. The differences with the king of Prussia, who took possession of part of its territory, necessarily increased its difficulties, till the Act of the Confederation of the Rhine assigned over its territory to the king of Bavaria, a decision which was by no means agreeable to the inhabitants. The population of Nürnberg, including the suburbs and the territory, was officially stated to be, in 1826, 39,628, of whom 3200 formed the garrison. The latest accounts we have seen (1838) make the population 41,000, of whom about 3500 are Roman Catholics, and the great majority Lutherans.

The great painter Albert Dürer was a native of Nürnberg, and also Melchior Pfinzing and Hans Sach, the poets, and Martin Behem, who made the first serviceable terrestrial globe. Among the numerous inventions for which the world is indebted to Nürnberg are watches (first called Nürnberg eggs) by Peter Hele, the pedal by Heinric Traxdorf, the air-gun by Lobzinger, the clarionet by C. Denner, brass by Erasmus Ebner, the lock for fire-arms by a person not known, and many others.

(The descriptions of Nürnberg and of the public edifices are very numerous: among them are the 'Nürnbergisches Taschenbuch,' 1829; the 'Nürnberger Jahrbücher,' Hagen's 'Norica,' &c.)

NUT. [Filbert.]

NUTATION. [Precession and Nutation.]

NUTCRACKER, the name of an Insessorial bird, rarely seen in Britain, and whose place in the system it is rather difficult to fix. Some of its habits, and the worn appearance of the tail-feathers from climbing about the branches of trees, together with the nesting in hollows of trees, indicate a relationship to the *Picidæ*. Its manners, which are said to resemble those of the *Jay*, and other circumstances connected with its food and organization, bring it into alliance with the *Crows*, to which family it is generally referred by ornithologists, and so placed as to approximate either to the *Woodpeckers* or *Starlings*. Mr. Vigors considers it as assimilating to the latter family, and especially to the genera *Cassicus* and *Barita*. Mr. Swainson makes it a subgenus of *Corvus* in his subfamily *Corvinæ*, placing it immediately after the subgenus *Pica*, and immediately before the genus *Barita*. The Prince of Musignano arranges it also under the subfamily *Corvinæ*, among which it occupies the last place in his 'Geographical and Comparative List,' whilst it immediately precedes the subfamily *Sturninæ*. Mr. Yarrell (*British Birds*) places it at the end of the *Crows*, and immediately before the Woodpeckers. Sir W Jardine (*British Birds*) arranges the genus between the *Magpie* and the *Jay*. In Temminck's arrangement its place is between the *Jays* and the *Choughs* (*Pyrrhocorax*).

Nucifraga.

Generic Character.—*Bill* conical, longer than the head, straight, the upper mandible having the culmen rounded, overhanging the lower, both terminating in an obtuse and depressed point. *Nostrils* basal, round, open, concealed by hairs directed forwards. *Toes*, three before and one behind, the two outer being united at their base. *Tarsus* longer than the middle toe. *Wings* long and pointed, the first quill shortest, the fourth and fifth longest. (Gould.)

This genus is generally considered to comprehend only two known species:—the bird whose English name heads this article, and *Nucifraga hemispila*, which bears a considerable resemblance to it, though it is clearly a distinct species, described and figured in Mr Gould's 'Century of Birds,' from the Himalaya mountains. The student should however bear in mind that the Prince of Musignano and Mr. Audubon, both high authorities, the former from his extensive and accurate knowledge of genera and species, and the latter from the great attention which he has paid to the habits of the birds of America, include the *Corvus Columbianus* of Wilson in the genus *Nucifraga*.

We select as an example the European species, *Nucifraga Caryocatactes*.

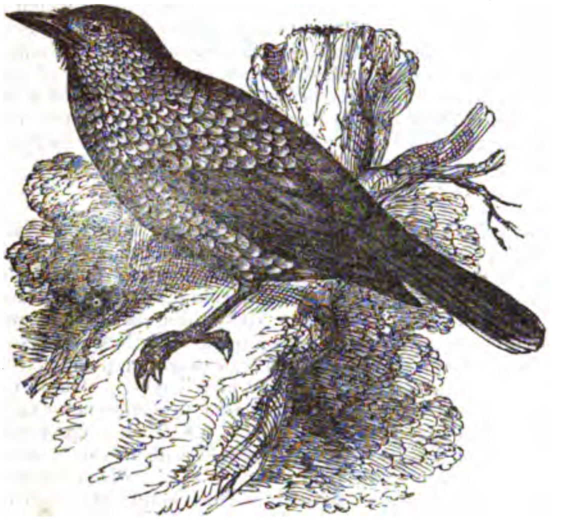
Description.—Size about that of the *Jackdaw*, but the tail is longer. Plumage reddish umber-brown; the body, with the exception of the head and rump, dappled with large white spots which occupy the centre of each feather. wings and tail blackish, shot with green; the feathers of the latter (except the two middle ones) tipped with white. Bill and legs brownish black. Sexes, as in the crows generally, nearly alike. The female is, if anything, a little smaller and her plumage less lively.

This is the *Corvus Caryocatactes* of Linnæus; *Caryocatactes* of Willughby; *Casse Noix* of the French; *Ghiandaia Nucifraga* of *Stor. degl. Ucc.*, *Nocciolaja* of Savi; *Kurz und Langschnäbliger Nussknacker* of Brehm; *Tannen Heher* (Pine Jay) oder *Türkischer Holzschreyer* of Frisch; *Notwecka, Notkraka*, of the Swedes; *Noddekrige* of the Norwegians; *Notkraake* of Brunnich; *Nussrabbe* of Meyer; and *Aderyn y cnau* of the antient British.

Habits, Food, Reproduction, &c.—The manners of the Nutcracker are said, by those who have observed it, to resemble in some degree those of the Jay, and some of its habits those of the Woodpeckers. Like the former it feeds on nuts and berries, as well as on the seeds of the pine, of which it appears to be very fond; and, like the latter, it climbs the trunks and branches of trees, tapping the bark with its bill to start the insects and their larvæ that may lurk beneath, and devour them. They are said to crack nuts much in the same way with the *Nuthatch*. The nest is formed in the hollows of trees, which the bird is supposed to enlarge after the manner of the woodpeckers. The eggs are five or six in number, of a yellowish white or grey, with a few spots of bright grey brown. Temminck states that it sometimes devours young birds and eggs.

Geographical Distribution.—Central Europe. The bird is a rare visitant to Great Britain, and does not appear to have been seen in Ireland. The only one Pennant ever heard of was killed near Mostyn in Flintshire. Montagu mentions one that was killed in Kent, and states that one was seen by an accurate observer near Bridgewater. He also notices two others, which were shot in 1808, one in Devon, the other in Cornwall. Mr. Selby mentions one that was seen in Netherwitton Wood in Northumberland. Mr. Rodd, of Penzance, gave Mr. Yarrell information of one that was seen on a tree on the banks of Hooe Lake. It is recorded by Dr. Moore as having been shot in Devonshire near Washford Pyne Moor. Another is said to have been lately noticed at Pepper Harrow Park, lord Middleton's seat. Mr. Macgillivray gives instances of its having been shot in Scotland.

Temminck records varieties of pure white, or yellowish white, with deeper spots; sometimes with the wings and tail white.



The Nutcracker.

NUTHATCH, the vernacular name for a Scansorial British bird, with much of the habits of the Woodpeckers, and which may be taken as an apt illustration of the genus *Sitta* of Linnæus.

Mr. Swainson places the genus in the subfamily *Sittinæ*, being the second of his family *Certhiadæ*. The Prince of Musignano makes it the first subfamily of that family.

Generic Character.—*Bill* straight, cylindrical, slightly compressed, subulated, accuminated. *Tongue* short, horny, and armed at the point. *Nostrils* basal and rounded, partly hidden by reflected bristles. *Feet* with three toes before and one behind, the outer toe being joined at its base to the middle one; hind toe of the same length as or longer than the middle one, with a long and hooked claw. *Tail* of twelve feathers. *Wings* rather short; the first quill very short, the third and fourth the longest. (Gould.)

Example, *Sitta Europæa*, the *Common Nuthatch*, or *Nutjobber*.

Description.—Plumage above fine blue grey; quills and base of tail-feathers, except the two middle ones, black, the outer tail-feather on each side with a black spot near the tip. A black band passes from the bill through the eye down the sides of the neck, ending abruptly near the shoulders; throat whitish; rest of plumage below rufous brown blending into chesnut on the flanks; bill and feet black; iris hazel. Sexes alike.

This is in all probability the Sitte (Σίττη) of the Greeks, and *Sitta* of the Latins. It is the *Ziolo*, *Picchio grigio*, *Raparino*, and *Picchio formicajo* of the Italians; *Muratore* of Savi; *Torchepot* and *Pic-maçon* of the French; *Kleiber* and *Blauspecht* of the Germans; *Notwacka* and *Notpacka* of the Swedes; *Spætt-meise* of the Danes; *Nat-Bake* of Brunnich; *Klener*, *Nusszhacker*, of Kramer; and *Delor y cnau* of the antient British.

Habits, Food, Reproduction, &c.—Like the Woodpeckers and Creepers, the Nuthatch runs with facility upon and about the trunks and branches of trees; but the tail, which is short and rounded, is of no assistance to the bird in its progress. Unlike the Woodpeckers however, the Nuthatch runs with the head downwards as well as upwards, and indeed the former position of the head appears to be the favourite one; it generally alights on a branch with the head in the downward position, and sleeps in that posture. It is almost constantly in motion. Its food consists of insects and their larvæ, berries, and nuts. The latter it fixes in some chink, and cracks them by repeated strokes of the bill. 'It is a pretty spectacle,' says Willughby, 'to see her fetch a nut out of her hoard, place it fast in a chink, and then, standing above it, with its head downwards, striking it with all its force, break the shell and catch up the kernel.' The same author found beetles in the muscular stomach or gizzard of one opened by him. The filberd gives the Nuthatch but comparatively little trouble; but the more dense hazel-nut calls forth greater energies, and when employed upon one of those nuts, the bird makes the neighbourhood resound with the strokes of its bill. Its call-note in the spring is a clear shrill whistle. The nest is generally made with only a few dry leaves in the hole of a tree, and the eggs, which are from five to seven in number, are of grey-white spotted with reddish brown. If the hole selected be too large, the bird plasters up a part of it with mud, and will renew the plaster if destroyed, whence one of its French names.

The female, when surprised on the eggs or her young, makes a most determined defence with bill and wings, hissing at the intruder violently at the same time. It seems indeed to be a very attached bird. The old French quatrain says—

Le Torchepot et sa femelle ensemble
Vivent en paix tout le long de l'Esté.
Parquoy l'on dit, que qui est arresté
A son mesnage au Torchepot ressemble.'

Of its bravery and courage when made captive, a painful story is told in the 'Magazine of Natural History.' A Nuthatch had been winged by a sportsman, and was put into a small cage made of oak and wire. During a night and day, the period of his confinement, his tapping labour was incessant, and at the end of that time the wood-work of his prison was pierced and worn like worm-eaten timber. His impatience of his situation was excessive; his efforts to escape were unremitted, and displayed much cunning and intelligence. He was fierce and fearlessly familiar, and voraciously devoured the food placed before him. His hammering is described as having been peculiarly laborious, for he did not peck as other birds do, but taking a firm grasp with his great feet, he turned upon them as upon a pivot, striking with his whole weight, and thus assuming with his body the appearance of the head of a hammer in motion. This unfortunate bird sank at the close of the second day under the combined effects of his vexation,

Common Nuthatch.

assiduity, and voracity. The Rev. T. L. Bree mentions one which he caught in a common brick trap: when the bird was found, the bill appeared to be truncated, and he inferred that it had been fairly ground down to about two-thirds of its original length by the pecking of the bird at the bricks in its efforts to escape.

Geographical Distribution.—Europe generally. Temminck notes its range as extending far to the north and south, and as rather abundant in central Europe. Mr. Selby traced it in Britain as far north as the banks of the Wear and Tyne; and it is noted in Mr. Thompson's Irish list.

Mr. Gould describes and figures two other species, *Sittæ rupestris* and *Asiatica*, in his 'Birds of Europe.'

The genus is found in India and America; and there are closely allied forms in the Indian Archipelago and in New Holland.

NUTMEG. [MYRISTICA.]

NUTRITION. One of the chief differences between inorganic and organic bodies is, that the former retain their form and other characters by a passive resistance to change; the latter by a constant change of their particles, in which those that in the constant actions of life or by the influence of external agents have been destroyed, are replaced by others similar to themselves. This constant change is effected by the process of nutrition. Nutrition is the last step of the general process of assimilation, by which living bodies convert the materials which they derive from their food into substances like their own, and appropriate the materials thus changed to their own increase or repair. The several nutritive matters received into the living body are variously altered by digestion, absorption, respiration, and by all the other changes which the blood or other fluid undergoes in its passage to the several parts of the frame; these changes constitute the process of assimilation, at the end of which each part of the body abstracts from the general and homogeneous mass of nutritive fluid that which is required for its own growth or repair; muscle abstracting particles to form muscle, nerves from the same fluid abstracting particles to form nerve, and so on.

That a constant change of particles goes on in the majority of the tissues of the living body may be considered certain. It is evidently necessary from the nature of the case; for the living body is exposed to the same external agents as inorganic matter is, and all its own actions are so many more sources of waste to each tissue. Some constant power of repair must therefore be requisite to maintain living bodies in a state of integrity against these constant sources of waste; and that power is exerted in nutrition. Its influence is shown in the fact, that the living body retains throughout life, or a great portion of it, its form and composition less altered than the most solid of inorganic matters exposed to similar influences. Within certain limits also, the greater the waste, the greater the nutritive supply: thus, for example, by constant exercise the size of the muscles, so far from being decreased, is ultimately increased, the effect of nutrition being not only to replace that which was destroyed, but to supply a certain quantity more. We may clearly observe an application of the same law in the cuticle; that in the palm of the hand is more than twice as thick as that on the back of the arm, yet the former is subject to the most friction; and if the friction of the palm be greatly increased, the cuticle, notwithstanding the greater waste, increases in thickness in a yet greater proportion, so as to defend the subjacent skin from the greater source of injury to which it is exposed.

It is true that when the body does not change in any of its sensible qualities, we cannot be so well assured of any change of particles still going on; but we may reasonably assume that the two parts of nutrition, the removal of old and addition of new particles, which at other times we trace producing either an increase or decrease of the body, as one or the other of them predominates, are exactly balanced. If we examine, for example, the growth of any hollow organ of the body, as the heart, we find that in advancing years from childhood to manhood, it increases not only in its whole bulk, but also in the size of its cavities, and that, at every period of life, the size of the cavities and the thickness of their walls bear nearly the same proportion. Now, if only an addition were made to the exterior of the heart of a child, its whole bulk would be increased, but the size of its cavities would be disproportionately small. We must therefore assume that substance is removed from the interior of the heart, at the same time, though not in exactly the same quantity, that substance is added to its exterior In like manner, when the heart diminishes in size, as it usually does in persons labouring under consumption, material must be at the same time abstracted from the exterior and, in rather a less proportion, added to the interior Whatever of this kind is true of the larger organs must be equally so of the small ones; so long as they preserve the same form and proportions, no change of size can take place without the concurrence of the two processes of nutritive deposition and absorption; when the former preponderates, the part will increase in size—when the latter preponderates, it will diminish; the former, when connected with disease, is named Hypertrophy [HYPERTROPHY], the latter Atrophy. [ATROPHY.]

The coincidence of these two processes, where any change of size takes place, being thus proved, and their continuance, when no such visible change occurs, being necessary, we may fairly assume that in the latter case, in the state of nutritive equilibrium, they still continue, though their opposite effects being exactly balanced, the ultimate result is not discernible. Popular belief, adopting this idea as one of whose truth there could be no possible doubt, has even assigned the periods of time in which one whole set of particles is removed and replaced. There is no evidence whatever upon which any such calculation can be made; the period in which an entire change is completed probably varies greatly in different tissues and different external circumstances, and in the bones and teeth it is probable that the particles once deposited are never removed, so long as the animal's size and other characters remain unaltered.

The process of nutrition is concerned in the production of two apparently different results—that of development and that of growth. In development the added particles not merely increase the size of the part, but produce a change in its form or its substance. Thus, the whole body, with all its varieties of tissues, and through all its changes of form, is *developed* by nutrition, from a small part of a little sac [FŒTUS], which, to all appearance, is composed of homogeneous materials. In *growth* each part increases by the predominant deposition of particles within and around those of which it was previously composed, and similar to them. These two nutritive processes, though in the period of life previous to the adult age they are usually concurrent, may go on independently of each other. Thus the body may be deficient in development, some part of it being monstrous, that is, remaining of the same form as that which it had in the embryonic state [MONSTER], and yet with this defect in form it may increase in size, for monsters are commonly well-grown; and, on the other hand, being perfect in development and form, the body, or some part of it, may be deficient in size. A dwarf is an example of a defect of growth; a hare-lip, a cleft palate, an anormal unossified cartilage, are examples of defects of development: both are defects in the process of nutrition, but the failure is in each in a different direction.

One of the most important facts regarding the process of nutrition is that lately discovered by Dr. Schwann of Berlin (*Mikrosk. Untersuch. über die Uebereinstimmung der Thiere und Pflanzen*), that all the tissues of the body, however different in their fully developed state, yet originate from the same fundamental forms, and up to a certain period of their development pass through the same series of changes. He has shown that the law of development from cells, which Schleiden had proved to obtain in the formation of all vegetable tissues (*Beiträge zur Phytogenesis*, Müll. Arch., 1838), holds with equal truth in all the animal tissues, and thus that in their first periods of existence all organised structures follow the same laws of formation. The great principle of formation is briefly this:—from a living but amorphous substance, to which the name of cytoblastema is given, minute roundish corpuscles first form. Around each of these a layer of organic substance, being after a time deposited and becoming membranous, forms a spherical or elliptical cell enclosing the corpuscle in or upon its wall. Around or rather upon this cell, a second cell next forms in the same manner as the first had, and to a part of its walls the first cell remains attached, and forms what is named the nucleus of the cell. These cells, containing nuclei, which again enclose one or more corpuscles, may be regarded as the original forms of which all the solid parts of the body are composed, or from which, altered according to various but certain laws, they are all produced. As examples of such primary cells in their simplest form and separate, we find in the animal body the blood-globules, which float in a quantity of fluid cytoblastema. Nearly similar cells with nuclei are found, forming membranes, with scarcely any intervening substance, in the horny tissues, as the cuticle, nails, feathers, &c., in which moreover each cell presents evidence of vitality to a certain degree independent of the rest of the body, inasmuch as they undergo various changes of form, flattening, enlarging, and splitting into fibres, after their first formation. In the next stage, the cells are separated by a larger quantity of intervening substance, with which their walls become amalgamated, as in the cartilages, bones, and teeth, in which such primary cells constitute the peculiar corpuscles by which those tissues have been long distinguished, and the intervening substance, which forms the greater part of the tissue, is analogous to the soft or fluid cytoblastema of other parts. In these tissues also, the cells begin to acquire some peculiarities of form, sending out branched canals from their sides in a star-like manner, and becoming elongated. In the next degree similar cells, existing in the early periods of the tissue, acquire in the course of its development more peculiar forms, lengthening into the form of fibres and then splitting up into bundles of filaments, so as to form the fasciculi of cellular tissue, tendons, and elastic tissue, which remain connected by a very small quantity of the amorphous cytoblastema. Lastly, instead of each cell lengthening and splitting into fibres, we find a number of cells arranging themselves in rows and adhering together, till, by the absorption of their attached membranous walls, their cavities open into each other and form a continuous hollow tube. Thus they form a kind of elongated secondary cell, which, continuing to grow in length and having peculiar substances deposited in its interior, acquires the characters of the fibres of peculiar tissues, as of the muscles or the nerves. In other cases each cell elongates and branches, and becomes connected with others which like it retain their cavities, so as to form together a series of tubes in the form of a network, which thus make up the capillary blood-vessels.

Each tissue thus formed from a series of cells increases in size, either by the increase of its primary cells or the elementary forms developed from them, by the interstitial deposition of particles within their tissue or in their cavities, or it grows by the formation of new cells within the tissue interposed between those previously existing, or (though very rarely in the animal body) by the development of young cells within the older ones.

The material of nutrition is in animals obtained from the arterial blood, which is constantly sent in the vessels distributed amongst or near the elementary structures of each tissue; but the proper act of nutrition is performed not by the power of the blood-vessels, as has been commonly supposed, but by the cells and the structures analogous to them, which convert the common nutritive matter drawn from the blood into their own proper tissue. The blood-vessels are only the conveyers of the materials for nutrition, and the difference commonly made between growth by intussusception, or deposition within the tissue of a part, and growth by apposition, or deposition on the surface of a part, is more apparent than real. The parts that are said to grow by apposition are those in which vessels do not run through the very substance of the tissue, but only on one side of it, as the cuticle, the vessels for the nutrition of which run in the subjacent skin. In these the formation of cells from the nutritive matter poured out from the blood-vessels can only take place on the surface of the skin, though they may undergo various changes when removed to a short distance by fresh depositions beneath them. In vascular parts, on the other hand, the nutritive matter is effused in all the interstices of the net-work of their blood-vessels, and therefore in all parts of the interior of the tissue; but here also the development of the nutritive matter must take place in layers concentric with the blood-vessel from which it was poured out, and therefore by *apposition*, though, with reference to the mass of the organ or tissue, it seems to be a growth by intussusception. The formation of fresh cells is therefore always by apposition on those already existing; but the cells and the elementary tissues immediately developed from them increase by intussusception, that is, by particles being deposited in the interspaces of those already existing, or in the cavities which the membranes of the cells already formed surround.

Thus the process of organic nutrition is widely different from that by which inorganic masses increase in size, as in crystallization, which, as in it alone inorganic matter acquires definite form as it increases, can alone be compared with organic growth. In crystallization the addition of similar particles is entirely by external apposition, and the crystal has no power of attracting the particles of any matter different from its own: organic particles (as cells), on the contrary, not only attract particles into their interior spaces, but alter them on their passage, decomposing them from their previous elementary composition, and recombining them into matter like their own.

In healthy nutrition each part appropriates particles similar to its own, or differing according to certain laws of development; in disease, parts frequently appropriate other substances than their own, and all the solid products of various diseases may be regarded as the effects of morbid processes of nutrition. Some of these are formed according to the laws of normal development, and are only morbid because out of place, as cicatrices, adhesions, and the other similar products of simple inflammation; others are produced by the deposition of substances different from any of those already existing in the body, as in the production of various tumours. The former are composed of a tissue similar to cellular tissue, but the injuries of parts are but partially repaired by it, because the new tissue, which is in all cases nearly the same, differs in many of its characters from that which it replaces.

The most complete exercise of the process of nutrition in repairing injuries, whether from accident or disease, is exhibited in the regeneration of parts, but in man and the higher animals there are but few examples of a perfect reproduction of the injured or destroyed tissue. The bones and the non-vascular tissues are probably the only instances in which a tissue destroyed by disease or internal injury is replaced by one similar to itself.

In all these cases of repair or regeneration of tissue, the same process of the effusion of nutritive matter and the several stages of formation and alteration of the cells, is gone through which is observed in the first development of the tissues. But the process fails before the higher changes are accomplished, and the repairing tissue acquires only a low degree of development. As far also as they have been at present examined, the various morbid growths appear to be formed on a similar plan, and to proceed from a formation of primary cells.

NUTTALITE, a mineral which occurs crystallized. Primary form a square prism. Cleavage parallel to the lateral planes. Fracture uneven. Hardness 4·0 to 4·5. Colour grey. Lustre vitreous. Translucent. Specific gravity 2·7 to 2·8.

It is found at Bolton in Massachusetts imbedded in calcareous spar. Analysis by Thomson—

Silica . . .	37·81
Alumina . . .	25·10
Lime . . .	18·33
Potash . . .	7·30
Protoxide of Iron . .	7·89
Water . . .	1·50
	97·93

NUWAYRI is the patronymic of a celebrated Arabian historian of the eighth century of the Hejira, whose complete name was Ahmed Ibn Abd-al-wahhab Al-bekrí Al-teymí Al-kindí, and who was further distinguished by the honourable surname of *Shehábu-d-dín* (bright star of religion). He was born at Nuwayreh, a small town of the province of Bahnassá in Egypt, in the year 682 of the Hejira (A.D. 1283-4). Nuwayri distinguished himself as a theologian of the sect of Sháfei, and also as a rhetorician and grammarian, and he wrote several works on these subjects, the titles of which have not reached us. But the work which has made Nuwayri known among European scholars is his 'Neháyetu-l-árab fí fonúni-l-adab.' It is a sort of cyclopædia, consisting of thirty books or volumes, and divided into five *fenn* (subjects), each of which is further subdivided into *kasm* (sections), containing each a certain number of *bab* (chapters). The first four *fenn* treat of the physical sciences and the several branches of natural history and moral philosophy. The fifth and last, which is likewise the most valuable for Europeans, is wholly occupied with a history of the Mohammedan settlements both in the east and west. The sixth *bab* (chapter) of the same contains a narrative of the conquest of Africa, Spain, and Sicily by the Saracens, together with a chronological history of the sultans of the family of Umeyyah, who filled the throne of Cordova from A.H. 138 to 428 (A.D. 755 to 1036), and a short account of the principal events of their reigns.

Nuwayri died, according to Haji Khalfah, in the year 732 of the Hejira, at the age of 50. Among his other accomplishments his biographers say that his hand-writing was very fine; indeed he seems to have made a trade of it. for Soyútti, in his 'History of Egypt' (Ar. MS. in the Brit. Mus., 7331, f. 127), says that he made eight transcripts of the large collection of Mohammedan traditions, by Bokhari, entitled 'Sahih,' for each of which he was paid the enormous sum of one thousand dirhems, or about sixty-five pounds sterling. He dedicated his large work to Almalek An-nasser Kalaun, sultan of Egypt (reigned from A.H. 678 to 689), a liberal patron of letters, by whom he was munificently rewarded.

Complete copies of Nuwayri's work are exceedingly scarce. We are however assured that it is entire in the library of the university of Leyden. The Escurial library possesses one volume, containing parts xi. and xii. (*Catal.*, No. 1637.) There are also several loose volumes at Paris belonging to different sets, and among them one supposed to have been written by Nuwayri himself. (*Bib. Reg. Pari. Cat.*, No. 702.)

Various extracts from the work of Nuwayri have been published at different periods. Reiske was the first who mentioned the work, in his 'Prodigmata ad Hagi Khalifæ Tabulas,' Leyden, 1766. Albert Schultens next gave a slight notice of the historical part of his work, together with a few extracts from it, at the end of his 'Monumenta Vetustiora Arabum,' published at Leyden, in 1740. Again, in 1786, Reiske made use of it for his 'Historical Notes,' published as a continuation to his translation of Abú-l-fedá (Hafniæ, 1789-94). Schultens published also a Latin translation of some fragments of Nuwayri in the collection entitled 'Historia Vetustissimi Imperii Joctanidarum in Arabia Felice.' That chapter of the fifth *fenn* which treats of the conquest of Sicily by the Mohammedans was next translated, first into Latin, by Rosario Gregorio, and printed in folio at Palermo, 1790, and inserted in the collection entitled 'Rerum Arabicarum quæ ad Historiam Siculam spectant, amplissima collectio,' and then into French, by Mr. J. J. A. Caussin; and Mr. James Lassen Rasmussen has lately published, in his 'Additamenta ad Historiam Arabum ante Islamismum,' Copenh., 1821, some fragments of the same work, in Arabic and Latin, respecting some curious customs of the Arabs who preceded Mohammed.

Notwithstanding all this, Nuwayri's work is still imperfectly known, and it is to be regretted that the historical part—at least that concerning the settlements of the Arabs on the continent of Europe—has not been published entire, as it would throw great light on the history of the middle ages.

Haji Khalfah's *Kashfu-dh-dhunún*, a bibliographical dictionary, in the British Museum; At-soyútti's *History of Egypt*, ib.; *Bib. Rich.*, No. 7331, fol. 70, v. *et passim.*

NUX VO'MICA. [Strychnos.]

NYCTALO'PIA. [Hemeralopia.]

NY'CTERIS. [Cheiroptera, vol. vii., p. 24.]

NYCTHE'MERUS. [Pavonidæ.]

NY'CTIA. [Owls.]

NYCTI'BIUS, M. Vieillot's name for a genus of birds, the type of which is the *Great Ibijau*, the *Grand Crapaud volant de Cayenne* of Buffon, *Caprimulgus grandis* of Latham.

Generic Character.—Bill very much depressed and dilated, especially at the base, where it is furnished with bristles, narrowed and hooked at the point; upper mandible with an obtuse tooth on each edge, towards its origin, very much developed in the old bird; lower mandible larger, with the edges curved outwards; gape very wide, reaching to the eyes; anterior toes united at the origin by a small membrane; lateral toes unequal; hallux robust and flattened. First quill shorter than the fifth.

Description of the Great Ibijau.—Size about that of a stout owl; total length of the bird rather more than twelve inches; of the bill, taken from the corners of the mouth, rather more than three; tail a little graduated, and exceeded by the wings when folded by a few lines; plumage brown, speckled with black, fulvous, and white, principally upon the back, wings, and tail; breast of a deeper brown than the spots; head, neck, and lower part of the body striped transversely with the same colours. In some individuals the plumage is more brown than it is in others.

Habits, solitary. The bird haunts hollow trees, and prefers those which are near the water. [Night-Jars.]

Nyctibius grandis.

NYCTICE'BUS. [Slow Lemur.]

NYCTI'CORAX, Mr. Stephens's name for a genus of *Grallatores*, or *Wading Birds*, belonging to the family *Ardeadæ* (Herons and Cranes). Mr. Swainson has changed the name to *Nyctiardea;* but besides the inconvenience arising from the change, the generic name *Nyctiardea* is a hybrid word derived from Greek and Latin roots, and therefore objectionable.

Generic Character.—Bill very strong, rather longer than the head, compressed; upper mandible curved towards the point; maxilla sulcated for three-fourths of its length and emarginated; culmen rounded; tomia of both mandibles straight and sharp, that of the under mandible entering within the upper one. *Nostrils* basal, longitudinal, placed in the furrow of the maxilla, and covered above by a naked membrane; lores and orbits naked. *Legs* of mean length, slender. *Toes* three before and one behind; middle toe shorter than the tarsus, exterior toe connected by a membrane to the middle one as far as the first joint. *Claws* short, falcated, that of the middle toe pectinated. *Tibiæ* naked for a short space above the tarsal joint. (Gould.)

This form, of which at least seven species are now known, is widely diffused. Species occur in Europe, Asia, Africa, and America; and have been found in Manilla, New South Wales, and Tierra del Fuego.

We select as our example *Nycticorax Europæus*, Stephens; *Nycticorax Gardeni* Jard.; *Ardea Nycticorax*, Linn.

Description.—Old Birds—no difference in that stage of life between the sexes. Top of the head, back and scapulars, black with bluish and greenish reflections; three white very narrow feathers, six or seven inches in length, taking their origin at the back of the head just above the nape, and descending backwards; lower part of the back, wings, and tail clear ash-colour; forehead, space above the eyes, throat, front of the neck, and lower parts white; bill black, yellowish at the base of the lower mandible; iris red; feet yellowish green; length rather more than 1 foot 8 inches.

Young of the Year.—The three long nuchal feathers absent; top of the head, nape, back, and scapulars of a muddy brown, with longitudinal bright red dashes on the centre of each feather; throat white, with small brown spots; feathers of the front and sides of the neck yellowish, with wide brown borders; coverts of the wings and quills ashy-brown, marked with great yellowish white spots at the extremity of each feather; lower parts clouded with brown, white, and ash-colour; middle of the belly whitish; *arête* and point of the bill brown, the rest greenish yellow; iris brown; feet olive brown.

In this stage it is the *Ardea maculata*, and *Ardea Gardeni*, Gmel.; *Le Pouacre* and *Le Pouacre de Cayenne*, Buff.; *Spotted* and *Gardenian Heron*, Lath.; and *Scarza cenerino*, 'Stor. degl. Uc.' Indeed ornithologists have described it as a distinct species, in almost every progressive stage of plumage.

In the old state the bird is the *Bihoureau*, *Roupeau*, and *Heron gris* of the French; *Scarza Nitticora* of the Italians; *Der Nacht-Reiher* and *Aschgraue Reiger mit 3-nacken federn* of the Germans; *Blaauwekwak* of the Netherlanders; *Night-Heron* and *Lesser Ash-coloured Heron* of the British.

Habits, Food, Reproduction, &c.—The *Common Night-Heron* appears to affect high situations by day, and in the evening resorts to the low-lands, marsh, or river side for its food, which consists of fish, for choice, and in their absence of frogs, mice, and even insects. The old French quatrain says:—

'Le Bihoureau espece de Heron
Es haults rochers et es collines hante.
Sa forme est peu au Heron differente.
Sus le rivage il vit, et environ.'

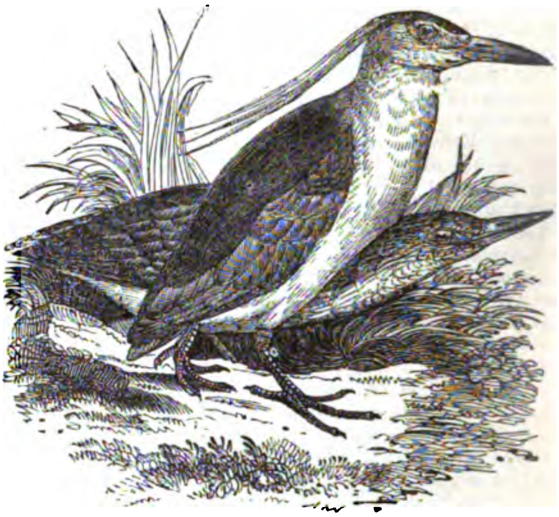
The general truth of this picture of its habits is borne out by modern observation; and its fondness for perching on high situations is attested by Mr. Gould, who received a fine adult specimen which had been shot from a high tree in the gardens at Frogmore near Windsor. The nest is built of sticks on the topmost branches of trees, and the bird breeds, like the *Common Heron*, in society. Where there are no woods, the nest has been found among reeds. The eggs, four in number, are pale greenish blue.

Geographical Distribution—very wide. Since the article BITTERN was written, the Prince of Musignano has corrected the statement of its identity with the *Qua Bird*, which he notes as distinct, in his *Geographical and Comparative List*, under the name of *Nycticorax Americanus*, Bonap., *Ardea Nycticorax*, Wils. In addition to the localities given in the article above quoted, Col. Sykes notices it among the collection of birds' skins formed at the Cape of Good Hope by Captain Spiller, R.A. (*Zool. Proc.*, 1835.) It will be observed in the article BITTERN, that Le Vaillant had previously noticed it in South Africa. Mr. Gould records it, among other localities, from North Africa. Dr. Von Seebold and M. Bürger saw it in Japan. M. Lesson states that he found it at the Falkland Islands (Isles Malouines).

In Europe, M. Temminck notes it as rather abundant in most of the southern countries, but as more rare towards the north; and as not numerous in Holland. He considers the bird found in North America as the same species; but in this, it seems, he is mistaken.

In these islands the common Night-Heron is a rare visitor. In the last editions of Pennant, the specimen in the Leverian Museum, which was shot near London, is noticed, and the editor had heard of another having been killed in Suffolk; and Dr. Latham, in a note to the same work, records one that was killed at Cliefden in Buckinghamshire. He adds, that it is common in Spain and about Gibraltar, and that it inhabits China and India; and falls into the general error, as it now seems to be considered,* that the North American species is identical with it.

Montagu notices a specimen shot on the Ouse near Ampthill, and another (a young bird—*Gardenian Heron*) was shot near Thame in Oxfordshire, by Lord Kirkwall. Bewick took his figure from a specimen in the Wycliffe Museum. Two came under the observation of Mr. Selby:—one shot by the earl of Home, at the Hirsel, near Coldstream, in 1823; and another, now in Sir W. Jardine's museum, killed about two years afterwards in the neighbourhood of Dumfries. It appears in Mr. Thompson's Irish List. He saw a specimen in Dublin, which, he was informed, was sent to the bird preserver, in whose possession it was in a fresh state, from Letterkenny, early in 1834.



Common Night-Heron.
Front figure, adult; back figure, young.

NYCTI'NOMUS. [CHEIROPTERA, vol. vii., p. 24.]

NYCTIORNIS. [MEROPIDÆ, vol. xv., p. 118.]

NYCTI'PETES. [OWLS.]

NYCTO'PHILUS. [CHEIROPTERA, vol. vii., p. 24.]

NYKÖPING. [SWEDEN.]

NYL GHAU, or NEEL GHAU. [ANTELOPE, vol. ii., p. 76.]

NYMEGEN. [NIMWEGEN.]

NYMPHA'CEA, Lamarck's name for a family of Dimyarian conchifers, consisting of the genera *Sanguinolaria*, *Psammobia*, *Psammotea*, *Tellina*, *Tellinides*, *Corbis*, *Lucina*, *Donax*, *Capsa*, and *Crassina*. To these Mr. G. B. Sowerby suggests that *Gratelupia* and *Egeria* may be added. [CONCHACEA; CONCHIFERA; GRATELUPIA; MALACOLOGY, vol. xiv., p. 319 (*Nymphidæ*).]

NYMPHÆA'CEÆ, a natural order of aquatic plants, with floating leaves and solitary flowers, found in all the hot and temperate parts of the world. They usually have four sepals and many petals, which latter gradually contract into stamens, indefinite in number, and either hypogynous or adherent to the sides of the carpels. The ovary is superior, divided internally into numerous cells, to whose sides adhere many seeds, containing an abundance of albumen and a small embryo external to it: the stigmas radiate from the apex of the ovary. The order differs from Ranunculaceæ in the consolidation of its carpels, from Papaveraceæ in the placentation not being parietal, and from Nelumbiaceæ in the want of a large truncated disk containing monospermous achenia. The stems of these plants are fleshy rhizomata, rooting in the mud at the bottom of the waters in which they grow; and their woody tissue is so loosely disposed among the cellular, as to have given rise to a controversy concerning the real nature of the plan on which it is arranged, most writers considering, with us, that it is Exogenous, while others refer it to the Endogenous type. The species of this order are generally plants of great beauty, either the flowers or the leaves being of unusual size. The white water-lily (*Nymphæa alba*) and the yellow (*Nuphar luteum*) of our own rivers and ponds are among the finest specimens of floral development in these latitudes; in other countries both their size and colour are augmented, brilliant tints of blue and crimson being added to the pure white of our native species, and the most delicious odour being also emitted. In Demerara grows the *Victoria regia*, whose flowers have a diameter of fifteen inches, while the leaves are as much as six feet and a half across. (*Penny Magazine*, vol. vii., p. 20; and *Botanical Register* for 1836. Miscell., No. 13.) In the East Indies the *Euryale ferox* emulates the Victoria in the size of the leaves, but its flowers are small and inconspicuous. In both these plants the farinaceous seeds are used for food.

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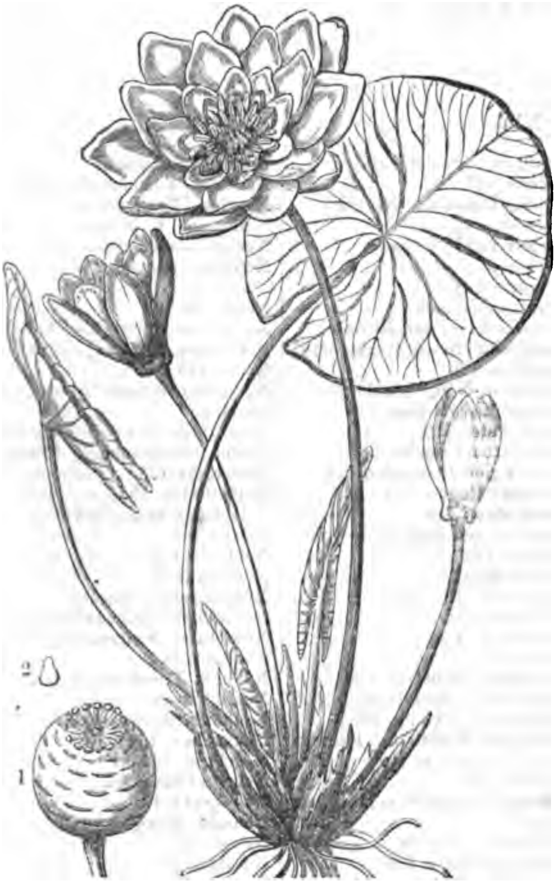
* Mr. Gould appears still to entertain doubts whether this bird and the North American species are not the same; for, in his magnificent work on the 'Birds of Europe,' he says, 'if not identical, the Night-Heron of North America bears so great a resemblance to the European bird, as to require an experienced eye to detect the difference; the American birds are however, we believe, larger in all their proportions.' Latham, on the contrary, says that the American birds are smaller



Nymphæa alba.

1, the ovary, on which are seen the scars left by the petals and stamens removed from it; 2, a seed.

NY'MPHICUS. [Psittacidæ.]

NYMPHODO'RUS, a surgeon, whose date is not exactly known, but who must have lived some time before Christ. He is mentioned by several antient authors as the inventor of a machine for reducing luxations of the femur (Cels., *De Med.*, lib. viii., cap. 20; Gal., *Comment. in Hippocr. de Artic. Libr.*, tom. xviii., pars i., p. 736, ed. Kühn), and also of a sort of box (γλωσσοκομεῖον) for fractures of the limbs (Oribas., *De Machinam.*, cap. 24). He is probably the same person as Nymphodotus mentioned by Aetius (*Tetrab.* iii., Serm. i., cap. 45, 49), Paulus Ægineta (lib. vii., cap. 12), and Galen (*De Composit. Medicam. per Genera*, lib. vi., cap. 14, tom. xiii., p. 926, ed. Kühn).

NYMPHS (Νύμφαι, *Nymphæ*) were female deities in the Greek and Roman mythology, who were supposed to preside over all parts of the earth. Those who presided over rivers, brooks, and springs, were called *Naiads;* those over mountains, *Oreades;* those over woods and trees, *Dryades* and *Hamadryades;* those over the sea, *Nereids;* those over valleys, *Napææ*, &c. They are represented as beautiful young women; and indeed their name, which is probably connected with the Latin *nubo*, appears to have signified originally marriageable young women. They were the attendants of Hera, Aphrodite, Artemis, and other of the goddesses; and the nurses of many of the gods, as Zeus, Dionysus, and Pan. Their lives were very long, but they were not immortal. (Paus., x. 31, sec. 2.) They were worshiped in many parts of Greece, and were propitiated by offerings of milk, oil, and honey, and by sacrifices of lambs (Theocr., *Id.*, v. 53, 149); and temples were also dedicated to them in Italy. (Cic., *De Nat. Deor.*, iii. 17.) [Naiads; Nereids.]

NYSSO'NIDÆ, a family of Hymenopterous insects belonging to the section Fossores. This family is thus characterised by Latreille:—Labium either entirely or for the most part hidden; the maxillæ and labium do not form a proboscis; mandibles without any internal notch; head moderately large; abdomen either conical or somewhat ovate, and with a short peduncle; antennæ filiform, with the first joint but slightly elongated.

The principal character which distinguishes this family from its congeners is the absence of a notch on the inner side of the mandibles. It contains the following genera:—*Astata*, *Nysson*, *Oxybelus*, *Nitela*, and *Pison*.

In the first of these genera, *Astata* of Latreille, the eyes are large and of an oval form, converging at the *vertex*, and in the male sex meeting; the mandibles are bifid at the apex: the anterior pair of wings have one narrow, short, and appendiculated marginal cell, and three submarginal cells, of which the first is narrow, longitudinal, divided obliquely near the middle by an obsolete nervure that runs from the base of the stigma to the middle of the first transverso-cubital; the second submarginal cell is triangular, and receives both the recurrent nervures; the third is very distant from the apex of the wing; the legs are moderately long and very spinous in the female.

Astata boops (Schrank) is about half an inch in length; the head, thorax, and legs are black, and the body is red, with a black tip and a small spot of black at the base. This species is found in various parts of England and on the Continent, but appears to be local. The female builds her nest in the ground, and is said to select the burrow formed by some other insect for the purpose. Mr. Shuckard, in his excellent work on the British Fossorial Hymenoptera, states that the males are much more abundant than the females; and whenever he succeeded in capturing the latter with its prey, he always found it to consist of the larvæ of *Pentatoma bidens*. Mr. Curtis has captured specimens laden with the larvæ of *Pentatoma prasina*, and a little bee (*Epeolus variegatus*) is preyed upon by the Astata to feed her larvæ.

In the genus *Nysson* (Latreille) the anterior wing has three submarginal cells; the second cell receives both recurrent nervures and is petiolated; the first submarginal cell is considerably longer than the two others; the mandibles are terminated by a simple point; the eyes are oval and prominent. Five species of this genus are recorded as British.

The genus *Oxybelus* (Latreille) is distinguished by the eye being oval and slightly prominent; the antennæ short and arcuated; the anterior pair of wings have a narrow marginal cell slightly appendiculated, and one submarginal cell, which receives a single recurrent nervure; abdomen short. Eight species of this genus are described in Mr. Shuckard's work: the most common is the *Oxybelus uniglumis*, an insect about a quarter of an inch in length; black, with a row of white spots on each side of the abdomen, and with the tibiæ and tarsi red. It preys upon flies, which it carries by its hind legs to deposit in the burrow in which the young are reared.

The genus *Nitela* (Latreille) differs from the last in having the antennæ longer and nearly straight, and with the second and third joints of equal length. Like *Oxybelus*, it has but one submarginal cell; the mandibles are bifid at the apex; there are no protuberances on the thorax, nor spines on the legs.

In the genus *Pison* (Spinola) the eyes are emarginated; there are three submarginal cells to the anterior pair of wings; the second cell is very small, petiolated, and receives two recurrent nervures.

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O.

O, in the vowel series, if arranged according to the nature of the sound, occupies the position between *a* and *u*. In the hieroglyphical characters it appears, according to Champollion, to have been a picture of an eye, and even in the old Greek alphabet it is occasionally found with a dot in the centre, to represent the pupil, for instance in the Elean Tablet. But for the different forms of the letter see ALPHABET. The changes to which this vowel is liable are numerous.

It is convertible with the adjoining vowel *u;* and indeed the two characters seem to have had a common origin. Thus, the old Greek alphabet would appear to have once terminated, like the Hebrew, with *tau*, so as to exclude the *upsilon;* whereas the Etruscans had a *u* but no *o*. Hence the predominance of the *o* in Greek, of the *u* in Latin. Within the limits of the Latin itself the two letters are often interchanged, out of which arises the confusion between the second, or *o*, and the fourth, or *u* declension, to both of which belong *ficus*, *cibus*, *senatus*, *tumultus*, *ornatus*, *laurus*, *domus*, &c. The words *consul* and *consulere* also appear as *cosol* and *cosolere*, and they have both a common root with *solium*, a seat. The English language, too, has often an *o* written where *u* is heard, as *one*, *none*, *once*, *come*, *done*, *won*, *some*.

2. With *a*. Grimm has pointed out this change as existing between the Latin and Teutonic tongues, as *doma-re*, *longus*, *odium*, &c., compared with *zähm-en*, *lang*, *hass*, &c. Hence too the double form of the name *Longobardi* and *Langobardi*. So, in Latin, from the root *gno* (*gnosco*) were formed *gnarus* and *ignarus;* and again, from these *narrare* and *ignorare*, in the latter of which the original vowel reappears. Again, with *clarus* is connected *gloria*, as closely as *gratia* with *gratus*. It is probable too that the masculine *bono* and the feminine *bona* were mere dialectic varieties which originally had no distinction of gender. Thus in the Gothic the converse prevails, the forms in *o* being feminine, those in *a* masculine. Lastly, the English and Scotch have many instances of the interchange, as *one*, *two*, *stone*, in the one, *ane*, *twa*, *stane*, in the other; but perhaps this change belongs to the next head.

3. With the long *ē*, the sound of which must be considered as the same with the English *a*. Hence in Greek, Ευπατωρ, *απατωρ*, &c., from *πατηρ;* and the Latin *sol cor* correspond with the Greek ἡλιος and *κηρ* (observe too the German *herz*). The town *Nemētum* in Gallia is called by Greek geographers Νεμωσσος, and the German *jener* is in English *yon*.

4. With *ou*. This interchange is virtually the same with the first-mentioned. It is not uncommon in French, as compared with Latin, as *novella*, *nouvelle; rota*, *roue; totus*, *tout*, &c.

5. With *uo*, especially in Italian, as *huomo*, *buono*, *luogo*, *nuovo*, from the Latin *homo*, *bonus*, *locus*, *novus*.

6. With *eu*, in French, as *lieu*, *feu*, *jeu*, *peu*, *leur*, *heure*, *douleur*, *queue;* from the Latin, *locus*, *focus*, *jocus*, *páuci* (and Italian, *poco*), *illorum*, *hora*, *dolor*, *cauda* or *coda*.

7. With *au*. This exists within the Latin; as *cauda* and *coda*, *cautes* and *cotes*, *caudex* and *codex*, *Claudius* and *Clodius*, *plaudo* and *plodo*. So from the Latin *aurum*, *audere* (whence the frequentative *ausare*), *Aufidus*, *audire*, the Italians have *oro*, *osare*, *Ofanto;* and the French *or*, *oser*, *ouir*. Hence too the French pronunciation of the diphthong *au*.

8. With *oa*. Thus, the English words *boat*, *oath*, *oak*, must have received their present orthography when both the vowels were pronounced, as they still are in some parts of England, *bo-at*, *o-ath*, or *boo-at*, *oo-ath*.

9. With *ue*, as in Spanish *bueno*, *luego*, *fuego*, *huesped;* from the Latin *bonus*, *locus*, *focus*, *hospes*.

10. An initial *o* with *hue* or *hui*. Hence from the Latin *ostium*, *ostiarius*, are derived the French *huis*, *huissier*, and the English *usher*. From the Latin *os*, a bone, *ovum*, an egg, the Spaniards have *hueso*, *huevo*. From the Latin *octo*, *ostrea*, come the French *huict* or *huit*, *huistre* or *huître*. From the Latin *hodie*, which appears to have been pronounced as the Italian *oggi*, was formed the French *hui*, in *au-jour-d'-hui*.

11. In the paragraphs numbered 5, 9, and 10, the *o* really takes the sound of the English *w*, or the Greek digamma; and the same is the case in the Greek language itself, as in *οικος*, *οινος*, *οιδα*, Οαξος (which is the true reading in Herodotus, iv. 154), for Ϝικος, Ϝινος, Ϝιδα, Ϝαξος; the first three of which may be compared with the Latin *vicus*, *vinum*, *video*. Closely allied hereto is the frequent interchange in Latin of *oe* or *oi* with *ū*. [U.]

12. With *ea*, as between German and English. Thus the former language has *strom*, *brot*, *gross*, *tod*, *drohen;* the latter *stream*, *bread*, *great*, *death*, *threaten*. This same change exists in the English by itself, as *cleave*, *clove; weave*, *wove; heal*, *whole; heat*, *hot*, &c.

13. With *ei*, pronounced as the English long *i*. This is exceedingly common in the same languages. Compare the German *beide*, *bein*, *ein*, *nein*, *geist*, *heim*, *heiss*, *kleiden*, *mannheit*, *meist*, *theil*, *heilig*, *reihe*, *speiche*, *zeichen;* with *both*, *bone*, *one*, *none*, *ghost*, *home*, *hot*, *clothe*, *manhood*, *most*, *dole*, *holy*, *row*, *spoke* of a wheel, *token*. This change also exists within the English language, as *shine* and *shone; strike* and *stroke; drive* and *drove*.

14. A short *ŏ* with a short *ĕ*. This is particularly common in Greek, and above all in the penult of dissyllables. Thus with *νεμω*, *στελλω*, *λεγω*, there co-exist the substantive forms *νομος*, *στολος*, *λογος*. The Latin commonly prefers the *ŏ* in such words. Hence to the Greek *πεπτω*, *επι*, *εννεα* (*εννεϜα*), *νεος* (*νεϜος*), *εμεω* (*Ϝεμεω*), correspond the Latin *cŏquus* and *pŏpina*, *ŏb*, *nŏvem*, *nŏvus*, *vŏmo*. The change of these vowels is exceedingly common when preceded by a *w* sound, especially if an *r* or *l* follow. Hence in Latin, *verto* and *vorto*, *velle* and *vŏlo*, *vester* and *voster*, *vĕto* and *vŏto*. Hence likewise to the Latin *vermis*, *vellus*, *verruca*, correspond the English *worm*, *wool*, *wart*. Again, the German *schwerdt* is in English *sword;* and *vice versâ* the German *ant-wort* (as it were *anti-word*) is in English *answer;* and lastly, many words of this form are written with an *o* and pronounced with an *e*, as *wort*, *worm*, *worth*, *worse*.

15. For the tendency of the final letter *n* to disappear after *o*, see N.

OAK. [QUERCUS.]

OAK BARK. [BARK.]

OAKHAM. [RUTLANDSHIRE.]

OAKHAMPTON. [DEVONSHIRE.]

O'ASIS (in Greek, Ὄασις, and sometimes Αὔασις) is the appellation given to those fertile spots watered by springs and covered with verdure which are scattered about the great sandy deserts of Africa. [DESERT.] In Arabic they are called wadys. The Arabic and the Greek name seem to contain the same root, and possibly the word may be originally a native African term. The most noted are in the Libyan desert, namely, AUGILA, SIWAH, the great oasis west of Thebes, or El Khargeh, the little oasis, or Wah el Bahryeh, and several smaller ones which are noticed under EGYPT. Fezzan also may be considered as a great oasis of the Sahara. Hornemann has described Fezzan; Browne has given an account of the oasis of El Khargeh, and Cailliaud of the smaller oases west of Egypt.

The oases appear to be depressions in the table-land of Libya. On going from the Nile westward, the traveller gradually ascends till he arrives at the summit of an elevated plain, which continues nearly level, or with slight undulations, for a considerable distance, and rises higher on advancing towards the south. The oases are valleys sunk in this plain, and when you descend to one of them you find the level space or plain of the oasis similar to a portion of the valley of Egypt, surrounded by steep hills of limestone at some distance from the cultivated land. The low plain of the oasis is sandstone or clay, and from this last the water rises to the surface and fertilises the country; and as the table-land is higher in the latitude of Thebes than in that of lower Egypt, we may readily imagine that the water of the oases is conveyed from some elevated point to the south, and being retained by the bed of clay, rises to the surface wherever the limestone superstratum is removed. (Sir J. Gardner Wilkinson 'On the Nile, and the present and former Levels of Egypt,' in *Journal of the London Geographical Society*, 1839.) [OLYMPIODORUS.]

OATES, TITUS, was the son of a ribbon-weaver, who, having seceded from the Anabaptists, among whom he was a preacher, conformed to the doctrines of the English established church, took orders, and held a benefice. He was educated at Merchant Taylor's school in London, and at the university of Cambridge. Having received ordination, he became chaplain to the duke of Norfolk, who also settled him in a small living. (Hume.) He was subsequently accused of perjury, but he escaped conviction, and became chaplain in one of the king's ships, from which he was disgracefully expelled. Shortly after he embraced Roman Catholic doctrines, entered the College at St. Omer, and though more than 30 years of age, resided for some time among the students. On his return from a mission to Spain in 1677, the Jesuits, who were heartily tired of their convert, dismissed him from their seminary; and it is probable that resentment for this dismissal, combined with a prospect of gain, induced him to contrive the 'Popish Plot,' which alone has preserved his name from being forgotten.

In September, 1678, he made a disclosure before Sir Edmundbury Godfrey, a noted and active justice of the peace, and afterwards before the council and the House of Commons, to the effect 'that the pope felt himself entitled to the possession of England and Ireland on account of the heresy of prince and people, and had accordingly assumed the sovereignty of these kingdoms; that power to govern them had been delegated by the pope to the society of Jesuits, who, through Oliva, the general of their Order, had issued commissions appointing various persons whom they could trust to the chief offices of state, both civil and military. Lord Arundel, he said, was to be chancellor; Lord Powis, treasurer; Lord Bellasis, general of the papal army; Lord Stafford, paymaster; Sir William Godolphin, privy seal; and Coleman, secretary of state. All the dignities too of the church, he alleged to be newly appropriated, and many of them to Spaniards and other foreigners. Two men named Grove and Pickering, he declared, were hired to shoot the king, and that Sir George Wakeman, the queen's physician, had engaged to poison him, the queen herself being privy to the scheme. He also stated that the Roman Catholics were to rise in different districts of the kingdom, and that every means would be adopted for the extirpation of Protestantism.' His evidence was confirmed by two men named Tonge and Bedloe, especially the latter, a man of low extraction and bad reputation. (For Tonge see Evelyn's *Memoirs*, 8vo., vol. ii., p. 450; for Bedloe, Lingard, vol. xiii., p. 97, and Hume.) For the list of persons, both Jesuits and men of importance in this kingdom, who suffered imprisonment and execution through the accusations of Oates, we must refer to the general histories of the time.

Notwithstanding the almost universal credence which was given to him at the time, it has subsequently been placed beyond doubt that the plot which Oates pretended to reveal was an infamous and perjured fabrication. His circumstances, his character, the nature of his evidence, the manner of its production, not at one time but at several times, though he had previously professed to have told all that he knew, the mode in which the first disclosure was made, together with inconsistency and errors, evidently betray imposture. 'While in Spain he had been carried, he said, to Don John, who promised great assistance to the execution of the Roman Catholic designs. The king asked him what sort of a man Don John was? He answered, a tall, lean man; directly contrary to the truth, as the king well knew. He totally mistook the situation of the Jesuits' college at Paris. Though he pretended great intimacy with Coleman, he did not know him when placed very near him, and had no other excuse than than his sight was bad in candle-light.' He also fell into other errors. (Hume.) We mention these particular proofs of falsehood, but little reliance can be placed on the evidence of a man who, if his word was to be believed, had entered the Jesuits' society with the sole purpose of 'gaining their secrets in order to betray them.'

It may be urged, that the universal credit given to Oates's evidence at the time is a strong proof that his story was true. There are circumstances however which account for the ready belief with which his accusations were received, although they do not prove their truth.

The English Protestants had long apprehended an attempt on the part of the Roman Catholics to restore their religion and re-establish their power; and their anxiety on this account had latterly been augmented in some degree by the conduct of the king, and in a still greater degree by the Duke of York's open profession of the old religion and his attachment to its adherents. Moreover there were immediately connected with Oates's disclosure two events giving it an apparent corroboration, which was eagerly assumed to be real by the feverish minds of contemporary partisans. The first of these was the sudden and violent death of Sir Edmundbury Godfrey, the magistrate who had taken Oates's depositions. No proofs could be adduced to show the manner of his death. Whether he committed suicide or was murdered has never been ascertained; but the fact that he had taken Oates's evidence, and had been active in searching out the supposed plot, was sufficient to convince the Protestants, excited as they then were, that he had been murdered by Roman Catholics, partly out of revenge and partly to aid the escape of their conspirators. The second apparent corroboration of Oates's evidence, which, though no real confirmation, had at the time an influence in maintaining its credibility, is, that it led to the discovery of a plot, though not such a plot as he disclosed. (Hallam, *Const. Hist.*, ii., p. 571.) Oates denounced Coleman, the secretary of the Duchess of York; and upon searching his house, there were found, among his correspondence with Père la Chaise, papers which proved a combination for the purpose of re-establishing Roman Catholicism in England. That it was a plot, that it was on the part of the Roman Catholics, and discovered through Oates, was sufficient in the then temper of Protestants to reflect credit on his disclosures, though Coleman's plans did not coincide with the schemes which Oates pretended to have discovered.

During the closing years of Charles II.'s reign, Oates was protected by the government, and received a pension of 1200*l.* a year. In the following reign, as might be expected, his enemies revenged themselves. The Duke of York had not long succeeded his brother on the throne, before Oates was tried and convicted of perjury, sentenced to imprisonment for life, and to be whipped and stand in the pillory at intervals. The punishment was so rigidly enforced, that Hume states it must have been the intention of the government that it should terminate his life; he lived however until William's reign, received a second pension of 400*l.* a year, and died at an advanced age. Grainger says that there have been published under his name, though for a clergyman he was an illiterate man, 'A Narrative of the Popish Plot;' 'The Merchandize of the Whore of Rome;' and 'Eikon Basilike, or a Picture of the late King James.' A full account of his evidence and the Popish plot is given by Rapin, and in the 'State Trials.' See also Hume, Lingard, Burnet, Evelyn, and Hallam's *Const. Hist.*

OATH. Oaths have been in use in all countries of which we have any exact information, and it is probable that there is no nation which has any clear notion of a Supreme Being, or of superior beings, that does not make use of oaths on certain solemn occasions. An oath may be described generally as an appeal or address to a superior being, by which the person making it engages to declare the truth on the occasion on which he takes the oath, or by which he promises to do something hereafter. The person who imposes or receives the oath, imposes or receives it on the supposition that the person making it apprehends some evil consequences to himself from the superior Being, if he should violate the oath. The person taking the oath may or may not fear such consequences, but the value of the oath in the eyes of him who receives or imposes it consists in the opinion which he has of its influence over the person taking it. An oath may be taken voluntarily, or it may be imposed on a person under certain circumstances by a political superior; or it may be the only condition on which the assertion or declaration of a person shall be admitted as evidence of any fact.

The form of taking the oath has varied greatly in different countries. Among the Greeks, a person sometimes placed his hand on the altar of the deity by whom he swore; but the forms of oaths were almost as various as the occasions. Oaths were often used in judicial proceedings among the Greeks. The Dicastæ, who were judges and jurymen, gave their verdict upon oath. The Heliastic oath is stated at length in the speech of Demosthenes against Timocrates (c. 36). It does not appear that the oath was always imposed on witnesses in judicial proceedings; and yet it appears that sometimes witnesses gave their evidence on oath: perhaps the oath on the part of witnesses was generally voluntary.

(Demosth., Πρὸς Ἄφοβον Ψευδ, c. 16; Κατὰ Κόνωνος, c. 10; and Meier and Schömann, *Att.* Process., p. 675.)

In the Roman jurisprudence, an oath was required in some cases from the plaintiff or the defendant, or both. Thus the oath of calumny was required from the plaintiff, which was a solemn declaration that he did not prosecute his suit for any fraudulent or malicious purpose. The offence of false-swearing was *perjurium*, perjury; but it was considered a less offence in a party to a suit when the oath was imposed by a *judex* than when it was voluntary. It does not appear that in civil proceedings witnesses were necessarily examined on oath; but witnesses appear to have been examined on oath in the judicia publica, which were criminal proceedings. The title in the *Digest*, 'De Testibus' (22, tit. 5), makes no mention of the oath, though it speaks of punishment being inflicted on witnesses who bore false testimony.

The law of England, as a general rule, requires all evidence or testimony for judicial purposes to be given on oath, and all persons may be sworn as witnesses who, being questioned on the occasion of taking the oath, will declare their belief in the existence of God, in a future state of rewards and punishments, and who will further declare their belief that perjury will be punished by the Deity. This rule permits all persons, of all religious persuasions, who profess to have the necessary belief, to be sworn as witnesses; and it excludes all other persons from being witnesses. A Jew, a Mohammedan, and a Hindu may be sworn as witnesses, but they must severally take the oath in that form which is sanctioned by the usage of their country or nation, and which they severally consider to be binding. It follows that a person who professes atheism, or who does not profess such belief as is stated above, cannot be sworn, and consequently cannot be admitted to give testimony for judicial purposes. Children also who are too young to understand the nature of an oath, and adults who are too ignorant or too weak in intellect to understand what is meant by an oath, cannot be sworn as witnesses. The offence of declaring what is false, when a witness is examined upon oath, constitutes perjury: the particular circumstances which must concur in order that false-swearing shall be legal perjury are stated under that head. [PERJURY.]

Declarations made by a person under the apprehension of immediate death are generally admitted as evidence in judicial proceedings, when properly verified; for it is considered that the circumstances in which the person is placed at the time of making the declaration, furnish as strong motives for veracity as the obligation of an oath. Quakers also, in all civil cases, were allowed by the statute 7 and 8 Wm. III, c. 34, to give their evidence on affirmation; and now the affirmation of Quakers and Moravians is admissible in all judicial proceedings, both civil and criminal. When a defendant in chancery is entitled to privilege of peerage, or as a lord of parliament, he is required to give his answer to a bill upon honour only; and in the case of a corporation, the corporate body defendants put in their answer under their common seal. Other defendants are required to put in their answer upon oath. For other matters connected with judicial evidence see EVIDENCE.

An oath is required in England in a great many cases besides judicial proceedings, as for instance, on admission to places of public trust, and on a variety of other occasions. By an act of the 5 and 6 Wm. IV., c. 62, the lords of the Treasury are empowered to substitute a declaration in lieu of an oath, solemn affirmation, or affidavit, in a variety of cases, such as relate to the revenues of Customs or Excise, the Post Office, and other departments of administration mentioned in the second section of this act. This act also substitutes declarations in lieu of oaths, solemn affirmations, and affidavits, in various other cases enumerated in the act, for instance, where a person seeks to obtain a patent under the Great Seal. Justices of the peace and others are (s. 13) prohibited from administering or receiving oaths, affidavits, or solemn affirmations, touching any matter or thing whereof such justice or other person has not cognizance or jurisdiction by some statute in force at the time; with certain exceptions however, specified in the latter part of this section. The object of this section was to put an end to the practice of administering and receiving oaths and affidavits voluntarily made in matters not the subject of any judicial inquiry, nor in anywise pending or at issue before the person by whom such oaths or affidavits were administered or received. But this act does not extend or apply to cases where the oath of allegiance then was or thereafter might be required to be taken by any person who may be appointed to any office; nor does it extend or apply to any oath, solemn affirmation, or affidavit, which then was or thereafter might be made or taken, or required to be made or taken, in any judicial proceeding, in any court of justice, or in any proceeding for or by way of summary conviction before any justice of the peace. (s. 7.) Persons who wilfully and corruptly make or subscribe any declaration, under the provisions of this act, knowing the same to be untrue in any material particular, are declared (s. 21) to be guilty of a misdemeanor. The statute of 1 and 2 Vic., c. 77, provides the same privilege of solemn affirmation for persons who have been Quakers or Moravians, and have ceased to be such, but still entertain conscientious objections to the taking of an oath, as they would have enjoyed if they were still Quakers or Moravians.

As oaths may be either voluntary or may be imposed by a political superior, so they may be imposed either on extra-judicial or on judicial occasions. Oaths which are imposed on occasion of judicial proceedings are the most frequent in this country, and the occasions are the most important to the interests of society. The principle on which an oath is administered on judicial occasions is this: it is supposed that an additional security is thereby acquired for the veracity of him who takes the oath. Bentham, in his 'Rationale of Evidence,' on the contrary, affirms that 'whether principle or experience be regarded, the oath will be found, in the hands of justice, an altogether useless instrument; in the hands of injustice, a deplorably serviceable one;' 'that it is inefficacious to all good purposes,' and 'that it is by no means inefficacious to bad ones.' As the policy of abolishing oaths has been a matter of some discussion, and is one of great importance, a few words on the subject may not be out of place.

The three great sanctions or securities for veracity in a witness, or, to speak perhaps more correctly, the three great sanctions against mendacity in a witness, are, the punishment legally imposed on a person who is convicted of false swearing, the punishment inflicted by public opinion or the positive morality of society, and the fear of punishment from the Deity in this world or the next, or in both. The common opinion is, that all the three sanctions operate on a witness, though they operate on different witnesses in very different degrees. A man who does not believe that the Deity will punish false swearing, can only be under the influence of the first two sanctions; and if his character is such that it cannot be made worse than it is, he may be under the influence of the first sanction only. Bentham affirms that the third sanction only appears to exercise an influence in any case, because it acts in conjunction with 'the two real and efficient sanctions,' 'the political sanction and the moral or popular sanction;' and that if it is stripped of those accompaniments, its impotence will appear immediately. This experiment of stripping cannot easily be made, but a little consideration may help us to a solution of the question in another way.

Bentham's chief argument is as follows: 'that the supposition of the efficiency of an oath is absurd in principle. It ascribes to man a power over his Maker. It supposes the Almighty to stand engaged, no matter how, but absolutely engaged, to inflict on every individual by whom the ceremony, after having been performed, has been profaned,—a punishment (no matter what) which, but for the ceremony and the profanation, he would not have inflicted. It supposes him thus prepared to inflict, at command, and at all times, a punishment, which, being at all times the same, at no time bears any proportion to the offence.' Again: 'either the ceremony causes punishment to be inflicted by the Deity, in cases where otherwise it would not have been inflicted; or it does not. In the former case, the same sort of authority is exercised by man over the Deity, as that which, in English law, is exercised over the judge by the legislator, or over the sheriff by the judge. In the latter case, the ceremony is a mere form without any useful effect whatever.'

The absurdity of this argument hardly needs to be exposed. He who administers the oath, by virtue of the power which he has to administer it, and the political superior who imposes the oath, may either believe or not believe that the Deity will punish false swearing, and it is quite immaterial to the question, which of the two opinions they entertain. That which gives the oath a value in the eyes of him who administers it, or of that political superior who imposes it, is the opinion of the person who takes the oath; and if the individual who takes the oath believes that the Deity, in case it is profaned, will inflict a punishment which otherwise he would not inflict, the object of him who enforces the oath is accomplished, and an additional sanction against mendacity is secured. It matters not whether the Deity will punish or not, nor whether he who enforces the oath believes that he will punish or not: if he who takes the oath believes that the Deity will punish false swearing, that is sufficient to show that the oath is of itself a sanction.

The fear of legal punishment is admitted by Bentham to be a sanction against mendacity. But the legal punishment may or may not overtake the offender. Legal punishment may follow detection, but the perjury may not be detected, and therefore not punished. Is the oath, or would a declaration without oath be, 'a mere form without any useful effect whatever,' because the legal punishment may not and frequently does not overtake the offender? When a Greek or a Roman swore by his gods, in whose existence he believed, and who, being mere imaginations, could not punish him for his perjury, was not his belief in their existence and their power and willingness to punish perjury a sanction against mendacity? All antiquity at least thought so.

There are occasions on which oaths are treated lightly, on which he who imposes the oath, he who takes it, and the community who are witnesses to it, treat the violation of it as a trivial matter. Such occasions as these furnish Bentham with arguments against the efficacy of oaths on all occasions. Suppose we admit, with Bentham, as we do merely for the sake of the argument, that 'on some occasions oaths go with the English clergy for nothing;' and this, notwithstanding the fact, which nobody can doubt, 'that among the English clergy believers are more abundant than unbelievers.' The kind of oaths 'which go for nothing' are not mentioned by Bentham, but they may be conjectured. Now, if all oaths went for nothing with the clergy, or with any other body of men, the dispute would be settled. But this is not the fact. If in any way it has become the positive morality of any body of men that a certain kind of oath should go for nothing, each individual of that body, with respect to that kind of oath, has the opinion of his body. He does not believe that such oath, if broken, will bring on him divine punishment, and therefore such oath *is* an idle ceremony. But if there is any oath, the violation of which he thinks will bring on him divine punishment, his opinion as to that kind of oath is not at all affected by his opinion as to the other kind of oath. Now, oaths taken on judicial occasions are by the mass of mankind considered to be oaths of the latter kind, and therefore they have an influence on the great majority of those who take them. Whether society will in time so far improve as to render it safe to dispense with this ceremony in judicial proceedings, cannot be affirmed or denied; but a legislator who knows what man now is, will require better reasons for the abolition of judicial oaths than Bentham has given.

How far the requisition of an oath may be injurious in excluding testimony in certain cases, and how far oaths on solemn and important occasions may be made most efficacious, and in what cases it may be advisable to substitute declarations in lieu of oaths, are not matters of consideration here. It is enough here to show that an oath is a sanction or security to some extent, if the person who takes it fears divine punishment in case he should violate it; and that this, and no other, is the ground on which the oath is imposed.

Indeed it is evident that in English procedure the professed opinion or belief of the person who takes the oath is the only reason for which courts of justice either admit or refuse to receive his evidence; and this is shown by the questions which may be put to a witness when he comes to deliver his evidence in a court of justice.

There is some difficulty in stating accurately how far oaths were required from witnesses in Roman procedure under the republic and the earlier emperors. In addition to what has been stated, the reader may refer to Cicero, *Pro Q. Rosc. Comoed.*, c. 15, &c.; Noodt, *Op. Omn.*, ii. 479, 'De Testibus;' and to the commentary of Asconius on the Verrine Orations. By a constitution of Constantine, all witnesses were required to give their testimony on oath; and this was again declared by a constitution of Justinian. (*Cod.* 4, tit. 20, s. 9, 16, 19.)

Many persons conscientiously object to the taking of an oath on religious grounds, and particularly with reference to our Saviour's prohibition (*Matth.*, v. 33). On the subject of oaths in general the reader may consult Grotius, *De Jure*, B. & P., lib. ii., c. 13; Paley's *Moral Philosophy*, Tyler's *Origin and History of Oaths*; the *Law Magazine*, vol. xii.; and the work of Bentham already referred to.

OATS (*Avena sativa*) is a well-known species of the genus *Avena*, a plant of the family of the Gramineæ, in the class Triandria Digynia of Linnæus. [AVENA.] We shall here only consider those varieties which are cultivated for their grain, principally as food for horses, and in some cases for men also, when ground into oatmeal or grits.

The great use of oats, and the ease with which they are raised on almost every kind of soil, from the heaviest loam to the lightest sand, have made them occupy a place in almost every rotation of crops. Before agriculture had been subjected to regular rules, the result of long experience, the land was often sown as long as any return could be obtained, before any means of recruiting it with manure were thought of; and the last crop which would return any increase of the seed was generally oats. After this the land, no longer repaying the labour of ploughing and sowing, was abandoned, till, by length of time and the decomposition of roots and weeds, some renewed fertility was produced. Of all the plants commonly cultivated in the field, oats seem to have the greatest power of drawing nourishment from the soil, and hence are justly considered as greatly exhausting the land. Some farmers on this account prefer buying all their oats in the market to raising them on their own land. Where the soil is well adapted to the growth of wheat and barley, which bear a better price, this may be a judicious plan; but as a general rule, it is always more profitable to raise oats for home consumption than to trust to a fluctuating market. With proper management, a crop of oats may give as great a profit on the best land as any other crop, when it is considered that it requires less manure and produces an abundance of straw, which is very fit for the winter food of horses and cattle, especially when aided by roots or other succulent food.

To make a crop of oats profitable, some attention must be paid to the preparation of the soil and to free it from weeds; for to sow oats on a foul wheat or barley stubble slightly turned in by the plough, as is sometimes done, is the reverse of good husbandry.

The best oats are raised in Scotland and in Friesland, and in both countries the land is carefully cultivated. In Scotland, oats are generally sown on a grass layer which has been in that state for some years, and sometimes on old pastures which are broken up for the purpose. The crops exceed in bulk and weight of grain all that the most sanguine person, unacquainted with the system, would expect, and in many seasons, not favourable for the wheat crop, oats are much more profitable. Wherever the land is not of a good quality, and wheat is apt to fail, oats are a much safer crop, especially in retentive soils, as rye is on poor sands.

When oats are sown after turnips, cabbages, or any other green crop, the land should be well ploughed, if the green crop was not consumed on the spot, and a moderate supply of manure will be well repaid by the increased produce. A heavy loam is best suited for oats: they require a certain degree of moisture, and a deep soil is very favourable to their growth. On land which has been trenched, or where the subsoil plough has been used, after careful draining, if required, oats will thrive wonderfully, without requiring so rich a soil as barley or wheat. The roots are hardier and have a stronger vegetative power. When once they have struck deep into the soil, a good crop, according to the quality of the land, may be relied on.

When oats are sown after artificial grasses, the land is seldom ploughed more than once, and the seed is sown on the fresh mould which has been turned up; but unless the land be very free from weeds, it would be better to plough the sward with a shallow furrow early in autumn. Before winter the scarifier would break the rotten sward, which might then be buried deep by another ploughing. The land would be ready for sowing early in spring, which is a great advantage, both as to the quality of the oat crop and the earlier harvest, especially in those districts where the latter part of the autumn is apt to be stormy and rainy. The land thus treated would be clean, and the fallow, which is often resorted to, of necessity, after a crop of oats, might be dispensed with, as the weeds have been destroyed and buried deep.

When oats are sown on light land after turnips, which have been eaten by sheep folded on them, it may be ploughed with as shallow a furrow as will turn in the surface: the preparation for turnips will have sufficiently moved the soil; and the manure of the sheep should not be buried too deep. On poor moist land oats are more profitable than barley. Clover and grass seeds may be sown among them with equal advantage, as they will seldom grow so high as to be laid and smother the young clover; and barley is very apt to fail on land subject to retain the water.

In sowing oats more seed is often used than of any other grain, because, although the plants tiller where they have room, the straw of the second shoots is weaker, and the grain is not ripe so soon as that of the principal stem; but when the plants rise close and thick, there are no tillers, the main stem is stronger, and the corn is more plump and equal. Six bushels of oats are often sown on an acre; but if they are drilled, four bushels are sufficient, and when dibbled, which is sometimes the case in Norfolk and Suffolk, much less seed is used. A good preparation of the land is of more consequence than a superabundance of seed.

In a field where oats are sown broadcast, and covered by the harrows, many seeds remain exposed to the depredation of birds, which soon find them out at a time of the year when food is scarce; but when they are drilled or dibbled, all the seed is buried and germinates, without any loss. When the seed is sown and ploughed in, the same object is attained; but as the furrow must be shallow in order that the seed may not be buried too deep, the land must have been ploughed before to a considerable depth, unless it be after turnips fed off by sheep, in which case ploughing the seed in is a good practice: in either case four bushels of seed per acre is an ample allowance.

When the ground has been well prepared, there is no necessity for weeding or hoeing the crop as it advances; but if large weeds appear, such as charlock, May-weed, docks, or thistles, they must be carefully weeded out, or else the ground will be so infested with their seeds or roots that it will be difficult to eradicate them afterwards. Oats, when fully ripe, are very apt to shed, and many are lost for want of attention. As soon as the straw turns yellow under the panicle, the oats should be reaped, however green the lower part of the straw may be: the straw will be better fodder for cattle, and all the corn will be saved. Oats are generally mown with a scythe, and raked into heaps to dry like hay; but this is a wasteful and slovenly practice. A good crop of oats should be reaped, like wheat, close to the ground, and tied in sheaves. A cradle scythe or a short Hainault scythe does the work well in the hands of an expert mower, who should be followed by binders, who gather the straw with their hands, and lay it regularly on the ground, if it be not fit to tie up immediately: the straw should afterwards be tied up into sheaves, and set with the corn uppermost in shocks of ten or twelve sheaves, leaning against each other, and open at bottom, in order to allow the air to pass through. Thus, in a short time the oats become sufficiently dry to be stacked, or carried immediately into the barn. The produce of an acre of oats varies according to the soil and preparation, from four to eight and even ten quarters.

Oats ground into a coarse meal form a considerable portion of the food of labourers and many men in the middle ranks of life in Scotland, Ireland, and the north of England. The meal is simply stirred into boiling water with a little salt, until it becomes of the consistency of a hasty-pudding; it is then called porridge or stir-about; and when eaten with milk or treacle makes a wholesome and palatable food. It is sometimes mixed with the thin liquor of boiled meat, or the water in which cabbages or kale have been boiled, and acquires the denomination of beef-brose or kale-brose. When made into a dough with water, and baked on an iron plate in thin cakes, it makes a bread, which is very palatable to those who are accustomed to it, and who often prefer it to wheaten bread. Its use was once almost universal in Scotland, which has in consequence been called the Land of Cakes. In Germany and Switzerland the coarsely bruised oat-meal is put into an oven till it becomes of a brown colour; it is then called haber-meel, and is used in broths and pottages, as the semolina, made from wheat, is used in France and Italy. The coarsely broken grains, after the husk has been removed, form grits, which are extensively used to make gruel for children and invalids. The chaff of oats put into a canvas bag forms a good substitute for feather-beds for the poor, and is far more wholesome than feathers, from the ease with which it may be renewed at little or no cost.

In some countries the oats are given to horses in the straw, without threshing them; and where the quantity can be regulated, the practice is good. The horses masticate the corn better in the chaff, and the straw is wholesome; but where horses do hard work, they would be too long in eating a sufficient quantity, and it is better to give them oats threshed and cleaned, with clover hay cut into chaff. When hay is dear, it is often cheaper to increase the quantity of oats, and to give it with wheat-straw cut fine. In this way very little hay is required. The calculation is easily made when we consider that a pound of good oats gives as much nourishment to a horse as two pounds of the best clover, or saintfoin hay. A truss of hay of 56 pounds is therefore equal to 28 pounds of oats; or a bushel of the best oats will go as far as one truss and a half of hay; and if this quantity is worth four shillings, which is at the rate of 4*l.* 16*s.* per load of thirty-six trusses, the equivalent price of oats is 32*s.* per quarter.

Farmers who have hay-ricks from which they often allow their men to take as much as they please for their horses, will carefully measure out the oats, which probably are much cheaper. Some men who keep many horses, cut all the hay into chaff by a machine, and mixing this with a proper proportion of oats, feed all their horses in mangers with a certain allowance of the mixture, a practice much more economical than that usually adopted. In France and Germany the practice of baking oats, as well as rye, into loaves for horse-food, is gaining ground, and is said to be attended by an evident saving of food.

OAXACA. [Mexican States.]

OBADI'AH (עֹבַדְיָה, ’Οβδιάς) was one of the twelve minor Hebrew prophets. The name corresponds to the common Arabian name Abdallah, meaning *a servant of God;* it occurs several times in the Old Testament (1 *Kings*, xviii. 3; 1 *Chron.*, iii. 21; vii. 3; ix. 16; 2 *Chron.*, xvii. 7; xxxiv. 12); but neither of the persons mentioned in these passages appears to have been the prophet, about whose personal history we know nothing. His prophecy appears from internal evidence (verses 11-14, 20) to have been written shortly after the destruction of Jerusalem in the year 587 B.C. He was therefore contemporary with Jeremiah; and we find a striking resemblance between some passages in these two prophets (compare *Obadiah*, 1-4, 5, 6, 8, with *Jer.*, xlix. 14-16, 9, 10, 7). The question here is, which of these writers copied from the other? We know that Jeremiah quoted other prophets, and therefore it is nothing strange to find in him a quotation from Obadiah; and critics who have carefully examined the passages in question have thought that those in *Jeremiah* bear marks of being copied from *Obadiah*. The reason why the book of *Obadiah* has been placed so much out of its chronological order in the Hebrew Bible is thought to be, because its subject is so closely connected with the last verses of the prophecy of *Amos*, which immediately precedes it.

The prophecy of *Obadiah* is the shortest book in the Old Testament, consisting of only one chapter. The prophet denounces the destruction of Edom, on account of their insolent triumph in the day of the captivity of their Hebrew brethren and in the destruction of Jerusalem (verses 1-16), and foretells the restoration of the Jews, the subjection of their enemies, and of Edom among the rest, and the setting up of the kingdom of the Lord (verses 17-21). The conduct of the Edomites at the fall of Jerusalem, which is referred to in the former part of this prophecy, is not mentioned in the Old Testament history, but it is alluded to by other prophets and by a writer in the *Psalms* (*Ezek.* xxv. 12; xxxv; *Jerem.*, xlix. 7-22; *Amos*, i. 11; *Psalms*, cxxxvii. 7). The latter part is supposed to have been accomplished in the return of the Jews from Babylon and the victories of the Maccabees over the Edomites, but the last words seem to refer to the more remote period when all the world shall become the kingdom of God (compare *Rev.*, xi. 15; xix. 6). The style of Obadiah is clear and energetic: his prophecy forms a short poem.

(Rosenmüller's *Scholia*; Schnurrer's *Dissertation*; the *Introductions* of Eichhorn, Jahn, De Wette, and Horne.)

OBE'LIA. [PULMOGRADA.]

OBEIDALLAH. [FATIMIDES.]

OBELISK, from the Greek 'obeliscus' (ὀβελίσκος), the diminutive of 'óbelus' (ὀβελός), which signifies a 'skewer' or 'needle' (Herod., ii. 41), but is also used by Herodotus (ii. 111) to signify an *obelisk:* the Italian name *aguglia* and the French *aiguille* (needle) are from the Latin *acus*. An obelisk is a lofty monumental four-sided shaft diminishing upwards with the sides gently inclined, but not so as to terminate in an apex at the top; neither is it merely truncated or cut off at the summit, but the sides are sloped off so as to form a flattish pyramidal figure, by which the whole is suitably finished off and brought to a point, without the upper part being so contracted as to appear insignificant. Herein, as well as in their purpose and application, besides other circumstances, obelisks differ from spires, which are carried up from their base to a point, and which nevertheless are beautiful on that very account. It may be asked why the same form that pleases the eye in the one case would be disagreeable in the other. To answer this question we must consider not only wherein they agree, but wherein they differ. Whether perfectly square or not, obelisks are uniformly quadrilateral, whereas spires are polygonal, and consequently the bases of their sides are much narrower in proportion to their entire diameter, so that the diminution is not so sudden as it would be in a four-sided mass of the same bulk and height. Secondly, a spire is generally terminated by a pinnacle, cross, or some other ornament at its summit, whereby sufficient importance is given to it; and thirdly, a spire neither is nor is intended to look like a solid mass of stone, but requires to have a certain expression of lightness, both in itself and so as to bring it into harmony with the rest of the building. An obelisk, on the contrary, either is or is intended to appear not only a solid mass, but a single stone, standing upon a massive pedestal, and that pedestal resting on the ground. Hence it is obvious that so far from being attended with any beauty, the reducing it to a mere point would greatly impair its character, and in a measure destroy all nobleness of appearance towards its summit, because it would be of inconsiderable bulk for a considerable length downwards.

Though the mere form of the obelisk has no particular beauty to recommend it, as is proved by the meanness and pettiness of little obelisks employed merely as decorations in *catafalchi*, and also in many buildings of the time of James I., yet when wrought out of 'time-defying material,' and of colossal dimensions, it produces a most imposing effect. As a monument an obelisk is greatly preferable to a column, inasmuch as it possesses all that recommends the latter without being open to the objection of being a mere imitation of what was designed for a totally different purpose, and never intended to be insulated or considered as complete in itself. The greater diameter of the capital and abacus, which is both a beauty and propriety in a column supporting a superincumbent mass, ceases to be so, or rather becomes quite the contrary, when the column supports nothing. The abacus, forming in fact a square platform on its summit, overhanging the structure itself at its angles, gives the whole a top-heavy appearance, which is still further increased by a railing upon it. The London Monument and the York Column in London are examples of this perversion. Though not properly an obelisk, it being built up of masonry, the Wellington Testimonial in Phœnix Park, Dublin, is a much nobler object than a column of the same dimensions would have been; and it is to be regretted that the obelisk form was not made choice of for the monolith of Finland granite (84 feet high) erected at St. Petersburg as the Alexander column. Where, instead of being one solid mass, a monument of the kind must be constructed of separate stones, there may so far be some reason for rejecting such shape; yet where the greatest difficulty was accomplished, namely, that of obtaining a monolith of sufficient dimensions, very little short of those of the largest antient obelisks, and exceeding the generality of them, it was unfortunate that the usual pillar-shape was preferred, surmounted by the usual square platform.

Much learning and research have been expended by Zoëga and others in endeavouring to ascertain the origin of obelisks, yet without throwing any very satisfactory light on that part of the question. Antiquaries have in fact endeavoured to find positive evidence where none was to be obtained; for the case itself is not, like that of a particular invention or discovery, referrible to some precise period or nation. On the contrary, from the very earliest ages it had been the practice to mark some particular spot, the scene of some important event, by what might serve as a durable monument of it; nor would any thing more naturally suggest itself for such purpose than fixing in an upright position a stone of unusual dimensions. The Bible makes mention of this practice; and it prevailed not only in the East, and in the early ages of the world, but has prevailed among nearly all nations either in a savage state or in an early stage of civilization. Among the Egyptians therefore the practice was not otherwise very remarkable than on account of their continuing it, and bringing such simple primæval monuments to great perfection, making them of stupendous dimensions, working them in the most elaborate manner, and adorning them with hieroglyphics, though not indeed invariably, for there are instances of Egyptian obelisks which are not so sculptured; among others that in front of St. Peter's at Rome, and the one before the church of Santa Maria Maggiore.

Small obelisks were sometimes of sandstone or granite, but the larger Egyptian obelisks are all of the red granite of Syene; and it is certainly astonishing how such enormous masses of that material could be quarried out, and afterwards removed and placed in their position. We may conjecture that the Egyptians detached the large masses of rock for their obelisks somewhat in the same way that was adopted by the natives of India on the occasion of raising the great granite obelisk at Seringapatam in the year 1805. In this instance a groove about two inches wide and deep was chiselled out by the workmen in the line where it was required to separate the stone; which being done, a fire was kindled upon it from end to end, and kept up until the stone was sufficiently heated, when the embers were blown off, and cold water poured into the groove, whereby a clear fracture in the stone was made without further labour. Indeed the mode in which the Egyptians worked their quarries is clear enough at the present day from an inspection of the excavations: see Gau's *Nubia*, pl. 9, and the French work on Egypt, *Antiq.*, i., pl. 32. Among the Egyptians, when the block had been thus hewn out of the quarry, it was conveyed away by a raft on a canal brought up to the very edge of the rock, either at the time of the inundation, when the water would rise to a sufficient level, or by lowering the block down an inclined plane or platform to the raft; or by digging a canal from the river to the site of the block, and bringing a boat under the obelisk, in the manner described by Pliny (xxxvi., chap. 9). The granite block was afterwards polished, and probably raised in the same way as the Seringapatam obelisk, by means of banks of earth.

For raising the obelisk before St. Peter's (supposed to be that brought from Heliopolis by Caligula), no fewer than five hundred different projects were submitted by architects and engineers to the pope Sixtus V., and Domenico Fontana was thought to have accomplished little short of a miracle in rearing it by means of very complex machinery and several hundreds of workmen and horses. The process by which the Lateran obelisk was originally erected at Rome seems to have been equally complicated and laborious. (Ammian. Marcell., xvii. 4.) How the Egyptians raised such masses of granite is not known, but probably by a much simpler mode, whether similar or not to that practised in elevating upon its pedestal the one at Seringapatam. According to Colonel Wilks's account of the operations, this obelisk, a single stone about sixty feet long and six square at its base, was placed horizontally upon a mound, or platform of earth, secured by strong walls, and level with the top of the pedestal, the base of the obelisk being placed just on the ledge of the pedestal. The shaft having been laid on planks or timber poles, these served as fulcra, by means of which the smaller end or top was gradually raised; wedges were put under it and earth rammed in, which was repeated until the platform became an inclined plane as steep as it could with safety be carried up. The shaft being got thus far out of its horizontal position towards a perpendicular one, ropes were then applied, worked from a strong timber scaffold nearly as high as the obelisk itself, and enclosing the other three sides of the pedestal, other ropes being also employed in a contrary direction in order to check its coming down on the pedestal with too sudden a shock.

By the Egyptians themselves obelisks do not appear to have been raised as insulated monuments or single objects, but as the accompaniments to temples and palaces, where they were placed in pairs, that is, one on each side of a large entrance, or *propylon*, and it may therefore be inferred that some particular signification was attached to them. They were also sometimes placed in the intorior courts of temples. With respect to their proportions, the shafts of obelisks were usually about ten diameters in height, and one-fourth narrower at top than at their base. The pyramidion, or apex, was made much more pointed in some obelisks than in others. One singularity is that few Egyptian obelisks are perfectly square, two of their sides being generally somewhat broader than the other two, which may be accounted for by what has just been said, namely, that they were placed against buildings, and not intended to be insulated objects viewed from every direction. The face of an obelisk is sometimes slightly convex, instead of being quite plain; as is the case with one side of the Lateran obelisk.

The number of obelisks in Egypt must have been at one time very considerable, yet we are not therefore to suppose that the erection of them was a frequent circumstance, since, once formed, they were almost imperishable, and would therefore greatly increase in the course of ages. Many that are still remaining are no longer standing; and in some places several have been found on the same spot, some still standing, others lying on the ground. When the Romans became masters of Egypt, they removed many of these monuments to their own capital, among others that of the Lateran, which is the largest now known, its shaft being 105 feet (although it has been reduced, a portion at the lower part having been cut off in consequence of being fractured), and two of its sides 9 feet 8½ inches, the other two 9 feet. This obelisk was first conveyed from Heliopolis to Alexandria by Constantine, and by that emperor's son Constantius brought from the latter city to Rome, where it was erected in the Circus Maximus. The shaft of the Lateran obelisk weighs about 445 tons in round numbers. Augustus also had previously brought two from Heliopolis. That which was originally placed in the Vatican Circus by Caligula, and now stands in the piazza of St. Peter's, is next in size to that of the Lateran, though supposed to have been somewhat abridged of its original dimensions. The entire height, including the pedestal and the ornament at top, is about 132 feet; the shaft itself is 83 feet, and 8 feet 10 inches square at its base, and 5 feet 11 inches at the other end. In the At-Meidan at Constantinople there is an obelisk about 50 feet high, said to have been erected by the emperor Theodosius.

During the calamities that befel Rome under its barbarian invaders after the downfal of the empire, the obelisks were damaged and overthrown, but they have been gradually restored under various pontiffs. The following table contains a list of the Roman obelisks, with their dimensions and other particulars:—

I.—Sixtus V., 1585.

The Vatican, in front of St. Peter's, where it was removed by Fontana from the Vatican Circus. On the side facing the church, and on the opposite side, we see the dedication to Augustus and Tiberius.

	ft.	in.
Whole height	132	2
Ditto without base and modern ornaments at top, cross, &c.	83	2·8

Without hieroglyphics, and still entire.

II.—Sixtus V., 1587.

In front of the church of Santa Maria Maggiore, erected by Fontana.

	ft.	in.
Whole height	83	9·5
Ditto without base and modern ornaments at top, cross, &c.	48	4·8

Without hieroglyphics; broken in three or more places.

III.—Sixtus V., 1588.

In front of the St. John Lateran church, erected by Fontana.

	ft.	in.
Whole height	149	7·2
Without base, &c.	105	7·2

Hieroplyphics; broken in three pieces.

IV.—Sixtus V., 1589.

Flaminio del Popolo, erected by Fontana.

		ft.	in.
Whole height	about	116	0
Without base, &c.	about	78	5·5

Hieroglyphics; broken in three places.

V.—Innocent X., 1651.

In the Piazza Navona; sometimes called the Pamphilian obelisk.

		ft.	in.
Whole height	about	99	0
Without base, &c.		54	3·2?

Hieroglyphics; fountain round the base.

VI.—Alexander VII., 1667.

Minerveo della Minerva, erected by Bernini.

This obelisk, with singular bad taste, is placed on the back of a horrible elephant, the work of Bernini.

		ft.	in.
Whole height	about	39	7·5
Without base, &c.	about	17	0?

Hieroglyphics.

VII.—Clement XI., 1711.

Mahuteo della Rotonda, in front of the Pantheon of Agrippa.

	ft.	in.
Whole height	47	8
Ditto without base, &c.	19	8·85?

Hieroglyphics; probably the pendant of No. 6: Fountain round the base.

VIII.—Pius VI., 1786.

Quirinale di Monte Cavallo, erected by Antinori.

	ft.	in.
Whole height	94	11·85
Without base, &c.	47	8?

No hieroglyphics; appears broken in two or three places.—Zoëga, pl. 6.

IX.—Pius VI., 1789.

Sallustiano della Trinità di Monte, erected by Antinori.

		ft	in.
Whole height		99	11
Ditto without base, &c.	about	43	6

Hieroglyphics.—Zoëga, pl. 7.

X.—Pius VI., 1792.

Campense di Monte Citorio, by Antinori.

	ft.	in.
Whole height	110	0
Ditto without base, &c.	71	6

Hieroglyphics.—Zoëga, pl. 8.

XI.—Pius VII., 1822.

Aureliano della Passeggiata, on the Monte Pincio.

	ft.	in.
Whole height	56	7·8
Ditto without base, &c.	30	0·8

Hieroglyphics. This is called by Zoëga the Barberini obelisk, of which he says, 'Hic e Romanis obeliscis adhuc cognitis solus expectat sospitatorem.'

XII.—1817.

Private obelisk on the Cœlian Hill, in the gardens of the Villa Mattei; hardly worth mentioning. It is a small fragment of a real obelisk mounted on a piece of modern granite.

In the present century, the labour of bringing away and re-erecting an obelisk nearly equal to some of the largest removed by the Romans has been accomplished by the French. It is the smaller of the two which stood before the propylon of the temple at Luxor, and is about 76 feet high and 8 feet wide on the broader sides of its base. Permission for the removal of both the obelisks having been granted to the French government by the viceroy of Egypt, a vessel constructed for the purpose was sent out in March, 1831, under M. Lebas, an engineer, to whom the undertaking was confided, it being previously determined to bring away only one. After three months' labour with eight hundred men, an inclined plane was formed from the obelisk to the river, where the vessel lay; and having been first carefully encased by planks to secure it from injury, the monolith was lowered by nearly the same process afterwards employed for raising it again on its pedestal at Paris, where it safely arrived, up the Seine, December 23, 1833, and was deposited near the Pont de la Concorde. Nearly three years however elapsed before it was elevated in the centre of the Place de la Concorde, which delay was partly occasioned by its being necessary first to construct a pedestal of as massive materials as could be procured. Blocks of granite were accordingly fetched from Brittany, the largest of which, forming the die of the pedestal, is 10 feet square by 16 in height. An inclined plane leading from the river up to a platform of rough masonry level with the top of the pedestal was then formed, and the obelisk, having been placed on a kind of timber car or sledge, was dragged up by means of ropes and capstans. One edge of its base having been brought to the edge of the pedestal, it was reared perpendicularly by ropes and pulleys attached to the heads of ten masts, five on each side, and within about three hours the operations were completed, under the direction of Lebas, October 25, 1836.

Some few years ago the project was entertained of bringing over to this country and erecting in our own metropolis the monolith called Cleopatra's Needle, one of the two granite obelisks at Alexandria, which is still standing, the other being on the ground. Including the pedestal, the entire height is about 79 feet, but the monolith itself does not exceed 63 feet, and is therefore smaller than the Luxor obelisk at Paris. The idea of removing it hither seems now however to be quite abandoned.

The largest Egyptian obelisk hitherto brought over to this country is that which was removed from the island of Philæ by Belzoni, and which is now erected at Kingston Hall, Dorsetshire, the seat of W. J. Bankes, Esq. It is a monolith of red Egyptian granite, 22 feet 1 inch in length, and its larger end, or base, 2 feet 2 inches square, the other being 1 foot 5¾ inches.

Before the cathedral of Catania in Sicily is a small obelisk, said to be Egyptian, which is remarkable on account of its being not square but polygonal, and also for being placed on the back of an elephant raised on a lofty pedestal.

In the article Axum a drawing is given of an obelisk which differs somewhat from the genuine obelisk in form; but it will serve, together with that given in the article Arles, which stands on an appropriate pedestal, to give an idea of the general appearance of one of these monuments on a large scale.

For further particulars the reader may consult the great work of Zoëga, Champollion, and the 'Egyptian Antiquities,' in the *Library of Entertaining Knowledge*, vol. i.

OBERLIN, JEREMIAH JAMES, was born at Strasburg on the 7th of August, 1735, and was educated at the gymnasium of that town. He afterwards spent a few months at Montbéliard for the purpose of learning the French language, and returned to Strasburg in 1750, where he prosecuted his university studies. He took the degree of Doctor of Philosophy in 1758, and afterwards paid considerable attention to the study of theology. In 1768 he was appointed a teacher in the gymnasium where he had been educated, and in 1763 was entrusted with the care of the library of the university of Strasburg, and obtained permission to give lectures on the Latin language. In 1770 he was appointed Professor of Rhetoric, and from this time was accustomed to give lectures on Greek and Roman archæology, antient geography, &c. In 1778 he was appointed Extraordinary Professor in the university, in 1782 Ordinary Professor of Logic and Metaphysics, and in 1787 Director of the Gymnasium. During the Revolution his life was in considerable danger. He was imprisoned at the beginning of November, 1793, but obtained his liberty at the end of a few months; and again resumed his lectures at Strasburg, which he continued till his death, which took place on the 10th of October, 1806.

Oberlin was an accurate and industrious scholar. He published good editions of several of the Latin classics, of which his Tacitus and Cæsar are considered the most valuable. He had also paid great attention to the study of the antient French language, and travelled more than once through some of the provinces of France in order to become acquainted with the different patois spoken in the country. He published several works on this subject, of which the most important are, 'Observations concernant le Patois et les Mœurs des Gens de la Campagne,' Strasb., 1791; and 'Essai sur le Patois Lorraine des Environs du Comté du Ban de la Roche,' 1775.

Oberlin was also the author of several other works, the principal of which are,—'Dissertatio Philologica de Veterum Ritu condiendi Mortuos,' 1757; 'Rituum Romanorum Tabulæ in usum Auditorum,' 1774, reprinted in 1784; 'Jungendorum Marium Fluviorumque omnis ævi Molimina,' 1770-1775; and 'Dissertations sur les Minnesingers' (the Troubadours of Alsace), 1782-1789.

The life of Oberlin has been written by Schweighäuser in Latin, and by Winckler in the *Magas. Encyclopéd.*, 1807.

OBERLIN, JEAN FRE'DERIC, Protestant pastor in the Ban de la Roche, and younger brother of the philologist Jeremiah James Oberlin, was born at Strasburg on the 31st of August, 1740. His education was conducted with the greatest care by his intelligent and pious parents, and while yet a child he gave striking indications of the benevolence and self-denial which were afterwards so conspicuous in his conduct. He had a strong taste for the military profession; but as it was his father's desire that he should devote himself to one of the learned professions, he pursued his studies at the university of Strasburg and received holy orders. While he was at the university, the preaching of Dr. Lorentz make a powerful impression on his mind, and he has left behind him a record of his strong religious feelings in a solemn dedication of himself to God, similar to that recommended by Doddridge in his 'Rise and Progress,' which is dated 'Strasburg, the 1st of January, 1760; renewed at Waldbach, the 1st of January, 1770.' He remained without a pastoral engagement for some years after his ordination (from 1760 to 1767), and during this period he was private tutor in the family of M. Ziegenhagen, an eminent surgeon at Strasburg. In the year 1766 he had just accepted the offer of a chaplainship to a French regiment, when he was invited by M. Stouber to succeed him as pastor of the Ban de la Roche. This post afforded to Oberlin the very opportunity which he longed for, to devote all his powers to the good of his fellow-men, and he therefore at once accepted it, and arrived at Waldbach to enter on his duties on the 30th of March, 1767.

The Ban de la Roche, or, as it is called in German, the Steinthal (valley of stone), was part of the former province of Alsace, in the north-east of France: it is situated on the western slope of the Haut Champ, or Champ de Feu, a range of mountains to the east of the Vosges, from which chain it is divided by a deep valley. The Ban contains two parishes, one of which is Rothau, and the other consists of the five hamlets of Foudai, Belmont, Waldbach, Bellefosse, and Zolbach. Nearly all the inhabitants of these hamlets are Lutherans. The soil is sterile, and nearly half of the land is covered with wood. The district was laid waste in the Thirty Years' War, and again in the time of Louis XIV.; so that in the middle of the eighteenth century it afforded a bare subsistence to some eighty or a hundred families, who were in a state little removed from barbarism, but who possessed one blessing of which all France except Alsace was deprived, namely, religious liberty, which had been guaranteed to the province of Alsace when it was united with France. In the year 1750 M. Stouber became pastor of this district, and succeeded by great exertions in establishing efficient schools, and in distributing Bibles through the parish, where they had been so scarce before, that the former minister had not possessed a copy. Stouber removed to Strasburg in 1767, after finding in Oberlin a successor well qualified to carry on the work he had begun. Notwithstanding all Stouber's exertions, Oberlin found his parish in a wretched state, and a large party in it obstinately prejudiced against any improvement, and prepared to oppose all his plans. It was only by his great decision and mildness that he escaped personal violence on one or two occasions soon after his arrival. From the moment he set foot in his parish he directed all his energies and learning to the civilization and religious improvement of his people. His first object was to bring them into communication with their better instructed neighbours, from whom they were entirely cut off by the want of roads. He assembled the people, and proposed to them to make a road to Strasburg by blasting the rocks and building a bridge across the river Bruche at Rothau. The peasants with one voice declared the thing to be impossible. Oberlin reasoned with them in vain. At length he took up a pickaxe, and, inviting all who saw the importance of his plan to follow him, he set to work with his own hands. The peasants at once joined him, and by their efforts, assisted by the contributions of Oberlin's friends, the road was made and the bridge built by the beginning of the year 1770. The results which Oberlin had foreseen soon followed. The people could now dispose of their produce and supply their wants; agricultural implements were imported; and several young men from his parish were apprenticed in Strasburg to the most useful mechanical trades, which were thus introduced into the Steinthal. Oberlin next turned his attention to the agriculture of the district, which was in the worst possible state; but he found his people little disposed to be taught their own art by one brought up in a town. He appealed, as before, to their senses, by planting with fruit-trees two large gardens belonging to the pastor's house, which were crossed by public footpaths. His trees flourished; the people came to him to beg for slips and to learn the art of rearing them; and in a few years the desolate cottages of the Ban de la Roche were surrounded with neat orchards.

The potatoes, which were the principal food of the people, had so degenerated, that some fields only yielded about one-third of their former crop. The people blamed the land; but Oberlin procured new seed; and as the soil of the mountains was well adapted to the culture of the potato, abundant crops, and of a very superior quality, were soon obtained. He also introduced the culture of flax and Dutch clover, taught the people the value of manure, persuaded them to convert a great quantity of pasturage into arable land, and established an agricultural society and a fund for the distribution of prizes to the farmers.

Oberlin was no less zealous in promoting education in his parish. He procured the erection of a new school-house at Waldbach in place of the log-hut built by Stouber, which had fallen to decay; and in a few years a new school-house was built in each of the other four hamlets. To him also belongs the honour of being the founder of infant-schools, which he established in each commune, placing them under the management of conductresses paid at his own expense. In these schools the children were not allowed to speak a word of patois. In the higher schools the subjects taught were reading, writing, arithmetic, geography, the principles of agriculture, astronomy, and sacred and profane history. Oberlin carefully superintended all the schools, and reserved the religious instruction almost entirely to himself. He made great efforts to supply the people with suitable books, some of which were printed at his own expense: among these was an almanac which he drew up for the use of his parishioners.

None of these schemes for the worldly advantage of his flock ever diverted Oberlin from his peculiar duties as their religious teacher. He constantly laboured to impress upon them that they must do everything from religious principle, and even the planting of trees and the repairing of a road were represented by him as works which were to be performed from love to God, who has commanded us to live for each other's welfare, and from love to Christ, who spent his life in doing good. So far did he carry this mode of connecting faith and good works, that he required of all young persons applying for confirmation a certificate from their parents of their having planted two trees. His preaching was simple, impressive, and affectionate, well adapted to the minds of his people, and perfectly orthodox. In the year 1782 he founded a Christian Society for the religious improvement of his flock; and dissolved it in 1783, on account of the opposition it met with from some, whom his gentle spirit did not wish to offend. His own conduct was always influenced by the most sincere piety, and by a strong practical faith in a superintending Providence. This faith he carried so far, that he used to keep by him slips of paper with the words *Oui* and *Non* written on them, with which he drew lots whenever he found himself unable to decide which of two courses to pursue, believing that 'the lot is cast into the lap, but the whole disposing thereof is of the Lord.' (*Prov.*, xvi. 33.) At the time of the French Revolution, the Ban de la Roche was not only secured from molestation by the well-known character of the people and their pastor, but Oberlin was even able to afford an asylum to several proscribed persons. Once indeed he was cited before the supreme tribunal of Alsace on a political charge, when he was not only acquitted, but received an assurance from the court of their deep regret that he should have been called from the scene of his labours. In 1795 he renounced his stipend on account of the poverty of his people, leaving each of them to contribute what they could to his support. His economy was as strict as his benevolence was extensive. He was never known to owe a single sous; and he made it a point of conscience to set apart for religious and charitable purposes the three tithes required of the Jews by the Mosaic law. He was a warm supporter of the Missionary Society, and the first foreign correspondent of the British and Foreign Bible Society. When the assignats were issued by the French revolutionary government, he soon foresaw their depreciation, and began to buy them up from his people to prevent them losing by them: in the space of twenty-five years he succeeded in redeeming all that had been brought into the Ban de la Roche.

Among the employments which Oberlin found for his people were straw-plaiting, knitting, dyeing with the plants of the country, and weaving. About the year 1813 the industry of the district received a fortunate stimulus through the introduction of the ribbon manufactory by M. Legrand, formerly a director of the Helvetic Republic, who was induced by his esteem for Oberlin's character to remove with his two sons from Basle to the Ban de la Roche. In this family Oberlin found faithful friends and able assistants in his plans of usefulness.

Among the old evils under which the Ban de la Roche had suffered, one of the greatest was the remains of the feudal system, out of which had arisen a ruinous law-suit between the peasantry and the seigneurs respecting the right to the extensive forests of the district. Oberlin persuaded the parties to come to an agreement, and the pen with which that agreement was signed was solemnly presented to him by the maires of the district on the 6th of June, 1813. Nor was this the only civic honour he received, for Louis XVIII. presented him with the decoration of the Legion of Honour as an acknowledgement of the services which he had rendered to a numerous population; and in 1818 he received a gold medal from the Royal and Central Agricultural Society of Paris. His Memoirs contain accounts written by several persons, of very different characters and pursuits, of visits to the Ban de la Roche during Oberlin's life, and all of them bear witness to the astonishing results of his labours, as shown by the intelligence and piety, the politeness and hospitality, the industry, benevolence, and happiness of the people whom he had found wretched, ignorant, and half-savage. Those readers who wish further information as to his character, habits, and personal appearance, are referred to the work mentioned below.

Oberlin died on the 1st of June, 1826, in the 86th year of his age and the 59th of his residence in the Ban de la Roche. He was buried at Foudai on the 5th of June. Nearly all his flock followed their *Cher Papa*, as they always called him, to the grave, and several Roman Catholic priests, with all the Protestant clergy in the neighbourhood, joined in the funeral rites. An affectionate parting address to his people, which he had left behind him, was read from the pulpit on the occasion.

Oberlin was married on the 6th July, 1768, to Madeleine Salomé Witter, who died on the 18th January, 1784. He had nine children, two of whom died very young. The other seven were brought up under his own care, and lived to help him in his labours. Their names were—Fréderic, who died in 1793; Fidelité Caroline, who was married in 1795 to the Rev. James Wolff, of Mittelbergheim, and died in 1809; Charles Conservé, who became in 1806 pastor of Rothau, in the Ban de la Roche, where he still resided in 1838; Louisa Charité; Henrietta, married to the Rev. M. Graff; and Frederica Bienvenue, married to the Rev. M. Rauscher. Oberlin was succeeded by his son-in-law, M. Graff, who had been his assistant for some time: but he was soon obliged to remove to Strasburg on account of ill health, and was succeeded by M. Rauscher, the present pastor.

(*Memoirs of John Frederic Oberlin*, 8th edit., *with a Short Notice of Louisa Schepler*, London, 1838. The 2nd edition of this work was reviewed in the 'Journal of Education,' vol. i., p. 362.)

Any account of Oberlin's life would be incomplete without some notice of LOUISA SCHEPLER, who was originally his servant and a conductress in one of his schools. Upon the death of Oberlin's wife she became his housekeeper, and soon after she begged him to pay her no more wages, but to treat her as one of his children. Her request was complied with, and she lived in Oberlin's family till and after his death, employing all her energies and the whole of a little property which she possessed in works of benevolence. In August, 1829, she received one of the *Prix de Vertu* distributed annually by the Académie Française, amounting to 5000 francs, the whole of which she laid out in assisting the poor and in other benevolent objects. She died on the 25th of July, 1837, at the age of 76, having been a conductress 55 years.

OBESITY is an excessive accumulation of fat in various parts of the body. It is not possible to define the boundary beyond which the fat in the body can be called excessive, for persons possessing it in the most varied degrees enjoy equally good health, and the same person may at different times possess more or less without any injury to his comfort. The average quantity of fat in healthy men is from $\frac{1}{16}$ to $\frac{1}{20}$ of the weight of the whole body.

Obesity may occur at all ages; it is not uncommon in children; is far more rare in youth and in the early periods of manhood; and is most common after the age of 40, at which time an increase in the quantity of fat is observed in perhaps the majority of persons.

The chief accumulations of fat take place beneath the muscles, in the omentum and mesentery, about the heart, on the chest, and under the chin. In all these parts a certain quantity of fat naturally exists, and here therefore its amount is merely increased; but in cases of excessive obesity, it accumulates in situations where before there was none, as among the minute fibres of the muscles even of the heart, and in various other tissues.

The common effects or accompaniments of excessive fatness are sleepiness and heaviness, indisposition or incapacity for active exertion, shortness of breath, a weak action of the heart, and a general torpor of all the functions of the body. It predisposes to various congestive diseases, as apoplexy, &c.

The remedies for obesity are unfortunately not so well known or so efficacious as the modes of producing it. Perfect quietude, a bountiful supply of nutritious food, and long sleep are the means by which the grazier rarely fails to produce obesity in his cattle: and it is in general found that a plan exactly the reverse of this is the most successful means of relieving men from the same condition. Dr. Radcliffe's brief advice 'to keep the eyes open and the mouth shut' embodies nearly all the curative means for this disorder. A small quantity of food, and that of the least nutritive kind, active exercise both of body and mind, diminished quantity of sleep, an avoidance of all indulgence, and the maintenance of the various secretions in at least their natural quantity, are the only means that can be employed with the least prospect of benefit. It is true these are often insufficient, but they should still be persevered in to prevent the malady from growing worse, an evil which the opposite course will undoubtedly ensure.

OBI'DOS, a small town of Portuguese Estremadura, situated near a lagoon which communicates with the sea, about 50 miles north of Lisbon, and on the west side of the ridge which crosses the country from north to south. This place has become memorable in the history of our own times through the battle which took place near it on the 17th August, 1808, between the English, commanded by Sir Arthur Wellesley, who was advancing from Mondego Bay, where he had landed about a fortnight before, and the French, commanded by General Delaborde. The English attacked and drove the French from their position with the loss of six hundred men. The French general fell back upon Torres Vedras, where he was joined by Junot, who soon after fought the battle of Vimeiro with a similar result. The battle of Obidos was the first of a long series of engagements between the English and the French in the Spanish Peninsula, which continued till 1814.

OBJECT GLASS. [TELESCOPE.]

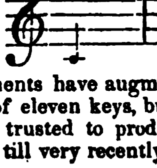
OBLATE, a term applied to a spheroid which is made by the revolution of an ellipse about the smaller of the two axes.

OBLIQUE. This term is used as opposed to direct or right, and signifies whatever is not direct or right. The word seldom appears, except as expressing that an angle is not a right angle, all other uses of it being almost obsolete.

OBLIQUITY, a term used in astronomy to express the angle made by the ecliptic with the equator. The greatest latitude at which the sun ever appears vertical is the obliquity of the ecliptic. [SUN; PRECESSION AND NUTATION.]

OBLONG, a word in common use, expressing the same meaning as, and in our opinion preferable to, the mathematical term rectangular, or having the figure of a rectangle.

OBOE (*Ital.*), a musical instrument of the pneumatic kind, blown through a reed: it is a tube of boxwood, 22 inches in length, slender in the upper part, but spreads out conically at the lower end, and consists of three joints, or pieces, besides the reed. Its compass is two octaves and a fifth, from C below the treble clef, to G, the fourth added line above it:—



Modern improvements have augmented the resources of the Oboe by means of eleven keys, but only skilful performers can safely be trusted to produce the two or three highest notes; and till very recently, E, or even C, above the staff, was considered the utmost practicable extent of the instrument. Oboes are now frequently made to go down to B♭, in which case they exceed the usual length, and have an additional key.

The Oboe has for centuries past been in use, and may be traced back to the reign of Edward III., in whose band oboes, under the denomination of *Wayghtes*, were employed. Indeed our itinerant parish-musicians, the official precursors of what was once a merry season, retain the appellation of *Waits*, though they have long abandoned the instruments which conferred on them their title.

Up to nearly the close of the last century, this instrument was only known, in most parts of Europe, by its French name, *Hautbois*, a word which in England has always been pronounced *Hoboy;* and this pronunciation has been transferred to the Italian term, through the word Oboe is now invariably adopted in writing.

O'BOLUS (ὀβολός), was a Greek coin, both silver and brass. At Athens it was of silver, the sixth part of a drachma, and worth somewhat more than five farthings sterling. The Æginetan obolus is stated to have been heavier than the Athenian. It is generally supposed that *óbolos* and *óbelos* (ὀβολός and ὀβελός) were originally the same word differently pronounced [OBELISK], and that the coin *obolus* was first of iron or copper, in form like a spit, which the word also means, or a bar; that a handful made a *drachme* (δραχμή); and that the form was afterwards changed from an oblong to a round shape, but that though struck round, like other money, it continued to retain the antient name. Others say that the obolus was originally so called from being stamped with the figure of a skewer or spit, or other sharp-pointed instrument.

At a later period the obolus was of brass. Eckhel (*Doctrina Num. Vet.*, tom. i., p. 156) mentions a brass coin of Metapontum, which on the reverse bears the word ΟΒΟΛΟΣ. This coin, which is in the Imperial cabinet at Vienna, is engraved by Motraye (*Voyage*, tom. ii., tab. 7, n. 40). Pitiscus notices a similar coin bearing the same word, struck by the Nicæans. Wise, in the *Nummi Bodleiani*, in his 'Notæ in Nummos Populorum,' p. 134 a, observes that the Chians designated their brass coin by the same term; 'Chii monetæ suæ æreæ valorem nominatim designabant, ut ΟΒΟΛΟΣ, *obolus*.' The small silver coin of Athens, bearing on one side two bodies of an owl rising into one head, is supposed to be the obolus. There are small brass coins of Athens also of the same type.

The Greeks had an hemi-obólion (ἡμιωβόλιον), or semiobolus, and a *tribbolon* (τριώβολον), or silver coin of three oboli, which was the common pay of the Dicastæ; the pay originally having been two oboli. Two *oboli* were placed in the mouth of a dead person, in order to enable him to pay for his passage over Styx. According to Lucian, Charon's demand was only one obolus. (Aristoph., *Frogs*, 141; Lucian, *Catapl.*, i., p. 643.)

According to Suidas (ὀβολός), the Athenian *obolus* contained six *chalci* (χαλκοῖ), and the *chalcus* contained seven *lepta* (λεπτά). Other authorities say that the *obolus* contained eight *chalci*.

(Julii Pollucis *Onomasticon;* Pitisci *Lex. Antiq. Rom.*, Rasche, *Lexicon Rei Nummariæ*, tom. iii., p. 2, 32; Boeckh's *Public Economy of Athens*, i. 132; ii. 386, Engl. tr.)

OBSERVANTS, Friars, a branch of the Franciscans. Some considerable relaxation having been gradually effected in the rule of the Franciscan order, it was thought requisite, as nearly as possible, to restore it to its first rule and original institution; whereupon such as continued under the relaxed order were called Conventuals, and such as accepted the reformation were called *Observants*, or Recollects. This reformation was begun about A.D. 1400, by St. Bernard, or Bernardin, of Siena, was confirmed by the Council of Constance, A.D. 1414, and afterwards by Eugenius IV. and other popes.

The Observants were brought into England by king Edward IV., who allowed them to fix their first residence at Greenwich. King Henry VII., by his charter bearing date 1486, after reciting that his predecessor, king Edward IV., had, by the pope's licence, given to certain Minorites, or Observant Friars of the Order of St. Francis, a piece of ground adjoining to his palace there, on which were some antient buildings, and that these friars having taken possession, and having laid the first stone with great solemnity, began to build several small mansions in honour of the

Virgin Mary, St. Francis, and all Saints granted and confirmed the said premises, and founded a convent of friars of the Order above described, to consist of a warden and twelve brethren at the least. (*Cart.*, 1 Henry VII., n. 24.) It is said that he afterwards rebuilt their convent for them from the foundation. (*Hist of the Eng. Franciscans*, p. 216.)

Catharine of Aragon, the first wife of Henry VIII., was a great favourer of this convent and their order. She appointed one of the friars of Greenwich, father John Forrest, to be her confessor; and while she was resident at this place, she used to rise at midnight and join the friars in their devotions. The friars were grateful, and openly maintained her cause when the subject of the divorce was agitated. The king was so much irritated by this conduct, that he suppressed the Order altogether.

The convent at Greenwich was suppressed August 11, 1534. On the accession of queen Mary to the throne however, the Observant friars appeared again in public, and returning to Greenwich, began to form themselves into a community. The queen reinstated them in their possessions, founded their monastery anew, and repaired it at her own cost, out of gratitude for their fidelity to her mother. Queen Elizabeth expelled the friars, and suppressed their monastery again, on June 12th, 1559.

(Tanner, *Notit. Monast.*, edit. Nasm., p. xiii.; *History of the English Franciscans*, ut supr.; Stevens's *Contin. of Dugd. Monast.*; Lysons's *Environs of London*, ed. 1811, vol. i., pp. 527, 528.)

OBSERVATION AND EXPERIMENT. The first of these terms includes a portion of the second, inasmuch as every experiment is made with a view of observing the result. But the latter signifies more than the former, implying a disposition of means of observation which it is in the power of the experimenter to make for himself, and which he actually did make for himself. If, for example, a person who observed the attraction of the magnet for the first time, dubious of the residence of the attracting power, were to move the magnet to another place, that he might see whether the attracted body would still move towards it, he would make an experiment. But if his magnet were the sun and the attracted body the earth, he could only wait the proper times for observing the motion of the latter with respect to the former, in order to establish the attraction. Thus astronomy, geology, meteorology, natural history, &c. are sciences of observation (that is, of nothing but observation); while mechanics, optics, electricity, &c. are sciences of experiment. In one sense geology and meteorology are partly sciences of experiment, since portions of the material subject-matters of these sciences may be submitted to preconcerted tests. It would however be more proper to consider mineralogy and aero-mechanics as the experimental sciences connected with these, than to class them as mixed sciences.

To give an account of experiment would require us to explain the methods of every science which proceeds upon it: to give a detailed account of observation, we should need the description of all the means or instruments by which our senses are assisted in the examination of phenomena. We shall here confine ourselves to a short sketch of the errors which render observations discordant, and which make a final process of combination necessary in every case in which we cannot command results which agree with each other so well that the difference between them is imperceptible to the senses.

Everything which is called observation is of two kinds; in the first a simple individual fact is noted, in the second a magnitude is measured. The results of the first species are the proper subjects of inductive reasoning only; the results of the second, of inductive and mathematical reasoning, either or both. Individually, the first kind of observations are not necessarily subject to error: thus a zoologist observing the structure of a new animal might in every instance correctly note the resemblances which exist between it and other animals, and might refer it to its proper class in a manner which centuries of succeeding observation would not induce naturalists to disturb. Collectively however, wrong inferences might be drawn from facts; thus results of classification which are true of all animals known up to one moment, and are therefore inferred to be always true, may be disturbed in the next moment by the discovery of a new specimen.

Observations of the mathematical character are of necessity erroneous from the imperfections of our senses. When a new insect is observed, it is soon seen, for instance, whether it has or has not wings, and the question once settled is finally settled. But when, say the specific gravity of a gaseous substance, at a given pressure and temperature, is *measured*, it is impossible to consider the question as settled at any time. Say that, under given circumstances, the specific gravity is asserted to be ·934 of that of air similarly circumstanced; this is only an admission, at most, of its being somewhere between ·9335 and ·9345. And that which we call an exact measurement of a length may for one purpose mean within a hundredth of an inch, for another within a thousandth, and so on; but no person dreams of having attained absolute truth. This being well known, and every process used in observation being subject to error, it is the business of the observer to repeat observations many times, and to extract a result as near to the truth as may be, from the mass of discordant materials which the repetition will furnish.

The necessary errors of observation arise from the imperfection of our perceptions and of the instruments which we use, and also from hasty or otherwise incorrect conclusions. The subject requires the separation of these errors into three classes, which may be mixed up with one another in results, and may be mistaken for one another. We may call them *fixed*, *personal*, and *casual*.

By a *fixed* error we mean one which is inherent in the instrument or method employed, so that it must exist, and, all other things remaining the same, must have a given magnitude. Thus, if the axis of an equatorial (supposing such an instrument to be employed for absolute measurements) do not absolutely coincide with that of the heavens, the right ascension and declination of a given star, measured when at a given distance from the meridian, must have a given error. It might be precisely the same in numerical effect, and would certainly produce an error of the same class, if the observer used a wrong formula in the reduction of his observations. Thus, it would be perfectly possible to give to one observer an incorrect instrument and a correct formula, and to another a correct instrument and an incorrect formula, in such manner that their final results should coincide.

Errors of this kind cannot be detected by multiplying similar observations, since there can be no tendency to destroy error in the mere repetition of it. There are many modes of detecting fixed errors, and of allowing for them; but the only mode of avoiding them is by taking advantage of the construction of the instrument to use it for the same purpose under different circumstances, in such manner that measurements which are too large in one set of results must be as much too small in the other. If the same number of observations be contained in each set, this, as we shall presently see, is really a reduction of the fixed error to the class of casual ones; or rather, a destruction of the fixed error by the same process which gives the highest probability of destroying the casual errors.

All instruments must be more or less erroneous in every particular. In the science of observation, as now understood, and in any matter in which the utmost attainable exactness is requisite, the assumption of perfection in an instrument, in any point whatsoever, is looked upon as nothing but the expression of the observer's unwillingness to take trouble. For even if ninety-nine successive days' trials have shown that any particular error does not exist to any sensible amount, it is not conclusive against the observations of the hundredth day being affected by some new circumstance, necessary or accidental, in which the instrument has been placed in the intermediate time.

By a *personal* error is meant one of the same character as a fixed error, but arising from the temperament or habits of the observer, and not from the instrument. Thus if A should, in noting the time of a phenomenon by the clock, have a tendency to accelerate the moment of its happening, and B a similar tendency to retard it, the results of the two would differ by the sum of their personal errors. It is only lately that it has been discovered that two individuals, observing the same phenomenon with the same species of instruments, may differ sensibly (though but little) from each other; and this not once or twice, but nearly always, and in such a manner as to make the average of a set of observations of one observer differ from that of the other. For anything we can know to the contrary, this species of error may exist in every observer; and its absolute quantity must be unknown until we can compare the observations of men subject to it with those of some other beings who are not. If indeed the personal error is purely casual, so that where one person measures too much, another measures as much too little, the average of the results of a large number of observers would give the truth or very near it. But should it be the case, which is not impossible, that all men are subject to an error of the same kind, some more and some less, namely, that all measure more or less too much, or else that all measure more or less too little, the average above mentioned would give, not the truth, but the truth affected by the average error of all the observers. Nor would the results obtained ever enable us to distinguish whether personal errors have a fixed average or not; for suppose the fact observed to be that A, one time with another, measures more than B; this *may* mean either of several things:—either A measures truly, and B too little; or B measures truly, and A too much; or B measures too little, and A too much; or both measure too little, but B more than A; or both measure too much, but A more than B. Now, if A and B were to observe together for a century, the mere comparison of their observations, though it would settle their average amount of difference, would never enable us to give the least guess which of the preceding cases is the true one. If indeed we could convert the observer, as we have previously mentioned might generally be done with the instrument, into another observer with an error of the opposite kind, a true result, or one sensibly true, might be obtained. Suppose, for example, it is the observer's habit, in noting the transit of a star over a fixed wire in the field of a telescope, to take the transit too soon when the star comes in on the right side, and too late when on the left: consequently, by making a number of observations with an inverting telescope, and an equal number with one which does not invert, the average of both sets would be as likely to give a true result as if neither error had existed.

All the errors which precede, though called errors because they give a result which is not the one intended to be obtained, yet are in fact the consequences of an actually existing state of things, and their laws can be determined by using the right means, or at least must be supposed to arise from natural causes determinable by experiment in the same manner as other consequences of existing relations. They are then really measures of phenomena, called errors simply because the effects of their causes are to be removed from the results. It is even possible that they might be made intentionally in a given form, with a view to prevent their occurrence in a more objectionable form. Thus, suppose an observer finds himself, in correcting discordant observations, apt to confound additions and subtractions, using one for the other: he will set his instrument intentionally wrong to an amount which casual discordances never reach, taking care, of course, to preserve means of correcting the intentional error with the rest; so that the requisite correction shall always be of one kind, additive or subtractive. Nevertheless this arrangement, as it should be called, would go by the name of an error, simply as being to have its effect afterwards destroyed.

By *casual* errors, the only ones to which the name of errors can properly be given, are meant those which are absolutely inexplicable, or of which the cause and tendency are equally unknown. They must be considered as equally likely to be positive or negative; so that in the long run the results which they give too great will be compensated by those which are too small. If this be not the case, that is, if there be a greater tendency to too much than to too little, there must be a reason for this phenomenon, and a law of action, which must be sought for and detected. Let us suppose this done, so that any result of a single observation, corrected for all discoverable sources of error, is in itself as likely to be too small as too great.

If all the observations be equally good, the Mean, or average, is more likely to be true than anything else. This is even true with reference to fixed or personal errors which may remain, but which are totally unsuspected; for there is an even chance of such errors acting in either way. In the article just cited is shown the way of finding, from the observations themselves, the probable error, as it is called, or that which there is an even chance of not exceeding; with references to further sources of information. This article [Mean], together with the general considerations in Probabilities, Theory of, and Weight of Observations, will contain all we shall find it necessary to say on the subject.

It might be supposed that the greater the number of observations, the less, in the same proportion, the probable error of the average; but this is not true, since the probable error diminishes as the *square root* of the number of observations increases. Thus, suppose it to be well settled that twenty observations of a given observer will have an average of which it is an even chance that it does not err by (say) a unit: then the same observer must make *four* times as many observations to get an average with an even chance of not more than *half* a unit of error; *nine* times for one-*third* of a unit, and so on.

Those who neglect sound principles of observation are apt to overrate the effect of multiplying observations; which, though considerable, does not, as we see in the above rule, keep pace with the number of observations.

OBSERVATORY. [Transit Instrument.]

OBSIDIAN (called by the Romans, *Obsidianus Lapis*, by the Greeks, Ὀψιανὸς λίθος), a mineral, probably of volcanic origin, and so called, as stated by Pliny (*Hist. Nat.*, xxxvi. 26) from a person named Obsidius, who first found it in Ethiopia. This substance occurs in beds, in large and rolled masses and in small grains. Its structure is compact. Fracture large, conchoidal. Hardness 6·0 to 7·0. Scratches glass. Brittle. Colour greenish, greyish, or brownish black. Lustre vitreous. Opaque. Translucent on the edges. Specific gravity 2·34 to 2·39.

Obsidian in the form of little grains of the size of peas, and of a pearly white colour, and consisting of very thin concentric layers, has been found at Marekan in the Gulf of Kamtchatka. It has been called *Marekanite*.

Pliny says that gems and sometimes whole statues were made of obsidian: he also speaks of four elephants of obsidian which were dedicated by Augustus in the temple of Concord. Statues were also made of it by the Egyptians.

Before the blow-pipe, it swells up strongly, and fuses into a transparent glass. It occurs in veins and beds traversing rocks in many parts of Europe, Asia, and America, and in the neighbourhood of most volcanoes.

The analyses of different varieties of obsidian differ considerably: the following analyses of Marekanite and of Obsidian from Cerro de las Navagas, are by Klaproth and Vauquelin respectively:

	Marekanite.	Obsidian.
Silica . .	77·50	78
Alumina . .	11·75	10
Soda } . .	7·00	
Potash } . .		6
Oxide of Iron .	1·25	3·6
Lime . . .	0·50	1
Water . .	0·50	
	98·5	98·6

OBTUSE, opposed to acute, is applied to an angle which is greater than one right angle and less than two.

OBY, River. [Siberia.]

OCA'ÑA, a town of Spain, in the province of New Castile, not far from Aranjuez, and about 30 miles south of Madrid, situated on the high road to Andalusia. On the 19th November, 1819, the Spanish army of Andalusia, about 50,000 strong, commanded by General Areizaga, advanced to Ocaña, and threatened Madrid, which was occupied by the French. The French under Marshal Soult attacked the Spaniards, who fought with great courage, especially the infantry, and at first repulsed the enemy; but after three hours' fighting, the French succeeded in breaking through the Spanish line, which dispersed in the greatest confusion leaving their cannon, baggage, and one half of their men killed or prisoners. Areizaga hurried away with the remainder of his army towards the Sierra Morena. The battle of Ocaña was a most disastrous event to the Spanish cause. The advance of the Spaniards upon Madrid had been effected against the advice of Lord Wellington, who was encamped near the frontiers of Portugal.

OCANA. [Granada, New.]

OCCAM, or OCKHAM, WILLIAM, an English scholastic philosopher, was born in the county of Surrey about the end of the thirteenth century. He was a pupil of Duns Scotus, 'the most subtle Doctor,' and, like his master, a member of the order of Franciscans. He himself attained to the title of the 'Invincible Doctor.' He opposed the Realism of Scotus and his followers, and formed a new speculative sect, bearing the name of Occamists, who revived the tenets of Nominalism. In the early part of the fourteenth century, he taught at Paris. He was distinguished by his powerful opposition to the papal power. A book which he published, entitled 'De Potestate Ecclesiasticâ et Seculari,' drew down upon him the censure of the pope. He was protected by the king of France, whose cause he had supported against papal encroachments. When afterwards excommunicated by the pope, he found another friend in the emperor of Germany. He died at Munich, in 1347.

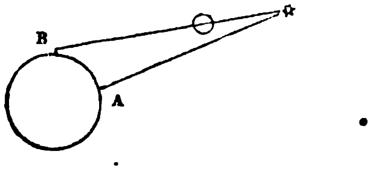
Very little is known of Occam's life. A list of his works, which includes a commentary upon the Predicables of Porphyry and the Categories of Aristotle, and many treatises of scholastic theology and ecclesiastical law, will be found in Fabricius's 'Bibliotheca Latina,' tom. iii., p. 466. Occam's *Summa totius Logicæ* was published at Pàris in 1488, and at Oxford in 1675, 8vo.

Tennemann gives the following account of the Nominalist speculations of Occam:—'He maintained that general ideas had no objective reality out of the mind, because neither the possibility of judgments nor the possibility of a real science requires this hypothesis, and it only leads to absurd consequences. These general ideas have no objective existence but in the mind; they are a product of abstraction; and are either images (*figmenta*) which the mind creates for itself, or subjective qualities belonging to the mind, and which, according to their nature, are the signs of exterior objects. From this doctrine, roughly sketched only, the problem of the principle of individualization came to lose all interest, and the question of consciousness to occupy men exclusively. In the theory of consciousness, Occam diverged still more from the Realist opinion; and in maintaining the subjectivity of thought, he has perhaps given more encouragement than he meant to give to scepticism and empiricism.' (Tennemann, *Manuel de l'Histoire de la Philosophie;* Cousin.)

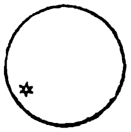
A few pertinent remarks on Occam and his philosophy are contained in Mr. Hallam's 'Introduction to the Literature of Europe,' vol. i., p. 233.

OCCULTATION. This word, which might serve to designate any eclipse of one heavenly body by another, and even the effect of cloud or fog, is particularly applied to the eclipse of a fixed star by the moon. It has been seen [Moon, p. 373] that the spiral course of the moon's real orbit must bring her at some time or other in the course of a revolution of the nodes (18¼ years) at or near to every star situated within about 5° of the ecliptic either way. There are consequently continual occultations of stars by the moon; such of which as can be made useful in finding the longitude are given yearly in the Nautical Almanac.

If the moon were (like the star) so distant that two spectators at nearly opposite points of the earth would not be sensibly removed from each other in space when their distance from each other was compared with their common distance from the moon, then all observers, wheresoever situated, would see the moon begin to hide a star at the same instant. They would all then be able to note by their different clocks the absolute instant of the same phenomenon; and [Longitude] their differences of clock-time at this absolute instant would give their differences of longitude. But the proximity of the moon makes it possible that one observer (at A) may see no occultation at the time when such a phenomenon has occurred to another (at B); and makes it certain that two observers cannot see the beginning of an occultation at the same instant of absolute time. Both therefore must deduce from their own observed times of commencement, and from their knowledge of the moon's place and motions, the times, at their several places, at which a spectator situated at the earth's centre would see the star touch the moon's limb; and this being done, they are in the same position as if the moon had been too distant to require such a process. If, in this work, we had given the details of astronomical calculations, we should not have separated that required in reducing an occultation to the earth's centre from the similar case which occurs in an eclipse of the sun or a transit of Venus: the principles employed in all are identical, though the first process is rendered more simple than the second or third, by the very great distance of the star, which may be considered as marking the same point of the heavens at all places. For the value of observed occultations in finding the Longitude, see vol. xiv p. 143.



Here we might close this article, if it were not for a singular circumstance which sometimes occurs; and which cannot be traced either to the character of the telescope employed, of the observer, of the weather during the observation, or of the particular star under occultation. When the moon approaches the star, instead of an instant of contact, followed by disappearance of the star, the latter for a few seconds is frequently thrown upon the moon, as if it were the nearer body, and were going to cross the moon's surface, as Venus does that of the sun during a transit. While this is taking place, which sometimes lasts until the star has fairly left the moon's limb or border, the star preserves it light, though it frequently undergoes a change of colour. Aldebaran, whose natural colour is inclining to red, has been seen to present this phenomenon much more frequently than any other star: but θ Tauri, θ^1 and θ^2 Pleiadum, Spica Virginis, Regulus, γ Libræ, 132 Tauri, α^1 Cancri, 49 Libræ, λ Aquarii, 249 Aquarii, 187 Sagittarii, γ Tauri, ρ Leonis, ρ Geminorum, δ Cancri, δ Piscium, &c., have been seen more or less to come upon the moon's limb. See a detailed list of quotations from the different observers in a paper by Mr. South 'On the Occultation of δ Piscium by the Moon,' in the third volume of the *Memoirs of the Astronomical Society*. It is to be noted that many of these appearances did not exhibit the whole of the phenomenon, but made the star hang for some seconds upon the moon's limb, instead of immediately disappearing.



The occultations of Aldebaran approaching again in the years 1829 and 1830, the Society just mentioned invited the particular attention of astronomers to them. The consequence was, a large number of communications from different parts of Europe, which are printed in the fourth volume of their Memoirs. Nothing can be more different than the results: some, who had not seen the phenomenon before, saw it for the first time; others, who had seen it before, did not see it; some, who had never seen it before, continued unable to do so. Of six observers at the Royal Observatory, five distinctly saw the projection on the moon's limb, and one saw it hang on the edge of the moon five or six seconds before it disappeared. Of three at the Observatory of Paris, two distinctly saw the projection, and one saw the star disappear instantaneously, leaving a shade (' ombre ') on the part of the moon at which it disappeared. The majority saw the star either projected or hanging on the moon's edge. It is to be noted that this phenomenon has been seen, though rarely, at the dark edge of the moon as well as at the enlightened. Its cause is matter of much diversity of opinion. Some suppose that the moon has an atmosphere close to the surface, which reflects the sun's light and appears opaque like the body of the moon, but is sufficiently transparent to allow the star to shine through it. Others think that certain telescopes give spurious disks to the moon, which inferior instruments certainly do: others again refer it to the eye of the spectator, and think that the impression produced by the star on the retina lasts a short time after the actual disappearance; and one observer states that he saw somewhat different phenomena, according as his attention was directed exclusively to the moon or the star. All these explanations have their difficulties, and are not given very positively. No one of them except that which refers the phenomenon to the eye of the observer will explain why it should sometimes happen and sometimes not, with the same observer and the same instrument; and it is obvious that by supposing a peculiarity of each individual retina for the time being, we do little more than make a purely arbitrary supposition, and one which would serve for any optical difficulty whatever. We need hardly add that no one imagines the star to come between the moon and ourselves.

OCCUPANCY. This term in English law signifies the taking possession by any person of any thing which has no owner (Bracton, fol. 8, *b*), and the general doctrine, as stated in Bracton, is derived from the Jus Gentium of the Roman lawyers, as explained in the *Digest* (lib. 41, tit. 1, s. 1, 3, 5, &c.). That use of the term which will be here explained has reference to the occupation of land.

An estate *pur auter vie*, or for the life of another person or persons, had formerly some peculiar qualities incident to it. If a man had an estate in land for his own life, such estate was of course determined by his death. But if he had an estate in land for the life of another person, and he or his assignee died before such person, the estate was not determined, and yet there was nobody to take it, inasmuch as it could not go to the heir, nor, being a freehold interest, to the executor or administrator. Such an estate belonged to the first person who could take possession of it, and he was entitled to hold it, as general occupant, till the expiration of the life for which it was originally granted. But if the original grant were to A and his heirs, for the life of B, and A died during the life of B, the heir of A took the estate as special occupant, that is, as a person designated in the original grant. Sometimes the heir was said to take the estate as a descendible freehold, though the estate is admitted not to be an estate of inheritance, and therefore not subject to courtesy or dower; it not being perceived that to say an estate is not an estate of inheritance and yet is descendible, is a contradiction, for descent implies an heir who takes as heir. Still it appears from Bracton (fol. 26 *b*, 62 *b*) that if lands were given to a man and his heirs for the life of another person, the heir could recover the land by an assise of *mort d'ancestor*, because the ancestor died seised as of fee, and a man could claim by an assise of mort d'ancestor any land of which his ancestor was seised as of a fee (ut de feodo); and hence it has been concluded that the heir took not as special occupant, but that he took a descendible freehold. This subject of occupancy, general and special, is discussed at great length and with considerable acuteness by Vaughan, Justice. (Vaughan, *Holden* v. *Smallbrooke*.)

In the case of copyhold, when there was no special occupant, the lord took the estate, for the lord, having the freehold, was also considered to have the possession; and therefore 'vacancy,' the necessary condition to any other person's title by occupation, was wanting. In the case of a rent or other incorporeal hereditament, when there was no special occupant, inasmuch as there could be no entry, there could of course be no possession or title by general occupancy.

It is stated by Bracton, that if land was given to a man for the life of another without any mention of his heirs, the land on the death of the donee did not immediately revert to the donor, unless the donee died intestate, or unless, though he made a will, he had made no mention of his interest in the land as of a term of years, but that if he had disposed of it in his will as of a chattel, such disposition was valid. (Bracton, fol. 27 *a*. See Doe dem. Blake, 6 *T. R.*, 291.) This power of disposing of a freehold interest in land must have fallen into disuse after the time of Bracton; for it is quite inconsistent with the doctrine of general occupancy as stated by Littleton, and also with the general rule of law, which prevented freehold interests in land from being disposed of by will, before the Statutes of Wills passed in the reign of Henry VIII. But the Statutes of Wills were limited to estates in fee simple, and no power to devise estates *pur auter vie* existed at law before it was given by the Statute of Frauds.

Since the passing of the Statute of Frauds (29 Car. II., c. 3) general occupancy (with perhaps one exception, hereafter mentioned) has ceased to exist. By that statute (s. 12) a man was enabled to devise an estate *pur auter vie* by a will in writing, executed as therein mentioned, and attested by three witnesses; and if no such devise thereof was made, the estate was chargeable in the hands of the heir, if it should come to him by reason of a special occupancy, as assets by descent, as in case of lands in fee-simple; and in case there should be no special occupant thereof, it was declared that it should go to the executors or administrators of the party that had the estate thereof by virtue of the grant, and should be assets in their hands, that is, should be liable to the payment of the testator's or intestate's debts. By the 14 Geo. II., c. 20, s. 9, which recites 'that doubts had arisen, where no devise had been made of such estates, to whom the surplus of such estates, after the debts of such deceased owners thereof were fully satisfied, should belong:' it was enacted, 'That such estates *pur auter vie*, in case there was no special occupant thereof, of which no devise should have been made according to the said act (29 Car. II., c. 3), or so much thereof as should not have been devised, should go, be applied, and distributed, in the same manner as the personal estate of the testator or intestate.' These two statutes provided for the case both of a devise being made of an estate *pur auter vie*, and also for the case of the land coming to the heir as special occupant where no devise was made. But an estate *pur auter vie* may be limited either to a man and his heirs, or to a man, his executors and administrators, or to a man simply without mentioning either heirs, executors, or administrators. The Statute of Frauds appears to contemplate the heir only as special occupant, and if there was no devise according to the statute, and no special occupant, which would happen when the estate was limited simply to the grantee, the estate went to the executor or administrator for the payment of debts, and after payment of debts, the surplus was distributed, under the act of George II., in the same manner as the testator had directed the distribution of his personal estate, or it went, in case of an intestacy, to the next of kin of the intestate. But when no devise was made according to the statute, and the estate was limited to the grantee, his executors and administrators, inasmuch as the heir could not in that case be special occupant, the question arose, if the executor or administrator could be such occupant, and if he could, the further question arose, Who was to have the estate after payment of debts? The proper construction of the two statutes seemed to be that the heir only could be special occupant, and that he alone could take as such. If then the land were not devised according to the Statute of Frauds, and there was no special occupant, by reason of the limitation being simply to the grantee, or to him, his executors, and administrators, the executor or administrator would take it under the Statute of Frauds, and distribute it, after payment of debts, under the statute of George II. The executor or administrator took the estate as a freehold, which it is, but in trust for the persons entitled under a will, which was sufficient to pass personal estate, or, in case of intestacy, in trust for the next of kin. (See the opinions of Lord Redesdale, in *Campbell* v. *Sandys*, 1 Sch. and Lef., 288; and the opinions of Lord Eldon, in *Ripley* v. *Waterworth*, 7 Ve., 425.)

If a man dies intestate who is seised of an estate for another's life, and the limitation is such that the estate cannot go to his heir as special occupant, the estate seems open to a general occupancy until an administrator is appointed; but such administrator seems to have a title by relation.

Neither the Statute of Frauds nor that of George II. applied to copyholds, and therefore not to estates *pur auter vie* in copyhold lands.

Estates *pur auter vie*, whether there shall or shall not be any special occupant thereof, and whether the same shall be freehold, customary freehold, tenant right, customary or copyhold, or of any other tenure, and whether the same shall be a corporeal or incorporeal hereditament, are now devisable by a will in writing executed in the manner prescribed by the statute of 1 Vic., c. 26, which repeals, among other clauses, that part of the Statute of Frauds which relates to estates *pur auter vie*, and also the 9th section of 14 Geo. II., c. 20. And if no disposition by will is made of any estate *pur auter vie* of a freehold nature, the same shall be chargeable in the hands of the heir, if it shall come to him by reason of special occupancy, as assets by descent, as in the case of freehold land in fee simple; and in case there shall be no special occupant of any estate *pur auter vie*, it shall go to the executor or administrator; and if the same shall come to the executor or administrator either by reason of a special occupancy or by virtue of that act, it shall be assets in his hands, and shall go and be applied and distributed in the same manner as the personal estate of the testator or intestate. This statute settles a number of questions, some of which have been already referred to, which were of frequent occurrence, with respect to estates *pur auter vie*.

On the subject of Occupancy, the reader may consult Puffendorf, *Law of Nature and Nations*, iv., c. 6.

OCEAN (a Greek word, Oceanus, Ωκέανος) is a term used to indicate the extensive bodies of salt-water which cover the greater part of the earth's surface. The word first occurs in Homer, who uses it to designate the river or stream which, according to his ideas, surrounded the surface of the earth like a circle. The Greek geographers however knew that the ocean was a wide expanse of water, which surrounded the land, and the term ocean was used by them in this sense. They supposed that it penetrated deep into the mass of the continent by four great bays or seas: these were, on the south the Arabian Sea and the Persian Gulf; on the west the Mediterranean; and on the north an imaginary strait which connected the Northern Ocean with the Caspian Sea. (Strabo, p. 121; Pomp. Mela, i. 1.)

The proportion between the surface of the solid and watery surface of the earth is differently stated. Darby, in his 'View of the United States,' calculates the water-surface to be 160,152,000 square miles, and the land only at 38,840,000 square miles: if this be correct, the land does not amount to one-fourth of the entire superficies of the earth. Some German geographers however are of opinion that the land-area is fully equal to one-fourth of the whole surface, and perhaps a small fraction more.

Several parts of the ocean are distinguished by peculiar names. The widest expanse of salt-water is that which extends between America on the east, and Asia and Australia on the west, and is called the Pacific Ocean. Its boundary-line is pretty well determined by the adjacent continents, which approach one another towards the north, and at Behring's Strait, which separates them, are only about 36 miles apart. This strait may be considered as closing the Pacific on the north. Towards the south both continents are widely separated from one another, and both terminate at considerable distances from the Antarctic Pole: America, in 56° S. lat.; and Tasmania, or Van Diemen's Island, which is an appendage of Australia, between 43° and 44° S. lat. The boundary-line of the Pacific must here be marked by lines drawn from Cape Horn, the most southern point of America, and from South-West Cape, the most southern extremity of Tasmania, to the Antarctic Pole. The expanse of water contained within these boundary-lines is estimated at 100,000,000 of square miles, or nearly half the superficies of the earth.

The ocean which extends between Europe and Africa on the east, and America on the west, and is called the Atlantic, may also be considered as being closed on the north by a strait, but it is one of considerable width. This strait is formed by the northern coast of Norway and the eastern coast of Greenland, which two countries are nearly 900 miles apart, between 68° and 71° N. lat. Towards the south the Atlantic extends to the Antarctic Pole, where it is divided from the Pacific by a line drawn from Cape Horn to the Pole. As Africa projects much farther to the south than the countries to the east of it, that portion of the sea which is east of Africa is not included in the Atlantic; and the eastern boundary-line of this ocean is here considered as formed by an imaginary line drawn from Cape L'Agulhas, the most southern extremity of Africa, to the Antarctic Pole. Within these boundaries the Atlantic, including its numerous seas, as the Mediterranean, the Black Sea, the Baltic, Hudson's Bay, and the Columbian Sea, is estimated to cover an area of nearly 30,000,000 of square miles.

That portion of the ocean which is separated on the east from the Pacific by a line drawn from South-West Cape, and on the west from the Atlantic by a line drawn from Cape L'Agulhas, is called the Indian Ocean. Its surface, including the Red Sea, Persian Gulf, Bay of Bengal, &c., is supposed to occupy more than 25,000,000 of square miles.

The northern coasts of Europe, Asia, and America do not extend to the Arctic Pole, but terminate between 70° and 80° N. lat. Between these coasts is a sea, which may be about 2000 miles across from one continent to the other. This sea is called the Arctic Ocean, or Icy Sea. The latter term has been applied to it from the circumstance of its being encumbered with heavy masses of ice all the year round. This sea is connected with the Pacific by Behring's Strait, and with the Atlantic by the wide strait between Greenland and Norway. Its area is estimated at about 4,000,000 of square miles.

OCEA'NIA. [PULMOGRADA.]

OCE'ANUS, De Montfort's name for the umbilicated form of Nautilus. [NAUTILUS, p. 113.]

OCELLA'RIA. [POLYPIARIA MEMBRANACEA.]

OCELLUS LUCA'NUS, Ὄκελλος ὁ Λευκανός, a Pythagorean philosopher, was a native of Lucania in Italy, and is supposed to have been a disciple of Pythagoras; but the time in which he lived is uncertain. He wrote many works on philosophical subjects, the titles of which are given in a letter written by Archytas to Plato, which has been preserved by Diogenes Laertius (viii. 80): but the only work of his which has come down to us is 'On the Nature of the Universe,' Περὶ τῆς τοῦ παντὸς φύσεως. This work, as we learn from the extracts in Stobæus, was originally written in Doric Greek, and appears to have been transferred in later times into the common Greek dialect. Its chief philosophical topic is to maintain the eternity of the universe (τὸ Πᾶν); Ocellus also attempts to prove the eternity of the human race (c. 3, s. 3).

The best editions of Ocellus are by Batteux, Par., 1768, 3 vols. 12mo., and by Rudolphi, Leip., 1801, which is accompanied with a valuable commentary. The work has been translated into French by the Marquis D'Argens, Berlin, 1762, and by the abbé Batteux, Paris, 1768; and into German by Bardili, and by J. G. Schulthess, Zürich, 1781, 8vo.

OCELOT. [TIGERS.]

OCHILL HILLS, are a system of hills, or rather mountains, in Scotland, the principal ridges of which are situated between 56° 10′ and 56° 20′ N. lat. and between 3° 30′ and 3° 50′ W. long., but the lower ridges extend eastward through the peninsula of Fife between the Frith of Forth and that of the Tay, and terminate a few miles from the North Sea.

The Ochill Hills begin on the west about three miles north-east of the town of Stirling, and on the north side of the road which leads from that place to Alva. Their western edge has the form of a segment of a circle, with its convexity turned to the north-west, and lying nearly parallel to the course of the river Allan, which flows about four miles from the base of the hills. Where this river descends from the hills, the outer edge of the mountain-mass begins to lie nearly due west and east, and continues in this direction until it passes 3° 30′ W. long., whence it continues in an east-north-east direction to the shores of the Frith of Tay and along this frith to the vicinity of Port-on-Craig Ferry. In all this line, which is nearly 40 miles, the Ochills form a continuous mass, and rise from a comparatively low and flat country, which along their western base is called Strathallan, and along the northern, Strathearn. At the foot of the mountains there are elevated moors. The declivity is steep, especially where the mass extends east and west, and in some parts near the base of the mass the sun is not seen for three months in the year. The elevation west of 3° 30′ probably exceeds, on an average, 1000 feet above the sea-level, but the mountains do not rise into peaks or elevated summits. East of 3° 30′ they sink lower, but maintain in general a height of 500 to 1000 feet. The summit of Norman's Law, south of Flisk, on the Frith of Tay, is supposed to be 1500 feet above the sea.

The width of this mountain-mass varies greatly. From its western extremity to near 3° 30′, a space of about 1 miles in length, it is on an average six miles wide. This area is occupied by one mass of rocks, with the exception of a deep narrow valley which traverses the mass in its whole length, and in which the river Devon runs from west to east. The valley, as far down as the church of Muckhart, is hardly more than two furlongs wide in any part, though it widens to half a mile below that place. The mountain-masses to the south of the valley are much higher than those which are north of it, and the highest portion of the Ochill Hills, Ben Cloch, attains the elevation of 2359 feet above the sea, and several other summits rise to more than 1500 feet. Both mountain-masses are furrowed by narrow ravines, through which the waters descend to the Devon. The southern mountains terminate in the great bend of the Devon, called the Crook of Devon. The width of the ridge which is north of the upper course of the Devon is much less, and probably in no part exceeds two miles, and it grows still narrower as it approaches the Frith of Tay. Its prolongation along the southern shore of that bay is probably only half a mile wide. Another ridge which runs south of this must be considered a lateral ridge of this prolongation. It branches off near 3° 15′ W. long., south of Newburgh, encloses the small lake called Loch Lindores, and extends in a general east-north-east by east direction through the peninsula of Fife, terminating east of Logie, about five miles from the North Sea in the Inchlaw hill, which is about 600 feet high. The highest summits of this ridge probably do not exceed 700 feet, and in many places the range hardly attains 300 feet. The western part of the valley, between this ridge and that along the Frith of Tay is narrow, but towards the east it widens; between Creig and Kilmany it is four miles wide.

The mountains just described constitute what are generally called the Ochill Hills. But to the south of them several groups and ridges traverse the counties of Fife, Kinross, and Clackmanan, which may be considered as dependencies of the Ochills, though they are separated from them by depressions of considerable width. Such a depression occurs to the north of Loch Leven, between the Ochill and Lomond Hills. The high grounds called the Braes of Orwell, which connect both ridges across this depression, gradually rise from Milnathort to about 450 feet above the sea, and 120 feet above Loch Leven, and descend northward into Strathmiglo. This depression is about 4 or 5 miles wide. On the eastern side of it, West Lomond Hill, or Bishop's Hill, rises precipitously to an elevation of 1721 feet above the sea. A ridge not exceeding 1000 feet in height unites it with East Lomond Hill, which attains the elevation of 1466 feet. Both Lomonds are about 5 miles apart. High grounds extend southwards from the southern declivity of West Lomond Hill to the very banks of the river Leven near its efflux from Loch Leven. A high tract runs eastward from the eastern base of East Lomond Hill, and in some places rises into hills, the most elevated of which are Down Hill, Clatto Hill, and Largo Law; the last is 952 feet above the Frith of Forth, from which it is only two miles distant. From Largo Law a ridge of high ground runs north, terminating east of Kembach, about one mile from the banks of the Eden, and two miles from the shores of the sea, and another east by north, terminating north of Dunino, about 2 miles from the sea. The general elevation of these ridges may be about 300 feet, and some hills are higher. The country enclosed by these ranges may be from 20 to 80 feet above the sea, a height which it maintains to the shores, except on some bays, which are enclosed by sandy and level plains.

South of Loch Leven, and only half a mile from its shores, is the Benarthy Hill, which rises very gradually from the east and terminates abruptly on the west. Its elevation probably exceeds 1000 feet above the sea. Its eastern declivities, which are gentle, approach the river Leven near its efflux from the lake, and two moderately elevated ridges of high ground run eastward between the Leven and Orr rivers, and enclose the valley of the Lochty, terminating near its confluence with the Orr. No elevated hills occur on these ridges. From the western extremity of the Benarthy Hill an elevated tract stretches southward to the eastern extremity of the Cleish Hills, but probably is not much more than 500 feet above the sea. The Cleish Hills, which extend nearly 6 miles east and west, form the boundary-line between Kinross and Fife. They rise to a considerable elevation; the highest summit, Mount Dumglow, is 1215 feet above the sea-level, and three others, called the Ingans, rise respectively to 1030, 1060, and 1048 feet.

The Saline Hills are west of the Cleish Hills, and separated from them by a narrow but rather deep depression. They cover a large surface, being 4 miles long from north to south, and more than two from east to west. They also rise to a considerable elevation, but we are not aware that their height has ever been determined. They may be considered as the nucleus from which the high grounds branch off that traverse Fife, south of the Orr river, and Clackmanan, south of the Devon. The elevated ground between the Orr river and the Frith of Forth extends nearly parallel to the course of the river, east and east-north-east, and terminates between Dysart and Wemys, about a mile from the sea. Except a few hills near Beath, called Beath Hills, it rises only to a moderate elevation, but a high tract of considerable width extends from Beath Hills southward, and terminates, between Aberdour and Kinghorn, in several hills of considerable elevation, as Dunearn Hill (695 feet), Orrock Hill, and the Bin (625 feet); the last-mentioned elevation stands north of Burntisland, half a mile from the sea. The western ridge of high land, which extends through Clackmanan, is rather elevated near the Saline Hills, but gradually decreases as it advances farther west. It terminates in the vicinity of Tillibody, where the Devon river turns to the south, and it contains no high summits.

The Ochill Hills consist chiefly of porphyry and amygdaloid, but the hills which enclose them on the south belong to the coal formation, and are principally composed of limestone, sandstone, ironstone, clay, slate, bituminous shale, greenstone, basalt, and trap-tufa. This district contains one of the most extensive coal-beds in Scotland. It begins on the east in the parish of Dunino, about 6 miles west of Fifeness, and extends to the mouth of the river Devon. The richest part of this coal-field is stated to be between Dysart and Alloa. It is worked at several places. Iron-ore abounds likewise in this tract, and is also worked. As to the other useful minerals, see Fifeshire. The lower hills and declivities are cultivated, and the higher hills make excellent pasture-grounds. The whole of this hilly region is destitute of trees, except where they have been planted: the plantations consist of oak, ash, larch, elm, beech, spruce, silver and Scotch fir. (Sinclair's *Statistical Account of Scotland; New Statistical Account of Scotland.*)

OCHNA'CEÆ form a very small natural order of plants nearly allied to Rutaceæ, and remarkable for their fleshy carpels being elevated upon an enlarged succulent receptacle. They are shrubs, inhabiting the tropics of either hemisphere, with shining evergreen leaves, showy yellow flowers, with five or ten stamens, whose anthers open by pores at the point. They appear to be possessed of tonic and astringent qualities. (Lindley's *Natural System of Botany*, ed. 2, p. 129.)

OCHRA, or OKRO, a plant of which the fruit is used as a vegetable in the West Indies, the United States, and in South America, and which is remarkable for the similarity of its name to the vegetable called *Ochra* by the Greeks, but which has not been ascertained by botanists. The names by which the produce of the New World is distinguished in the works of Marcgrave and Piso are *Quingombo* and *Quigombo*, and in later works by that of *Gombo*, and *Gombaut*, or *Gombeau*. It is possible therefore that a classical name, which was not otherwise engaged, may have been applied to a new vegetable, and, as has been the case in other instances, without any attempt being made to identify the plant named with that which had been described by classical authors.

The okro has been already alluded to under *Hibiscus*, to which genus it belongs, and is the *H. esculentus* of botanists, which is very closely allied to *H. Abelmoschus*, now *Abelmoschus moschatus*, so long noted for its musk-scented seeds, and which by Browne, in his 'Nat. Hist. of Jamaica,' is called *Musk-okro*. The former is characterised by having a thick unarmed herbaceous stem, leaves cordate at the base and palmate, or divided into five rather obtuse lobes, dentate at the margin, involucels ten-leaved, deciduous petioles longer than the flowers, with the calyx bursting longitudinally. The fruit is from 2 to 4 inches in length, pyramidal in form, furrowed, and filled when in a green state with a large proportion of mucilage, on which account it is esteemed both when cooked as a vegetable, and as an addition to make soup viscid, in the country where it is indigenous, as well as in the South of France and the Levant. A similar but distinct species is employed in the East Indies for the same purpose, whence it has probably been introduced into Africa, as a similar plant is described as being cultivated there, and the fruit employed for the same purpose. The seeds may be added like barley to soups, and have been recommended to be roasted as a substitute for coffee.

OCHRE, hydrated sesquioxide of iron. [Iron.]

OCHROITE. [Cerium, Ores of.]

OCHSENHAUSEN is a principality in the circle of the Danube, in the kingdom of Würtemberg, about 56 square miles in extent, with a population of 6000 inhabitants. It formerly belonged to a Benedictine abbey: the abbot was raised by the emperor Francis I., in 1740, to the rank of a prince of the Empire. In the year 1803, the greater part of it was assigned as an indemnity to Prince Wenzel Lothar von Metternich (the Austrian high-chancellor), but of the revenue, amounting to 70,000 florins, he is bound to pay over 20,000 florins for certain purposes.

The town of Ochsenhausen, situated on the river Rottum, in 48° 4′ N. lat. and 10° E. long., has 1400 inhabitants. The fine buildings of the antient Benedictine abbey, and the church, which is distinguished for its size and beauty, are looked upon as the chief ornaments of that part of the country. These buildings are now, under the name of Winneburg, the residence of the prince.

OCKLEY, SIMON, was born at Exeter in 1678, entered Queen's College, Cambridge, in 1693, was presented to the vicarage of Swavesey in 1705, was chosen professor of Arabic in the university of Cambridge in 1711, and died at Swavesey, August 9, 1720.

Ockley had paid great attention to the study of the Oriental languages, and was well acquainted with the Arabic. His principal work, 'The History of the Saracens,' which was originally published in two volumes 8vo., the first in 1708, and the second in 1718, was compiled from Arabic manuscripts in the Bodleian library at Oxford. This work, which commences at the death of Mohammed, and terminates in the year 705, contains much valuable information respecting the early conquests of the Arabs, and may still be consulted with advantage by those who are unacquainted with the Oriental languages. Gibbon made considerable use of it in his 'Decline and Fall,' and speaks of the author in his autobiography as 'an original in every sense, who had opened his eyes.' This work however does not appear to have brought Ockley much profit; for he complains, in his inaugural oration, in 1711, of his straitened circumstances, and dates the second volume of his history from Cambridge Castle, where he was imprisoned for debt.

Ockley wrote several other works, of which the principal are:—'Introductio ad Linguas Orientales, in qua iis discendis via munitur, et earum Usus ostenditur,' 1706; 'The History of the present Jews throughout the World,' 1707, translated from the Italian of Leo of Modena, a Venetian Rabbi; 'The Improvement of Human Reason exhibited in the Life of Hai Ebn Yokdhan,' 1708, translated from the Arabic; 'An Account of South-west Barbary,' 1713; a new translation of the second 'Apocryphal Book of Esdras,' from the Arabic version of it, 1716.

OCOOCH HILLS. [Mississippi River.]

O'CREA (a boot) is a term used in descriptive botany to express those kinds of stipulæ which grow together by their back and front edges in such a way as to form a tube, through which the stem passes. The genera Polygonum, Rheum, and Rumex offer a common illustration of this structure.

OCTAGON. [Polygons, Regular.]

OCTAHEDRON. [Solids, Regular.]

OCTANS (the instrument commonly called a quadrant, which, when on Hadley's construction, is of the form of an *octant*, or eighth part of a circle), a constellation of Lacaille, situated at the south pole, which it includes. The principal stars are as follows:—

Character.	No. in Catalogue of		Magnitude.
	Lacaille.	Astron. Society.	
δ	1190	1609	5
α	1686	2472	5
β	1811	2700	5
γ^1	1917	2849	5
γ^2	1921	2861	5
γ^3	1940	10	5

OCTANTS. [Syzygies, &c.]

OCTAVE (*Octavus*, Lat.), in Music, the eighth note of the scale, the most perfect of concords, whose ratio is 2 : 1, therefore the simplest of all the sounds, except the unison. The harmonics of the octave and unison agree invariably, a coincidence which occurs in no other interval, and these sounds have so close a resemblance, that in combination they are hardly distinguishable, the one from the other. The following are the properties, says Rousseau, which so singularly distinguish the octave from all other intervals:—The Octave embraces all the primitive sounds, that is to say, all the original tones and semitones. Hence, after having established a system or series of notes within the limits of an octave, if it be wished to extend this series it will be absolutely necessary to follow the same order in a second octave, in a third, or a fourth, &c., and no sound will be found in any of these but what is, as it were, a recurrence of some one in the first series. It is in virtue of this property in the Octave that the term *Diapason* was applied to it by the Greeks. [Diapason.]

The Octave has also another remarkable property, the same writer observes, namely, that it may be doubled, tripled, and multiplied at pleasure, without changing its nature. This multiplication, however, is limited as relates to its effect on the ear, and an interval of eight octaves, for instance, would be scarcely, if at all, appreciable as such by the auditory organ. A double Octave is less agreeable than a single one; a triple Octave loses still more of its pleasing quality; till, by increasing the distance, the relationship of the sounds becomes nearly undistinguishable.

OCTAVE, The Rule of, or what the French call *La Règle de l'Octave*. [Accompaniment *of the Scale*.]

OCTA'VIA. [Antonius, M.]

OCTHO'SIA. [Cirripeda, vol. vii., p. 209.]

OCTOBER, in the year of Romulus, was strictly what its name implies, the eighth month. With us it is the tenth. Suetonius tells us that Domitian, who was born in this month, gave it his own name (Sueton., *Domit.*, c. 13); but it lasted during his life only (Plutarch, *Num.*, p. 72; Macrobii *Saturnal.*, i. 12). Antoninus Pius, in honour of his wife Faustina, called it 'Faustinus' (Julius Capitolinus, c. 10); and the flatterers of Commodus assigned to it one of their patron's epithets, 'Invictus.' (Ælius Lamprid., ed. Lugd. Bat., 1671, p. 507.) Our Anglo-Saxon ancestors called it *se teotha monath*, the tenth month; they also gave it the name of *Winter-fyllith*, winter-beginning. (Bosworth, *Sax. Dict.*, v. 'Monath.')

OCTO'CERA, M. de Blainville's name for the first family of his order *Cryptodibranchiata*, containing the genus *Octopus*.

OCTOLASMIS, Mr. Gray's name for a genus of Cirrhipeds (*Heptalasmis*, Leach).

OCTO'MERIS. [Cirripeda, vol. vii., p. 210.]

O'CTOPUS. [Cephalopoda; Sepiadæ.]

OCULI'NA. [Madrephylliœa.]

O'CYMUM, a genus of labiate plants, remarkable for the fragrance of their leaves, which are used as an ingredient in savoury dishes, on which account some of the species have from time immemorial been objects of very general cultivation. In English gardens they are called Basils, a corruption of Basilisca, the name given to common basil by the monkish writers upon plants, in allusion to its regal qualities.

Of common basil (*Ocymum Basilicum*, Linn.) there are many varieties, differing in their size, in the form and colour of their leaves, and in minor particulars: in their qualities they are nearly alike. This species is found wild in the hotter parts of the East Indies, where it is a perennial, with a woody root; but in our gardens it is treated as a tender annual, being raised in the spring in a hot-bed, and turned into a warm border when the summer is so far advanced that there is no longer any danger from frost, which is instantly fatal to such plants. Besides this Mr. Bentham enumerates forty-three other species (*Labiatarum Genera and Species*, p. 18), one of which, the *O. viride*, is used as a febrifuge in Sierra Leone. The genus is readily known by its calyx being bent downwards when the fruit is ripe, and then appearing covered as it were by a very large ovate dorsal lobe, and by the stamens being declinate.

OCYPO'DIANS, a tribe of *Brachyurous Crustaceans*, placed by M. Milne Edwards between the *Pinnotherians* and the *Gonoplacians*.

Character of the Tribe.—Carapace rhomboidal or trapezoidal, very much elevated anteriorly and depressed posteriorly; the frontal border occupying the whole width, and the *front*, which is lamellar and bent down to the *epistome*, extremely narrow; its width does not equal a third of the length of the eyes, nor the half of the width of the buccal frame, which itself is very narrow. The *eyes* are very long and the *cornea*, in general, is very large. The basilary joint of the *internal antennæ* is oval, rather large, and placed vertically in the anterior angle of the orbit; the moveable stem of these appendages is extremely small and hidden under the front; the two terminating filaments are very short, large, and hardly annulated, a disposition which is not observed in any of the crustaceans previously treated of in the system of M. Milne Edwards, except in the *Dotos*. The *external antennæ* are rudimentary, and situated, as they ordinarily are, in an opening of the internal angle of the orbit; their first joint is less than the second, and the third only reaches to the edge of the anterior border of the basilary joint of the internal antenna. The *epistome* is continuous with the lower border of the orbit, and the buccal frame is remarkably more narrow anteriorly than it is posteriorly. The *external jaw-feet* close the mouth completely; the interior border of their lamellar portion is straight; their third joint is very much elongated, and their fourth inserted at the external angle of the preceding. The *sternal plastron* has a trapezoidal form, the base of which is directed backwards; it is strongly curved in its longitudinal direction, and gives passage to the male organs at a considerable distance from its external border. The anterior feet are, generally, compressed and of very unequal size; the rest are very long and exhibit no great difference between themselves; the terminating joint is often depressed, but has never the form of a natatory oar. The *abdomen*, composed ordinarily of seven distinct segments in both sexes, is very narrow. In general it does not cover more than a third of the posterior portion of the sternal plastron of the male, and even in the female leaves that part of the plastron which approaches the base of the feet exposed. In the greater part of the cases, if not always, there are only seven *branchiæ* on each side of the thorax, five of which only are couched under the vault of the sides, and two reduced to the state of vestiges only, and fixed to the jaw-feet. (M. Edwards.)

Locality and Habits of the Tribe.—The Ocypodians, as their name implies, are very swift runners, living nearly always on the strand, where they dig holes for themselves.

M. Milne Edwards, who remarks that this small and very natural group is closely allied to the genera *Doto* and *Mycteris* among the Pinnotherians, thus divides the tribe:—

Tribe of Ocypodians.	Cornea transparent, very large, oval, occupying at least the half of the length of the ocular peduncles, and commencing very near the base of those stems	Ocypoda.
	Cornea transparent, very small, rounded, not occupying the fourth part of the length of the ocular peduncle, and only commencing close to its extremity.	Gelasimus.

Ocypoda. (Fabricius.)

Generic Character.—*Carapace* rhomboidal or even nearly square, and nearly as large behind as before; its upper surface, which is nearly transversely horizontal, but a little curved in a longitudinal direction, is strongly inclined downwards and backwards; its anterior and lateral surfaces are very much elevated and nearly vertical, and these last are divided into two portions by an elevated vertical line which terminates between the base of the third and fourth pair of feet. The *front* is much longer than it is wide; it does not cover the articulation of the ocular peduncles, and only equals in width the half of the epistome, to the anterior border of which it unites itself. The orbits are very large, not deep, and divided into two distinct portions, one internal or foraminal, which gives insertion to the ocular peduncle, and which in the *Cyclometopes* and *Oxyrhynchi* is always hidden under the front; the external portion serves for the lodgment of the major part of the eye and its peduncle. The upper border of these cavities, which is much less advanced than the lower, presents a disposition which accords with this division, for it describes two curved lines which unite in forming an angle, the summit of which is directed forwards. The form of the *eyes* is also very remarkable; the cornea is oval, very large, and extends below within a very smal distance of the base of the peduncle; but in general this last is prolonged beyond its extremity, so that the eyes terminate with a kind of horn, the length of which seems to increase with age. The *internal antennæ* are disposed as stated in the character of the group; the *external antennæ* are rudimentary; their third joint is not half so long as the second, and their terminal stemlet is scarcely longer than their peduncle. The *epistome* is very small and presents at its median part a small quadrilateral prolongation which is soldered to the front. The third joint of the *external jaw-feet* is quadrilateral and much smaller than the preceding; it never hides the sort of appendage formed by the three succeeding joints, and the palp which occupies the external border of these members is styliform and deprived of a multi-articulate terminal filament. The *anterior feet* are, in general, shorter than the rest, and the hand which terminates them is much compressed and very large in comparison with the arm: the difference between the hands of each side is often very great, especially in the male. The succeeding feet are also much compressed, and increase in length up to the fourth pair inclusively; these last are about thrice the length of the post-frontal portion of the *carapace* and the posterior feet are much shorter; the tarsi are always compressed and nearly of the form of a small spatula, and at the basilary joint of the third and fourth pair there is a sort of articular surface surrounded with hairs, which seems destined to diminish the friction of these two members against each other. The *abdomen* is much narrower at its base than the posterior part of the thorax, and, in both sexes, leaves a considerable portion of the last segments of this part of the body exposed; in the male, it has a triangular, elongated form, and advances to the anterior extremity of the plastron; in the female its last segment is not a fourth as large as the preceding, and is ordinarily received in a notch of its anterior border. The first pair of abdominal appendages, in the male, are very much developed, cylindrical and slightly hooked towards the end; the second pair are, in general, rudimentary.

The branchia which ordinarily exists on the antepenultimate joint of the sides is wanting in the *Ocypodæ*; the others are directed very obliquely backwards, and the branchial cavity is elevated so as to leave above a great void space which is lined by a membrane more or less spongy. (M. Edwards.)

Habits of the Genus.—So rapid are the *Ocypodæ* in their motions, that those who have observed these animals in their native haunts declare that they run so fast that a man can hardly overtake them. They hollow out holes for themselves in the sand of the sea-bank, and remain shut up in their burrows throughout the winter.

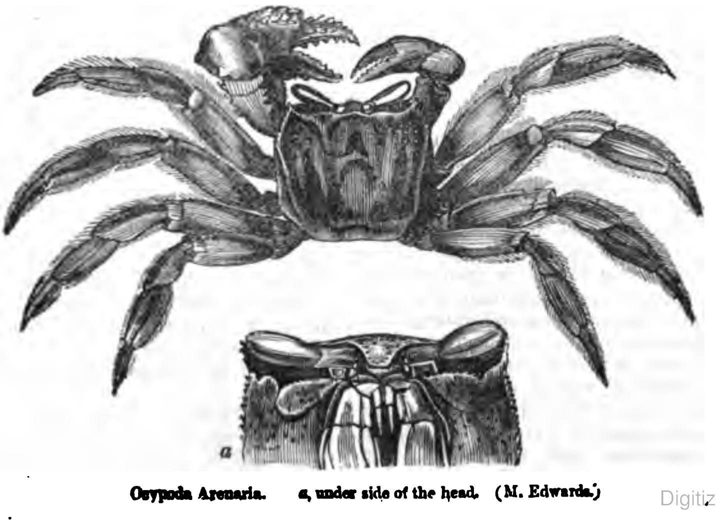
Geographical Distribution.—The warm climates of both hemispheres.

M. Milne Edwards records seven recent species, which he separates into two divisions, observing, at the same time, that the species are difficult to distinguish on account of the changes which age produces on the form of these crustaceans.

A.

Species whose transparent cornea occupies the extremity of the ocular peduncle, and is not overpassed by a styliform prolongation or a terminal tubercle.

Example, *Ocypoda arenaria*, *The Sand-Crab* of Catesb-



Ocypoda Arenaria. a, under side of the head. (M. Edwards.)

Length about two inches; colour yellowish.

Locality.—The coasts of North America and the Antilles.

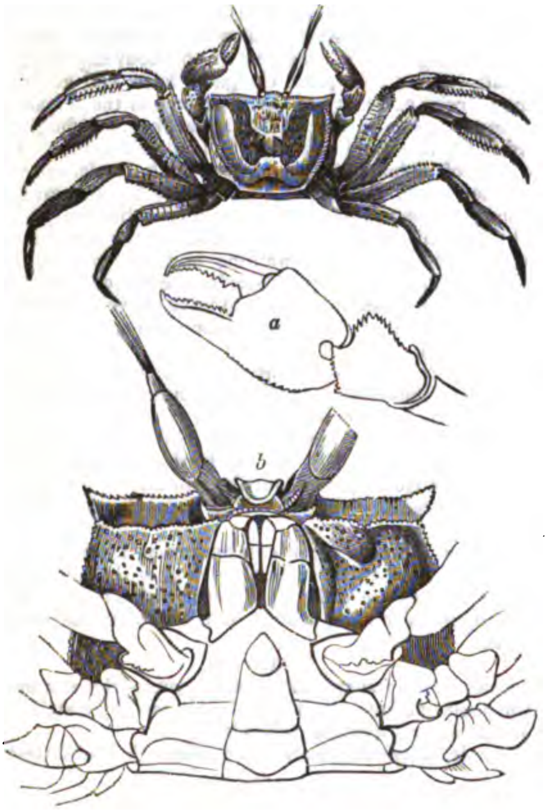
Habits.—This species lives in holes three or four feet deep, which it hollows out in the sand immediately above the level of the wash of the sea. Its general time of quitting the burrow to seek its food is the night, and when pursued it runs with great swiftness, elevating at the same time its claws in a menacing manner. This is their summer life; but towards the end of October they retire inland to hybernate in the earth. When they have found a place proper for their purpose, they dig a hole like that which they had occupied on the edge of the sea; and, after entering therein, stop up the entrance so cleverly that no trace of its existence is left. Then they retire to the bottom, and there remain till the warm weather brings them forth, when they again repair to their marine residences.

B.

Species whose eyes carry at their extremity an appendage, in the form of a tubercle, cylinder, or stylet, which overpasses the transparent cornea.

Example, *Ocypoda hippea.* Terminal appendage of the eyes large, short, conical, and furnished at its extremity with a pencil of long hairs. Length, two inches, French.

Locality.—Syria, Egypt, Cape de Verd, &c.

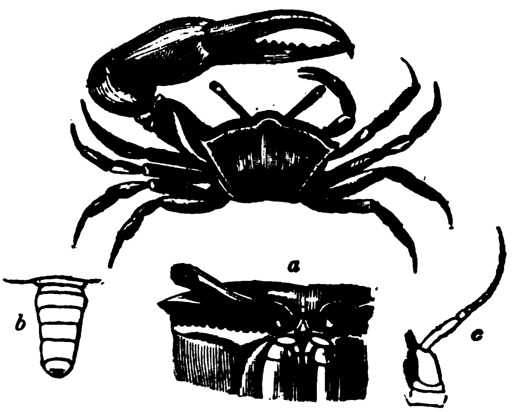


Ocypoda hippea.
a, pincers; *b*, under side of male, in detail. (M. Edwards.)

Gelasimus.

Generic Character.—*Carapace* much wider than that of *Ocypoda*, more convex, and much narrower backwards. Stomachal region very small, and genital region generally very large. Disposition of the *front* and of the *internal antennæ* nearly the same as in the preceding genus; *ocular peduncles*, on the contrary, very narrow, and the cornea which terminates them not occupying more than its fifth part; upper border of the orbits much less projecting than the lower; not divided into two portions as in the *Ocypodæ*, and convex nearly throughout its length; external extremity of those cavities largely open, and communicating with a furrow which is obliquely directed behind and downwards. *External Antennæ* much more developed than in the preceding genus. The *external jaw-feet* have the same form as the *Ocypodæ*. The *anterior feet*, in general, very small in the female; but, in the male, one of them acquires enormous dimensions. Sometimes it is the right, sometimes the left claw which grows to this great size, being, in certain instances, twice as large as the body. The claws of the smaller anterior foot are enlarged and lamellar towards the end and a little contorted; those of the great anterior foot are arched, elevated, and slightly dentated on the edges. The rest of the feet are moderate, and present nothing remarkable. The same remark applies to the abdomen.

M. Milne Edwards, who gives the above character, states that Mr. Thomas Bell had informed him that some *Gelasimi* have at a certain age, if not always, a stylet at the extremity of the ocular peduncle, on the side of the great claw, whilst the eye of the opposite side always retains the ordinary form.



Gelasimus annulipes. (Indian Seas.)
a, under side of head; *b*, abdomen; *c*, antenna. (M. Edwards.)

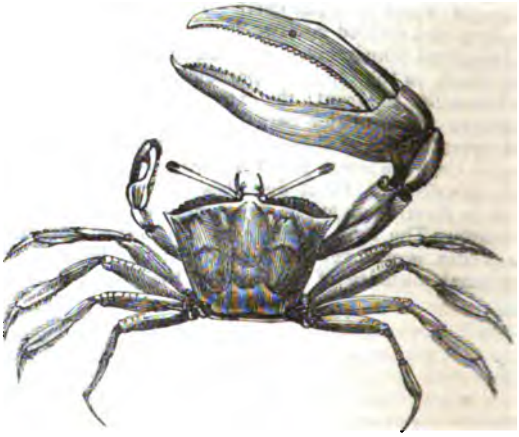
Geographical Distribution of the Genus.—The warm countries in both hemispheres.

Habits of the Genus.—The *Gelasimi* live in holes near the edge of the sea, in pairs, and the great claw of the male is used to stop the entrance of the hole.

The species are numerous; but they, as well as the *Ocypodæ*, are difficult to be distinguished, because the parts which differ the most, namely the front and the great claw, change their form with the progressive age of the animal.

Example, *Gelasimus Marionis.* Length about 8 lines; width about an inch, French.

Locality.—Manilla.



Gelasimus Marionis.

Fossil Ocypodians.

Gelasimus.

The fossil species which most resembles *Gelasimus Maracoani* seems to be *Gelasimus nitidus*, figured by M. Desmarest in his *Histoire Naturelle des Crustacés fossiles*, but the lateral edges of the carapace in the fossil are quite smooth, and the front is terminated by a very short sharp point. Neither the geological nor geographical locality appears to be known. The specimen is in the Paris museum.

OCY'PTERUS. [Shrikes.]

OCY'RÖE. [Ciliograda, vol. vii., p. 165.]

OCY'THÖE. [Cephalopoda; Paper Nautilus.]

OCZAKOW, a Russian town in the government of

Kherson, is situated in 46° 37′ N. lat. and 31° 30′ E. long., on a small brook near the mouth of the river Dnieper, which is here about four miles and a half wide between Oczakow and Kinbourn. Oczakow, though never a large place, was formerly one of the most important fortresses in this part of the country, and had a citadel, the walls of which were twenty-five feet high. The population was at that time 5000. It is chiefly remarkable for the importance that was attached to it in the wars between the Turks and the Russians in the last century. In 1737 it was taken by storm by the Russians under Count Munich, but with the loss of 18,000 men. In the same year a Turkish army of 70,000 men attempted to recover it, but was repulsed with the loss of 20,000 men. The Russians, having razed the fortifications, abandoned the place in 1738. The Turks re-occupied it in 1743, and held it till 1788, when, after a six months' siege by the Russians under Suwarroff, it was taken by storm. The English government interfered in 1790, to oblige Russia to restore it to Turkey; but the Porte ceded the place, which was quite devastated, at the peace of 1791. Oczakow has never recovered, and has not at present above 1000 inhabitants, consisting of Greeks, Armenians, Turks, Russians, and Moldavians. This however may be ascribed in a great measure to the rise of Odessa, which attracted both its trade and its population. The town is still of some importance, because the larger merchantmen going to Kherson are obliged by the shallowness of the sea to stop at Oczakow, where the goods are put on board smaller vessels. Not far from Oczakow, at the village of Tarutino, at the mouth of the Bug, are the ruins of the antient Milesian colony of Olbia, where numerous antiquities, particularly antient coins, are frequently found.

ODE is derived from a Greek word, which signifies a song (ᾠδὴ, ἀοιδὴ), and appears to have been originally applied to any kind of poetry which was written to be sung or accompanied with music. The ode may be regarded as the foundation of lyric poetry, and differs from epic poetry in delineating the poet's own thoughts and feelings, while the latter species of poetry details external circumstances and events. The most celebrated Greek and Roman odes are those of Pindar, Horace, and Anacreon. In English the best odes have perhaps been written by Dryden and Gray. For a further account of this species of poetry the reader is referred to LYRIC POETRY.

ODENA'TUS, or ODENATHUS. [ZENOBIA.]

ODENSEE. [FÜNEN.]

ODENWALD. [GERMANY.]

ODER, River. [GERMANY.]

ODERIT is probably black mica; for, like that substance, it may be split into thin leaves. It is opaque, black, and has very little lustre. Its colour is probably owing to some foreign substance, which may cause the difference between its appearance and that of common mica. It occurs in Sweden.

ODESSA, a seaport and important commercial town of Southern Russia, in the government of Kherson, is in 46° 28′ N. lat. and in 30° 42′ E. long., at the north-western extremity of the bay of Adschai. This town, which is now so flourishing, and constantly increasing in extent and importance, was a miserable village called Kodschabeg when the empress Catherine obtained possession of Oczakow and the part of the country as far as the Dnieper, by the treaty of peace of 1791. Ever since the time of Peter I. the Russians had been very desirous of an establishment on the Black Sea, especially after they had got possession of the south-east part of Poland. Catherine chose this spot for the site of the new town and seaport, and several regiments were employed in 1794 in digging the foundation and in the construction of public works. The site is on the whole well chosen. There is no river, but it has a fine bay, with sufficient depth of water, almost to the very shore, for the largest men-of-war. The bottom is fine sand or gravel, and the bay is seldom frozen, and then only for a short time.

The emperor Alexander completed what Catherine had begun. He appointed the Duke of Richelieu, a French emigrant nobleman, who had entered the Russian service, to the post of governor of the new town, under whose judicious administration its prosperity rapidly increased. The first inhabitants of Odessa were some Greek families, but in 1804 the population already amounted to 15,000. The town is regularly built in the form of an oblong parallelogram, on a declivity sloping towards the sea. The surrounding country is an extensive and fertile plain, but the climate is unhealthy at some seasons of the year. The harbour, which is formed by two large moles, and can contain two hundred ships, is defended by strong works. At the eastern extremity is the citadel, and at the other the lazaretto; on a projecting point of land on the south side of the bay there is a lighthouse. The road is very spacious, and the anchorage safe, being protected against all winds except the south-east. The town is well built; the streets are broad and straight, but not paved. The houses are in general two stories high, and built of stone. There are many fine buildings; among them the church of St. Nicholas, which is the Russian cathedral, the Protestant church, the admiralty, the hospital, the custom-house, the exchange, and the theatre, where Russian pieces, Italian operas, and Greek tragedies are performed. There is a fine public garden in the middle of the town. Between the harbour and the town there is a line of barracks, consisting of sixteen detached edifices; there are in the town nearly six hundred corn-magazines, and a bazar, which contains 550 shops.

To the north of the town there are magazines of salt and salt meat, and to the west of them reservoirs of water. The rivers which flow into the sea on both sides being at a considerable distance, Odessa used often to suffer from want of water, but this disadvantage has been remedied by the construction of an aqueduct. The chief establishment for education is the Lyceum, founded by the Duke de Richelieu, on the plan of those in France, and called by his name; two schools for jurisprudence, political economy and commerce, and a school for training schoolmasters, are connected with the Lyceum: the other institutions are a school for young ladies, a school of trade and navigation, a model-school for young Jews, the academy of the Oriental languages, the museum of the antiquities of Southern Russia, and the botanic garden and the Agricultural Society. Three public baths have been established of late years, chiefly for the Poles, many of whom come to Odessa for the benefit of sea-bathing. The total population of Odessa, with its suburbs of Perisip and Moldawanka, was 63,000 at the end of 1837, among whom there are many Jews, Poles, Greeks, Armenians, and German mechanics. The labouring class consists chiefly of Little Russians, who speak a Russian dialect, and are for the most part runaway serfs. The adjacent country is inhabited by settlers from different parts of Germany, by Bulgarians, gypsies, Polish and Russian peasants. Of the Russian inhabitants of the adjacent country, the men are a robust well-built race; the women, on the contrary, are very ugly, dirty, and lazy. The Jews are in general very dirty in their dress; the costume of the Jewesses, many of whom are very handsome, is more ornamental, and often rich. The Greeks appear in a motley mixture of Turkish or Slavonian costumes. The Greek women are very handsome, and their dress pleasing and tasteful.

In the year 1817 Odessa was declared a free port for thirty years, into which all foreign goods are admitted free of duty. The space allotted to the free port is enclosed with a circular wall to prevent smuggling into the interior. The most important article of exportation is corn from the Ukraine. Wheat is exported to Turkey, Italy, France, Spain, and England. The principal towns with which Odessa is directly connected are Trieste, Leghorn, Marseille, Barcelona, and London. Other articles brought from the Ukraine for exportation are flax, timber, tallow, and hides. The imports are colonial produce, and manufactures of all kinds. The richest merchants are English, French, and Italians; many Jews and Armenians are also engaged in trade.

Odessa has considerable breweries and distilleries, and manufactories of woollens and silks, tobacco, soap, and candles. There is a great want of mechanics in the town, and of agricultural labourers in the country. The Russian government has granted great advantages to settlers of both kinds. Within these few years many gardens have been formed in the environs.

The commerce of Odessa in 1838 was remarkably prosperous: the value of the exports exceeded 38 millions of rubles, and that of the imports was nearly 22 millions of rubles. Above 800 foreign ships (of which 160 were English) entered the port, and nearly 800 sailed laden with the productions of Southern Russia, amongst which was above a million chetwerts* of wheat. Of vessels employed in the coasting-trade, 659 arrived and 702 sailed. The customs' duties were, 1, for the Richelieu Lyceum, 3,274,686 rubles (there is a small duty on every chetwert of corn); 2, for the town of Odessa, 1,630,612; 3, for the lighthouses, 19,975: in all, 4,925,273 rubles. The year 1839 will probably show a further increase in the trade of Odessa; for the value of the exports in the first six months of the year was 23,109,990 rubles, whereas it was only 13,855,324 in the first six months of 1838. Up to August the imports were 12,662,162 rubles; 492 ships had arrived, and 473 sailed.*

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* A chetwert is 288 lbs. English.

(Hassel; Stein; Cannabich; and the *Russian Official Journal of the Chamber of Merchants.*)

ODIN, or **OTHIN**, was the principal deity of the antient Scandinavians and Northern Germans. 'Wodan,' or 'Gwodan,' was another form of the name of Odin. Odin is represented by some as the god of war, the Mars of Scandinavian mythology. (Paulus Diaconus; Adamus Bremensis; Braun, *Religion der alten Teutschen.*) Among the Anglo-Saxons, Wodan was the god of merchants, corresponding to the Hermes of the Greeks. The fourth day of the week, Wednesday, derived its name from this deity. In the account of the origin of the world, as given in the older Edda, Odin, the eldest son of Bör, the second man, is represented as having, with his two brothers Vilé and Vé, defeated and slain the frost giant Ymer, out of whose body they formed the habitable world. According to this fable, Odin and his brethren and antagonists are personifications of the elements of the world. [Mythology, *Physical Theory.*] But there is another and a younger Odin, who is partly a mythological and partly an historical personage.

In all the Scandinavian traditions preserved by the chroniclers, mention is made of a chief, called Odin, who came from Asia with a large host of people called Aser, and conquered Scandinavia, where he built a city called Sigtuna, with temples, and established a worship and a hierarchy; he also invented or brought with him the characters of the Runic alphabet; he was in short the legislator and civiliser of the North. He is represented also as a great magician, and was worshipped as a god after his death, when some of the attributes of the older Odin were ascribed to him. (Messenius, *Scandia Illustrata;* Münter, *Ecclesiastical History of Denmark;* Finn Magnusen, *Priscæ veterum Borealium Mythologiæ Lexicon*, Copenhagen, 1828.)

The epoch of this emigration of Odin and his host is a subject of great uncertainty. Some place it in the time of the Scythian expedition of Darius Hystaspis; others (and this has been the most common opinion among Scandinavian archæologists) fix it about the time of the Roman conquests in Pontus, about 60 B.C. Suhm, in his 'Geschichte der Nordischen Fabelzeit,' enumerates four Odins. One was Bör's son; he came from the mouths of the Tanais, and introduced into the North the worship of the sun. A second, the son of Hermodi, came with the Aser from the borders of Europe and Asia at the time of the invasion of Darius Hystaspis, and brought with him the Runic alphabet, built temples, and established the mythology of the Edda: he is called Mid Othin, or Mittel Othin. A third Odin, according to Suhm, was the son of Fridlef; he fled from the borders of the Caucasus at the time of Pompey's conquests, 50 or 60 years B.C., settled at Upsala, and distributed Norway, Denmark, Gothland, and Scania among his several sons. The fourth Odin, called also the Saxon Odin, lived in the third or fourth century of our æra, and is alluded to by Saxo Grammaticus and other chroniclers. All this however is far from being authenticated, though the north-western emigration of Odin from the borders of the Caucasus to Scandinavia has the support of a uniform tradition in its favour. For the antient mythology of Scandinavia see Edda.

Wodan, or Odin, was worshipped by the Saxons, the Alemanni, the Longobards, and other German nations, until their conversion to Christianity.

ODO, Bishop of Baieux. [Baieux Tapestry.]

ODO'ACER, a Gothic chief, who, according to some authorities, was of the tribe of the Heruli, originally served as a mercenary in the barbarian auxiliary force which the later emperors of the West had taken into their pay for the defence of Italy. After the two rival emperors Glycerius and Julius Nepos were both driven from the throne, Orestes, a soldier from Pannonia, clothed his own son Romulus, yet a minor, with the imperial purple, but retained all the substantial authority in his own hands. The barbarian troops now asked for one-third of the lands of Italy to be distributed among them as a reward for their services. Orestes having rejected their demand, they chose Odoacer for their leader, who immediately marched against Orestes, who had shut himself up in Pavia. Odoacer took the city by storm, and gave it up to be plundered by his soldiers. Orestes was taken prisoner and led to Placentia, where he was publicly executed, in August, A.D. 475, exactly a twelvemonth after he had driven Nepos out of Italy. [Nepos.] Romulus, who was called Augustulus by way of derision, was in Ravenna, where he was seized by Odoacer, who stripped him of his imperial ornaments and banished him to a castle of Campania, but allowed him an honourable maintenance. Odoacer now proclaimed himself king of Italy, rejecting the imperial titles of Cæsar and Augustus. For this reason the Western empire is considered as having ended with the deposition of Romulus Augustulus, the son of Orestes. Odoacer's authority did not extend beyond the boundaries of Italy. Little is known of the events of his reign until the invasion of Theodoric, king of the Ostrogoths, who, at the instigation, as some historians assert, of Zeno, emperor of the East, marched from the banks of the Danube to dispossess Odoacer of his kingdom. Theodoric, at the head of a large army, defeated Odoacer near Aquileia, and entered Verona without opposition. Odoacer shut himself up in Ravenna, A.D. 489. The war however lasted several years; Odoacer made a brave resistance, but was compelled by famine to surrender Ravenna (March, 493). Theodoric at first spared his life, but in a short time caused him to be killed, and proclaimed himself king of Italy. (Procopius; Cassiodorus.)

ODONTIS. [Monodonta.]

ODONTO'PHORUS. [Tetraonidæ.]

ODOSTO'MIA, Fleming's name for a genus established from several small species of land shells—*Turbo plicatus, spiralis, unidentatus*, &c. of Montagu. The following is the

Generic Character.—Shell conical; aperture ovate; peristome incomplete retrally, and furnished with a tooth on the pillar.

ODYSSEY. [Homer.]

ŒCOLAMPA'DIUS. [Zwingli.]

ŒCUMENICAL COUNCILS. During the first and the greater part of the second century after the Christian æra, the Christian communities called churches were independent of each other. In process of time assemblies were held for the purpose of collecting the opinions of the churches on any points of faith or practice respecting which disputes had arisen. These assemblies were at first provincial, and consisted of the bishops only, or of the bishops and some of the inferior clergy, as representatives of the churches. They had their origin among the Greeks, by whom they were named *Synods* (σύνοδοι, that is, *Meetings*), and were adopted by the Latins, who called them *Councils* (Concilia): their decrees were called *Canons* (κανόνες, that is *Rules*). We have no trace of them till towards the end of the second century.

Constantine the Great was the first who attempted to assemble a council consisting of representatives from the whole Christian church. Such councils were called *Œcumenic* or *Œcumenical* (οἰκουμενικαὶ, that is, *general* or *universal*), from their comprising the whole Roman empire, which, in common language, was considered as equivalent to the habitable world (Œcúmene, ἡ γῆ οἰκουμένη). The canons of such councils were considered to be binding on the whole church. The following list contains those which are considered as general councils by the Latin church. There never was an œcumenical council in the strictest sense of the word. Of those in the following list, the first seven alone have any pretensions to the title, as all the others were held after the schism between the Greek and Latin churches: the latter can be accounted œcumenical only by those who consider the church of Rome to contain the whole Catholic church. At the first seven however the number of representatives from the Eastern church was very small.

1 *The First Council of Nice*, convened by Constantine

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* The following was received from St. Petersburg on the day when this article was sent to press:—

'*Odessa, December* 12, 1839. This will be a remarkable year in the annals of our commerce, on account of the great number of vessels from foreign countries which have entered the port. Up to this time they amount to 973, and a great many more are expected. The English far exceed in number those of any other nation; they already amount to 306; and out of 150 vessels now at anchor in the port, 60 are English. It is said that 50 more will arrive shortly, most of them being already in the Black Sea. The number of Greek and Neapolitan ships has likewise considerably increased this year.'

to settle the Arian controversy, A.D. 325. [NICE, COUNCIL OF.]

II. *The First Council of Constantinople*, convened by Theodosius the Great, to settle controversies respecting the Trinity. It added to the Nicene creed the words which relate to the divinity of the Holy Ghost, A.D. 381.

III. *Council of Ephesus*. It condemned the Nestorian heresy, A.D. 431. [NESTORIANS.]

IV. *Council of Chalcedon*, against Eutyches, A.D. 451. [CHALCEDON; EUTYCHIANS.]

V. *The Second Council of Constantinople*, convened by Justinian I., on the resurrection of the body and the preexistence of the soul. It condemned the Origenists and the 'Three Chapters,' A.D. 553.

VI. *The Third Council of Constantinople*, under Constantine Pogonatus. It condemned the Monothelites, A.D. 680. [EUTYCHIANS.]

VII. *The Second Council of Nice*. It approved the worship of images, A.D. 787.

VIII. *The Fourth Council of Constantinople*. It condemned Photius, A.D. 869.

IX. *The First Lateran Council*, convened by Pope Calixtus II. It decided in favour of the church's sole right of investiture to ecclesiastical offices, and decreed the celibacy of the clergy, A.D. 1123.

X. *The Second Lateran Council*, under Pope Innocent II., against the heretics Pierre de Bruis and Arnold of Brescia, and for the reformation of the church, A.D. 1139.

XI. *The Third Lateran Council*, under Pope Alexander III. It condemned the Waldenses and Albigenses, and settled the mode of electing the popes, A.D. 1179.

XII. *The Fourth Lateran Council*, under Pope Innocent III. It condemned the Albigenses, and defined the doctrine of transubstantiation, A.D. 1215.

XIII. *The First Council of Lyon*, under Innocent IV., for promoting the Crusades, restoring ecclesiastical discipline, and dethroning the emperor Frederick II., A.D. 1245.

XIV *The Second Council of Lyon*, under Gregory X., for the reunion of the Greek and Latin churches, A.D. 1274

XV *Council of Vienne*, under Clement V., convened to suppress the Templars, to condemn heretics, and to assist the Christians in Palestine, A.D. 1311.

XVI *Council of Constance*, convened by the emperor Sigismund, to settle the papal schism. It condemned John Huss and Jerome of Prague to the flames. It sat from 1414 to 1418 A.D. [CONSTANCE, COUNCIL OF.]

XVII. *Council of Basel*. Sat from 1431 till 1448 A.D.

XVIII. *Fifth Lateran Council*, convened by Pope Julius II., to oppose another which had been held the year before at Pisa by nine cardinals, A.D. 1512.

XIX. *The Council of Trent*, convened by Paul III., in order to crush the Reformation. It sat from 1545 to 1563 A.D. [TRENT, COUNCIL OF.]

ŒCUME'NIUS was bishop of Tricca in Thessaly. The time at which he lived is uncertain: but it was after the eighth century and before the tenth. He is generally placed in the ninth century; Cave assigns to him the date A.D. 990., Lardner, A.D. 950. He wrote commentaries on the *Acts*, on St. Paul's fourteen Epistles, and on the seven Catholic epistles (and perhaps on the *Revelation*), in the form which is called a *Catena* (chain), that is, containing, besides his own observations, the remarks of other writers. Among the authors thus quoted by him are Chrysostom, Cyril of Alexandria, Gregory of Nazianzus, Isidore of Pelusium, Theodoret, and Photius. The best editions of his works are those of Verona, 1532, and Paris, 1631.

(Monfaucon, *Bibliotheca Coisliniana*, pref. and p. 274; Fabricius, *Bib. Græc.*, tom. vii., p. 788; xiii., p. 845; Cave, *Hist. Lit.*, tom. ii., p. 112; Lardner's *Credibility*, in Works, vol. v., p. 154, ed. of 1831.)

OEDENBURG (in Hungarian, *Soprony*; the *Soprenium* of the Romans), the capital of the palatinate of the same name, is situated in a pleasant and fruitful country, amidst extensive vineyards and woods of chestnut-trees. It is about two miles and a half from the south-western part of the lake called the Neusiedler See. The temperature on the banks of this lake is milder than about Oedenburg itself, and the best vineyards are now there. The inhabitants have been celebrated from remote ages for the culture of the vine and the excellence of their wines, but of late years this branch of industry has from some unexplained causes greatly declined, and the wine is very inferior to what it once was.

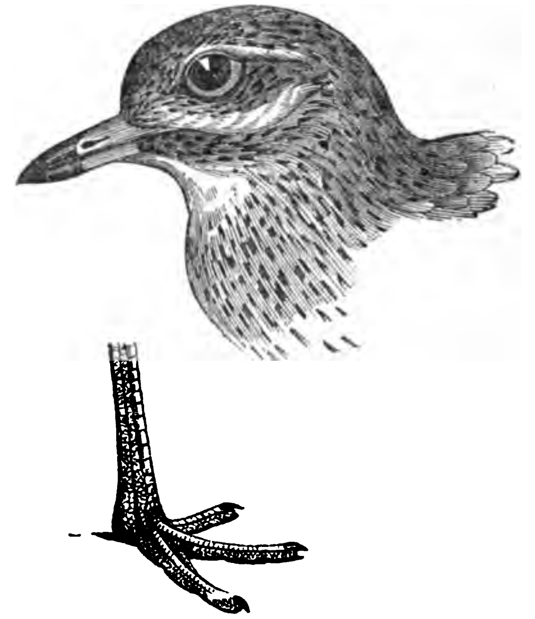
The town itself is not large, but it is regular and well paved; the suburbs are extensive and well built. The inhabitants, 14,000 in number, are Germans, whose ancestors came from Austria and Styria. Among the public institutions are the Roman Catholic chapters, a gymnasium (with 300 scholars) and a school, a Lutheran superintendency with a lyceum (360 pupils), and a Protestant German school (300 scholars). There are also a convent of Dominican monks, one of Ursuline nuns, two Roman Catholic churches, and a Protestant church. The inhabitants manufacture considerable quantities of woollen cloths, playing cards, snuff and tobacco, and sugar. They carry on a great trade in the productions of the country, and have well-frequented cattle-fairs, at which not less than 40,000 head of horned cattle and 150,000 swine are annually sold. In the vicinity there are very extensive coal-mines.

Oedenburg was founded by the Romans, and was the station of the fifteenth legion. Many Roman antiquities, inscriptions, coins, lamps, sarcophagi, &c., have been found in the neighbourhood.

ŒDICNE'MUS (literally, 'thick or swollen leg;' from οἰδ-άνω, to swell, and κνήμη, a leg), Belon's name for an interesting genus among the birds, which seems to be the connecting link between the two great groups of Bustards and Plovers.

Mr. Vigors terminates the family *Charadriadæ* by this form, which, in his opinion, by its affinity with the earlier groups of the *Gruidæ*, connects the former family with that which commences his order *Grallatores*. 'We may also remember,' adds Mr. Vigors, 'that the family of *Struthionidæ*, among the Rasores, is closely allied to the *Gruidæ* of the order before us (*Grallatores*), and equally so to the *Charadriadæ*, in consequence of the absence of the hinder toe. With the latter indeed it is frequently united into one group, from their similarity in this character, and the cursorial habits resulting from it, which are common to both. These three naturally allied families therefore are thus brought into contact, and their mutual affinities preserved; while at the same time they retain in the system the various stations into which the difference in their more important characters tends to separate them.

Mr. Swainson agrees in the main with Mr. Vigors. Linnæus had previously placed the form among the Plovers, and Cuvier had made his family *Pressirostres* consist of the Bustards (*Otis*); the Plovers (*Charadrius*)—which he distributes into two subdivisions, *Œdicnemus*, Temminck; and the Plovers properly so called, *Charadrius* — *Vanellus*, Bechst., consisting of the *Vanneaux Pluviers* (*Squatarola*, Cuv.) and the True Plovers (*Vanellus*, Cuv.); *Hæmatopus*, *Cursorius*, and *Microdactylus*, the *Cariama* of Brisson (*Dicholophus*), which last leads to the family of *Cultirostres*, composed of the great genus *Ardea* of Linnæus.



cnemus.

M. Temminck, who appears to be the first among the moderns who applied the term *Œdicnemus* to the genus, places it at the head of his *Grallatores;* and M. Lesson, in his 'Manuel,' places it among the *Charadriadæ* (Leach), between *Burhinus*, Ill., and *Himantopus*, Briss.

Mr. Gould, who considers the genus as connecting the Bustards and Plovers, observes that he has often had occasion to remark, that while the normal or typical groups are abundant in species, the aberrant forms, which appear to be created for the purpose of filling up the intervening chasms, are restricted for the most part to a limited number of species: thus while the Bustards and Plovers comprise a vast multitude of species, the genus *Œdicnemus* contains at most but five or six, and these confined entirely to the regions of the Old World. (*Birds of Europe.*)

Generic Character.—Bill strong, nearly straight, rather depressed towards the tip, culmen elevated, lower mandible angulated; *nostrils* longitudinal, pierced through and through the horny part of the middle of the bill, and most open anteriorly. *Tarsi* long. Three *toes*, all before, united as far as the second joint by a membrane which skirts their edges. *Wings* moderate; first *quill* shorter than the second, which is longest.

Example, *Œdicnemus crepitans*, Temm. — *Charadrius Œdicnemus*, Linn.

Description.—All the upper parts of a reddish ashy-brown, with a longitudinal dash on the middle of each feather; space between the eye and the bill, throat, belly, and thighs, pure white; neck and breast slightly coloured with reddish and speckled with longitudinal brown streaks; a longitudinal white band on the wing; towards the middle of the first quill a great white dash, and a very small one on the interior barb of the second; lower tail-coverts ruddy; quill-feathers, except those of the middle, terminated with black; base of the bill bright-yellowish, the rest black; naked skin round the eyes, iris, and feet, pure yellow. Length from the bill to the feet 16 inches 2 lines. *Male* and *Female.*

Such is Temminck's description of the adult bird; but the plumage varies in some individuals. For instance, in the specimen figured and described by Gould, in his 'Birds of Europe,' there is an obscure bar of white above and below the eye, and the ground-colour of the flanks and under surface is stated to be yellowish-white; whilst the yellow toes and feet are noticed as having a tinge of green.

Young Birds.—These have the colours less distinct, and are detected at the first glance by the highly dilated form of the upper part of the tarsus and by the size of the knee-joint. Temminck, who gives this description, adds that this form of the tarsus exists in the *young of the year* of all species of birds with long slender legs, but is particularly remarkable in the young *Œdicnemi.*

This is the *Ostardeau* of Belon; *Le Grand Pluvier, ou Courlis de Terre* of the French; *Gran Pivieri, Curlotte, Ciurlui*, and *Ciurlovi* of the Italians; *Lerchengraue Regenpfeifer, Grosser Brachvogel,* and *Grosse Bragvogel oder Gluth* of the Germans, among whom it is also called *Triel*, or *Griel*, according to Gesner, who thinks that it is the *Charadrius* of Aristotle; *y Glin-braff* of the ancient British; *Thick-knee, Thick-kneed Bustard, Stone Curlew,* and *Norfolk Plover* of the modern British.

Habits, Food, Reproduction, &c.—Rapid on foot, powerful in flight, which it executes in wide circles, and haunting downs and open places, this species is in general approached with difficulty by the sportsman, though it will often squat in places favourable to its colour, till it is almost trod on. Their shrill evening cry pierces the ear, and may be heard nearly a mile in a still night. Slugs, worms, reptiles, and, some say, mice, are eaten by them; but the two former seem to be their favourite food. White, in a letter to Pennant, dated 30th March, 1768, says, 'I wonder that the Stone Curlew, *Charadrius Œdicnemus*, should be mentioned by writers as a rare kind: it abounds in all the campaign parts of Hampshire and Sussex, and breeds, I think, all the summer, having young ones, I know, very late in the autumn. Already they begin clamouring in the evening. They cannot, I think, with any propriety, be called, as they are by Mr. Ray, "circa aquas versantes;" for with us, by day at least, they haunt only the most dry, open, upland fields, and sheep-walks, far removed from water: what they may do in the night I cannot say. Worms are their usual food, but they also eat toads and frogs.' No nest receives the eggs, which are two or three in number, of a light brown or dirty white, with dusky blood-coloured blotches and streaks. 'It lays,' says the author of the charming history of Selborne, 'its eggs, usually two, never more than three, on the bare ground, without any nest, in the field; so that the countryman, in stirring his fallows, often destroys them. The young run immediately from the egg, like partridges, &c., and are withdrawn to some flinty field by the dam, where they sculk among the stones, which are their best security; for their feathers are so exactly of the colour of our grey-spotted flints, that the most exact observer unless he catches the eye of the young bird, may be eluded. . . . *Œdicnemus* is a most apt and expressive name for them, since their legs seem swollen like those of a gouty man. After harvest I have shot them before the pointers in turnip-fields.' In his MS. the same author remarks that they seem to descend in the night to streams and meadows, perhaps for water, which their upland haunts do not afford them.

Geographical Distribution.—Europe generally, where it seems to be migratory in many parts, in Britain and Germany for instance. Temminck notes it as abundant in the south of France (in which country Belon found young ones that could not fly at the end of October), Italy, Sardinia, the Greek Archipelago, and Turkey. It is also found in Asia and Africa. It occurred among the Trebizond collection of birds presented to the Zoological Society of London by Mr. Keith Abbott; and the localities attributed to it by Mr. Gould are Europe and Africa, but not India. (*Zool. Proc.*, 1834.) Col. Sykes however had previously recorded it among the birds of the Deccan: at least he says 'there is no visible difference between the Dukhun and British species.' (*Zool. Proc.*, 1832.) If it be the Charadrius Kervari of Hasselquist, which Linnæus and most authors suppose it to be, that traveller describes it as inhabiting Lower Egypt, near the sepulchres, and in the deserts. In Britain it arrives early in the spring. The following is the earliest period recorded by White:—'On the 27th of February, 1788, Stone Curlews were heard to pipe; and on March 1st, after it was dark, some were passing over the village, as might be perceived by their quick short note, which they use in their nocturnal excursions by way of watch-word, that they may not stray and lose their companions. Thus we see that retire whithersoever they may in the winter, they return again early in the spring, and are, as it now appears, the first summer birds that come back. Perhaps the mildness of the season may have quickened the emigration of the curlews this year.' They are seldom seen after the beginning of October; but Markwick states that he received on the 31st January, 1792, a bird of this species which had been recently killed by a neighbouring farmer, who said that he had frequently seen it in his fields (Sussex) during the former part of the winter. This, perhaps, adds Markwick, was an occasional straggler, which, by some accident, was prevented from accompanying its companions in their migration. As the autumn advances, these birds collect into flocks, soon after

Œdicnemus crepitans.

which they leave this country. Norfolk, Suffolk, Kent, and Hampshire seem to be the favourite counties of the Stone Curlew; but it occurs, though rarely, in the Yorkshire Wolds, higher than which it does not seem to go in these islands. Mr. Selby says that he never met with it or heard of it in the more northern English counties, nor in Scotland. It does not occur in Mr. Thompson's Irish list in the 'Zoological Proceedings.'

Utility to Man.—In the hands of a good cook this species is a delicate bird for the table.

In the *Portraits d'Oyseaux*, the following quatrain well describes the bird and the reason for the name given to it by Belon:—

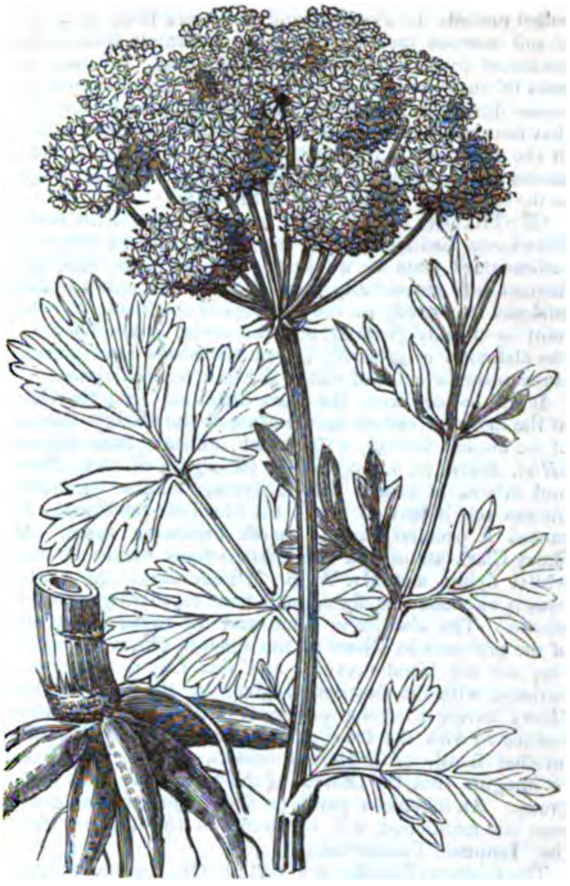
'Lon peut nommer cestuy-cy, Ostardeau,
Parcequ'il est approchant de l'Ostarde,
Qui sous le ply des genoux l'os regarde,
Le trouve gros plus qu' à nul autre oyseau.'

OELAND. [ALAND.]

OELS is a lordship, with the title of a principality, in Lower Silesia, and in the Prussian government of Breslau. Together with the principality of Oels Bernstadt, which has been united with it ever since 1745, it has an area of 780 square miles, above 90,000 inhabitants, and a revenue of 18,000*l.* per annum, burdened however with debts of long standing. The soil is in general fertile, and produces much corn, flax, fruit, and also timber, the forests being very extensive. Game and fish are in abundance. The chief town, OELS, situated in 51° 25′ N. lat. and 22° 30′ E. long., in a plain on the river Oelsa, has a population of 6100 inhabitants, who carry on considerable manufactures of woollen cloths; there are likewise extensive breweries. The palace or castle, in which there is a good library, with collections of works of art and natural history, is surrounded with walls and a moat, and has a beautiful park. There are in the town one Roman Catholic and 5 Lutheran churches, 3 hospitals, a Lutheran gymnasium, admirable establishments for the poor, an institution founded in 1821 for the promotion of morality among poor country girls, a theatre, &c. The principality of Oels, after the death of the last duke, Charles Frederic of Münsterberg and Oels, in 1647, came to his son-in-law Duke Silvius Nimrod of Würtemberg, founder of the line of Würtemberg-Oels. This line becoming extinct in 1792, the principality came, through his only daughter and heiress Sophia Frederica Charlotte, to her husband Duke Frederick Augustus of Würtemberg; and after his death, in 1805, to his nephew Duke Frederick William of Brunswick, who fell in the battle of Quatre Bras in 1815, the succession having been secured to him by Frederick the Great in 1785. After his death it devolved to his eldest son and successor Charles, who in 1825 made it over to his brother William, who still possesses it, since he assumed the government of Brunswick in 1830.

ŒNANTHE, a poisonous genus of apiaceous or umbelliferous plants, one of which, the *Œ. pimpinelloides*, appears to have been the *οἰνάνϑη* of Theophrastus and Dioscorides. The species are readily known, independently of other characters, by their fruits being, by the contraction of the rigid pedicels, strongly compacted into heads, the upper side of which is muricated by the stiff straight long styles. The fruits have on each face five convex obtuse ridges, of which the marginal ones are a little the largest.

The species are all inhabitants of damp meadows or watery places, and are common in Europe. The most important is *Œ. crocata*, an inhabitant of ditches, banks of rivers, and similar situations. This plant, which Dr. Christison reckons the most energetic of the narcotico-acrid poisonous plants of its class, has a root of many fleshy fingers, looking exactly like a dahlia-root in miniature, but abounding in an orange-coloured fetid juice, which is also plentiful in other parts of the plant, and in which the deleterious qualities reside. The stem grows from two to five feet high, is much branched, round, and hollow. The leaves are of a dark shining green, doubly pinnate, with wedge-shaped leaflets variously and deeply cut. The umbels are large and convex, of many general and a still greater number of partial rays. The bracts of the involucre are variable in number and size. The flowers are white, tinged with purple. Cases of accidental poisoning with this plant, in consequence of its roots having been mistaken for ground-nuts, parsnips, &c., by ignorant people, are common. In general death takes place within three hours and a half of the poison having been administered, and often within the first hour.


Œnanthe crocata.

ŒNANTHE. [WHEATEAR.]

OESEL, an island in the Baltic, situated between 58° and 58° 40′ N. lat. and between 21° 40′ and 23° 20′ E. long., stretches across the entrance of the Gulf of Livonia, or Bay of Riga. It extends from south by west to north by east about 45 miles, with an average width of about 25 miles; a narrow peninsula extends from its south-western corner about 20 miles southwards. The area of the island falls short of 1200 square miles: in extent it may be compared with the county of Stafford. The surface is uneven and rocky, but it is covered with a good layer of vegetable mould, and accordingly the island is rather fertile. The highest hills do not appear to exceed 200 feet in elevation. The winters are much less severe than on the adjacent continent. The island produces grain, of which a part is exported, flax, hemp, and a little tobacco. A considerable portion of the island is used as pasture-grounds. The inhabitants, who are Esthonians, amount to more than 30,000. The island belongs to the government of Livonia, or Riga, of which it constitutes the circle of Arensburg, so called from the principal town, which is situated on the southern coast of the island, has a harbour for small vessels, and carries on some trade with Riga in the produce of the island. The population is about 1500. Oesel was early taken possession of by the Danes, who ceded it to Sweden, in 1645, by the peace of Bromsebrö; it remained in the possession of the Swedes till the beginning of the last century, when it was taken by Russia, to which power it was finally ceded, in 1721, by the peace of Nystädt, together with Livonia. The position of this island across the entrance of the Gulf of Livonia renders the navigation of that gulf dangerous in the early part of the spring. When western or north-western winds prevail, the ice which is brought down by the Düna river, being prevented from dispersing in the sea, is accumulated within the gulf, a circumstance which causes loss of life and property.

ŒSOPHAGUS, or gullet, is the canal leading from the pharynx, the short cavity at the back of the mouth, to the stomach. In man, it is composed of two layers of muscular fibres, an external longitudinal layer, and an internal, composed of circular fibres, by which the food is pro pelled towards the stomach, and which are lined by a layer of soft mucous membrane and a moderately thick cuticle continued from that of the lips and mouth. In many animals its interior is beset with numerous firm pointed processes directed towards the stomach to prevent any food that has passed through it from returning into the mouth; in the ruminants, on the other hand, it is one of the chief means by which the partially digested food is brought again to the mouth for the chewing of the cud.

ŒSTRIDÆ, a family of Dipterous insects of the section *Athericera*, distinguished by the proboscis being either in a rudimentary state or wanting; the palpi are sometimes distinct and occasionally wanting; the antennæ are short, enclosed in a cavity in the fore part of the head; the third joint is usually globular, and the stylet is usually dorsal; the abdomen is generally large; the wings have generally three posterior cells, of which the first is often closed.

It will be seen from the above definition that the Œstri of the moderns cannot be the same as the Œstrus (*οιστρος*) of the antient Greeks, a fly, which, we learn from Aristotle (*Hist. Anim.*, iv. 4, &c.), Virgil (*Georgics*, iii. 148), Ælian, and others, is armed with a strong tongue (proboscis), pierces the hides and sucks the blood of quadrupeds, and makes a peculiar kind of harsh humming noise. Mr. Bracy Clark states that the *Œstrus bovis* makes no noise whilst flying, and Mr. W. S. M'Leay says, 'the *Œstrus equi* is also silent in flying, as I have repeatedly myself observed.' The absence in some and the rudimentary state of the proboscis in others of the modern *Œstri* proves that they are not blood-suckers; and this fact is otherwise at variance with the description given by the antients, their *Œstri* having a strong proboscis, a circumstance which, connected with the blood-sucking habits of the *Tabanidæ*, another family of Dipterous insects, induces Mr. M'Leay to imagine that the Œstrus of the antients belongs to that group. An ingenious paper on this subject, by the gentleman last mentioned, will be found in the 14th volume of the 'Linnæan Transactions.'

The modern *Œstridæ* are certain flies (whose larvæ are well known by the name of bots) which deposit their eggs on the body of various herbivorous quadrupeds, so that the larva when hatched shall find itself in the neighbourhood of its appropriate food, either in the hide of the animal, in its stomach, or elsewhere. Each species of *Œstrus*, almost invariably confines its attacks to a certain species of quadruped, and finds its nutriment in the same part or nearly the same part of that quadruped; from this circumstance the species are often named after the animal of which each is a parasite.

The larvæ of the Œstri are usually of a conical form, and the segments of the body are generally furnished with spines; the organs of respiration are situated at the posterior extremity of the body, which is the largest; the mouth, which is situated at the opposite extremity, in some consists of soft mamillæ, whilst in those species which derive their nutriment in the stomach of an animal or in such a situation that they would be liable to be dislodged, the mouth is furnished with two hooks for prehension; these hooks are curved outwards, so that when once inserted they retain their hold without any exertion on the part of the insect.

These larvæ are divided by Latreille, according to the situations which they inhabit, into *cutaneous*, *cervical*, and *gastric*, as some live in the tumours formed on the skin, others in some part of the interior of the head of the animal attacked by them, and the last in the stomach. 'The eggs of the first,' says Latreille, 'are deposited by the parent under the skin, by means of a squamous ovipositor, composed of four tubes fitting one within the other, and armed at the end with hooks and two other appendages. This instrument is formed by the last annuli of the abdomen. These larvæ are not compelled to change their domicile, finding themselves, when hatched, in the midst of the purulent matter on which they feed. The ova of the others are simply deposited, and glued to various parts of the skin, either in the vicinity of the natural cavities into which the larvæ afterwards penetrate and take up their abode, or on those spots which the animal is in the habit of licking, by which means the larvæ are conveyed by the tongue into the mouth, whence they are carried with the food into the stomach, to the coats of which they attach themselves.' Mr. Bracy Clark thinks the food of these is most probably the chyle, which, being nearly pure aliment, may go wholly to the composition of their bodies, without any excrementitious residue. When full grown, they pass with the digested food, and falling to the ground, they seek some convenient retreat, in which they assume the pupa state and undergo their final transformation. A detailed account of the habits of several of the species of Œstri will be found in the article BOTS.

In the most modern work on dipterous insects * the following seven genera are enumerated as belonging to the family *Œstridæ*.

Genus 1. *Cuterebra* (Clark). Distinguishing characters: head somewhat swollen in front; buccal cavity triangular; proboscis very small and retractile; third joint of the antenna ovate; stylet plumose; joints of the tarsi provided with tolerably large pads. Two species of this genus are found in North America, the *Cuterebra cuniculi* and *C. buccata*; their larvæ are parasites on the hares and rabbits. A third species is found in Cayenne, the *C. ephippium*.

2. *Hypoderma* (Clark) has the proboscis indistinct; a small Y-shaped buccal opening; no distinct palpi; the third joint of the antenna is very short and transverse. To this genus belongs the Œstrus which attacks the ox (*Hypoderma bovis*), the larva of which lives in the hide of that animal.

3. *Œdemagena*. This genus has the buccal opening linear, and enlarged above; it has no proboscis; the two palpi are placed near together and are two-jointed, the second joint is large, orbicular, and compressed; the claws and pads of the tarsi are large. Only one species of this genus is known, the *Œdemagena tarandi*, and this is found in Lapland. The female fly deposits her eggs on the back of the rein-deer, and the larvæ live in the hide of that animal.

4. *Cephenemyia* has a very small rounded proboscis, above which the palpi are inserted close together; they are two-jointed, and the second joint is globular; the third joint of the antennæ is compressed, and the stylet is inserted at its base. The body is broad and rounded. *Cephenemyia trompe* is found in Lapland; its larva lives in the frontal sinus of the rein-deer. Since the same fly however is found in Saxony, where there are no rein-deer, the larva must find its nutriment likewise in some other animal.

5. *Cephalemyia*. In this genus the body is but sparingly clothed with hair, the head is very large and rounded in front; there are no cheek cavities; the palpi are wanting, or at least are only represented by two small tubercles; the stylet of the antenna is apical; the wings have two posterior cellules.

But one species of this genus is recorded, the *Cephalomyia ovis*. The female fly deposits her eggs in the nose of the sheep, and the larvæ live in the frontal sinus.

6. *Colax*. Here there are likewise no buccal cavities; the antennæ are distant from each other and inserted near the eyes, the stylet is terminal; the wings have four posterior cellules; the first posterior cellule is short and open, the third is closed, and the anal is long.

The only species hitherto discovered belonging to this genus is found in Brazil; its habits are unknown. It is the *Colax macula* of Wiedemann.

7. *Œstrus*. This generic name is now confined to such species of the *Œstridæ* as have no buccal cavity; the palpi wanting, or represented only by minute tubercles; the wings are decumbent, and have the first posterior cellule entirely open.

To this genus belongs the Œstrus whose larva or bot is found in the stomach of the horse, the *Œstrus equi*. The larvæ of two other species (*Œstrus hæmorrhoidalis* and *Œstrus salutaris*) are also found in the stomach of the horse.

The *Œstrus pecorum* (a species found in Sweden), when in the larva state, is found in the intestines of the ox.

The larva of another species, the *Œstrus nasalis*, is said to live in the œsophagus of the horse, the ass, the mule, the stag, and the goat.

ŒTA, MOUNT. [GREECE; THESSALY.]

ŒTHRA, Dr. Leach's name for a genus of Brachyurous Crustaceans, placed by M. Milne Edwards as the representative of his first division (*Canceriens Cryptopodes*) of his tribe *Cancerians*; and indeed his Cryptopod Cancerians are composed of this genus solely. Latreille made *Œthra* and

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* 'Histoire Naturelle des Insectes Diptères,' by M. Macquart, in two volumes, forming part of the 'Suites à Buffon.'

Calappa [Calappa] form the family *Cryptopodia;* but M. Milne Edwards is of opinion that the only character which they have in common with the latter is the existence of lamellar prolongations on the sides of the carapace, dispositions which are also found in certain *Leucosians*, whilst all the rest of their organization approaches that of the *Crabs*.

Œthra.

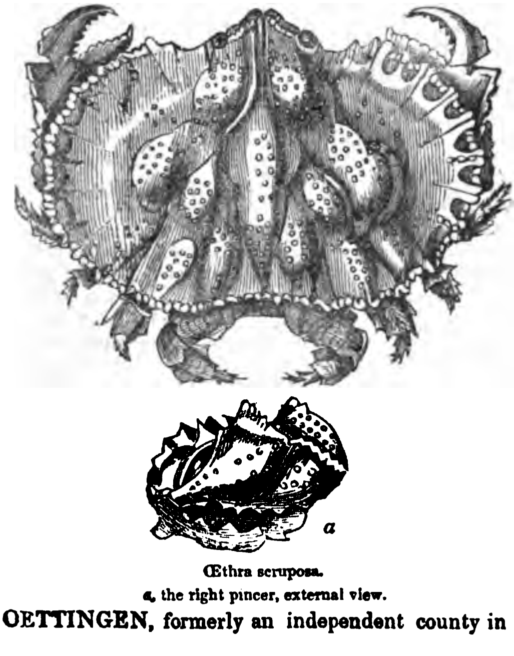
The whole surface of the body rugged and appearing as if eroded. *Carapace* a third wider than it is long, oval, strongly knobbed above, and with the lateral borders strongly dentilated and a little curved upwards. Front entire and a little more projecting in the middle than on the sides. *Eyes* very small, the orbits nearly circular, their upper border with two small fissures, and the lower border separated from the front by a very large gap. *Antennary fossets* nearly square, and the basilary joint of the *internal antennæ* filling them almost entirely; the moveable stem of these appendages very small, and bent longitudinally forwards. Basilary joint of the *external antennæ* very large, and advancing up to the lower border of the front, so as to fill the gap which would otherwise make the orbit communicate with the antennary fosset; its anterior extremity very narrow and upon the edge of the inferior orbital border; second joint of the external antennæ very small, occupying the internal *canthus* of the eyes, and supporting a stemlet which is rudimentary and very difficult to distinguish. *External jaw-feet* completely closing the buccal frame; the internal border of their second and third joints straight: this last portion is strongly truncated at its posterior and internal angle, and hides almost entirely the palpiform stemlet which has its origin under its anterior and internal angle. *Sternal plastron* much longer than it is wide. Anterior *feet* about once and a quarter as long as the post-frontal portion of the carapace, and of nearly the same form as in *Parthenope*, excepting that their upper and internal surface is slightly concave, so as exactly to fit the lower and anterior portion of the trunk; second pair of feet much shorter than the post-frontal portion of the carapace; the other pairs successively diminishing in length, and all surmounted with a sharp and unequal crest. *Tarsus* short and styliform. *Abdomen* with seven segments in the female and five only in the male.

Place in the System.—M. Milne Edwards is of opinion that this form has great affinity with the genus *Cryptopodia* belonging to the family of *Oxyrhynchs*, and that it establishes the passage between those crustaceans and the other *Cancerians*, at the same time that it approaches *Calappa*, whose natural place is in the family of *Oxystomes*.

Geographical Distribution of the Genus.—East Indian and African Seas.

Example, *Œthra scruposa*. Length 2 to 3 inches. Colour greyish.

Locality.—Isle of France and Indian Archipelago.



Œthra scruposa.
a, the right pincer, external view.

OETTINGEN, formerly an independent county in the north part of Swabia, now belongs partly to Bavaria and partly to Würtemberg. Its area is 372 square miles, and the population above 61,000. It is a very fertile country, watered by the rivers Wernitz and Eger, and produces corn, hemp, flax, and timber. It has a good breed of horned cattle and horses, and is particularly famous for its geese. It abounds in fact in all the necessaries of life except salt. It has likewise iron, saltpetre, and remarkably fine stone for building. The county is now divided between two princes, whose common ancestor, Lewis XV., lived at the time of the Reformation; of his two sons, Lewis XVI. founded the Protestant and Ferdinand the Roman Catholic branch: the former, which obtained in 1674 the rank of prince of the empire, became extinct in 1731; the latter was divided by the three sons of William the Elder into three branches—Oettingen-Spielberg, which obtained the princely dignity in 1734; Oettingen-Wallerstein, which succeeded by will to the possessions of the extinct Protestant line, and obtained the princely dignity in 1774; and Oettingen-Baldern, which is now likewise extinct.

Oettingen-Oettingen, or Spielberg, in the circle of the Rezat in Bavaria, is 84 square miles in extent, and contains about 15,000 inhabitants. The prince resides in the town of Oettingen on the Wernitz, in 48° 57′ N. lat. and 10° 38′ E. long. The inhabitants, 3280 in number, are half Protestants, half Roman Catholics; there are 250 Jews. It is a well built town, has two palaces, a gymnasium, an elegant Lutheran church, a Roman Catholic church, a literary society, an orphan asylum, and manufactories of cotton, linen, and worsted.

The prince of Oettingen-Wallerstein has a territory of 252 square miles, partly in Würtemberg, partly in Bavaria, with 46,000 inhabitants. Wallerstein, the capital and residence of the prince, is a well built market-town, with 1500 inhabitants. The prince's palace is a handsome building, and contains a good library and a collection of paintings.

OFEN. [Buda.]

OFFENBACH is the capital of a circle in the province of Starkenburg, in the grand-duchy of Hesse, and belongs to the mediatised princes of Isenberg-Berstein. It is situated in a very pleasant and fertile country, about a league from Frankfort, on the bank of the Maine, over which there is a bridge of boats: it is surrounded on one side with a wall, on the other by a navigable canal which joins the Maine. It consists of the old and the new town, the latter of which is well built. The public buildings are a fine palace, a Lutheran, a French Calvinist, and 2 Calvinist churches, and a gymnasium. The population is 8000. Offenbach is the only considerable commercial and manufacturing town in the grand-duchy. The manufactures are, very various: the principal are leather, hats, silks, hosiery, earthenware, all kinds of lacquered goods, gold and silver wire, jewellery, snuff and tobacco, wax candles, white-lead, chocolate, and carriages, which are much esteemed all over Germany for lightness and durability.

OFFICE FOUND. By the common law of England, where the king is entitled, upon the occurrence of certain events, to take possession of real or personal property previously belonging to a subject, the facts upon which the king's title accrues must be first ascertained by an inquisition or inquest of office. This inquiry is executed by some officer of the crown, such as the escheator, coroner, or sheriff, or by persons specially commissioned for the purpose, and the facts are ascertained by a jury of an indeterminate number, but consisting usually, though not necessarily, of twelve men. Such inquests were much more frequent before the abolition of military tenures, when inquisitions *post mortem* were instituted upon the death of any of the king's tenants, to inquire of what lands he died possessed, and of other matters tending to establish the king's rights respecting the property of the deceased. [Jury.] When an inquisition of this kind has been executed and returned, it is said to be *an office found*. Thus where treasure has been discovered under circumstances which do not give it to the owner of the land, an inquest is held, and the king, upon office found, takes it; and where a person of illegitimate birth dies intestate, the king (if he is the immediate lord of the fee), upon office found, is entitled to all his land: in the latter case however the land is generally granted again to some person or persons who can make out the most reasonable claim to it. So also the verdict of a jury upon a coroner's inquest, declaring a person to have died *ut felo de se*, is an office found, upon which the king becomes entitled to take possession of the property of the deceased.

OFFICE, HOLY (*Sanctum Officium*), is the name of an ecclesiastical tribunal established in the thirteenth century by popes Honorius III., Gregory IX., and Innocent IV., to try heretics, blasphemers, apostates, relapsed Jews or Mohammedans, witches and wizards, polygamists, and other persons charged with infractions of the canons of the Church. The judges of this court were called inquisitors, whence the tribunal itself has been commonly styled the 'Holy Inquisition.' The name of inquisitors, or inquirers after heretics, appears as early as the reign of Theodosius I., who, by his constitution against the Manichæans and other heretics, A.D. 382, after adjudging the punishment of death for several aggravated cases of heresy, directs that 'Inquisitores ad conquirendos et eruendos hereticos' be appointed by the prefect of the Prætorium. (*Codex Theodosianus, Gothofredi*, xvi., tit. 5, lex 9.) This is the first law under the Christian emperors by which the punishment of death is awarded for heresy. Constantine had only sentenced the Arians to banishment, though he threatened to punish with death those who should retain and make use of the books of Arius. The subsequent law of Honorius, A.D. 398, expels from the towns the 'Clerici' or priests of the Montanists and Eunomians, and if they persist in bringing people together, it banishes them for life. It further orders their books to be burnt, and condemns all persons who are found to conceal them to be beheaded. (*Cod. Theod.*, xvi., tit. 5, l. 34.) Two more constitutions or laws of Honorius (51 and 56 of the same book and title in the Theodosian Code) threaten with proscription and death those who publicly profess certain heresies. These are the oldest laws on record which make heresy a capital crime; but it ought to be observed, that there is no law in the whole Theodosian Code which subjects heretics in general to the pain of death, that punishment being reserved for the leaders, those who collected assemblages of people, made proselytes, and preached or spread certain heterodox doctrines specified and condemned by the laws. The trial and punishment in all such cases were left to the civil magistrate.

Previous to the time of Theodosius I. there had been persecutions of Arians by the Orthodox, and *vice versâ*, carried on through the violence of individuals; but there was no specific law making heresy a capital offence. Towards the heathens the case was different. Constantius (A.D. 353) had forbidden heathen sacrifices under pain of death. Theodosius I. confirmed that law, and Theodosius II., after remitting the capital penalty (A.D. 423), put it in force again in 426. (Gothofredus, *De Statu Paganorum*.) Most of the earlier fathers, Tertullian, Cyprian, Lactantius, Hilarius, Ambrose, and Gregory Nazianzenus, and even Athanasius, openly disclaim violence as a means of enforcing unity and obedience to the Church. Chrysostom and Augustin however think that heretics ought to be prevented from holding assemblies, and ought to be confined or banished, but not put to death. But it ought to be remembered that the heretics of those times, the Arians and Donatists in particular, constituted political factions which rebelled against the authority of the state, murdered their antagonists, demolished their houses, and committed all sorts of violence, as may be seen by the letters of Augustin.

The first person on record who was juridically condemned and put to death for heresy is Priscillianus, the leader of a sect in Spain, in the latter part of the fourth century. Two Spanish bishops, one of whom was called Idacius, accused Priscillianus, with two other priests or bishops, before a council held at Bordeaux, A.D. 385. Priscillianus appealed to the emperor Maximus, who had assumed the imperial purple in Gaul, and who was then residing at Treves, whither Priscillianus and his friends were taken, being followed by their prosecutor Idacius. Martin, bishop of Tours, interceded in their behalf; but after his departure from Treves, Maximus entrusted Evodius, the prefect of the Prætorium, with the trial of the accused, and upon his report Maximus condemned them to be beheaded. This novelty was generally censured, and Ambrose and Martin of Tours strongly reprobated the part which Idacius had acted, and which they characterised as unbecoming the episcopal character. The consequence was, that Idacius was excommunicated, and died in exile.

Justinian, in the first book of his Code, in which he treats of the Catholic faith, and defines its creed according to the first four general councils, of Nicæa, Constantinople, Ephesus, and Calchedon, forbids public disputations upon dogmas, and enacts several penalties against heretics, Jews, and apostates. In the 131st Novel, the same emperor says: 'We receive the doctrines of the four Holy Synods as the Divine Scriptures, and their Canons we observe as laws.' Thus the orthodox creed, as expounded in the four councils, became the law of the empire, an empire which was then administered despotically, and dissent from that creed was an offence against the law. From this principle the whole penal code against heretics was derived. But for several centuries after, cases of heresy were tried and penalties awarded by the ordinary courts, as the bishops had not then any temporal jurisdiction. In course of time however councils interfered, and after condemning particular tenets as heretical, specified in some instances the punishments to be inflicted upon heretics, Jews, and apostates. [JEWS.] It became the practice for the bishops to examine the accused, and decide whether there were sufficient grounds for the charge of heresy against them; if the charge was proved, they were to admonish them, and convince them of their errors, after which, if the accused remained obdurate, the bishop handed them over to the secular court. 'Heretici perseverantes in errore relinquantur Curiæ secularis judicio.' (Council of Tarracona, A.D. 1242.) And the law of Las Partidas, which is still the fundamental code of Spain, promulgated in 1258, says: 'Heretics may be accused by any one of the people before the respective bishop or his vicar, who must examine and interrogate them upon the various articles of the faith, and if they find that they err in them or in any other thing which the church of Rome commands to be believed and observed, he must endeavour to convert them and make them forsake their errors by means of good arguments and mild words. And when the penitents have acknowledged their belief, they are to be reconciled to the church and be forgiven. But if it so happens that they will not forsake their errors, the bishop must convict them as heretics, and then hand them over to the secular or lay judges.' The lay judges however were not mere executors of the episcopal verdict: they examined the proceedings, and having convinced themselves of their regularity, they awarded the penalty. By a clause of the same law of Las Partidas, 'the property of those who are condemned as heretics, or who die in the heretical belief, belongs to their children or other descendants.' The principle of confiscation is here not recognised. This was in the kingdom of Castile; but in Aragon, France, and Italy, a different process was introduced by means of the Inquisition.

In the council of the Lateran, convoked at Rome in 1215, by Innocent III., new and severe enactments were made against heretics, but the cognizance of matters of heresy was left to the ordinaries or bishops. But some years before this time, Innocent himself, of his own authority, had sent a commission consisting of two legates, who were Cistercian monks, accompanied by subordinate priests and officers, to the south of France, in order to extirpate the heresy of the Albigenses. These legates acted independently of the local bishops; they held their own court, before which they summoned, by the authority of the pope, individuals accused of heresy, and condemned, and inflicted penalties, and even capital punishments. Dominic de Guzman, the founder of the order of Dominicans, was one of the most zealous agents of this commission, the members of which were called Inquisitors. This however was only a temporary and local commission.

In 1208, Peter de Castelnau, one of the legates, who had become obnoxious for his severity, was murdered near Toulouse, and Innocent was so exasperated, that he preached a crusade against the Albigenses, which, after a long struggle, ended in their extermination. [ALBIGENSES.] Honorius III., the successor of Innocent, issued new provisions against heretics, which were enforced by the emperor Frederic II. in three constitutions, or laws, dated Pavia, A.D. 1224, by which he condemned impenitent heretics to death, and those who repented to perpetual imprisonment. In the year 1228 a severe penal law against heretics was enacted in the city of Milan by Cardinal Godfrey of St. Mark, papal legate, with the consent of the archbishop and the people; it was to the effect that 'no heretic should be allowed to remain in the state of Milan; that any person might lay hands on a heretic and bring him before the magistrates; that those who were convicted as heretics by the Ecclesiastical Court should be executed by the prætor within ten days, their houses pulled down, and their property confiscated to the community.' (Calchi, *Historiæ Patriæ*, b. xiii.; Corio, *Storia di Milano*, part ii., p. 72; Verri, *Storia di Milano*, ch. ix.) No less than fifteen sects of heretics, with strange names, are enumerated by these historians as having been discovered within the state of Milan. The archbishop of Milan at the time was Enrico da Settala, who exerted himself greatly in rooting out the heretics, and having probably exceeded all bounds, he was at last banished by the council of the republic, for which the council and the podestá were excommunicated by the pope. In the inscription on the tomb of this archbishop, it was stated that 'being appointed inquisitor, he destroyed the heretics.' It was about the year 1233 that Pope Gregory IX. laid down the rules and defined the jurisdiction of the inquisitors' courts, which he sent to various countries, under the name of Inquisitorial Missions. He appointed as chief inquisitor in Lombardy, Pietro da Verona, a Dominican monk, who was strenuously seconded by the then podestá of Milan, Oldrado da Tresseno, who consigned to the flames numerous heretics. The likeness of this podestá was, not many years since, and probably is still, seen sculptured in relief in the façade of the hall of the municipal council at Milan, with an inscription recording, among other things, that he had burnt the heretics as in duty bound: 'Catharos, ut debuit, uxit.' The chronicler Fiamma says, that he was the first who put heretics to death in Milan. By degrees inquisitors were sent by the popes to most Italian cities and states, where, with the consent of the local authorities, they established their tribunal, and had their officers, notaries, informers, and other agents. Dominican monks were generally employed as inquisitors, as the principal object of the institution of their order was to defend the orthodox faith by arguing and preaching against heresy, on which account they are styled 'Fratres Prædicatores,' or brother preachers. The inquisitor Pietro da Verona, in the course of nineteen years, burnt a great number of heretics throughout Lombardy, banished or frightened away a still greater number, and confiscated their property. A certain Confaloniere of Alliate, being warned that he was on Fra Pietro's list, conspired with several of his friends, who lay in wait for the inquisitor, and on the 6th of April, 1252, as he was returning from Como to Milan, in company with another Dominican, they killed him near Barlassina, and wounded his companion, who died a few days after. The inquisitor was shortly after canonized by Pope Innocent IV., under the title of St. Peter Martyr. In 1277, another Dominican, brother Pagano da Lecco, was killed in the same manner in Valtellina.

The chroniclers of the various cities of Lombardy record the acts of the inquisitors, and the number of heretics and witches whom they put to death at particular times. The chronicle of Muralto states that brother Antonio da Casale, inquisitor of Como, in 1416, sent three hundred heretics to the stake in one single year. Tartarotti states that in the year 1485 forty-one witches were burned at Como. Bartolomeo Spina, 'De Strigibus,' ch. 13, states that in the diocese of Como the number of those who were tried annually by the Inquisition exceeded one thousand; that the inquisitor employed eight, ten, and even more vicars, and that almost every year about one hundred persons were burned. (*Lettere del Conte Gianbattista Giovio all' Abate Bettinelli*, letter vi.)

The Inquisition was introduced into Rome as well as other parts of Italy by Gregory IX., and entrusted to the Dominicans, but it was a long time before it was established as a distinct and permanent court. Inquisitors were appointed by the pope on particular occasions, who visited the various provinces and towns, proclaiming to all persons the obligation they were under of informing against those whom they knew or suspected of being heretics, under pain of excommunication. At the same time they also made it known that all persons guilty of heresy who came of themselves before the inquisitor within a certain fixed period, and accused themselves and professed repentance, should receive absolution and be only subject to a canonical penance. These penances were public, humiliating and very severe, as may be seen by a letter of St. Dominic concerning a heretic whom he had converted, by the acts of the council of Béziers, A.D. 1233, and of the council of Tarracona in 1242. After the expiration of the period of grace, the inquisitor proceeded *ex-officio* against those who were denounced, the name of the informer being kept secret: he examined witnesses privately in presence of a notary and two priests, and having taken down the evidence in writing, he read it over to the witnesses, who were asked whether they confirmed what had been read. If there appeared to be sufficient grounds for proceeding against the accused, the inquisitor ordered his arrest by the municipal officers, and he was taken to the convent of the Dominicans, if there was one in the town, or to the prison of the ecclesiastical court. He was then interrogated by the inquisitor, and his answers might be used afterwards as evidence against him. If the accused denied the charge of heresy, he was supplied with a copy of the instruction and depositions, but without the names of the accuser and witnesses, and with the omission of such circumstances as might discover them. The accused having made his answer or defence, which was taken down in writing, if he denied the charges, the inquisitor, together with the bishop of the diocese or his delegate, if they thought proper, ordered him to be put to the torture in order to obtain his confession. The torture might be repeated three times, but it was afterwards ordered to be applied only once; this regulation however was often evaded by suspending the torments and then resuming them, and considering the whole as one torture. If in the end there were not sufficient grounds for the conviction of the prisoner, he was declared to be 'suspected of heresy,' was obliged to make a public abjuration of all heresies, and was subject to certain penalties, according to the nature of the case. If the accused was convicted of heresy, but professed his repentance, he was condemned to prison for life, a penalty which however might be mitigated by the inquisitor. But if he was a *relapsed*, that is to say, had been tried before, and found guilty or only strongly suspected, there was no mercy for him; he was 'relaxatus,' that is to say, given over to the lay magistrate, who, according to the civil and canon laws, was bound to put him to death upon the sentence of the inquisitor which declared him a heretic. The only favour shown to the relapsed heretic who confessed and abjured his guilt was, to be strangled before he was burnt. If the convicted heretic was not relapsed, but impenitent, a respite of the sentence was granted in order to effect his conversion, and if he at last abjured, his life was spared, and he was sentenced to perpetual imprisonment. If he persisted in his impenitence, he was publicly burned alive. Such were the principal characteristics of the old or delegated Inquisition as it existed from the thirteenth century to the latter part of the fifteenth, and the regulations of which are found in the 'Directorium Inquisitorum' of Friar Nicholas Eymeric, a native of Catalonia, and a Dominican monk of the fourteenth century, who held the office of chief inquisitor in Aragon for forty-two years.

The Inquisition had nearly fallen into disuse in the kingdom of Aragon in the fifteenth century, in consequence of the total extinction of the heretical sects in the south of France, whose spreading on the other side of the Pyrenees had occasioned the introduction of the inquisitional courts into Catalonia and Aragon. In the kingdoms of Castile and Leon and of Portugal, the Inquisition had not yet taken permanent root. But towards the end of the fifteenth century, the Holy Office was introduced into Spain under a new and more appalling form, and became consolidated and permanent, and more absolute and independent than in any other country of Europe. This is what is designated by Llorente and other writers by the name of the 'Modern or Spanish Inquisition.'

Alfonso de Hodeja, prior of the Dominican convent of Seville, and Friar Philip de Barberis, inquisitor of the kingdom of Sicily, which was then subject to the crown of Aragon, suggested to Ferdinand and Isabella, in 1477, the establishment of the Inquisition in Spain for the purpose of punishing those Christians who secretly relapsed to the Jewish faith. The converts, or children of converts, from Judaism, were looked upon with dislike and mistrust by the old Christians; and many of them were at the same time among the wealthiest merchants and monied men of Spain, and as such had numerous debtors. Reports were spread of their secret meetings with those who had remained Jews, of their profaning the images of Jesus Christ, and even crucifying Christian children. Ferdinand easily listened to the suggestion; but Isabella, a princess of mild character, hesitated for some time, and without her consent nothing could be effected in the dominions of the crown of Castile. Means were at last found to alarm her conscience: she was told that the interests of religion required her acquiescence, and accordingly she solicited, by means of her ambassador at Rome, a Papal bull, authorising the establishment of the Inquisition in the kingdom of Castile. The bull, despatched from Rome in November, 1478, authorised Ferdinand and Isabella to appoint two or three bishops or other dignitaries of the church, aged at least forty years, of irreproachable character, graduates in theology and the canon law, who were to be commissioned to seek after and discover, throughout the dominions of the Spanish sovereigns, all apostates, heretics, and their abettors, with full power to proceed against them according to law and custom. Isabella however suspended the execution of the bull for two years, desiring at the same time that measures of persuasion should be adopted to warn the relapsed converts of their error and of their danger. A catechism was composed expressly for them, and several pamphlets against Judaism were issued. In 1480 the Cortes of Castile assembled at Toledo, and passed several restrictive measures against the Jews, with the view of checking their intercourse with the Christians. Nothing however was said in that assembly about the Inquisition. At last, in September, 1480, Ferdinand and Isabella, who were then staying at Medina del Campo, appointed two Dominicans as inquisitors, with an assessor and a fiscal attorney; and on the 9th of October a royal order was despatched to the governors of provinces to furnish the new inquisitors and their retinue with everything necessary for their journey to Seville; and at the same time their privileges were declared, which were the same as those granted by the emperor Frederic II. to the inquisitors in Italy in the thirteenth century. The inquisitors established their court in the Dominican convent of St. Paul of Seville, whence, on the 2nd of January, 1481, they issued their first edict, by which they ordered the arrest of several 'new Christians,' as they were styled, who were strongly suspected of heresy, and the sequestration of their property, denouncing the pain of excommunication against those who favoured or abetted them. The number of prisoners soon became so great, that the Dominican convent not being large enough to contain them, the court was removed to the castle of Triana, in a suburb of Seville. The inquisitors issued another edict, by which they ordered every person, under pain of mortal sin and excommunication, to inform against those who had relapsed into the Jewish faith or rites, or who gave reason for suspecting them of being relapsed, specifying numerous indications by which they might be known. Sentences of death soon followed; and in the course of that year, 1481, 298 new Christians were burnt alive in the city of Seville, 2000 in other parts of Andalusia, and 17,000 were subjected to various penalties. The property of those who were executed, which was considerable, was confiscated. (Mariana, *Hist. de España*, b. 24, ch. 17.) The terror excited by these executions caused a vast number of new Christians to emigrate: several who were condemned as contumacious repaired to Rome, and appealed to Pope Sixtus IV. against the inquisitors. The pope wrote to Ferdinand and Isabella, in January, 1482, complaining of the arbitrary conduct of the two inquisitors appointed by them, revoking the authority which he had given to their majesties to appoint other inquisitors, and reserving that right to himself, which he exercised by a brief in the following February. Among these new appointments was that of the afterwards famous Torquemada. Queen Isabella now wrote to the pope, requesting him to give a permanent and fixed form to the new tribunal, and to make its judgments definitive without appeal to Rome, complaining at the same time that she was accused of doing all that she had done in favour of the Catholic faith, for the sake of the confiscations which follow the condemnations. The pope laid the proposal of Isabella before a committee of Spanish cardinals and bishops who were then at Rome, and among whom was Rodrigo de Borja, afterwards pope Alexander VI. By their advice Sixtus IV. despatched a brief to Isabella, appointing Manrique, archbishop of Seville, to be apostolic judge of appeal for all Spain, with power to decide on all appeals from the judgments of the Inquisition. By several other briefs, directed to the various archbishops of Spain, the pope gave them the power and regulated the manner of appointing the ordinary inquisitors in the various dioceses. Notwithstanding these measures, appeals from Spain continued to be received at Rome; and the pope again wrote, in August of the same year, to the archbishop of Seville, ordering the proceedings against several individuals to be quashed, and recommending mildness and moderation. This recommendation however had no effect. Soon after, the pope appointed Thomas de Torquemada, prior of the Dominican convent of Segovia, to the new dignity of inquisitor-general of the kingdom of Castile; and by another brief, dated 17th October, 1483, he made him likewise inquisitor-general of the kingdom of Aragon, with full jurisdiction over all other inquisitors in Spain and its dependencies. His powers were confirmed by Innocent VIII., in February, 1486. Torquemada chose for his assessors and councillors two jurists, J. Gutierrez and Tristan de Medina: he created four subordinate courts, at Seville, Cordoba, Jaen, and Villa Real; the last was soon after transferred to Toledo. The Dominican monks, who had been appointed inquisitors by the pope in February, 1482, at first refused to submit to the authority of Torquemada, but they finally yielded. Ferdinand at the same time appointed a royal council of the supreme Inquisition, 'Consejo de la Suprema Inquisicion,' of which the grand-inquisitor was president of right and for life, and a bishop and two doctors-at-law were councillors. The councillors had a deliberative vote in all matters of civil law, but the president alone judged in matters which concerned the canon or ecclesiastical law.

Torquemada and his two assessors framed the organic laws of the new tribunal, which were styled 'Instructions,' and were partly based on the older 'Directorium Inquisitorum' of Eymeric. Being sanctioned by a junta of the inquisitors of the four courts which he had established and of the royal councillors, the instructions, consisting of 28 articles, were promulgated at Seville, the 29th October, 1484. They are given at length by Llorente, in the sixth chapter of his History. New articles were added to them in 1488 and 1498, and lastly the inquisitor-general Valdez, in 1561, compiled a new series of ordinances in 81 articles, which regulated ever after the practice and proceedings of the Spanish Inquisition. They are also given by Llorente, in the 22nd chapter of his work. They are substantially the same as those already noticed as being in practice by the old Inquisition, but are more minute, and rather more unfavourable to the accused. By the old practice, for instance, the names of the witnesses for the prosecution were in many cases communicated to the accused, to whom they were of great use for his defence. Confiscation of the property of those who were condemned was not generally enforced under the old practice, and this was more particularly the case in the kingdom of Aragon, a circumstance which explains the resistance of the Aragonese, among whom the old or delegate Inquisition had been established for centuries, to the introduction of the new Inquisition as instituted by Torquemada.

Another important characteristic of the new Spanish Inquisition was its compact organization and independence of all other authorities. The inquisitor-general was appointed for life; he was proposed by the king and approved by the pope. He appointed all other inquisitors under him, as well as visitors and other agents. He had full and discretionary power by the papal bulls in all matters of heresy. The grand-inquisitor, being thus placed as a distinct power between the king and the pope, was in reality independent of both. He could refuse to submit to those papal decretals and bulls which he did not approve, by alleging that they infringed upon the rights of the Spanish monarchy; and he could likewise evade the king's ordinances, by alleging the papal bulls which forbade the inquisitors to tamper with the secular power under pain of excommunication. Among other proofs of this assumed irresponsibility, one of the strongest is the famous trial of Carranza, archbishop of Toledo, in the reign of Philip II., who had attended Charles V. at St. Yusto in his last moments, and whom neither the briefs of the pope Pius IV. nor the remonstrances of the prelates assembled at the council of Trent could save from being confined in the prisons of the Spanish Inquisition for more than seven years, without a termination of his trial; and when at last pope Pius V. demanded of the Spanish inquisitor and of the king, under pain of excommunication, that the archbishop and the papers of his trial should be sent to Rome, all sorts of obstacles were thrown in the way of his departure and his final acquittal by the pope. After the death of Pius V. new proceedings were commenced in Spain to prove the archbishop guilty of heresy, and on the information being transmitted to Rome, Gregory XIII., who had succeeded Pius V., was, though with evident reluctance, induced to declare, on the 14th April, 1576, that the archbishop of Toledo was strongly suspected of believing sixteen propositions qualified as Lutheran, and which had been deduced from the context of his writings by the casuists of the Inquisition. He was then sentenced to five years' confinement in a Dominican convent and other canonical penances. A few days after this sentence, the archbishop, who was then seventy-two years of age, was taken dangerously ill, and before receiving the sacrament, on the 30th April, he solemnly declared in presence of several witnesses 'that he had never fallen into the errors with which he had been charged; that his expressions had been distorted into a meaning totally different from his; that he however humbly submitted to the judgment pronounced by the sovereign pontiff, and heartily forgive all those who had taken part against him in the trial, and would pray for them before the throne of Grace.' On the 2nd of the following May the archbishop died in the convent of La Minerva at Rome, in which he was detained, and where he was buried. An inscription was placed over his tomb by order of Gregory XIII., in which he was described as a prelate 'illustrious for his birth, his life, his doctrine, his preaching, and his charity.' Llorente gives a copious abstract of this celebrated trial in chapters 32, 33, and 34 of his *History of the Inquisition.*

Pope Paul III., alarmed at the progress of the doctrines of the Reformation, with the consent of Charles V. sent inquisitorial commissioners to the various states and provinces of Italy to try heretics; but they were instructed to proceed according to the usual form of the ecclesiastical courts, the depositions and names of the witnesses were to be communicated to the accused, and sentence of condemnation was not accompanied by confiscation; in short their powers were very different from those of the Spanish Inquisition. The Spanish viceroy of Naples, Don Pedro de Toledo, applied to the pope for an inquisitorial commissioner with a brief to proceed against persons suspected of heresy, but the Neapolitans, who were acquainted with the severities of the Spanish Inquisition, revolted, and, after much bloodshed, Charles V. promised that no Inquisition should be established in the kingdom of Naples, and that cases of heresy should be tried, as before, by the ordinary episcopal courts. These occurrences took place in 1546-7, and the Neapolitans, the better to secure themselves against the dreaded tribunal, established a court whose office it was to watch against any attempt to introduce the same under any shape—a kind of inquisition against the Inquisition. This court, which continued to exist till the French invasion of 1799, was styled 'Tribunale contro quello del Sant Uffizio,' and was composed of deputies, chiefly noblemen chosen by the different Seggi into which the Neapolitan nobility was classed. To the Neapolitan character, mercurial and communicative, the secret and mysterious proceedings of the Inquisition were peculiarly obnoxious.

Philip II. wished to introduce the Spanish Inquisition into the duchy of Milan, but the towns of Lombardy sent deputies to the council of Trent to remonstrate against it, and the Milanese and other Italian bishops wrote to the pope and to Cardinal Borromeo, representing that the Inquisition of Spain acted in the dark, in an arbitrary manner, and with strange and fearful forms of proceeding, that it took away the jurisdiction from the bishops, that it showed itself more a rival than a subject to the papal see, that it had repeatedly refused to send a copy of its trials to Rome, and that if it were introduced into Italy, the Italian prelates, having its terrors before their eyes, would become estranged from the holy see. The pope, being easily persuaded by these reasons, interposed with King Philip, saying that if required he would, after consulting with the bishops of Lombardy, himself send inquisitorial commissioners from Rome, who should proceed not according to the Spanish form, but according to the canon law, and without prejudice to the episcopal authority. Thus the Spanish Inquisition was not introduced into Milan or into any other Italian state, with the exception of Sicily, which was an old dependency of the crown of Aragon.

The court of the Inquisition, as it was established in the sixteenth century, in Tuscany, Venice, Milan, Parma, and other Italian states, consisted of one inquisitor, sent from Rome, with assessors approved by the sovereign of the respective states, who appointed deputies or commissioners to attend the trials and report to him. The sentences of the court were subject to the sanction of the temporal sovereign.

The republic of Venice showed itself the most jealous of its sovereign rights in this particular. A series of statutes were issued at various times by the senate to regulate the proceedings of the inquisitors, which are given by Paolo Sarpi, in his 'History of the Venetian Inquisition,' and by Limborch, b. i., ch. 17. By a concordat with Pope Julius III., A.D. 1551, it was decreed that three senators were to attend all the proceedings and judgments of the Inquisition in the city of Venice, and although they took no part in the trial, they had the right to suspend the execution of the sentence and report to the senate. In the provincial towns lay magistrates were appointed to perform the same duty in the respective courts of the Inquisition. The Inquisition could not molest Jews or other unbelievers, or Greeks living under the protection of the republic. It could not take cognizance of cases of blasphemy or polygamy—which belonged to the secular jurisdiction—nor of witchcraft, nor of minor infractions of discipline, such as eating or selling of meat on Fridays, &c. Numerous other checks are provided by the same statutes. In short, although the Venetian senate was obliged by prudential reasons to admit the Inquisition within its territories, it took care to render it as inoffensive as possible. The famous tribunal of the state Inquisition, which was entirely a political institution of the Venetian aristocracy, and must not be confounded with the ecclesiastical Inquisition, is described under VENICE.

In Tuscany the grand-dukes Medici had provided that deputies appointed by themselves should attend the trials of the inquisitorial court, and should report to them, and that no sentence should be executed without their sanction. But in the year 1566, pope Pius V., a zealous promoter of the Inquisition, demanded of the grand-duke Cosmo I. the person of Pietro Carnesecchi, a man of some rank and learning, and well affected to his sovereign, but who had publicly adopted several tenets of the Protestant Reformers. Cosmo gave him up to the officers of Rome, but at the same time wrote earnestly to the pope to save him. Pius was inclined to spare his life, if Carnesecchi had shown signs of repentance, but he boldly persisted in his opinions, and in August, 1567, he was convicted by the Roman Inquisition of thirty-four heretical tenets, and condemned to death. The grand-duke again wrote in his behalf, and the pope suspended the execution for ten days, promising to spare his life on condition that Carnesecchi should abjure his tenets, and he sent him a friar to exhort him to do so. But Carnesecchi remained firm: he argued with the monk and wanted to gain him over to his own opinions. He was publicly beheaded at Rome, and afterwards burnt. In the following century Galileo was summoned from Florence to Rome, where however he was treated with considerable lenity, and after a verbal abjuration and a few months' confinement, he was allowed to return to Florence. The executions in Tuscany in consequence of sentences of the Inquisition have been comparatively few. The tribunal continued to exist in Tuscany till the reign of Leopold of Austria, who began by curtailing its jurisdiction, took away its 'sbirri,' or bailiffs, gave the censorship of books to a lay magistrate, and at last abolished the tribunal altogether in 1787. About the same time it was suppressed at Milan by the emperor Joseph II. In 1769 the duke of Parma abolished it in his territories.

Pope Paul III. founded at Rome, by a bull dated April, 1643, the Congregation of the Holy Office, consisting of six cardinals, who were styled 'inquisitors-general of the faith,' who had the superintendance over all other inquisitors, and he gave them full authority to proceed, without the concurrence of the ordinaries or bishops, against all heretics or persons suspected of heresy, to punish them, confiscate their property, to degrade and deliver to the secular courts all clerical offenders, to call in if required the assistance of the secular arm, to appoint inquisitors with such powers as they thought proper, to appoint fiscal attorneys, notaries, and other officials, and to hear and decide on appeals from the judgment of other inquisitors. The pope however declared that by this bull he did not intend to make any alteration in the privileges of the Spanish Inquisition as then established.

In 1564 popes Pius IV. and V. confirmed and extended the powers of the Roman Inquisition, which however were resisted in the kingdom of France. In that kingdom there was no regular tribunal of the Inquisition. The Cardinal de Lorraine, under Henri II., had indeed appointed delegated inquisitors who acted as extraordinary judges in the trials of the Huguenots, but their jurisdiction was not exclusive, as the parliament also took cognizance of the crime of heresy, besides which the king appointed special commissioners for the same purpose. (*Histoire du Parlement de Paris*, ch. 21.) But the authority of the Inquisition was totally abolished in France as soon as tolerance was established by the Edit de Nantes under Henri IV., which allowed the Protestants the exercise of their religion, for tolerance and the Inquisition could not possibly exist together; and although Louis XIV. afterwards revoked that edict and persecuted the Protestants, he did it by means of the secular power, and took care not to allow the introduction into his kingdom of an ecclesiastical tribunal which would encroach upon his own sovereign authority. But he advised his grandson Philip V., whom he placed on the throne of Spain, to maintain the Inquisition as a means of ensuring the tranquillity of that kingdom.

Sixtus V., in 1588, having distributed the cardinals into fifteen congregations or boards, made that which was styled 'Holy Roman and Universal Inquisition' to consist of twelve cardinals with several prelates as assessors, including the Master of the sacred palace, several monks with the title of 'consultors,' besides other clergymen and lawyers called 'qualificators,' whose business it was to prepare the cases. This is the Inquisition which still subsists at Rome, but its jurisdiction does not extend beyond the limits of the Papal State, and it is generally understood that its powers are exercised with considerable leniency and caution. Pius VII., after his restoration, is said to have abolished the use of the torture.

The Roman Inquisition watches more particularly over the conduct of the clergy, and has also the censorship of the press and of the introduction of foreign works. Provincial inquisitors reside at Bologna, Ferrara, and other towns of the Papal State, which is now the only country in which the tribunal of the Holy Office still remains.

In Germany and in Poland, the Inquisition has long since ceased to exist. In Spain it was suppressed, first by a decree of Napoleon, dated Chamartin, 4 December, 1808, as encroaching upon the rights of the sovereign, 'attentoire à la souverainete.' This decree however was only enforced in those parts of the monarchy which were occupied by the French.

On the 12th February, 1813, the extraordinary Cortes of Spain assembled at Cadiz definitively suppressed the Inquisition, as being incompatible with the new political constitution of the monarchy. At the same time they restored to the bishops the exercise of the ecclesiastical jurisdiction in cases of heresy. An interesting abstract of the long debate which took place upon this important question is given by Agustin de Arguelles, in chapters x. and xi. of his 'Examen Historico de la Reforma Constitucional,' 8vo., London, 1835.

Ferdinand VII., after his restoration, re-established the Inquisition by an ordinance of the 21st July, 1814, and appointed the bishop of Almeria inquisitor-general. In this act Ferdinand stated to the people that one of his objects in re-establishing the Inquisition was 'to repress the mischief occasioned to the national faith by the presence of the foreign troops which were not Catholic,' including of course his allies the English, who had been the chief means of restoring him to the throne. The new inquisitor-general published an edict, on the 5th of May, 1815, in which, after deploring the progress of infidelity and the corruption of morals, he proposes to employ against these evils not the fiery zeal of those apostles who would have called down the fire of heaven upon Samaria, but the milder spirit of their Divine Master, and he exhorts all offenders against the laws of the Holy Office to come and acknowledge their errors before the end of the year, in order to receive private absolution without any public penance.

The Inquisition continued in Spain till the Revolution of 1820, when it was again suppressed by the Cortes. During these five years of its re-establishment, many persons were arrested, but none appear to have been put to death in consequence of its judgments. When Ferdinand, in 1823, a second time overthrew the constitution, he did not re-establish the Inquisition. In Portugal, the Inquisition, which was likewise abolished by the Cortes, has not been restored.

Various and often exaggerated accounts have been published of the number of persons put to death by the Spanish Inquisition during the three centuries of its existence. Llorente, who wrote with calmness and had access to the archives of the tribunal, gives an approximate estimate of the number executed under each inquisitor-general, from which it results that the total amount in Spain is about 32,000 persons burnt, either alive or after being strangled, 17,000 burnt in effigy, and 291,000 condemned to various terms of imprisonment, to the galleys, or subjected to other penalties. During the eighteen years of Torquemada's inquisitorship alone, about 8800 persons were burnt. This calculation does not include the Spanish colonies, nor the islands of Sicily and Sardinia, which were long subject to the Spanish Inquisition. It is impossible to ascertain the amount of the victims of the Inquisition in these as well as in other countries of Europe. The last person burnt by the sentence of the Inquisition in Spain was a woman accused of having formed a contract with the devil. She was burnt at Seville, on the 7th November, 1781. The three last inquisitors-general, from 1783 to 1808, did not sentence any one to death.

In examining the history of the Inquisition under its various forms, two things ought to be carefully distinguished; the principle and the practice of that remarkable institution. The fundamental principle of the Inquisition is, that heresy, that is to say, dissent from the tenets of the Roman church, is a heinous crime, and liable to both spiritual and temporal punishment. This principle however is not peculiar to the Inquisition: it is that of the canon law, and it has the countenance of the Roman law in several constitutions of the early Christian emperors. In every country therefore in which the canon law has civil or temporal force, the principle subsists, although it may lie dormant. A subject of such a country who should openly dissent from the established Church is liable to prosecution by the episcopal or the secular courts. This is still the case in several states of Italy, and even in Spain and Portugal under their new constitutional governments, at least until a new code shall be enacted. It must not be forgotten that the Inquisition was established in Spain while the Cortes of Aragon and Castile were still in full vigour. It is not long since the minister of justice stated in the Spanish Cortes that laws were still in force by which persons, dying in a state of heresy, cannot bequeath their property. It is not therefore sufficient for the Inquisition to be abolished in a country, in order to ensure liberty of conscience; it is not even sufficient for this purpose to establish a representative or republican government, as long as the canon law remains in force and the majority of the people do not tolerate dissent. In the small democracies of the forest cantons of Switzerland, which are exclusively Roman Catholic, no dissent from the church is allowed, and persons accused of heresy are severely punished or obliged to emigrate.

In speaking of religious liberty, people are apt to confound three things very distinct, such as toleration, liberty of conscience or of opinion, and full religious liberty. Toleration properly applies to foreigners who profess a different faith from that established in the country which they come to visit or inhabit for a time, and who are tolerated, that is to say, allowed to remain unmolested, and in some cases are permitted to have chapels of their own communion. This is now the case in almost every European country, at least with regard to particular Christian communions and to the Jews. The Lutherans and Calvinists have chapels in almost every Catholic state, and even at Rome and Naples. But this toleration is not a legal right; it is only granted during pleasure to certain nations and sects, and it applies only to foreigners and by no means to natives. Even during the rule of the Inquisition in Spain, English, Dutch, and other Protestant merchants were allowed to reside in the seaport towns, but only so long as they gave no scandal or offence to the Catholic faith, and their position was therefore extremely delicate and insecure.

Liberty of conscience applies to natives as well as foreigners, and in the country where it is recognised, no one can be molested for his religious opinions or private religious practice. But the law regulates whether and under what conditions chapels or places of religious worship may be opened which dissent from the established church of the country. Much is left to the discretionary power of the executive. Thus in France, wherever there are in a town a certain number of Lutherans or Calvinists, they are allowed to have a place of religious worship, subject to certain regulations of the local authorities. In the Austrian states by the edict of the emperor Joseph of 1784, wherever there are 100 families of Protestants in one place, they may ask of the authorities permission to open a place of worship. Liberty of conscience is only found in countries where a considerable part of the population dissent from the established church; it does not exist in the Italian states or in other countries exclusively Roman Catholic. All the Protestant states of Europe allow liberty of conscience.

Full religious liberty is said to exist when not only every man may hold what opinions he pleases, but when every Christian sect may openly profess its faith and perform publicly its rites; and this not by especial permission, but as a matter of legal right. This is the case at present only in England and its colonies, and in the United States of North America. But even those countries cannot be said to have unlimited religious liberty, for this would mean that any one might set up any form of worship that he pleased. Now it cannot be believed that Fetish or other pagan rites would be publicly allowed in England or America. Therefore the religious liberty of England and America can only be said to extend to the various Christian and Jewish communions. And indeed it is questionable whether religious liberty in its full unlimited extent could exist in any orderly community of which the majority believe in any religion whatever; for what would be called liberty by some, would appear offence and scandal to the rest. Besides which the danger of proselytism must necessarily complicate the question still more. Mohammedans tolerate Christians and Jews, but will not allow any one to apostatise from the Koran. In the great French revolution, even those who professed to disbelieve all revealed religion, and who advocated full religious freedom, when they came to have the power in their hands, would not allow the people to worship God according to the old custom, but shut up the churches, persecuted the priests, and denounced religious meetings as treasonable. They would allow no dissent from incredulity. So much are men of all ways of thinking disposed to intolerance towards those who differ from them, not only in religious matters, but also in matters political, social, and even literary or scientific.

In the case however of countries in which penal statutes exist against heretics, it is still an important question how and when and by whom those statutes are to be enforced. We have seen how the Inquisition did enforce them, and the general opinion of Europe, not merely of Protestant but of Roman Catholic Europe, has reprobated and rejected its practice. The secular power has now taken into its own hands criminal jurisdiction in all its branches in every European state, with the single exception already mentioned of the Papal State, where, the government being in the hands of ecclesiastics, the jurisdiction of the canon law is kept distinct from that of the civil law, and has its own courts, of which that of the Inquisition is the principal. The secular power, at present, even in countries exclusively Roman Catholic, does not encourage spies and informers to pry into men's religious sentiments; it does not, like the Inquisition, consider men guilty merely because they silently dissent from the rites of the established church; it observes the essential distinction between opinions and acts, and leaving the former to man's conscience, it takes cognizance of the latter only. In so doing it goes back to the principle of the Theodosian and Justinian codes, whose constitutions against heretics were directed against those who made an open practice of their heterodox opinions, who assembled meetings, preached or spread their doctrines by writing, attempted to make proselytes, and thus disturbed the unity of the church and the tranquillity of the state. They were punished, not so much as heretics, but as rebels against the law, and their open acts were evidence against them. It was only in the thirteenth century that the Inquisition set about discovering private and silent heretics, and having once established the principle that it was necessary to ferret out, as it were, all individuals who dissented in their minds from the orthodox church, all kind of means were thought lawful for that purpose. Hence a system of secret and even anonymous denunciations was encouraged, domestic privacy was invaded, acts innocent in themselves were construed into guilt, and ample opportunities were given to private malice and revenge, as the informers were safe from the risk of discovery. The bad character of an informer or his relative position towards the accused was no objection to his denuncation being received, whilst, by a striking contrast, the Inquisition would closely scrutinise the character of the witnesses whom the accused called in his defence. Confessors were bound to exact of their penitents, under pain of non-absolution, that they should go and denounce to the Holy Office any person of whom they knew or had heard any thing which appeared contrary to the Roman Catholic faith. The witnesses summoned by the Inquisition for the prosecution were not informed of the subject on which they were called upon to give evidence, but they were asked at first whether they had seen or heard anything of any one which appeared obnoxious to the faith and to the rights of the Holy Office. At the preliminary examination of the prisoner, he was not made acquainted with the charges against him, but was told generally that there were good grounds of accusation against him, which he was left to guess, and that if he confessed all, he should be treated with mercy. Afterwards even the act of accusation of the fiscal attorney was not communicated to him in writing, but the particular charges were read to him in the hall of audience, and he was interrogated on each head, whether it was the truth. When the accused was called upon for his defence, he was obliged to choose for his counsel one among the list of the Inquisition lawyers, who was not permitted to communicate with him in private, and who did not know the whole of the proceedings nor the names of the witnesses. The limits of this article do not allow us to proceed further in exhibiting the other peculiarities of this strange system of proceedings, but the reader will find a full account of them in Llorente's chap. ix., on the proceedings of the Spanish Inquisition, and in Limborch's b. iv., on the mode of proceeding of the Inquisition in general. It was the horror of this terrific code which made nations revolt against this tribunal, which excited the war in the Netherlands that lasted nearly half a century and ended in the separation of one half of the country from the crown of Spain, which caused rebellions in Aragon, Sicily, Sardinia, and Naples, and embittered the religious feuds and wars of the sixteenth and seventeenth centuries. And yet with all the ingenuity displayed for the discovery and conviction of heretics, it is averred that a great number of individuals put to death by the Inquisition were orthodox Catholics. Among other proofs of this are the letters of Pietro Martire d'Angleria, councillor of the Indies, quoted by Llorente, ch. x., the trials of Carranza and many other bishops, and even of persons who have been since canonized by the Roman church, such as St. Francis de Borja, St. Ignatius Loyola, St Thérésa, St. Juan de la Cruz, &c. Even popes have not escaped the attacks of the Inquisition. Sixtus V. having published an Italian translation of the Bible, the Spanish Inquisition placed it upon its index of forbidden books. The same Inquisition condemned the works of Cardinal Noris, a friend of Benedict XIV., who wrote in a strong manner to the inquisitor-general on the subject. These and other disputes of the Spanish Inquisition with Pius V., Clement VIII., and other popes, amply prove the little deference which it paid to the papal authority whenever it came in opposition to its own assumed supremacy.

It is an error to suppose that intolerance is peculiar to the Roman Catholic church; all churches and religions, Jews, Mohammedans, and heathens, Arians and orthodox, Greeks and Latins, Protestants and Catholics—all have persecuted in turn; but no other church or sect ever invented or enforced for centuries a permanent system of persecution that can be in any respect compared with that of the Inquisition.

OFFSETS are lines drawn perpendicular to the chord of an arc, or the longest base of an irregular polygon, from points in the arc, or corners of the polygon. By means of these offsets the area contained between the chord and arc can be found with sufficient nearness. We mention this well-known term of surveying to direct attention to the article Quadratures, Method of, which contains the set of successive approximations of which the surveyor's process is the first and rudest step.

OGLETHORPE, GENERAL. [Georgia.]

O'GYGES, or OGYGUS (Ὤγυγης, Ὤγυγος), is said to have been the first king of Athens and of Thebes. (Tzetz, *Lycoph.*, 1206.) Thus Pausanias tells us that the Ectenes, who were the most antient inhabitants of Bœotia, were the subjects of Ogyges, and that Thebes itself was called Ogygian, an epithet which is also applied to it by Æschylus. (Paus., ix. 5, § 1; Æsch., *Pers.*, 37.) That Ogyges was closely connected with Thebes as well as Attica appears from the tradition, according to which he was said to be the son of Bœotus. (Schol. on Apollon., iii. 1178.) It may also be mentioned that the oldest gate in Thebes was called Ogygian. (Paus., ix. 8, 3.)

The name of Ogyges is connected with the antient deluge which preceded that of Deucalion, and he is said to have been the only person saved when the whole of Greece was covered with water. We possess scarcely any particulars respecting him; and the accounts which have come down to us are too vague and unsatisfactory to allows us to form any satisfactory opinion on the subject. He clearly belongs to mythology rather than to history. The earlier Greek writers, Herodotus, Thucydides, Xenophon, &c., make no mention of his name; but the accounts preserved by Pausanias and other writers appear to indicate the great antiquity of the traditions respecting him. Various etymologies have been proposed of his name. Mr. Kenrick supposes that the word was derived from the root *γυγη*, signifying darkness or night, and quotes a passage of Hesychius in support of his view, which appears however to be corrupt. The more favourite theory of modern scholars connects the name with Oceanus; which etymology is supposed to be supported by the tradition which places Ogyges in the time of the deluge. In support of this view it is remarked that Ogyges is only a reduplication of the radical syllable *Og* or *Oc*, which we find in Oceanus, and in Ogen (which is explained by Hesychius as equivalent to Oceanus, 'Ωγήν, 'Ωκεανός); and that a similar reduplication takes place in *ἔτυμος, ἐτήτυμος· ὅπτομας, ὀπιπτεύω, ἄταλος, ἀτιτάλλω*. But these are mere guesses. The name of Ogygia is supposed to be applied to the island of Calypso because it lay in the ocean. But whatever may be the etymology of the name, the adjective derived from it is frequently employed by the Greek writers to indicate any thing antient or unknown. We learn from the Scholiast on Hesiod, that according to one tradition Ogyges was the king of the gods; and it is not improbable that the name originally indicated nothing more than the high antiquity of the times to which it referred.

(*Philological Museum*, No. 5, 'On the early Kings of Attica,' by Mr. Kenrick; No. 6, 'Ogyges,' by Mr. Thirlwall.)

OHIO, River. [MISSISSIPPI, River.]

OHIO, one of the states of the North American Union, lies between 38° 30′ and 42° N. lat. and 80° 30′ and 84° 50′ W. long. It extends from east to west 220 miles in length, and its breadth from north to south varies between 93 and 200 miles; its average breadth may be 182 miles. On the west it is divided from the state of Indiana by a meridian line running south to the Ohio river, and measuring 170 miles. On the north lies the state of Michigan, from which it is separated by a straight line 80 miles long. Lake Erie, which borders it on the north and north-east, forms a coast-line of more than 150 miles. A meridian line running from the Ohio to Lake Erie, and dividing Ohio from Pennsylvania, is 93 miles long. The southern and south-eastern boundary is formed by the river Ohio, whose tortuous course along this line is stated to be 500 miles. Ohio comprehends nearly 40,000 square miles, or not much less than the kingdom of Portugal.

Surface and Soil.—The surface of this state may be divided into the Hilly and Prairie Region. The Hilly Region comprehends the eastern and southern districts, and may be considered as separated from the Prairie Region by a line commencing at the most north-eastern point of the state on Lake Erie, and running in a south-south-western direction to Zanesville on the river Muskingum; from this place it extends due west, and terminates on the boundary-line of Indiana near Eaton. Each region occupies about half the area of the state.

The *Hilly Region* contains some level and low land along the Ohio, but the level land does not extend more than one mile and a half from the bank of the river. It is very fertile, though in some parts swampy and subject to inundations. Behind this level tract the country rises suddenly into steep hills, called River Mountains, which vary in height, but in general range between 300 and 500 feet above the level of the river. From the summit of these hills the country extends in an uneven hilly plain furrowed by valleys; the hills are comparatively small, though very steep. Their summits form level plains of moderate extent. Rocks rarely appear on the surface, at least not to any great extent, though secondary limestone and sandstone prevail at a moderate depth below the surface. There are no precipices except along the numerous watercourses. The general elevation of these uplands varies from 800 to 1000 feet above the sea-level. The inequalities of the surface do not render it unfit for cultivation. The bottoms along the principal rivers, which are frequently extensive, are exceedingly fertile, and produce very rich crops of grain. The declivities of the hills, when not too steep for cultivation, and the higher grounds between them, are less fertile, but by no means barren. The soil of both the bottoms and hills is almost uniformly an argillaceous loam: the soil of the valleys is very deep, and contains much lime and vegetable mould; the soil of the uplands is not so deep, though more so than is usually found in hilly regions. As the soil is light and unencumbered with stones, it is cultivated with ease. In its natural state the whole region is covered with trees. The uplands contain different kinds of oak, hickory, walnut, ash, poplar, dogwood, mulberry, sassafras, and some yellow pine. The levels along the Ohio and the other rivers are overgrown with button-wood, white pine, hemlock, butternut, the tulip-tree, locust, honey-locust, black alder, beech, elm, cedar, and cypress. The maple-tree is common all over the state.

The *Prairie Region* is an extensive and tolerably level plain. It contains no hills of any considerable magnitude, except numerous swells, some of which are extensive. Other parts contain large tracts of flat country, where scarcely an undulation of the surface can be discovered. The general elevation of this region hardly exceeds 1000 feet. This plain contains the watershed between the rivers which run southward to the Ohio and northward to Lake Erie. Near the north-eastern extremity of the state the watershed approaches the shore of Lake Erie within less than ten miles, but as it proceeds westward it retires about 20 or 25 miles from the lake, and continues at that distance, and nearly parallel to the southern shore of the lake, to 83° W. long., where it turns to the south of west and divides the upper branches of the Maumee and Miami rivers. No hills are visible along this line, and in many places the country is swampy. According to an exact survey, made for the purpose of constructing canals, the source of the Big Beaver River is 907 feet, that of the Muskingum 902, that of the Scioto 919, and that of the Miami 964 feet above the sea-level. These numbers show how small a difference in elevation exists along a line exceeding 200 miles in length. It is also remarkable that the elevation increases as we advance west from the Muskingum to the Miami river. But west of the last-mentioned river, where the watershed begins to run in a north-western direction, it declines again towards Lake Michigan. In the vicinity of this lake, the elevation of the watershed is only 700 feet, or about 130 feet above the surface of the lake. The tract in which these rivers originate is less elevated than the country which is south of it and extends to the banks of the Ohio river. The surface of this plain presents an alternate succession of woodlands and prairies. In the eastern districts the woodlands prevail. Near 83° W. long., or in the middle of the state, the surface is nearly equally divided between woodlands and prairies; but farther west the woodlands decrease in extent. The prairies are both wet and dry, but are all fit for cultivation. Along the south-western shores of Lake Erie there is an extensive tract covered with a deep swamp, called Black Swamp. A great part of the marshy and wet country is heavily wooded, especially with beech. The valleys by which this table-land is intersected, and in which the rivers flow, are less depressed below the surface of the plain than farther south, but they are broader and more regularly defined, being separated from the adjacent uplands by parallel ranges of bluffs, or mural banks. They are generally very fertile. Besides beech, which is most common on the swampy tracts, the forests of this region contain oak, ash, elm, hickory, sugar-maple, wild cherry, black walnut, poplar, and in some places cotton-wood and sycamore, most of which, especially the sycamore, attain a gigantic size.

Rivers.—The Ohio river runs along the eastern and southern boundary-line of Ohio. [MISSISSIPPI.] The other rivers which drain this country, though comparatively small, have recently acquired great importance, as affording the means of establishing a very extensive water communication in the interior of the state and between the countries bordering on Lake Erie and on both sides of the Ohio river. The most important of the rivers which fall into Lake Erie are the Maumee, the Sandusky, and the Cayahoga. The Maumee is formed by two branches, the St. Mary's and the

St. Joseph's rivers, of which the former rises in Ohio, and runs north-west, and the latter originates in the state of Michigan, and flows south-west. St. Mary's River is navigable from St. Mary's Fort downward during half the year for large boats carrying from 100 to 200 barrels of flour; during the rest of the year, in the dry season, there is scarcely water enough to float a canoe, and the course is much impeded by drift-wood. St. Joseph's River is stated to be navigable for 50 miles for boats. Both rivers unite after a course of about 70 or 80 miles at Fort Wayne, at a very acute angle, and then run east by north to Lake Erie, under the name of the Maumee. The Maumee runs about 160 miles, and during the spring has a free navigation for boats carrying 300 barrels of flour along the whole of its course. In the dry season the navigation is impeded by sand-bars. It empties itself into the western corner of Lake Erie by a wide mouth called Maumee Bay. The Sandusky river originates near 83° W. long. and 40° 45′ N. lat., in two branches, which flow westward, and after their union turn northward. Towards its mouth it declines to the north-east, and falls into Sandusky Bay, a shallow sheet of water united to Lake Erie by a narrow strait. This river runs more than 100 miles, and is navigable for small boats during the early part of the year. The Cayahoga is the most important of the rivers which fall into Lake Erie, though its course does not exceed 80 miles. It rises west of 81° W. long., and in 41° 35′ N. lat., about 10 miles from the shores of Lake Erie. It flows first in a western and south-western direction to 41° 8′ N. lat., where it takes a north-north-western course to Lake Erie. In its natural state it was not navigable, but the waters are used to feed the Erie and Ohio canal.

The most important rivers which fall into the Ohio are the Big Beaver, Muskingum, Scioto, and Miami rivers. The Big Beaver rises east of the upper course of the Cayahoga river, and runs in an eastern and south-eastern direction for more than two-thirds of its course. In these parts it is not navigable on account of its great rapidity. After entering Pennsylvania, it receives from the north, near Newcastle, the Shenango river, and from this place downwards, a distance of 24 miles, is navigable for river barges. The Muskingum rises near 41° N. lat., south of the southern bend of the Cayahoga river, in two branches, of which the eastern is called Tuskawara and the western Chippewa Creek. By their union they form the Muskingum, which flows about 70 miles south, then nearly the same distance west, and lastly about 70 miles south-south-east. This river has much water, and is navigable for boats all the year for about 140 miles upward; when the waters are high, small vessels may ascend the Tuskawara Creek nearly to its source. Its waters are increased by many considerable affluents: at its mouth it is 541 feet above the sea-level. The Scioto river rises near 40° 30′ N. lat., and flowing southward nearly through the middle of the state, falls into the Ohio after a course of about 250 miles. At its mouth it is 464 feet above the sea-level. It is navigable for large boats nearly 200 miles upward. The Miami originates not far from the source of the Scioto river, and runs in a general southern direction about 165 miles. It becomes navigable a few miles above Piqua for keel-boats, during half the year. At Piqua there is a considerable rapid, and a canal is cut to avoid it in ascending the river. In the dry season it ceases to be navigable at Dayton, about 80 miles from its mouth. The navigation is always rendered difficult by numerous sand-bars. At its mouth it is about 400 feet above the sea-level.

Canals.—The moderate elevation of the country between Lake Erie and the Ohio river, and its gentle slope towards both basins, suggested the idea of uniting them by a canal. It was found that the Ohio at the mouth of the Muskingum river was only 24 feet lower than the surface of Lake Erie, and the highest part of the intervening country, near the source of the Muskingum river, was only 337 feet above Lake Erie. A canal was accordingly made, which united the Muskingum and Scioto rivers. This canal, which was begun in 1825 and finished in 1832, and is called the Erie and Ohio Canal, is 324 miles in length, has 44 locks, and begins at Cleveland, where the Cayahoga falls into Lake Erie. It runs southwards along the Cayahoga river to its most southern bend, where it passes to the Tuskawara Creek over the highest level. It then follows the course of the Muskingum first south and then westward. Where this river bends again to the south, the canal continues westward and reaches the Scioto river, about 10 miles south of Columbus from this point it runs along the course of the last-mentioned river to its mouth near Portsmouth. It passes the towns or villages of Newark, Coshocton, Circleville, Chillicothe, and Piketon. There are several short branches from the main canal, one of which runs to Columbus, the capital, and is eleven miles long. Another canal has been made to remedy the difficult navigation of the Miami. It is 65 miles long, beginning at Dayton on the Miami, and extending along the course of the Miami to Hamilton, whence it runs southward to Cincinnati on the Ohio. A canal was begun some years ago which is to unite the Wabash river of Indiana with the Maumee. It is to be 211 miles long, of which 136 are in Indiana and 75 in Ohio. We do not know how far this work has advanced.

Climate.—In comparing the climate of Ohio with that of England, it appears that the climate of Ohio is colder in winter and warmer in summer. The mean annual temperature at Cincinnati on the Ohio, which is sheltered on the north by high hills, was found, after many years of careful observations, to be 53·56°, or about 3·86° higher than that of London. The mean temperature of the winter at Cincinnati is 36°, at London 39·3°; that of the spring at Cincinnati 63°, and at London 54·1°; that of the summer at Cincinnati 72°, and at London 61·2°; that of the autumn at Cincinnati 43°, and at London 44°. This shows, that the winters are somewhat colder in Cincinnati than in London. The cold is considered very great if the ground which is exposed to the sun's rays remains frozen during a month, though the mean temperature of January is more than two degrees below the freezing-point. The frost does not penetrate to the depth of more than five or six inches. Night-frosts occur in the beginning of May. Vegetation does not begin before the first week of March. In May and in June the heat increases rapidly, and the difference of the mean temperature of the spring in London and Cincinnati amounts to 9°. For about fourteen days in summer the thermometer rises to 90° and sometimes even to 98°. The autumn is colder than in London, and the first night-frosts occur at the end of September or beginning of October. The greatest decrease of heat takes place in October. Most of the rivers, including the Ohio, are covered with ice every winter. On the 14th of February, 1817, this river near Marietta was frozen to the depth of 19 inches. In 1797 the mercury sunk to 14°. The quantity of snow is small. In the valley of the Ohio it seldom exceeds four inches, but in the northern districts the quantity is much greater. The south-west wind prevails for nine months in the year, from March to November included. In December, January, and February the wind generally blows from the north-west. The greatest quantity of rain falls in April and May; the mean annual quantity is stated to be 36 inches.

Productions.—The wealth of Ohio consist in its agricultural productions: Indian corn, wheat, rye, oats, barley, and tobacco are extensively cultivated. Cotton arrives at maturity only in the districts along the Ohio river; and is liable to be injured by frost. Indigo was formerly cultivated to some extent, but the cultivation has been nearly abandoned. Most of the fruit-trees of England succeed well, and especially peaches. The wild grape grows luxuriantly on the southern side of the hills; and several vineyards have been planted, from which pretty good wine is obtained. The cultivation of the grasses is not neglected. Horned cattle and pigs are very abundant, and are driven in great numbers to the Atlantic states for sale, or sent down the Mississippi. Salt pork also constitutes an important article of exportation.

Bears and deer are still numerous in the forests, and the flesh of both is dried and cured for sale. The woods abound with wild turkeys, geese, ducks, pheasants, and partridges. The rivers, especially the Ohio, are well stocked with fish, and some of them attain a great size. Turtles are also found in them, and one kind is considered a great delicacy.

Iron-ore abounds, and is worked in a few places not far from the Ohio river. Bituminous coal exists in extensive strata along the Ohio and some of its confluents, but it is not yet extensively worked. Salt is obtained from springs on the Scioto river, and saltpetre and alum are found in several places.

Inhabitants.—The Indians, who in 1816 amounted to more than 3000 individuals, have lately abandoned the country, and settled chiefly to the west of the Mississipp river. The Wyandots still remain in Crawford county on the upper course of the Sandusky river, between Columbus and Lake Erie. This tribe consists of less than 500 individuals; they cultivate some grain and keep cattle. The population, exclusive of the Indians, amounted, according to the census of 1830, to 937,903 individuals, of whom little more than 9000 were free coloured people, and the others were whites or descendants of Europeans. The great mass of the people is from the New England states. As no state in the Union has lately increased more rapidly in population, it is probable that by the census to be taken in this year (1840) it will not fall much short of 1,500,000 individuals. The population is not equally distributed over the surface of the country. The valley of the Ohio is not so populous as might be expected. Large tracts of it are but thinly settled, especially that which extends from the mouth of the Muskingum to that of the Scioto. The best settled districts are those of the hilly region which extends along the large rivers. The eastern districts of the prairie region, where the wooded tracts exceed the woodless plains, are nearly as populous. But nearly one-fourth of the state, or its north-western portion, is still thinly settled.

Political Division and Towns.—Ohio is divided into 75 counties. Columbus, the seat of government, is on the left bank of the Scioto river, very near the centre of the state; the population in 1835 was 4000; in 1812 the site of the town was covered with trees. It has little trade at present, and cannot rise to importance until the north-western portion of the state is better settled. The largest town is Cincinnati on the Ohio [CINCINNATI]; its population has not increased so rapidly since the opening of the Erie and Ohio Canal, because the produce of the eastern and better cultivated portion of the state goes now to Cleaveland, and thence to New York or Montreal. Cleaveland on Lake Erie, where the Erie and Ohio Canal begins, may be considered as the principal port of the state. The population in 1830 was 1076; in the beginning of 1835, one year and a half after the opening of the canal, it had increased to 4200 inhabitants, and it is now about 10,000. Steubenville, on the Ohio, contained about 3000 inhabitants in 1830, and has several manufacturing establishments. Zanesville, on the river Muskingum, a thriving place, had 3500 inhabitants in 1830, with some glass and vitriol manufactures and numerous flour-mills. Marietta, at the confluence of the Muskingum with the Ohio, is the oldest settlement of the state, being founded in 1788; it contained in 1830 about 1200 inhabitants. Portsmouth, at the mouth of the Scioto, and the termination of the Erie and Ohio Canal, is a thriving and populous place. Chillicothe, a well built town, in a very fertile tract on the river Scioto, has about 3000 inhabitants; Dayton, on the Miami, and at the beginning of the Miami Canal, has also about 3000 inhabitants. On the shores of Lake Erie is the small town of Huron, at the mouth of the river of the same name, which since 1833 has carried on some trade.

Manufactures.—Though this branch of industry cannot be expected to have made much progress in a country so lately settled, yet there are several manufactures of iron, wool, and cotton, although generally on a small scale. At Cincinnati and Cleaveland many vessels are annually built, especially steam-boats. The manufacture of salt is of importance. In 1830, 446,350 bushels were made, chiefly at and near Lancaster, south-east of Columbus.

Commerce.—Until the opening of the Erie and Ohio Canal, nearly all the commerce of Ohio was concentrated in the town of Cincinnati, which was the only place from which the produce of the state was exported, and by which foreign goods entered it. But since 1830 a large portion of the articles designed for the foreign market go to Cleaveland, and the supply of foreign goods comes through the same place. Its commerce has increased at an astonishing rate. In 1825 the number of vessels which entered the port was only 75, with a tonnage of 7310, and the value of the exports and imports was respectively 50,166 dollars and 132,645 dollars. In 1833 the total number of vessels, including steam-boats, was 1505, with 232,500 tons; the value of goods exported exceeded 2,000,000 dollars, and of goods imported 4,700,000 dollars. The distance of Cleaveland from the city of New York by the line of the canals, Lake Erie, and the Hudson river, does not much exceed 650 miles, and from Montreal in Lower Canada it is even less, whilst the distance of Cincinnati from New Orleans by land is 860 miles, and by water considerably exceeds 1000 miles. Besides this, the navigation on the Ohio and Mississippi is much more precarious and dangerous [MISSISSIPPI] than that on the canals, the Lake Erie, and the Hudson river, or on the St. Lawrence to Montreal. It is therefore probable that in a short time the greatest part of the produce of Ohio will find its way to Cleaveland and thence to New York or Montreal, and from these places the state will be supplied with foreign goods. Cincinnati however will always be the commercial depôt of the produce of the rich valley of the Miami river, and will continue a considerable place of trade. In 1833 its exports were valued at 5,000,000 dollars, of which pork amounted to 1,350,000. Some commerce is carried on with Baltimore, by way of Wheeling in Virginia, and with Philadelphia by way of Pittsburg, but it is not of great importance, on account of the heavy expense of the transport. The exports consist of live-stock, pork, bacon, beef, tallow, butter, whiskey, peach-brandy, ashes, soap, candles, some timber, and furs. The imports are manufactured goods from the United States and England, the produce of the West Indies, cotton, rice, and some articles of smaller importance.

Antiquities.—The remains of antient fortifications, which are found in many places west of the Appalachian Mountains, are most numerous and extensive in the state of Ohio. They generally consist of circular embankments, walls, and mounds many feet high: they occur principally in the western districts of the state. West of Chillicothe is a wall of stone from 12 to 15 feet high and 4 or 5 feet thick, which encloses upwards of 100 acres. The ruins of this kind near Piqua are of still greater extent, and others occur near Cincinnati, Hamilton on the Miami, and other places. They are overgrown with trees as large as those of the surrounding forests, and hence it is supposed that they must have been erected at a very remote period. The Indians who, until lately, were in possession of the countries in which they are situated, have no tradition respecting these fortifications, and hence it is conjectured that they were erected by a nation which has disappeared from the face of the earth.

Education has been much encouraged in Ohio. There are five colleges, the Ohio University at Athens [ATHENS], the Miami University, the Western Reserve College, Kenyon College, and Franklin College. There are a medical and a law school at Cincinnati. The New England system of common schools has been established. The chief religious sects are Presbyterians, Methodists, and Baptists.

History and Constitution.—This country was first visited by the French from Canada in the seventeenth century, by the route of the lakes Ontario and Erie, but no settlements were formed, until the British from Pennsylvania and Virginia began to occupy the country. The French tried to prevent this by establishing small forts from Presqu'ile on Lake Erie to the Ohio along the channel of the Alleghany river. This however was considered by the British government as an encroachment, and it led to the war of 1755, by which the French lost Canada and were expelled from North America. Some settlements which were attempted after that time were destroyed by the Indian tribes then in possession of the country. Ohio was comprehended in the cession made by Virginia in the year 1787, after which the country, including the states of Michigan, Indiana, and Illinois, was formed into a territory. The first permanent settlement was formed at Marietta about 1788, but its progress, as well as that of some others farther west, was slow, until the Indians, in 1795, ceded a great portion of the state to the general government by the treaty of Greville. The population now increased so rapidly, that in 1802 it attained the amount required for being constituted into a state. On the 29th November the present constitution was adopted, and in 1803 Ohio was admitted into the Union. The legislative body consists of a Senate and a House of Representatives, both elected by the white inhabitants who are twenty-one years of age and have resided in the state twelve months next preceding the election. The number of the House of Representatives is at present 72, and that of the senators 36: they are chosen annually. The number of the senators cannot be less than one-third nor more than one-half of that of the representatives. They are chosen biennially, and one-half of their seats are vacated every year. The supreme executive power is vested in a governor chosen for the term of two years by the same persons who elect the legislative body. Ohio sends two members to the Senate and 14 members to the House of Representatives at Washington.

(Darby's *View of the United States*; Pitkin's *Statistical View of the Commerce of the United States*; *American Almanac for* 1839.)

ÖHLMULLER, DANIEL JOSEPH, a German architect, who held the office of *Civilbau-inspector* at Munich, was born at Bamberg in 1791. After studying under Karl Fischer (died 1820), to whom many others were indebted for their professional education, he visited both Italy and Sicily, where he spent four years in examining the principal edifices, until he was summoned home in 1819, to superintend the erection of the Glyptotheca at Munich, after Klenze's designs. In 1831 he was commissioned to make designs in the Gothic style for a church in the Au suburb, and the first stone of the edifice was laid on the 28th November in that year. Taken altogether, this structure is one of the noblest and most successful works in that style which has been produced in modern times in Germany, and is remarkable for the splendour of its lofty windows, filled entirely with painted glass, one of which, whose subject is the Assumption of the Virgin, is represented in colours in Count Raczyneki's 'Art Moderne.' This building alone would suffice for Oehlmuller's fame; but it was not the only one in which he had an opportunity of displaying his talents during his brief professional career, for he erected in the same style both the national monument at Wittelsbach and the Otto chapel at Kiefersfelden, the latter of which was begun in 1834, and the other completed in 1835. The church of St. Theresia at Hallbergmoos, begun by him in October, 1833, is in the Italian style. On the death of Domenico Quaglio (1837), he was employed to complete the works at the castle of Hohenschwangau. He did not however long survive his predecessor in that building, for he died at Munich, April 22, 1839.

OIDE'MIA. [FULIGULINÆ, vol. xi., p. 7.]

OILS are substances obtained from very different sources and under various circumstances. First, animal fats [FAT], though more or less solid, are to be regarded, both on account of their general properties and chemical constitution, as varieties of oil; there are also animal oils more properly so called, as whale and spermaceti oil. Secondly, there are the oils of vegetable origin, as those of olives and linseed, obtained by pressure, and called fat, fixed, or expressed oils, and those procured by distillation, termed volatile, essential, or ætherial oils. Thirdly, there are various oils produced by heat from animal, mineral, and other bodies, such as Dippel's oil, and naphtha; and lastly, there are certain oils produced by chemical action, as oil of wine, &c.

As it is not possible here to describe every variety of each kind of oil, we shall select some of the more important and better known cases for illustration, and we shall commence with an account of some of the

Animal Oils.—One of the best known and most extensively used of these is common whale or train oil, obtained by melting the blubber of the animal. As met with in commerce, it is of a brownish colour, rather viscid, and has a disagreeable fishy smell and taste. Its specific gravity is about 0·927. When exposed to the temperature of 32°, it deposits stearin, and the oil separated from the stearin by filtration is soluble in 0·82 of pure alcohol when heated to about 168° Fahr. Like other oils, it does not combine with water; it does not redden litmus paper, and is therefore devoid of acid properties. Whale oil is very readily converted into soap, requiring for this purpose 0·6 of its weight of hydrate of potash and 5 parts of water. The resulting compound is known in commerce by the name of soft soap; it is of a brown colour, and perfectly soluble in water. When it has been decomposed by tartaric acid, the acid liquor yields on distillation traces of a volatile fatty acid, which has been called *phocenic acid.* Like other oils, it is very combustible, and it is largely employed for the purpose of giving light by burning in situations in which its use is not precluded by its disagreeable smell. Its composition does not appear to have been exactly ascertained; but it probably is not very different from that of the oil next to be mentioned, which is the

Spermaceti Oil, obtained from an oily matter lodged in a bony cavity of the head of the *Physeter macrocephalus*, or spermaceti whale. When this substance is subjected to pressure in bags, a quantity of pure limpid oil is expressed; and the residue, after being melted, strained, and boiled with a weak solution of potash, is well known by the name of *spermaceti.* This oil is more pure and has a much less disagreeable smell than common whale oil, and it burns much more brilliantly in lamps. According to Dr. Ure, spermaceti oil consists of—

Hydrogen	11·80
Carbon	78·00
Oxygen	10·20
	100·

The *Vegetable Expressed Oils* vary in their general properties: most of them are fluid at usual temperatures; such as olive oil and linseed oil; and these possess but a slight degree of colour; whereas cocoa-nut oil and palm oil are at common temperatures soft butyraceous solids, and the last mentioned is of a reddish yellow colour. The first vegetable expressed oil which we shall describe is one which is well known and most extensively employed, viz.

Olive Oil.—[OLEA EUROPÆA.]—The colour is yellowish, the odour and taste but slight. Its specific gravity is about 0·916, and consequently it floats on water, not being miscible with it. It congeals at about 36° Fahr., yielding small particles of stearin, which sink in the remaining fluid portion of oil; at 28° Fahr. it deposits 28 per cent. of stearin, the remainder being olein or elain. When heated to between 500° and 600° Fahr., it suffers decomposition; by exposure to the air it becomes rancid, especially when originally of inferior quality or adulterated with poppy oil. It dissolves in alcohol and æther, but in very small quantity. The more solid portion of vegetable oils is by some chemists called *margarin*, the term *stearin* being used only for the solid portion of animal oils.

This oil consists of olein and stearin or margarin, in the proportions of about 72 of the former and 28 of the latter According to Saussure these are composed of—

	Olein.	Stearin.
Carbon	76·034	82·170
Hydrogen	11·545	11·232
Oxygen	12·068	6·302
Azote	0·353	0·296
	100·	100·

The azote is so small in quantity, that if even actually present, it can scarcely be deemed more than accidental; and neglecting it, we shall find by calculation that taking the olein and stearin in the proportions stated, the ultimate analysis of olive oil will be nearly—

Carbon	78
Hydrogen	11·5
Oxygen	10·5
	100·

Linseed Oil is expressed from the seeds of the common flax, *Linum usitatissimum.* When no heat is employed in the pressing, it is more viscid and has a greenish-yellow colour; it is then called in commerce *cold drawn* linseed oil. Its mean specific gravity is about 0·930. Its smell and taste are stronger and more disagreeable than those of olive oil. Linseed yields about 22 per cent. of oil; at –4° Fahr. it becomes paler coloured, but does not deposit any stearin on congealing, but at 5° lower it becomes a solid yellow mass; it has however been stated that when exposed for several days to a cold of 4° Fahr. it becomes solid. Linseed oil is soluble in 5 parts of alcohol when boiling, and 40 parts when cold; by æther it is much more readily taken up, 1·6 part dissolving 1 of the oil. When this oil has been long kept in a bottle partly filled, it becomes thick, and much more soluble in alcohol.

According to Saussure, linseed oil is composed of—

Carbon	76·014
Hydrogen	11·351
Oxygen	12·635
	100·

When this oil is kept in a vessel imperfectly closed, in a cellar, a white fatty sediment and a brown powder are deposited. The former contains the stearin of the oil mixed with impurity insoluble in æther, which dissolves the stearin, and this crystallizes by the spontaneous evaporation of the æther. The stearin is soluble in 100 parts of cold alcohol, in 40 of boiling anhydrous alcohol, and 50 parts of cold and 20 of boiling æther; it is with great difficulty converted into soap. Linseed oil is largely employed in oil-painting and in varnish-making.

Almond Oil is another important fat oil, obtained, like the preceding, by pressure, and indifferently from sweet almonds or bitter. It is of a light yellowish colour, more fluid than olive or linseed oil; its odour and taste are very slight. Its specific gravity is about 0·917. When exposed to the air, it becomes colourless and rancid; it is soluble in 25 parts of cold and 6 of boiling alcohol, and æther dissolves it readily. According to Braconnot, when cooled to 15° it yields 24 parts of stearin, which melts at 43° Fahr., and 76 of olein, which does not solidify by exposure to the lowest temperatures; these statements have not however been confirmed by other chemists, and it has even been asserted that it contains no stearin whatever. This oil, according to Saussure, consists of—

Carbon . .	77·403
Hydrogen . .	11·481
Oxygen . .	10·828
Azote . .	·288
	100·

It is employed sometimes in soap-making, and also in medicine.

Castor Oil is the expressed oil of the seeds of the *Ricinus communis*, a biennial plant, cultivated both in the old and new continent. When expressed without the assistance of heat, it is transparent and nearly colourless, or has only a slight yellowish tint; that which is quite colourless appears to have been rendered so by artificial means, and is much diminished in efficacy. It is very considerably viscid, and becomes solid when exposed to about 0° Fahr. Its specific gravity is about 0·960. It has scarcely any taste or smell. When exposed to the air it becomes thicker and rancid. It differs from most other fixed oils in being entirely miscible with alcohol and æther in all proportions, and it is employed only in medicine as a cathartic. By the action of heat and re-agents it is converted into numerous new compounds, which have been described by Bussy and Lecanu, in the 13th vol. of the 'Journal de Pharmacie.'

The analysis of Saussure gives as its composition,—

Carbon . .	74·178
Hydrogen . .	11·034
Oxygen . .	14·788
	100·

Having now stated the properties and composition of some of the best known and most useful of the *fluid* fixed oils, we shall briefly describe two which are *solid* at the usual temperature.

Cocoa-Nut Oil.—This oil is obtained by pressure from the kernels of the cocoa-nut, the fruit of the *Cocos nucifera*. It is white, has a slight pleasant smell, and its taste is rather agreeable; its consistence is about the same, or perhaps not quite so hard, as that of suet, and yet it contains some olein mixed with the stearin or margarin. Its specific gravity is about 0·910; it melts at 122° Fahr., and of late years it has been employed in soap-making; the stearin or margarin is also used advantageously as a substitute for wax in the manufacture of candles. It is remarkable for the little change which it undergoes by keeping; years are required to render it rancid.

Palm Oil.—This oil is of the consistence of butter, and of an orange-yellow colour; its smell is agreeable. It melts at about 103° Fahr. It becomes rancid very readily, and at the same time loses its colour. It is sparingly soluble in anhydrous alcohol, to which it imparts a yellow colour, whilst the solution in æther is of a red colour. It is stated to be composed of

Stearin or Margarin .	31
Olein . . .	69
	100

We shall now mention the properties and composition of some of the *Volatile* or *Essential Oils:* these are fluid at the usual temperature, and with few exceptions are obtained by distillation. Essential oils are distinguished principally by the following properties from the expressed oils:—Usually they are more perfectly fluid, more combustible, have an aromatic or fragrant odour, and an acrid taste; they are volatile *per se* without decomposition, and may be distilled with water at 212°, although their boiling-point is much higher. They combine with alcohol and æther in all proportions, but combine with water only in sufficient quantity to impart their odour to it. These oils evaporate without leaving any stain on paper, and they do not saponify with the alkalis. In some instances, as those in which the volatile oils exist in great abundance, they are obtained by pressure, without the application of heat; this is the case with the oil of lemons, oranges, and bergamot; in general however they are procurable only by distillation, and this is effected by putting the herb or bark into a still with water, when the oil and water are volatilized and condensed together. Like the fixed oils, they appear to contain a harder and a softer principle; the former has been called *stearopten*, the latter *eleopten*.

The first volatile oil we shall notice is one which is extensively employed, the

Oil of Turpentine.—To obtain this oil, turpentine, a well known viscid substance, which exudes from various species of the genus *Pinus*, is put into a still with water; the oil rises in vapour, and is condensed with the water, while *rosin*, as it is usually termed, remains behind. This, it has been stated, consists of two resins, to which the names of pinic and silvic acid have been given by Unverdorben.

This oil when pure is limpid and colourless, and it possesses a peculiar, strong, and to most persons a disagreeable smell. Its specific gravity is about 0·865; the density of its vapour at 313°, compared with that of air, is 4·83 to 1. This oil is but slightly soluble in alcohol which contains water; 100 parts of alcohol, of 0·84 sp. gr., dissolve 13·5 parts at 72° Fahr. Like other essential oils, it is extremely inflammable, burns with much flame, and with the formation of water and carbonic acid, as is also the case with the fixed oils. Its boiling point is about 314°. It is composed of

Five equivalents of Carbon .	60	or	88·24
Four equivalents of Hydrogen .	4	or	11·76
	64		100·

It is largely employed in the arts as a solvent in varnish-making and in house-painting.

Oil of turpentine dissolves the fixed oils and several other bodies with great facility. Thus iodine, camphor, and resins are soluble in it to a considerable extent. It is stated that it is capable of dissolving 163 times its volume of hydrochloric acid gas, provided it be kept cool; the resulting compound is a crystallized substance bearing considerable resemblance to camphor, and has been called *artificial camphor*. Great difference of opinion prevails among chemists as to the precise nature of oil of turpentine and the mode in which its elements are combined.

Oil of Lemons, commonly called *Essence of Lemons*, is one of the few essential oils obtained by pressure and not by distillation. It is extracted from the rind of the lemon and is imported from the south of Europe. Its properties are, that it is limpid, and has a light yellow colour; it has an agreeable odour resembling that of lemons, and, like other essential oils, its taste is acrid. Its specific gravity is about 0·847: it remains fluid even when cooled down to 4° Fahr. It dissolves in absolute alcohol in all proportions, but is less soluble in alcohol containing water.

According to Dumas it is composed of

Carbon . . .	88·45
Hydrogen . .	11·46
	99·91

It is therefore probably composed of exactly the same proportion of its elements as oil of turpentine, and, like this, it combines and forms a peculiar compound with hydrochloric acid gas. It is used in perfumery.

The two volatile oils now described may be taken as types of those which consist entirely of carbon and hydrogen, but the greater number of them contain oxygen also. Among these are the oils of lavender, peppermint, rosemary, spearmint, and marjoram; the properties of this last only we shall deem it requisite in this place particularly to notice.

Oil of Marjoram.—This oil is obtained from *Origanum vulgare*, and, according to Dr. Kane, has a specific gravity of 0·890: it generally contains a large but not a constant quantity of stearopten, and when purified from this by repeated distillation, Dr. Kane found its specific gravity to be 0·8673, and its boiling-point was 322° Fahr.

This yielded, by Dr. Kane's analysis, such proportions of its elements as showed that it was constituted of, according to his equivalent numbers,

Fifty equivalents of Carbon	307	or	86·48
Forty equivalents of Hydrogen	40	or	11·27
One equivalent of Oxygen	8	or	2·25
	355	or	100·

The volatile oils which have been alluded to or described are all lighter than water, but there are some which are heavier than this fluid, and consequently sink in it; such are the oils of cinnamon, cloves, and cassia.

There are certain volatile oils which are poisonous, on account of the hydrocyanic acid which they contain: the most remarkable of these is the oil of bitter almonds; this however ceases to be poisonous when deprived of the hydrocyanic acid. Similar or analogous oils are obtained by distilling other substances with water, as laurel leaves, peach leaves, &c.

As an instance of an oil produced by the agency of heat upon animal matter, we shall briefly mention what has long been known by the name of Dippel's oil, from having been first obtained by a person of that name. When animal matter, such as the hoofs or horns of animals, is submitted to destructive distillation in retorts, there comes over with the other products an oily substance which has a very disagreeable odour and a dark colour; by repeated distillation the latter is got rid of, but the former remains, although the oil becomes light and limpid. It was formerly much used in medicine, but is not now employed.

The last example which we shall give is that of the formation of an oleaginous body by direct chemical action: it is the *Oleum Ætherеum*, or Oil of Wine of the Pharmacopœia. When alcohol is distilled with twice its weight of sulphuric acid, an oleaginous compound is procured, which, after treatment with potash and exposure to the air, has the following properties: it is a yellow fluid, of a penetrating aromatic odour and a sharp bitter taste; its specific gravity is variously stated from 1·050 to 1·133, and there is some doubt whether its composition is not also variable, dependent upon the different quantities of a peculiar carburetted hydrogen which it is apt to contain.

According to Hennell, it contains

Sulphuric acid	38·	or nearly one equivalent	40
Carbon .	53·7	or nearly nine equivalents	54
Hydrogen	8·3	or nearly nine equivalents	9
	100·		103

The analysis of Serullas differs however considerably from this.

OILS, VEGETABLE, are divided by chemists into fixed and volatile, and the former into such as are drying, fatty, and solid. They máy be considered with respect to the sources whence they are obtained, their abundance, and the probability of their being used as substitutes for the whale and sperm oils, which are becoming every day dearer from their comparative deficiency. Considerable prejudice is entertained against the employment of vegetable oils, in consequence, in some measure of their inferiority, and also because they are apt to undergo decomposition, but likewise because it is difficult to separate the other vegetable principles from the oil, and the chemical means adopted for their purification render some still more impure as oils. But that many of these are very valuable is evident from several being imported in large quantities from the countries where they are produced, and hence forming important articles of commerce. In many countries they are solely employed for all the purposes for which animal oil is alone thought applicable in England. The high price of the latter has however induced dealers to mix with them a portion of the despised oils of the vegetable kingdom. This subject appears interesting and sufficiently important to induce chemists to ascertain the properties of each kind of vegetable oil, as fitted either for burning in lamps for soap or candle making, and their numbers are sufficiently great to render it highly probable that some will be found eligible for all these purposes. Many are noticed under the heads of the plants which yield them, as the cocoa-nut, palm, olive, and croton oils. Linseed and hempseed are both imported in large quantities from the north of Europe, and the former, of late years, also from India, whence also sesamum or *til* seed is also largely imported, as well as from Egypt. Oil, both volatile and fixed, is very extensively diffused through vegetables; the former in almost every part of a plant except the cotyledons of the seed, and the latter in the seeds chiefly, but also in their fleshy covering, as in the olive, some palms, the fruit of Melia, and others. Some families of plants abound especially in this principle, and therefore several species yield it, as among the Cruciferæ we have mustard, rape, and colza seed oil, with other species especially cultivated in Europe, India, and Japan, of which some have of late years been imported into this country. Several of the family of Compositæ secrete oil in quantities large enough to render it desirable to cultivate them for this purpose alone, as the sunflower and Jerusalem artichoke, also some species of Carthamus or bastard saffron, and also the Verbesina sativa of India, now known to be identical with the Abyssinian *Guizotia oleifera*, and of which the oil is known in commerce by the name of Hutsyellow oil. So *Madia sativa* yields Madi oil, and its seeds are said to be more abundant in oil than any plant introduced into Europe. Most of the Cucurbitaceæ also, as the melon, gourd, cucumber, and the numerous varieties, cultivated especially in India, contain a large proportion of oil, which is expressed in the East, as it formerly was in Europe. The Rosaceæ also store up a large proportion of oil in the kernels of their fruit, as in the almond, which is particularly valued; so also that of the apricot, as well as that of the Briançon apricot, and other species of Prunus. In the Himalayas, oil is also expressed from the apricot kernel, and has been sent to this country, of a fine quality.

Among the *Amentaceæ* we have also several species which yield oil of good quality, and in sufficient quantity to repay the expense of expression, as nut oil, obtained from the hazel; beech-nut oil, from *Fagus sylvatica;* with these may be mentioned walnut oil, from *Juglans regia.* Besides these, poppy oil, Ben-nut oil (*Hyperanthera*), groundnut oil (*Arachis*), physic-nut oil (*Jatropha*), are well known. So the cotton-seed yields oil, which is also the case with the seeds of the tea-plant, especially of the species called *Thea oleifera*, and some of the Camellias.

In the article Bassia it has been mentioned that two species, *B. longifolia* and *B. latifolia*, both yield oil; another species, *B. butyracea*, yields a vegetable butter, and is commonly known as the Ghee, or butter-tree of Almora. The native name of this tree is *choonee*, and Mr. Traill describes it as not being found in Kemaon, but in the adjoining Goorkhal province of Dotee. Of this an analysis has been given by Mr. E. Solly, in the 'Proceedings of the Royal Asiatic Society.' He describes it as being solid at ordinary temperatures, and that at about 120° Fahr. it is perfectly melted, and appears then as a pale yellow oil. He found a specimen of the Phoolwa, as the butter is called, which was brought to this country five years ago by Mr. Traill, to consist of sixty parts of solid oil, thirty-four of fluid oil, and six parts of vegetable impurities. The whole is readily soluble in warm alcohol, and might therefore be employed for liniments. It makes excellent soap, and burns with a bright flame, without smoke or smell, and would therefore, Mr. S. conceives, be superior in some respects to the piney tallow. In the above Proceedings of the Committee of the Asiatic Society for 1839, there are notices of several other vegetable oils sent by the Bombay Chamber of Commerce for analysis and examination by practical men as to their useful properties. The other solid oils are much better known, and may be referred to the articles Cocos, Croton Oil, Palm Oil, Laurel, Myristica, and Cacao.

OISE, a river in France belonging to the system of the Seine. [Seine.]

OISE, a department in France, bounded on the north by the department of Somme; on the east by that of Aisne; on the south by those of Seine et Marne and Seine et Oise; and on the west by those of Eure and Seine Inférieure. Its form approximates to that of a parallelogram, having its northern and southern sides of 60 and 65 miles respectively, and its eastern and western sides of 42 and 38 miles. It is included between 49° 3′ and 49° 46′ N. lat. and 1° 40′ and 3° 8′ E. long. The area of the department is estimated at 2256 square miles, being a little below the average area of the French departments, and rather larger than the conjoint areas of the adjacent English counties of Derby and Stafford. The population, in 1831, was 397,725; in 1836 it was 398,641; showing an increase of 916, or less than one-quarter per cent. in five years, and giving about 177 inhabitants to a square mile, being above the average of the French departments, both in amount and density of population, but far inferior in both respects to the English counties with which we have compared it. Beauvais, the capital, is on the river Terrein, a feeder of the Oise, 39 miles in a direct line north by west of Paris, or 41 miles by the road through St. Denis and Beaumont-sur-Oise.

This department has no mountains nor any lofty hills the surface consists of gentle undulations. The highest ground extends across the department from east to west, not very far within the northern boundary, and separates the basin of the Seine from that of the Somme. That part of the department which is comprehended in the former basin is by far the larger, and is watered by the Oise and its tributaries. The Oise enters the department near the north-eastern angle between Chauny and Noyon, and flows in a tolerably direct line of 55 miles south-west through the department, passing Noyon, Compiègne, Pont-Sainte-Maixence, and Creil, between which last town and Beaumont it quits this department to enter the adjacent one of Seine et Oise. It is navigable throughout that part of its course which is in this department. The Aisne, which is also navigable, enters the department on the east side, and has a tolerably direct course of 12 miles west by north into the Oise above Compiègne. Below the junction of the Aisne the Oise receives the Bresches, or Brêche, and the Terrein, or Therain, on the right bank and the Autone; or Authonne, the Nonette, and the Thève, on the left. These are all small: the Terrein, the longest of them, has a course of about 45 miles south-east; neither of them is navigable. The Ourcq, a feeder of the Marne, just crosses the south-eastern angle of the department, and is navigable for a few miles; and the Epte, a feeder of the Seine, forms in one part the western boundary. Some of the feeders of the Somme have their sources within the northern boundary of the department, but they are all unimportant.

The official statement of the inland navigation of the department is as follows:—Oise, 65 miles; Aisne, 13; Ourcq, 6 miles: total river navigation, 84 miles. Canal parallel to the Oise, 17 miles; Canal of the Ourcq, 5 miles: total of canal and river navigation, 106 miles.

There are several pools and marshes.

The greater part of the department is occupied by the chalk formation which surrounds the Paris basin: the southern part is occupied by the strata of the supracretaceous group. There are no metallic ores; but marble, freestone for building, some of it of superior quality, sandstone for paving, millstones, gypsum, lignite (the ashes of which are used for manure), and potters' earth, are dug. Fossil remains are abundant; and round Beauvais above 1100 persons are employed in digging peat. There are several mineral springs, for the most part chalybeate, but none of much repute. There was, in 1834, only one iron-work in the department, having two forges for the production of wrought-iron.

The department is traversed by twelve Routes Royales, or government roads, having an aggregate length of 365 miles, namely, 341 in good repair, 12 out of repair, and 12 unfinished. The principal road is that which leads from Paris through Beauvais and Marseille to Abbeville and Calais. The road from Paris to Peronne and Cambray passes through Senlis and Pont-Sainte-Maixence; that from Paris to Amiens passes through Chantilly, Creil, Clermont, St. Just-en-Chaussée, and Breteuil; that from Paris to Laon crosses the south-eastern angle; and that from Paris to Dieppe crosses the south-western angle of the department. Roads lead from Beauvais to Clermont and Compiègne, to Breteuil, and to Gournay (Seine Inférieure); from Senlis, along the valley of the Oise, by Compiègne and Noyon, to La Fère and St. Quentin (Aisne), with a branch from Noyon to Ham (Somme); and from Compiègne, on the one hand, to Montdidier and Amiens, and on the other, to Soissons. The Routes Departmentales, or departmental roads, have an aggregate length of 311 miles, namely, 246 in repair, 11 out of repair, and 54 unfinished. The bye-roads and paths have an aggregate length of more than 3000 miles. (*Official Returns*, 1st January, 1837.)

The air is temperate, and for the most part healthy: the exceptions are the neighbourhood of the various pools and marshes. The soil varies in fertility: more than 950,000 acres, constituting about two-thirds of the department, are under the plough. The produce in corn is very great, being nearly as much again as the average produce of the French departments. In wheat, which is the grain chiefly cultivated, the preponderance is yet greater, and in rye and maslin (or mixed corn), and in oats, the growth of which is all but equal to that of wheat, greater still. Barley and potatoes are cultivated, but not very extensively. Some hemp and pulse are grown: maize and buckwheat are not grown at all. Wheat and oats are exported in considerable quantity, principally to Paris and Rouen. The quantity of grass-land is about 70,000 acres; and there are 35,000 to 40,000 acres of heath or other open grazing-land. The artificial grasses most cultivated are trefoil and lucerne. There are only about 6600 acres of vineyards, and the wine grown is, with little exception, of very inferior quality. The wines of Bourgogne and Champagne are chiefly consumed. Orchards and gardens occupy about 35,000 to 40,000 acres: a considerable quantity of cider is made. The woodlands comprehend about 200,000 acres. The principal forests are those of Compiègne (about 35,000 acres), Chantilly, Ermenonville, and Le Lys.

The number of horses in the department is nearly double the average number in the other departments; they are for the most part brought from the department of Pas de Calais, where they are bred. The number of neat cattle is not equal to the average of France. The calves reared in the department furnish the markets of Paris with some of their most delicate veal. The number of sheep is great, and the produce of wool considerable: the breed has been much improved by crossing with the English (Leicester and South-down) and Merino breeds. A portion of the wool is employed by the manufacturers of Beauvais and the valley of the Oise. A considerable quantity of pork and poultry is fattened for the supply of Paris, and bees are commonly kept. The larger game, stags, roes, and wild boars, are found in the woods, and the rivers abound with fish.

The department is divided into four arrondissements, as follows:—

			Population.		Communes.
		Sq. M.	1831.	1836.	
Beauvais	W.	749	131,385	132,369	234
Clermont	N.	501	89,448	89,837	161
Compiègne	N.E.	494	97,812	97,645	156
Senlis	S. & S.E.	512	79,080	78,790	132
		2256	397,725	398,641	683

The number of cantons, or districts, each under a justice of the peace, is thirty-five.

The arrondissement of Beauvais includes the towns of Beauvais (pop. in 1831, 12,867; in 1836, 13,082) [BEAUVAIS], Gerberoy, and Songeons, on the Terrein; Marseille and Milly, on the Petit Terrein; Grandvillers, or Grandvilliers (pop. 1811), Formerie, La Bosse, Chaumont, and Meru. Gerberoy is on an eminence. It is now an insignificant place, but was antiently a frontier fortress toward the duchy of Normandie, and was exposed to frequent assaults. It suffered much in the wars of the English in France, and in the religious wars of the sixteenth century. The fortifications of the town, which had been dismantled, were subsequently restored. It is surrounded with pleasant walks, and the townsmen carry on some trade in horses and cattle. It has two yearly fairs. Songeons is pleasantly situated at the foot of a hill, and consists of well-built brick houses. Spectacles and looking-glasses are manufactured, and trade is carried on in iron goods and other hardwares, coal, corn, cider, and cattle. It has four yearly fairs. Marseille is well built of brick and in a pleasant situation. The townsmen manufacture leather, and trade in cattle: there are five yearly fairs. At the village of Achy, in the neighbourhood of Marseille, yarn is spun of wool, camels' hair, and silk. Grandvillers is on the road from Paris to Abbeville: it has wide streets converging in a large market-place: the inhabitants manufacture woollen cloth, serge, hosiery, toys, and soap. Hosiery and serge are also made in the neighbourhood, and the town is the centre of a considerable trade in these articles, and in corn, brandy, cider, coal, cattle, and horses. In the neighbourhood are two castles, that of Damerancourt, a strong fortress of the feudal ages, and that of Sarcus, built early in the sixteenth century, in a rich style of architecture. Chaumont is built on the slope of a hill, the summit of which is crowned by the parish church. Woollen cloths, lace, leather, and fans are made; there are water-mills and lime-kilns; and trade is carried on in corn, hay, wood, and woollen goods. The population of the commune is about 1800. Meru is the centre of a considerable manufacture of horn, mother-of-pearl, bone, ivory, hard wood, and other toys: nearly fifty men were employed a few years since in making fans alone. At the neighbouring village of St. Généviève, two hundred workmen are employed in finishing these toys. Agricultural implements, snuff, leather, and lace are also made; and trade is carried on in corn, cattle, horses, and wool. In and around Auneuil, a village between Beauvais and Chaumont, eight hundred females are employed in lace-making; and in and about the village of Nivillers, near Beauvais, about the same number are engaged in spinning hemp, in combing and spinning wool, and weaving stockings. At the village of Hanvoile, near Songeons, a great quantity of serge is made; and at Savignies and La Chapelle-aux-pots, near Beauvais, are extensive potteries.

In the arrondissement of Clermont are—Clermont (pop. in 1831, 2594 town; 2715 whole commune; in 1836, 3235 commune) and Bulles, on the Breches or Brêche; St. Just en Chaussée, near the head of the Arre, a small tributary of the Breches; Mouy (pop. 1817 town, 2372 commune) on the Terrein; Breteuil (pop. 2244 town, 2284 whole commune) on the Noye, a feeder of the Somme; and Crèvecœur. Clermont, distinguished from other places of the same name as Clermont-Oise or Clermont en Beauvais, was at first probably a border castle erected as a barrier against the Normans. In the tenth century it became the capital of a county, which, in the thirteenth century, was conferred by St. Louis on his son Robert, ancestor of the house of Bourbon. The town is pleasantly situated on the slope of a hill, the summit of which commands an extensive and beautiful prospect, and is crowned by an antient castle. At the foot of the castle wall is an agreeable public walk. The principal manufactures of the town are cotton yarn, printed and other calicos, and linens; there are bleaching grounds, brewhouses, tanyards, and saltpetre refineries; and trade is carried on in corn, cattle, horses, flax, and linens. The surrounding country is remarkable for the growth of cherries. Clermont has a large monthly corn-market and fifteen yearly fairs. Bulles has a population of about 1000: the townsmen spin flax and manufacture fine linens. There are oil-presses. St. Just en Chaussée was formerly a walled town and of greater extent than at present; it is about as populous as Bulles. The townsmen manufacture hosiery, and trade in cattle and wooden wares. Mouy is the centre of a considerable woollen manufacture, which employs in the town and neighbourhood about 1200 workmen. The washing of the wool and the dyeing and finishing of the cloth are carried on in the town. There is a good weekly market, also a yearly fair. Breteuil has probably risen from the decay of a Gaulish town (the Bratuspantium of Cæsar, *Bell. Gal.*, lib. ii., c. 13), the traces of which, called by the people around Brantuspante, have remained till the present time. A number of vases, coins or medals, and other antiquities have been dug up. The townsmen make shoes for the troops and for the hospitals of Paris; worsted stockings, serge, shawls, and other woollen goods; paper, earthenware, and leather; they trade in corn, cattle, and cider. There are good nursery-grounds round the town. Crèvecœur has an antient castle built of brick, with a walled park and gardens. The inhabitants, who exceed 2000, are engaged in the manufacture of woollen stuffs; and trade in corn, trefoil and lucerne seed, cattle, and horses.

In the arrondissement of Compiègne are—Compiègne (pop. in 1831, 8879: in 1836, 8895) [COMPIEGNE] and Noyon (pop. 5535 town, 5946 whole commune), on or near the Oise; and Pier-fond, about 7 miles south-east of Compiègne. Noyon is mentioned in the 'Itinerary' of Antoninus and the Notitia Imperii' under the name of Noviomagus. In the fifth century the bishop's see was transferred hither from Augusta Veromanduorum, now St. Quentin. Pepin le Bref began and Charlemagne (who was crowned here) finished the erection of the cathedral; and at Noyon, Hugues Capet was elected king. It was taken by the League, A.D. 1593, and retaken the next year by Henri IV. The town is well laid out and well built, at the foot and on the slope of a hill, and is traversed by the two branches of the little river Vorse, which flows into the Oise a short distance from the town. It has four gates, which take their names from the four suburbs, and several fountains. The cathedral is a large building, about 340 feet long, with two towers of the height of 200 feet. There are an antient episcopal palace, a seminary for the priesthood, an hospital, and pleasant public walks. The bishop's see no longer exists. The townsmen manufacture linens, muslins, hosiery, and leather; and trade in corn, hosiery, hides, and vegetable ashes. Pier-fond or Pierre-font had a strong castle, which was obstinately defended by the leaguers against the troops of Henri IV. It was dismantled by Louis XIII., and now forms one of the most picturesque ruins in the country.

In the arrondissement of Senlis are—Senlis (pop. in 1831, 5066; in 1836, 5016) [SENLIS] and Nanteuil-le-Hardouin, on the Nonette; Pont-Sainte-Maxence (pop. 2453 town, and 2575 whole commune) and Creil, on the Oise; Merlou or Mello on the Terrein; Chambly, on the brook Méru, which flows into the Oise; Crespy or Crépy (pop. 2242 town), and Acy or Assy. Nanteuil has the ruins of an antient castle, the residence of François and Henri, the celebrated dukes of Guise, and of an antient Cluniac priory. The townsmen (about 1300 or 1400 in number) carry on some manufactures, and trade in corn and cattle. Pont-Sainte-Maxence or Maixence is in a pleasant situation, and is remarkable for a handsome bridge of three arches, erected in 1777, in the place of a more antient one supposed to have been built by the Romans. Each corner of this bridge is adorned with an obelisk, and the piers are composed each of four columns arranged two on each side, with an interval of 9 or 10 feet between them. The inhabitants are engaged in tanning leather, and they trade in corn (a considerable quantity of which is sent to Paris), wine, and cattle. It has a good weekly market, and a fair every month. In the neighbourhood are the ruins of the antient and rich abbey of Moncel. Creil is pleasantly situated. On an island in the Oise are some remains of an antient castle built by Charles V., and of an antient abbey. The town was pillaged by the Huguenots in 1567, and subsequently taken by the League. The principal manufacture of the place (which has a population of about 1500) is of earthernware, porcelain, pottery, and glass, which gives employment in and about the town to 900 workmen. Some printed cottons are manufactured, and trade is carried on in coal, corn, flour, and cattle. In the district round the town manufactures are carried on; and there are several stone quarries, where the workmen live in habitations excavated in the rock. Merlou or Mello has an antient castle on a picturesque and commanding eminence, at the foot of which lies the little well-built town, of 400 or 500 inhabitants, who weave cachemire shawls, merinos, calicos, and laces. Turf is dug in the neighbourhood, and some trade in cattle is carried on. Chambly has about three times the population of Merlou; the streets are wide and well laid out; and the houses well built; there is a pleasant public walk. The inhabitants make laces, braid, and blond lace; and there are tile-works and several flour-mills. Some trade in flour is carried on. Crépy or Crespy was the capital of the county (afterwards duchy) of Valois, and in the feudal ages was a place of great strength. In 1431 it was taken by the English, who are said to have destroyed fifteen hundred houses. The strong castle of the counts of Valois was also taken and destroyed. The town was retaken by the French in 1533. In 1544 a treaty was concluded at Crépy between François I. and the emperor Charles V. In 1588 the town was taken by the League and retaken by Henri IV. It is surrounded by a public walk planted with trees, and is entered by five gates. The columns of the choir of the parish church are remarkable for their lightness and beauty. Part of the walls of the town and of the old castle are standing. The manufactures are lace, cotton goods, leather, and, in the environs, home-spun linen; trade is carried on in corn, wood, cattle, horses, thread, and woven goods. There are two yearly fairs. In this arrondissement are the villages of Chantilly, where were the magnificent park and palace of the princes of Condé, destroyed in a great part during the Revolution; and of Ermenonville, where Rousseau died (A.D. 1778) and was buried. His tomb remains, but the body was removed to Paris, A.D. 1794.

The population of the towns, when given accurately, is, unless otherwise stated, from the census of 1831, and is that of the whole commune; when only an approximation is given, the authority is Dulaure's *Histoire des Environs de Paris*, Paris, 1825-28.

The manufacture of toys is carried on in the villages between Meru and Beauvais; that of optical glasses and mirrors around Songeons; bricks, tiles, crucibles, sugar-refiners' pots, and other pottery, between Beauvais and Songeons and around Songeons; cotton yarn at various places in the arrondissement of Beauvais. In the district round Creil manufactures and establishments of various kinds are carried on with great activity; porcelain, earthenware, glass, woollen, linen, and cotton yarn, and goods, lace (at Chantilly), silk and cotton buttons, brass and iron wire, and paper are made; stereotype and other printing, bleaching, card-making, sheet-copper and iron works, and flour-mills are in active operation. The industry of this district owes much to the duke of La Rochefoucauld. The morality of the humbler classes has been improved by the introduction and progress of manufactures, and by the attention of the capitalists engaged in them. The principal manufactures of the arrondissement of Compiègne are of cotton. The extension and improvement of the manufactures of the department are owing to the industry and skill of persons from other parts rather than to the inhabitants.

The department constitutes the diocese of Beauvais, and is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Amiens. It is in the first military division, the head-quarters of which are at Paris. It sends five members to the Chamber of Deputies. In respect of education it is above the average of France; of the young men enrolled in the military census of 1828-29, more than half (54 in every 100) could read and wrote.

In the most antient period of the history of France, this department was chiefly comprehended in the territory of the Bellovaci; portions of it were included in the territories of the Silvanectes, the Vadicasses, the Suessiones, the Veromandui, the Ambiani, and the Veliocasses, all of them Belgic nations, and all afterwards included in the Roman division of Belgica Secunda, except the Veliocasses, who were included in Lugdunensis Secunda. Of Gallic and Roman towns and stations the chief within its limits were Cæsaromagus, afterwards Bellovaci, Beauvais; Bratuspantium, near Breteuil; Litanobriga, Pont-Sainte-Maixence, or more probably Creil; all in the territory of the Bellovaci; Noviomagus, Noyon, in the country of the Veromandui; Augustomagus, afterwards Silvanectes, Senlis, in the territory of the Silvanectes; and Næomagus, probably Vez, a village near the Authonne, in the territory of the Vadicasses. There are the traces of a Roman camp between Beauvais and Clermont.

Before the Revolution the department was included in the districts of L'Ile de France proper, Valois, Noyonnais, and Soissonnais, in the military government of L'Ile de France, and in the districts of Santerre and Amienais in Picardie.

OKA, River. [Russia.]

OKHOTSK, a commercial town, situated on the northern shores of a wide gulf of the Pacific Ocean, which separates the peninsula of Kamtchatka from the continent. It is in 59° 20′ N. lat. and 145° 18′ E. long. The town was formerly built on a flat sandy neck of land, about two miles in width, and washed on one side by the river Ochota, and on the other by the sea. But as its low situation rendered the place extremely unhealthy on account of the fogs in which it was frequently enveloped, and also exposed it to inundations during southern and south-eastern gales, the town was removed a few years ago about three miles farther up the river. It is now built on a low hill rising about thirteen feet above high-water mark, on the right bank of the Ochota. The town is small, consisting only of a few hundred houses, and the inhabitants are estimated not to exceed 2000. But as it is the only place by which the intercourse between the interior of Siberia on one side and the peninsula of Kamtchatka and the Russian dominions in North America is maintained, it has a considerable commerce, though, owing to the sterility of the adjacent country, it has no article of exportation except a small quantity of furs. The Russian American Company, whose wealthy partners reside in the town of Irkutsk, build vessels here from time to time, but at a great expense, as the timber must be brought down from the woods, which are more than fifty miles distant. The furs brought from America are landed here, and transported by land through Yakutsk to Irkutsk, and thence to Kiachta, to be exchanged for articles of Chinese production. The harbour is very bad. It is formed by the river Ochota, which, meeting the sea by a rapid course, has formed at its mouth a sand-bar, with only nine feet of water on it. Besides this, it is only accessible from June to September, being blocked up with ice and snow the remainder of the year. The Russian government has accordingly resolved to select another place on the coast of the Bay of Okhotsk, which offers a better harbour, and to build there a new town. According to the most recent information, the mouth of the river Uda (54° N. lat. and 136° E. long.) offers considerable advantages, having a fine harbour sheltered by the Shantar Islands.

(Sauer's *Account of Billing's Geographical and Astronomical Expedition to the Northern Parts of Russia;* Langsdorf's *Voyages and Travels in various Parts of the World;* Saryschef's *Voyages of Discovery to Siberia, &c.;* Erman's *Reise um die Erde durch Nord Asien und die beiden Oceane.*)

O'KHRIDA, a town of Albania, in European Turkey, situated on the north-eastern shore of a considerable lake, which takes its name from the town. According to the map of Albania prefixed to Hughes's 'Travels' (2nd edit., 1830), Okhrida is in 41° 3′ N. lat. and 21° 5′ E. long.

Okhrida is on or near the site of the antient Lychnidus (Λυχνίδους, or perhaps Λύχνιδος, Strabo). This town of Lychnidus gave antiently its name to the lake which was called *ἡ λίμνη Λύχνιτις* or *Λυχνιδία*. The town lies at the foot of an eminence, the summit of which is crowned by a castle, in which the Turkish governor of the surrounding province resides. The population of the town is estimated at about 6000, chiefly of Bulgarian descent. Silver ore and sulphur are procured from mines near the town. A Greek archbishop resides here.

The lake of Okhrida extends about 18 miles from south-east to north-west, and is 6 or 8 miles across in the widest part. It is in the valley watered by the Black Drin, which flows through the lake in the direction of its length. There are several villages round the shore. It abounds with fish; and the fishery is actively carried on.

The pashalick or district of Okhrida is not very large, but in the uncertain state of Turkish geography we do not attempt to define its boundaries or dimensions. The district is mountainous, and is said to be well wooded; it is watered by the Black Drin and the Scombi. It is tolerably productive in corn, maize, rice, tobacco, cotton, hemp, fruit, and wine. Cattle and bees are reared, and game is tolerably abundant. The inhabitants are distinguished by their courage and ferocity, and are reputed to make the best soldiers among the Albanians.

OLACA'CEÆ. This name applies to a small and little studied natural order of Exogenous plants, chiefly found within the tropics. Its most important characters are a small inferior calyx, often becoming enlarged around the ripe fruit, a polypetalous valvate corolla, a small number of hypogynous stamens, partly fertile and partly barren, a one-celled ovary, with pendulous ovules, indehiscent fruit, and a small embryo amongst a large quantity of albumen. Its affinities are little understood, but are supposed to be greatest with Pittosporaceæ, on the one hand, and Aurantiaceæ, on the other. The plants are of little importance for useful qualities; one species, Heisteria coccinea, yields, it is said, the partridge-wood of cabinet-makers, and the fruit of others is eatable when ripe, though not very pleasant. (Lindley's *Natural System of Botany*, ed. 2, p. 33.)

OLA'US, MAGNUS, a native of Sweden, and brother to John Olaus, archbishop of Upsala, was an archdeacon in the Swedish church when the Reformation, supported by Gustavus Vasa, gained the ascendency in Sweden. In consequence of this change the two brothers, who remained attached to the Roman Catholic faith, left their country and retired to Rome, where Olaus Magnus passed the remainder of his life in the enjoyment of a small pension from the pope. At Rome he wrote his work, 'Historia de Gentibus Septentrionalibus, earumque diversis Statibus, Conditionibus, Moribus, itidemque Superstitionibus, Disciplinis, &c.,' Rome, fol., 1555, and Basil, 1567. Other editions of this work have been published, which, as well as a French translation in 1561, are all incomplete. The work is minute, and contains some curious information, but is uncritically written. Olaus died at Rome in 1568. His brother John wrote a work entitled 'Gothorum Suevonumque Historia, probatissimis Antiquorum Monumentis collecta,' Rome, fol., 1554, which is a still more uncritical performance than that of his brother Magnus.

OLD RED-SANDSTONE. By this title English geologists have almost universally designated the variable series of rocks which separate the youngest slates ('Transition Rocks') from the mountain-limestone and coal Messrs. Conybeare and Phillips (*Geology of England and Wales*) ranked the old red-sandstone in their 'Medial Order' along with the coal and mountain-limestone; and this classification has been unreservedly followed till within a short period. Mr. Murchison, in his work on the 'Silurian System,' has preferred to separate the old red-sandstone from the superincumbent strata, and to constitute for it an additional system. Since the publication of that work, the same author, in conjunction with Professor Sedgwick, believing that the limestones and slaty and conglomerate rocks of South Devon belong to the *same geological period* as the true old red-sandstone of Herefordshire, and desirous of improving the nomenclature, has proposed for these variable strata the title of the Devonian System. If the evidence of the correspondence of geological age, between the calcareous and slaty strata of South Devon and the red-sandstones of Herefordshire, should become strong enough to command the assent of geologists, the settlement of an appropriate name will not be without difficulty, especially if we remember that the continental types of stratification ought to be included in a good general appellation.

Confining ourselves then to the characters of this *formation*, or *system*, where they are most conspicuous, viz. in the districts of Monmouthshire, Breconshire, and Herefordshire, and the borders of the Cumbrian, Lammermuir, and Grampian mountains, we find in the old red-sandstone the following kinds of rocks:—

Conglomerates.—These are usually composed of a basis of red-sandstone, or red argillaceous matter, in which multitudes of large and small pebbles are imbedded. The fragments thus enclosed are usually such as may be supposed to have been derived from the neighbouring slaty rocks of older date, and they are often collected in great abundance in the lower parts of actual valleys. This is observed especially near Kirkby Lonsdale, Sedbergh, and the foot of Ullswater. Among the fragments of grauwacke, quartz pebbles occur, sometimes containing micaceous iron-ore and other products of mineral veins. The conglomerate rocks of Herefordshire, Monmouthshire, &c. contain little else than fragments of quartz, making what is called a plum-pudding-stone.

Sandstones.—In most situations these are laminated parallel to the stratification, and in Monmouthshire, Herefordshire, &c. they have interspersed mica, and yield very good flagstone.

Argillaceous Beds.—These abound in the English and Welsh series, and by their red, white, and greenish colours, often exhibited in alternate bands and spots, resemble very nearly some varieties of the upper or new red-sandstone series.

Calcareous Beds.—The limestones of this series of rocks are usually associated with the argillaceous strata, and are very peculiar in character. They lie somewhat irregularly interstratified with the clays, and partake of the same colours, reddish, whitish, greenish, the different lines being so mixed in spots as to give the stone the aspect of a breccia, or conglomerate, and to justify its local name of 'gooseberry stone.' It is in places a nearly pure carbonate of lime in massive beds, but it is very seldom employed for any useful purpose. We have seen polished fragments which might be mistaken for variegated marble.

The best general series of these rocks known is that unfolded by Mr. Murchison's examination of the country along the border of South Wales. That author presents us with the following three groups in a descending order:—

1. Quartzose conglomerate and sandstone. The conglomerates occupy a thickness of about 200 feet, and then pass down into chocolate-brown sandstones, mottled marls, &c.

2. Cornstone formation, including marly clays and the peculiar limestone above described. Fragments of fossil fishes, especially of the Cephalaspides, occur not uncommonly.

3. Tilestone. Nearest in position to the Silurian rocks, these laminated sandstones resemble them somewhat both in organic remains and mineral aspect, being however more arenaceous and micaceous, and, except in particular lines, less productive of fossils. On the surface they make a red soil, while the upper Silurians yield a grey soil.

Mr. Murchison estimates the total thickness of the old red-sandstone system at not less than 9000 or 10,000 feet. (*Silurian System*, p. 184.)

OLDCASTLE, SIR JOHN, called 'the good,' the first martyr and the first author among the nobility of England, was born in the fourteenth century, in the reign of Edward III. He married the heiress of Lord Cobham, by whom he obtained that title. He gained military distinction in the French wars under Henry IV. and V., and was a domestic and a favoured attendant of the latter. Lord Cobham was a man of extensive talents, qualified for the cabinet or the field, of ready wit in conversation, and of great learning. He examined the writings of Wickliffe as a philosopher, and in the course of his study became a convert to the doctrines of that reformer. He collected and transcribed the works of Wickliffe, maintained preachers of that persuasion, and became a leader of the reformers. Lord Cobham being summoned to appear before the archbishop of Canterbury, refused, was excommunicated, and sent to the Tower, from which he escaped into Wales. The clergy got up a report of a pretended conspiracy of the Lollards, headed by Lord Cobham, whereon a bill of attainder was passed against him, a price of 1000 marks set upon his head, and exemption from taxes was promised to any person who should secure him. At the expiration of four years he was taken, and without much form of trial executed in the most barbarous manner; he was hung in chains on a gallows in St. Giles's Fields, London, and a fire kindled under him, by which he was roasted to death, in December, 1417. He wrote 'Twelve Conclusions addressed to the Parliament of England;' he also edited the works of Wicliffe, and was the author of several religious tracts and discourses.

OLDENBURG, or HOLSTEIN-OLDENBURG, a grand-duchy in the north of Germany, consists of three distinct portions. 1. The Duchy of Oldenburg, properly so called, which lies between 52° 54′ and 53° 44′ N. lat. and 7° 40′ and 8° 45′ E. long., contains 2090 square miles: it is bounded on the north by the German Ocean; on the east by the Hanoverian province of Bremen, the territory of the city of Bremen, and the Hanoverian province of Hoya; on the south by Osnabrück; and on the west by the Hanoverian province of Meppen and East Friesland. 2. The Principality of Lübeck, which is surrounded by the duchy of Holstein, contains 180 square miles. One large portion is compact and unbroken; the remainder is scattered on the banks of the Schwartau and the Trave. 3. The Principality of Birkenfeld, which is on the left side of the Rhine, contains 170 square miles; it is bounded on the north-west and south by the Prussian province of the Lower Rhine, on the north-east by Mesenheim, and on the south-east by the principality of Lichtenberg. The area of the whole is 2440 square miles.

Surface of the Country; Soil; Climate.—The Duchy of Oldenburg Proper is a part of the great plain of Northern Germany, without mountains or hills, and without forests. Heaths and moors alternate with cultivated spots, in such a manner that the latter, as Hassel observes, are like oases in the desert. The coasts are low, and protected against the inroads of the sea, partly by dunes, and partly by dykes, like those in Holland. The mouths of the Weser and the Jahde are lined with dykes. The soil of the interior of the country is poor, but there is rich marsh land on the banks of the Weser and at the mouth of the Jahde. The principal rivers are the Weser (which however only forms the boundary between Oldenburg and the province of Bremen), the Jahde, which forms a large bay where it falls into the German Ocean, the Hunte, the Hase, and the Leda. There are no large lakes; the most considerable, the Zwischenahner Meer, is 6 miles in circumference, and its banks are surrounded by picturesque well-wooded eminences. The climate, like that of Northern Germany, is damp and subject to frequent fogs; yet on the whole it is not unhealthy. The natural productions are corn of all kinds, flax, hemp, some hops, culinary vegetables, timber for building, and wood for fuel. There are the usual domestic animals, especially very good horses, nearly equal to those of East Friesland, poultry, game, fish, and bees. There are no metals; but there is indifferent turf, pipe and brick clay, and quarry stone. The Principality of Lübeck is flat and resembles Oldenburg in its soil and climate, but it contains some beautiful lakes, especially those of Ploen and Eutin. The Schwartau and the Trave are the chief rivers. The Principality of Birkenfeld lies on the side of the mountain-range called the Hochwald, branches of which traverse it, and contain small valleys between them. The soil is in general sterile. The climate is rather cold near the mountains and on the eminences, but in the valleys it is mild and healthy. The natural productions are corn, flax, hemp, timber, fruit, and wine. The mineral kingdom affords lead, iron, coals, slate, agate, jasper, chalcedony, and lapis lazuli.

Trade and Commerce.—The chief occupations of the inhabitants are agriculture and the breeding of cattle. The farmers on the moors and marshes follow each a different system of cultivation; yet none of these systems can be called good. There is scarcely such a thing as a village, the farm-houses lying quite isolated in the centre of the farms. There are no great manufactures in the grand-duchy, but the people make considerable quantities of coarse linen, worsted stockings, and thread, which, though in general the work of the leisure hours of the country-people, are a source of great profit. Oldenburg is extremely well situated for commerce, but the trade is chiefly a coasting trade, which is carried on in vessels with one or two masts, from twenty to forty tons burden, calculated for navigating the shallow waters (called Watten) between the sand-banks in the German Ocean, on the coasts of North Holland, Groningen, Friesland, and Germany, to the river Eider. The exports are the natural productions of the country, including 6000 horses and from 8000 to 10,000 oxen annually, and considerable quantities of linen, leather, raw hides, rags, &c., principally to Holland and the Hanseatic cities. The revenue is about 150,000*l.* sterling, and there is no public debt. Of the inhabitants, 246,772 are Low Germans and 980 Jews. The established religion is the Lutheran; there were, in 1837, 173,598 Lutherans, 70,880 Roman Catholics, 2314 Calvinists, and 980 Jews.

Education.—With respect to education, Oldenburg is rather backward. The rarity of villages renders it difficult to establish schools. There is no university, and till lately no great public library or scientific institutions. Much has however been done of late years. The various branches of a learned education are now taught in the Protestant gymnasium at Oldenburg, the Roman Catholic gymnasium at Vechta, the Latin schools at Jever and Eutin. There are likewise a normal school, a military school, a seminary for school-masters, and 2 superior Burgher schools.

Government, &c.—As a member of the German confederation, in conjunction with Anhalt and Schwarzburg, Oldenburg has the fifteenth place, or vote, in the select council of the Diet, and one vote of its own in the full council. The contingent to the army of the Confederation is 2177 men. Since 1834 Oldenburg furnishes the contingent of artillery for the Hanseatic cities, which in return furnish the contingent of cavalry for Oldenburg. The constitution is monarchical, and hitherto without an assembly of estates. The government is hereditary in the male line.

History.—The antient house of Oldenburg is one of the most illustrious in Europe: the emperor of Russia, the kings of Denmark, and the late royal family of Sweden are descended from it. Oldenburg is the original seat of the family. Christian I. founded the town of Oldenburg in 1155, and assumed the title of count. One of his descendants, Dietrich the Fortunate, obtained with his first wife the county of Delmenhorst, and with his second the duchies of Schleswig and Holstein. After Dietrich's death in 1440, his eldest son, who had for his share Schleswig and Holstein, became in 1448 king of Denmark, by the title of Christian II., in 1450 king of Norway, and in 1458 king of Sweden. He left two sons, John, who succeeded him in the northern kingdoms, and Frederic I., who had Schleswig and Holstein, and who, after the deposition of his nephew Christian II., the son of John, was made king of Denmark and Norway. His eldest son Christian III. inherited in 1513 the two kingdoms, and Adolphus, the younger, founded the house of Holstein Gottorp, which has given sovereigns to Sweden, Russia, and Oldenburg. Dietrich's younger son Gerard the Warlike inherited Oldenburg and Delmenhorst, but the male line of this branch becoming extinct in 1667, the counties fell to the Danish crown, or to the house of Holstein, descended from Dietrich's eldest son. In 1773 the grand-duke Paul of Russia, who was descended from the elder branch of the house of Holstein Gottorp, made a convention with Denmark respecting his share of Holstein, by which he surrendered all Holstein to Denmark, and received in exchange Oldenburg and Delmenhorst, which he immediately transferred to his cousin Frederic Augustus, of the younger branch of Holstein Gottorp. This convention was sanctioned by the emperor Joseph II., who gave to the two counties the rank of a duchy, and as the house of Holstein Gottorp had ever since 1647 given bishops to the see of Lübeck, he assigned it to that family as an hereditary principality. Frederic, the first duke, was succeeded in 1785 by his son Peter Frederick William, but he being afflicted with mental imbecility, the government was assumed by his cousin Peter Frederick Ludwig, the bishop of Lübeck, who in 1808 joined the Rhenish confederation. But Napoleon, by a decree of 14 December, 1810, incorporated the duchy with the French empire, and offered the duke as an indemnity the territory of Erfurt, which he refused, saying, 'I desire only subjects whom I know and love, and who love me.' After the fall of Napoleon, the duke recovered his own dominions; the congress of Vienna also assigned to him the principality of Birkenfeld; he obtained from Russia the lordship of Jever, and likewise obtained the sovereignty over the lordships of Varel and Kniphausen, which belong to Count Bentinck.

OLDENBURG, the capital, in 53° 20′ N. lat. and 8° 11′ E. long., is a well built town on the navigable river Hunte; the ramparts have been converted into public walks and gardens. The population is 7800, including that of the two suburbs. The palace is a very handsome building with a fine park, or what the Germans call an English garden. There are some tanneries, distilleries, and soap manufactories in the town. The public institutions are—the gymnasium, the seminary for schoolmasters, the military school, a library of 45,000 volumes, an observatory, and a remarkable collection of antiquities chiefly of Oldenburg.

Varel, on a canal which joins the Jahde, forms a harbour which merchantmen can enter at high-water, has 3000 inhabitants. *Jever*, in a fertile country on a navigable canal, has a good trade and 3600 inhabitants. *Eutin*, which is the only town in the principality of Lübeck, is on the bank of a lake, has a palace of the grand-duke with a beautiful park, and 2700 inhabitants.

(Halem, *Geschichte des Grossherzogthums Oldenburg*, 3 vols., 1794-1796; Trundes, *Kurzgefusste Oldenbürger Chronik*, 1831; Köhlis, *Beschreibung des Herzogthums Oldenburg*, &c., 2 vols., 1824.)

OLDENBURG, HENRY, was born about the year 1626, in the duchy of Bremen. In 1653, or before, he came to London in the capacity of consul from the town of Bremen, but he does not appear to have held that office more than two years. In 1656 he became tutor to Lord Henry O'Bryan, a young Irish nobleman, whom he accompanied to the university of Oxford, and at the same time entered himself as a student, chiefly, it is supposed, in order to obtain access to the Bodleian library. He was afterwards tutor to Lord William Cavendish. While resident at Oxford he became acquainted with several of the more eminent literary and scientific men of the time, among whom were Dr. Wallis, Ward, and the other originators of the present Royal Society. His acquaintance with Milton commenced somewhat earlier, as appears by Milton's letters to Oldenburg, between the years 1654-59, published in his 'Epistolæ Familiares.' In 1662, the Royal Society having obtained a charter of incorporation, Dr. Wilkins and Mr. Oldenburg were appointed secretaries to the Society. According to most biographers the nominal appointment of Oldenburg was that of assistant secretary to Dr. Wilkins, but in the list of members who attended the first council held by the Society after its incorporation (Thomson's *Hist. of Royal Society*), we observe only one secretary specified, namely Oldenburg, and it is certain that those duties which demanded the greatest zeal and assiduity devolved exclusively upon him. Dr. Martin Lister, in his 'Journey to Paris,' 8vo., Lond., 1699, speaking of Oldenburg, remarks, 'I heard him say that he held correspondence with seventy odd persons in all parts of the world: I askt him what method he used to answer so great variety of subjects, and such a quantity of letters as he must receive weekly, for I knew he never failed, because I had the honour of his correspondence for ten or twelve years. He told me he made one letter answer another, and that to be always fresh, he never read a letter before he had pen, ink, and paper ready, to answer it forthwith, so that the multitude of his letters cloy'd him not, or ever lay upon his hands.' In the 'General Dictionary,' Lond., 1739, fol., art. 'Oldenburg,' there will be found several of his letters to Mr. Robert Boyle, who was one of his regular correspondents, and with whom he was always on the most friendly terms. The following extract from one of those letters, dated 17 December, 1667, shows that up to that time he had received no salary from the Society, and that his only emoluments were derived from the publication of their Transactions. 'I have some grounds to believe,' he remarks, 'that there are persons who think the Transactions bring me in a sufficient revenue: but I will make it out to any man that I never received more than 40*l.* a year upon this account (and that is little more than my house rent), and now by a new agreement I have been obliged to make, I shall not bring it to above 36*l.* a year at most. How strangely therefore I must needs shift for my subsistence, and with what distraction I must perform my tedious work, let any sober man judge.' The following year Dr. Ward, then bishop of Salisbury, suggested to the council of the Society the propriety o making some allowance to their secretary, observing that for his own part he was ashamed that Oldenburg should have been permitted to devote so much time and pains to the business of the Society without any consideration. The result of the application does not appear. The Transactions published by Oldenburg extend from No. 1, dated March 6, 1664, to No. 136, dated June 25, 1677, the year preceding his death. In 1675 he was accused by Hooke of not having done justice to him on the subject of the invention of spiral springs for pocket-watches. The dispute which ensued was at length terminated by a declaration of the council, 'that the publisher of the Transactions had carried himself faithfully and honestly in the managing of the intelligence of the Royal Society, and had given no cause for such reflexions.'

Oldenburg married the daughter of the famous John Dury, with whom he received an estate in Kent valued at 60*l*. a year. His only child was Rupert, named after his godfather Prince Rupert. He died, according to most authorities, in 1678 (Thomson says September, 1677) at Charlton, between Greenwich and Woolwich, where his body was interred.

He is author of a few short papers upon medical and other subjects in the 'Philosophical Transactions,' and also of some 'twenty tracts, chiefly theological and political, in which he principally aimed at reconciling differences and promoting peace and unanimity.' (Hutton.) He published, under the name of 'Grubendol' (an anagrammatised form of his real name), English translations of—1, 'Prodromus to a dissertation by Nich. Steno, concerning solids naturally contained within solids,' 1671, 8vo.; 2, 'A genuine explication of the Book of Revelations, full of sundry new Christian Considerations;' 3, 'The Life of the Duchess of Mazarine,' from the French. It is also stated that he translated several of Mr. Boyle's works into Latin.

The letters of Oldenburg, dated in 1667, leave no doubt that during some part of that year he was confined to the tower upon political grounds.

OLDHAM, a parliamentary borough and manufacturing town in the parish of Oldham-cum-Prestwick, in the Middleton division of the hundred of Salford and county palatine of Lancaster. Its direct distance from London is 165 miles north-west; from Lancaster 43 miles south-east; and from Manchester six miles north-east. The town is situated on an eminence on the western bank of the Medlock and near the source of another stream called the Irk. The rapid rise of this town is mainly attributable to its being in the vicinity of extensive coal-mines, which give employment to a large portion of its population, and to the great increase of cotton manufactures since the middle of the last century. In 1760 it is said to have consisted of only sixty dwellings: in 1801 its population was 12,024, and in 1831 it was 32,381. The number of steam-engines employed in the manufacture of fustians, cotton, and woollen and silk goods, has been roughly estimated at eighty, which is probably under the truth. The making of hats is supposed to be carried on here upon a larger scale than in any other part of England, and it was in this particular branch of manufacture that Mr. Thomas Henshaw, the principal benefactor of the town, realised his great wealth. Fairs for the sale of cattle, horses, sheep, and pedlery are held by custom on the 2nd May, 8th July, and the first Wednesday after 12th October.

In 1827 an act of parliament (7th and 8th Geo. IV., c. 64) was obtained for improving the road between Oldham and Standedge and for effecting other improvements in the town itself. Since then a local police has been established, and gas and water works erected. About the same time the old church of St. Mary, some portions of which are believed to have been erected in the reign of King Stephen, was taken down, and upon its site was laid the foundation of a new one, which, Mr. Baines observes, was by mistake dedicated to St. Paul instead of St. Mary. The living is a perpetual curacy, in the diocese of Chester and patronage of the rector of Prestwick. Its annual net income is 191*l*. The parliamentary borough is co-extensive with the chapelry of Oldham, comprising the townships of Chadderton, Crompton, and Royton, in addition to the township of Oldham. Oldham was first constituted a borough by the Reform Act, and now returns two members. In 1832 the Sunday-schools within the chapelry were thirty-eight in number and afforded instruction to more than 8000 children of both sexes. What is called the free grammar-school was founded by James Assheton, or Ashton, in the year 1606, but the income appears to have never exceeded its present value, which is about 26*l*. It 1826 it afforded partial instruction to fourteen boys free of charge. A much more important foundation is that of Thomas Henshaw, above mentioned, who, in 1807, after making sundry bequests, the chief of which was an annuity of 300*l*. a year to his widow during life, directed that the sum of 20,000*l*. should be applied out of his estate in supporting a blind asylum to be afterwards established at Manchester, and that 40,000*l*., together with the residue of his estate, should be appropriated to instituting and supporting a blue-coat school either at Manchester or Oldham, as the trustees might deem adviseable; but he further directed that no part of these sums should be expended in the purchase of ground or in the erection of buildings, not doubting that either public or private benevolence would supply both the one and the other. The testator died in 1810, and fifteen years elapsed before his confidence in the benevolence of others was shown to be well grounded. In the meantime a bill was filed in the Court of Chancery, praying that the bequests in favour of the Blue-Coat School and Blind Asylum might be declared void, and the widow and next of kin declared entitled to the residue of the estate. The prayer having been refused, the property was vested in the name of the accountant-general, and had in February, 1826, accumulated to 96,320*l*. 6*d*., three per cent. consols, inclusive of 11,000*l*. stock for securing the annuity to the widow, &c., which stock at the death of the annuitants will go in augmentation of the funds of the school. The blind asylum has been recently opened at Manchester. [MANCHESTER, xiv., p. 374, wherein read 'Henshaw,' instead of 'Kershaw.'] The ground for the blue-coat school was given in 1825 by Messrs. Radcliffe and Jones, and is situated on the lower part of Oldham Edge. The cost of erecting the school was principally defrayed by a subscription among the inhabitants of Oldham amounting to between 5000*l*. and 6000*l*., and the building itself was completed in 1833-4 under the direction of Mr. Lane. It is a handsome stone edifice of considerable length, ornamented with several pinnacles, and comprising among its numerous apartments a spacious lofty school-room, dining-rooms, and an elegant entrance-hall.

Since 1834 two other schools have been established at Oldham with the assistance of grants from the lords of the Treasury, made at the recommendation of the National and British and Foreign School Societies. One of these can accommodate 1200 and the other 500 children.

(*History of the County Palatine of Lancaster*, by Edward Baines, 4to., London, 1836, in 4 vols.; *Sixteenth Report of the Commissioners on Charities*, 1826-7, ix., p. 222; *Return of Grants for the Advancement of Education*, 1837-8. xxxviii., &c.)

OLDYS, WILLIAM, an industrious and accurate bibliographer, and a useful biographical writer, was born in the year 1687. He was the natural son of Dr. Oldys, chancellor of Lincoln and advocate of the Admiralty Court. His father left him some property, but he seems to have fallen into extravagant and intemperate habits, and soon dissipated it. He was for some time librarian to the earl of Oxford, and made the catalogue of that nobleman's collection of books and MSS. when it was prepared for sale by Osborne the bookseller. The Duke of Norfolk appointed him to the situation of Norroy king-at-arms. He died on the 15th of April, 1761, aged seventy-four. His dissolute habits continued through life, and he died poor.

He was the author of the following works:—'The British Librarian, exhibiting a compendious view of all unpublished and valuable Books in all Sciences, as well in MS. as in Print,' London, 1737, 8vo.: anonymous. This work, though long neglected, is now esteemed for its accuracy and usefulness. A 'Life of Sir Walter Raleigh,' prefixed to Raleigh's 'History of the World,' 1738, folio. A translation of Camden's 'Britannia,' 2 vols. 4to., has been ascribed to him, almost with certainty. 'The Harleian Miscellany, or a Collection of scarce, curious, and entertaining Pamphlets and Tracts,' London, 1753, 8 vols. 4to. He wrote in the 'Biographia Britannica' the lives distinguished by the signature G, among which are those of T. and E. Alleyn, Eugene Aram, Caxton, Sir Geo. Etherege, &c. Besides the above works, he published a few others on bibliographical and medical subjects; and several manuscript notes on subjects of bibliography, together with a copy of

Langbaine's Lives, filled with remarks, are preserved in the British Museum.

O'LEA EUROPÆA, differs from most trees, except the sweet bay (Laurus nobilis), some species of cornus, and a very few others, in yielding a fixed oil from the pericarp; the seed being the source of fixed oils in most plants. The oil which is expressed from the ripe fruit immediately after being collected is most esteemed, and called virgin oil, oleum provinciale. That which is most highly prized comes from Nice and Genoa. When the oil is extracted by a stronger pressure, or by the aid of heat, or after the olives, having been collected into heaps, have remained till a kind of fermentation has occurred, it is the common olive oil, the properties of which vary in proportion as the fermentation has been of long or short duration. An oil of still inferior quality is obtained, when the husk of the olive, after the former treatment, is boiled in water. This kind is employed solely for the preparation of soap.

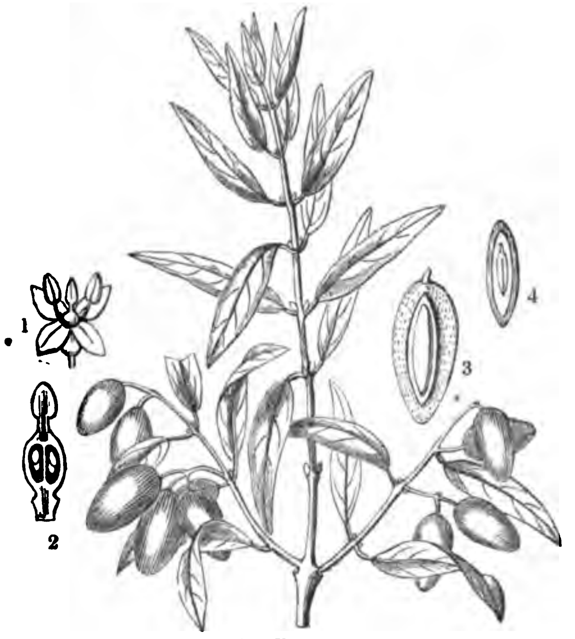
Virgin oil is of a very pale yellow or yellowish-green colour, more limpid when fine than any other fixed oil; inodorous; when fresh, but emitting a very peculiar odour when old; taste purely oily but by age becoming slightly rancid. Common olive-oil is of a deep greenish or brownish-yellow colour, and an odour and taste more or less subrancid. Its specific gravity is greater than the other.

Olive-oil, on account of its high price, is frequently adulterated with poppy or rape oil. The former may be easily detected, if present in the proportion of only one per cent., as it retards the solidification of the oil, when a mixture, consisting of nine parts of nitric and three parts of hyponitrous acid, is added to a hundred parts of the suspected oil. The presence of metals may be detected by sulphuretted hydrogen. For various means of applying these and other tests, see Thomson's *Organic Chemistry*, 'Vegetable Substances,' p. 435.)

Olive-oil is used in medicine as an emollient, and to form cerates and plasters. It is also used in the manufacture of soap. The finest kind is much employed with various articles of food, particularly in the countries where it is produced.

As this oil becomes viscid more slowly than any other vegetable oil, it is used, after being purified, by watch-makers.

OLEA'CEÆ, so named after the subject of the last article, are monopetalous Exogenous plants, with a superior 2-celled ovary, a subvalvate corolla, two stamens, and a fruit with pendulous albuminous seeds. In the artificial collocations of natural orders to be found in books, these plants are usually stationed next Jasminaceæ, with which they have been even combined. It is however probable that they have really as much affinity with some of the monopetalous dicarpous orders.



Olea Europæa.

1. A flower; 2, an ovary divided vertically; 3, a ripe fruit cut in half; 4, a stone divided longitudinally.

The species of the order best known in this country are, the Olive, or Olea Europæa, the Lilac, or Syringa vulgaris, the Evergreen Phillyrea of many forms, the Privet, or Ligustrum, and the Fringe-tree, or Chionanthus; all which correspond in habit and in sensible properties, which latter are very generally bitter and febrifugal. The bark of the Olive has been extensively used by the French instead of Cinchona, and the young fruits of the common lilac form an infusion scarcely inferior to gentian.

The most anomalous genus of the order is the Ash, which, in its most genuine form, has no petals, and in the division called Ornus has the petals present, but separate to the base. It is however, in all essential circumstances, the same in structure as the more regular genera; and its relation to the order has been ingeniously proved by the fact that the Olive and the Lilac will both live when grafted upon it. It is from the Ornus, or Flowering Ash, that the bitter-sweet purgative substance called manna is secreted.

OLEA'RIUS, ADAM, whose name was **OELSCHLAGER**, was born about the year 1600, in the country of Anhalt. He studied at Leipzig, and made considerable progress in mathematics and philology. Frederic, duke of Holstein Gottorp, having resolved to send an embassy to Russia for the purpose of opening a commercial intercourse through that country with Persia and India, appointed Crusius, a civilian, and Brugman, a merchant, as envoys, and named Olearius secretary to the embassy. The envoys left Holstein in October, 1633, and arrived at Moscow in August, 1634, where they were well received by the czar Michael Federowitz, who was related to Duke Frederic. The czar gave them permission to proceed to Persia by the Volga and the Caspian Sea, and encouraged them in their undertaking. They however returned to Gottorp in April, 1635, in order to make further preparations for the journey. In the month of October of the same year the embassy set off again, arrived at Moscow in March, 1636, and thence descended by various rivers to the Volga, and down that stream to Astrakhan, where they arrived in September. From Astrakhan they sailed into the Caspian Sea, but were wrecked off Derbent; and in December they pursued their journey by land, passing through Ardebil, Sultanieh, Casbin, and Koom. In August, 1637, they reached Ispahan, then the capital of the Persian kingdom. After spending several months at Ispahan, the two envoys, with Olearius, retraced their steps to Derbent, and thence by land to Astrakhan, passing through the desert of Lesghistan, and in January, 1639, they entered Moscow for the third time. On the following August they returned to Gottorp. In consequence of this mission the shah of Persia sent an envoy to the duke of Holstein. Olearius published a narrative of his journey, 'Muscowitische und Persische Reisebeschreibung,' fol., Schleswig, 1647, with plates. It was translated into French by Wicquefort, 4to., 1656, and both the original and the translation went through several editions. The work was also translated into Dutch, Utrecht, 1651; and into English, 'Voyages and Travels of the Ambassadors sent by Frederic, Duke of Holstein, to the Great Duke of Muscovy and the King of Persia; with John A. de Mandelslo's Travels from Persia into the East Indies:' translated by J. Davis, fol., London, 1662.

Olearius was a judicious observer and a conscientious but rather diffuse writer. His account of the state of Russia two centuries ago is extremely curious, as well as the information which he gives concerning Persia. He agrees with other modern travellers in describing the Persians as a very corrupt people, and as more debased than the Turks, though at the same time more refined in external behaviour. The then reigning sovereign of Persia, Saïn Mirza, called also Shah Sefi, grandson of Shah Abbas, he describes as a monster of cruelty and lust. Olearius also speaks very frankly of the conduct of some of the members of the embassy, especially the envoy Brugman, who behaved in a very improper and intemperate manner on several occasions. (b. iv.)

Olearius also published the narrative of Mandelslo's travels to India, which is annexed to the later editions of the travels of Olearius, as well as to the English translation above mentioned. Mandelslo was a young German nobleman who accompanied the embassy to Ispahan, from whence he proceeded to India by Ormuz and Surat. From Surat he went to Agra, where he saw Sultan Kurram, called also Shah Jehan, the then sovereign of the Mogul empire. Returning to Surat, he embarked for Goa, where he remained some time: he then proceeded by sea to Ceylon, from whence he sailed again for Europe, where he arrived at the end of 1639. Besides describing the places which he actually visited, Mandelslo communicated much information which he obtained at Ceylon concerning the Indo-Chinese countries, the empires of China and Japan, and the Philippines, the Moluccas, and Java.

Olearius, after his return, was made councillor and librarian to the duke of Holstein. He died in 1671. He wrote also a chronicle of Holstein, 4to., Schleswig, 1674.

OLEFIANT GAS. [HYDROGEN.]

OLE'GGIO. [NOVARA, Province.]

OLEIC ACID. Several processes have been proposed for the preparation of this acid, which is formed during the action of linseed and some other oils upon potash, and the formation of soap. To procure this acid a solution of the potash soap is to be mixed with a large quantity of water; by this supermargarate of potash is precipitated, and this is to be separated by the filter; the filtered liquor is to be concentrated by evaporation, and the free potash saturated with hydrochloric acid, and water again added precipitates a further portion of the supermargarate of potash: these operations are to be repeated as long as the pearly supermargarate is precipitated by water. After this the clear liquor is to be evaporated and decomposed by a slight excess of hydrochloric acid, which decomposes the oleate of potash, and separates the oleic acid.

The properties of oleic acid, when purified from margaric acid and a little colouring matter, are, that it is a colourless oil; its smell and taste are somewhat rancid; its specific gravity, at 65° Fahr. is 0·898. When cooled a few degrees below 32°, it concretes into a mass of needleform crystals. In vacuo it distils without alteration, but when in contact with air a portion suffers decomposition. It is insoluble in water, but mixes in all proportions with alcohol of specific gravity 0·822, and water precipitates it from the alcohol, which furnishes the best method of freeing it from colouring matter. It reddens litmus, and when heated decomposes the alkaline carbonates.

Oleic acid cannot however be obtained in a separate state, being always in combination with either water or base; 100 parts contain 3·8 of water. The anhydrous acid consists, according to the opinion and atomic numbers of Berzelius, of

70 atoms	. .	carbon	81·32
117 „	. .	hydrogen	11·09
5 „	. .	oxygen	7·59
			——100

It follows from what has been stated of the mode in which oleic acid is procured, that it enters largely into the composition of soaps, forming with potash soft soap, and with soda hard soap.

The *Oleates* in general are not crystallizable salts; and those which are not altogether insoluble are mucilaginous before drying; they are usually very fusible.

Oleate of Potash.—This salt has a bitter alkaline taste. When mixed with twice its weight of water, it swells and forms a transparent jelly; when this quantity of water is doubled, a syrupy liquor is obtained. A still larger quantity of water does not render it turbid, but after a considerable time a mucilaginous superoleate of potash separates. Alcohol dissolves its own weight of oleate of potash, when heated to 124° Fahr. and it solidifies on cooling; 100 parts of boiling æther dissolve 3·43 parts, and the solution remains fluid when cold. Bi-oleate of potash may also be formed; it is soluble in water and in alcohol both hot and cold, and the solution reddens litmus.

Oleate of Soda—Has a slight smell, and a slightly alkaline taste. Cold water dissolves 1-10th of its weight.

Oleate of Barytes is insipid, and insoluble in water. Boiling alcohol dissolves only a small quantity. It is soluble in oleic acid.

Oleate of Magnesia—Has the form of semi-translucent white grains, which soften between the fingers.

Oleate of Copper.—This salt is green. It melts when exposed to the heat of the sun.

Oleate of Lead.—The neutral oleate is prepared in the moist way. It melts between 144° and 153° Fahr. Alcohol and æther dissolve it slowly when cold and rapidly when hot, without altering its neutrality.

Superoleate of Lead.—This salt is liquid at 75° Fahr., and below this temperature becomes an adhesive mass. Boiling alcohol dissolves a little of it, and deposits a neutral salt on cooling. Oil of turpentine and oil of petroleum dissolve it and also the neutral oleate.

OLEIN, or ELAIN. It was first observed by Chevreul that expressed oils and different kinds of fat usually contain two oils of different degrees of fusibility, or in other words, two different fatty substances; so that on cooling any expressed oil, one part of it became solid, while another portion retained its fluidity. In consequence of this observation he concluded that all expressed oils are similarly constituted; to the less fusible oil he gave the name of *stearin* (from στέαρ, suet), and the more fusible he termed *elain* (from ἔλαιον, oil), which was afterwards changed to *olein.*

Several methods have been proposed for separating these two substances. When olive oil, for example, is exposed to a low temperature, a portion of it becomes solid, and the remainder retains its fluid form; the former is *stearin*, or *margarin*, and the latter *olein;* these are separated by absorbing the liquid part by blotting-paper, and pressing the solid portion between folds of this paper till it ceases to render it greasy. The olein which the paper has absorbed is then to be separated from it by boiling it in water, on which the olein floats, and the paper sinks.

Olein has scarcely any taste or smell when procured from oils which possess these properties only in a slight degree. Its specific gravity is 0·98, it solidifies at 27° Fahr., and crystallizes in needles. In water it is quite insoluble, but alcohol takes it up largely when boiling; by the alkalis potash and soda it is readily saponified, and during this operation oleic acid is formed by a new arrangement of the elements of the olein and their action on the elements of water; and these changes occur without the evolution of any gaseous matter.

On account of the very low temperature at which olein congeals, it is well adapted for lubricating the wheels of watches, and its value in this respect is enhanced by its not readily becoming rancid by the action of the air.

According to Saussure, the olein of olive oil consists of

Carbon	. .	76·03
Hydrogen	. .	11·54
Oxygen	. .	12·07
		——99·64

OLEON is a product obtained by distilling oleic acid mixed with lime; the residue is carbonate of lime, while from the commencement of the operation a fluid substance is obtained, which deposits mere traces of solid matter. This liquid is not acid, but the difficulty of obtaining oleic acid in a pure state has hitherto prevented chemists from determining its exact relation to oleic acid, or accurately determining its composition.

OLE'RON, or OLORON, a town in France, capital of an arrondissement in the department of Basses Pyrénées. It is situated on the Gave d'Oléron, 520 miles from Paris by the road through Poitiers, Bordeaux, Bazas, and Pau.

Oléron is an antient town, and appears in the 'Itinerary' of Antoninus under the name of Iluro, and in the 'Notitia Provinciarum Galliæ' under that of Civitas Elloronensium. From the commencement of the sixth century a bishopric existed here, which was suppressed at the Revolution. In the middle ages the town was ruined by the Saracens and the Northmen, but restored by the care of the viscounts of Béarn. It consists now of three parts: the upper town (*ville haute*), and the lower town (*ville basse*), forming Oléron properly so called, chiefly between the Gave d'Aspe and the Gave d'Osson, or Ossau, which, by their junction, form the Gave d'Oléron; and Sainte Marie, a separate commune on the left bank of the Gave d'Aspe. A portion of the lower town is on the right bank of the Gave d'Osson. The population of the commune of Oléron, in 1831, was 6458 (of whom 5850 were in the town itself); that of Sainte Marie, 3371 (of whom 2718 were in the town): giving an aggregate of 9829. The population of Oléron alone, in 1836, was 6620. The upper town is the oldest part of Oléron, and consists of a few lanes, an antient church, and a little old market-house on the summit of a hill. The lower town, which contains the greater part of the population, is at the foot of the hill on which the upper town stands. The trade of the place is carried on here. Sainte Marie, united to Oléron by a lofty bridge, is the best laid out and best-built quarter of the whole town: it contains the former cathedral and episcopal palace.

The chief manufactures of the town are of paper, stockings, the woollen caps worn by the Béarnais peasantry, and box and horn combs for the Spaniards: the manufacture of coarse woollen cloths has much decayed. Considerable trade was formerly carried on in Spanish wool, but it is now trifling. Wool from the surrounding country, sheepskins, cattle, horses, fir timber for masts of ships of war, are sold. Hams, called Bayonne hams, and salted geese, are prepared here and all over the department. There are two yearly fairs. There are some judicial or fiscal government offices in the town.

The arrondissement of Oléron comprehends an area of 712 square miles, and includes 81 communes. It is divided into eight cantons, or districts, each under a justice of the peace. The population, in 1831, was 74,552; in 1836 it was 76,312.

OLE'RON, ISLE OF. [CHARENTE INFERIEURE.]

OLE'RON, LAWS OF. The laws, or constitutions, or judgments of Oleron, are a capitulary of antient marine customs written in old French, and bearing the name of Oleron for several centuries, because tradition points to the island so called [CHARENTE INFERIEURE] as the place of their original promulgation. An antient copy of these laws is to be found in the 'Black Book' of the Admiralty, the original of which is supposed to be in the Bodleian Library; but they are not there called the Laws of Oleron, nor is there any reference in the laws themselves, or in the book which contains them, to their origin or history. They are not unfrequently appended to antient editions of the 'Coutumier' of Normandy under the title of 'Les Jugemens de la Mer:' in Cleirac's edition of the 'Uz et Coutumes de la Mer' they are given, without any description of the book or place from whence they are taken, under the name of 'Roole des Jugemens d'Oleron.' They are generally referred to by French writers on maritime law as 'Jugemens d'Oleron.' The copies of these laws however published by Cleirac, as well as those appended to the 'Coutumier de Normandie,' differ materially from each other, and also from that in the 'Black Book' of the Admiralty, though many of the articles are almost verbally the same in all. They relate to the rights and duties of ship-owners, mariners, maritime contracts, pilotage, port and custom laws, and losses at sea; but are chiefly remarkable at the present day from the circumstance that they were for several centuries adopted by all the nations of Europe as the foundation of their maritime laws.

It has been generally stated by English law writers that the laws of Oleron were compiled and published by Richard I. in the island of Oleron, on his return from the Holy Land. This statement, which is in substance given by Coke, Selden, Hale, Prynne, Blackstone, Reeve, and several English writers on maritime law, furnishes a curious instance of the readiness with which historical errors are propagated when one writer makes his assertions respecting facts from the statements of another without thought or examination. There is scarcely any fact in history more entirely settled, and few more notorious, than that Richard I., in returning from the Holy Land, was shipwrecked in the Adriatic, near Venice, and was immediately taken by Leopold, duke of Austria, and detained a prisoner in Germany (Rymer's *Fœdera*, vol. i., p. 70); and there is good evidence that at the expiration of his captivity he returned home through Flanders, without touching upon his French dominions. (Hoveden.) It is equally clear, from the account of Hoveden and other chroniclers, that on his way to the East he travelled by land through France, and embarked at Marseille for Sicily. There is therefore not the slightest foundation for the statement that these laws were made by Richard I. at the isle of Oleron on his return from the Holy Land. Indeed the only positive evidence that they were the work of Richard at all is found in what Sir Edward Coke calls a 'notable' record in the Tower (4 Inst., 144), which record is also mentioned by Selden in his 'Mare Clausum' (lib. ii., cap. 24). The part of this record however in which these laws are noticed is dated in the reign of Edward III., and consequently 150 years after Richard's time; and according to Mr. Luders's account of it, the document appears hardly to deserve the name of a record, being merely a roll, consisting of detached membranes, relating to maritime and mercantile affairs of different reigns, miscellaneously thrown together, and without any formal date or description, or anything to give them the authority of a judicial act. (Luders's *Inquiry into the Origin of the Laws of Oleron.*) This document contains the following passage, from which the false story, ascribing this piece of legislation to Richard I. has sprung: —'Quæ quidem leges et statuta per Dominum Ricardum quondam Regem Angliæ, in reditu suo de Terrâ Sanctâ, correcta fuerunt, interpretata, declarata, et in insulâ Oleron publicata, et nominata in Gallicâ linguâ La Ley Oleroun.' On the other hand, there are strong reasons for attributing to these ordinances a later date than the reign of Richard I., the principal of which are:—1, that they are written in the French language; whereas in the reign of Richard I. all laws of royal ordinance, both in the king's French dominions and in England, were written and promulgated in Latin; 2, that if they had been promulgated in England before the time of Bracton, Britton, and Fleta, they must have been mentioned by those authors; and 3, that the original historians of the reign of Richard I. (though sufficiently ready to record his merits) never mention this part of his legislation.

Mr. Luders conjectures, in the excellent tract above alluded to, that these laws did not proceed from any royal ordinance; but that the men of Oleron, who had corporate privileges granted to them by the name of 'Burgenses de Olerone,' in the reign of John (Rymer's *Fœdera*, vol. i., p. 111, 112), and had very considerable trade as early as the twelfth century, may have collected adjudged cases upon the laws of the sea, for regulating their own maritime affairs;—that hence the laws of Oleron derived their name; and being received and respected in England and France in the course of the fourteenth century, became known and partially adopted in other nations of Europe. To the copies of the laws appended to the 'Coutumier de Normandie,' and also to those given by Cleirac, in the 'Uz et Coutumes,' an attestation by the seal of the isle of Oleron is attached, with the date of 1266. This seal is inventoried as having been once in the treasury of the Court of Exchequer. See Palgrave's 'Kalendars and Inventories of the Exchequer,' vol. i., p. 106.

OLI'BANUM. This name, of frequent occurrence in comparatively modern works, does not appear to have been known to antient commerce or Materia Medica. It appears to have been derived from the Greek λίβανος, or the Arabic *looban*, which is applied, as well as the name *Koondur*, to the substance known in Europe by the name Olibanum. Avicenna describes a resinous substance under the name *Koondur*, to which, in the Latin translations, Olibanum is given as a synonyme, as well as *Thus*, and with this the Arabian author includes a description of the bark, manna, and smoke of Thus, or frankincense; in the same way as we find, in Dioscorides, the description of Libanos, or Thus, followed by that of the other parts we have mentioned, indicating, as is evident indeed from the description, that Avicenna, under *Koondur*, refers to the λίβανος of Dioscorides. Both authors mention an Indian kind of the substance. Mr. Colebrooke ascertained (*Asiatic Res.*, ix. and xi.) that *Koondur* was applied in India to a fragrant resin still used there as incense, and which he ascertained to be the produce of the tree which has been already described under the article BOSWELLIA *thurifera*. The name *Koondur* appears derived from the Sanscrit *Koondooroo*, which is applied to *looban* by the Hindus. (*Fl. Ind.*, ii., p. 384.) The tree is common in the mountains of Central India, as well as in those of the Coromandel coast, together with *B. glabra*, the other species of the genus, and which extends as far north as 30° in the Sewalik or sub-Himalayan range of hills.

Dr. Royle mentions that he has collected off the trunk of this species, in the latter locality, some very clear, pure, and fragrant resin, which burns rapidly away with a bright light, diffusing a pleasant odour. Both species yield this fragrant resin, which is employed as incense in India, and which might be much more extensively collected than at present. From the affinity in vegetation between parts of Arabia, Persia, and India, it is not improbable that the genus Boswellia may extend to Arabia, and there produce the kind known as *Arabian Olibanum*, the tree yielding which has not yet been traced out by botanists. But with respect to most of the Arabian exports, it is difficult to know whether they are the produce of that country, or have been first obtained by commerce and then re-exported, whence in early times Arabia obtained celebrity for producing so many of the fragrant and aromatic substances which we now know were obtained from Africa and India.

Dr. Royle further states that in Bengal the name *looban* is applied to Benzoin, though in Northern India applicable only to Koondur, the produce of *Boswellia thurifera*, and also that in Persian works, Benzoin is distinguished by the names 'hussee-al-jawa' and 'hussee looban.' (*Illustr. Himal. Bot.*, pp. 177 and 261.)

OLIFANT'S RIVER. [CAPE OF GOOD HOPE.]

OLI'GODON, a name given by Boié to some small serpents belonging to the great genus *Coluber*, characterized by their blunt, short, and narrow head, and their want of palatine teeth.

OLI'VA is a considerable and well-built town, with 1500 inhabitants, situated in a beautiful country about a mile from the Baltic, in the government of Danzig. It was formerly a Cistercian abbey of great celebrity. The abbey church is a fine building and contains much that is worthy of the notice of travellers. There are 20 altars, of which the high altar is of black marble; one of the largest and finest organs in northern Europe, which was 37 years in building; and a considerable collection of valuable paintings. It was in this town that the memorable treaty of peace was concluded on the 3rd of May, 1660, which put an end to the war between Sweden, Poland, the emperor of Germany, and Brandenburg. John Casimir, king of Poland, gave up his pretentions to Sweden, and the republic ceded to Sweden, Northern Livonia, Esthonia, and the island of Œsel. Sweden renounced Courland, and both parties recognised the independence of Prussia. Hereupon Sweden, by the treaty of Copenhagen, 27th May, 1660, restored to Denmark, Drontheim and Bornholm; lastly it concluded in 1661 the convention of Kardes with Russia, on the basis of the 'Status quo ante Bellum.' Thus the peace of Oliva regulated the political relations of the north. This important event is recorded on a marble tablet which is preserved in the cathedral of Oliva. The prince bishop of Ermeland, who is the abbot, possesses, besides the abbey, a fine palace with an extensive park. One of the greatest ornaments of the town is the Karlsberg, an eminence rising 270 feet above the level of the sea, which commands a most magnificent panorama, embracing on one side the Baltic with the road of Danzig crowded with ships, on another the town of Oliva with the tower of the venerable abbey at the foot of the hill, on a third side the pleasing valley called the Schwabenthal, with many country-houses of the wealthy citizens of Danzig and the steeples of the city in the background, and to the north-west richly wooded hills and mountains. In the vicinity there are several steel, iron, and copper works.

(Müller's *Handbuch;* Böhme, *Acta Pacis Olivensis inedita*, 1763-1765, Breslau, 4to.)

OLI'VA. (Malacology.) [VOLUTA.]

OLIVA'REZ. Gaspar Guzman, Count Duke de Olivarez, was descended from one of the most illustrious families of Castile, which for three centuries had distinguished itself by courage, honour, and loyalty. Alfonso Perez de Guzman, the first of this name of whom mention is made, was the great captain of the thirteenth century, and his exploits against the Moors, as well as in the contest between the two princes of Spain, Don Juan and Don Sancho, have furnished some of the most interesting pages of the history of that period. The virtues and military abilities of this family elevated them to the highest dignities of the kingdom; and the Count Duke de Olivarez reckoned in his lineage, besides the noble house of Medina Sidonia, a long line of illustrious ancestors. But in him the virtues of the first Guzmans were completely lost, nor was he endowed with abilities equal to the times in which he lived, and to the duties of his exalted station.

The Count Duke de Olivarez was born at Rome, about 1587, where his father had been sent as ambassador of Philip III., and was educated in the university of Salamanca. On the termination of his studies, his uncle, the Duke of Uceda, introduced him to the prince of Asturias as gentleman of the bedchamber, and Olivarez now began to show that love of power which was the passion of his after-life. To gain the affections of him who was to be the ruler of the empire was a great step towards future aggrandizement, and in this he succeeded so completely, that when Philip IV., at the age of seventeen, ascended the throne of Spain, in 1621, Olivarez was intrusted with the management of the affairs of the kingdom. Policy induced him to abstain for a few months from assuming any definite public character, and this apparent disinterestedness endeared him still more to the young king, who, as a token of his increased esteem, conferred on the favourite the title of Duke de San Lucar.

Guzman now laid aside the mask of moderation, and displacing his benefactor the Duke of Uceda, and dismissing all the best servants of the people and the king, he assumed uncontrolled power. The consciousness that he was building his greatness on the ruin of others, made him so suspicious, that he saw an enemy in every individual whom the late minister had patronised. Actuated by this feeling, he surrounded himself with men who had scarcely any other claim to his confidence than attachment to his person, and he put them in places of the first responsibility; those who had hitherto occupied these places were dismissed, and often imprisoned. Ability and popularity in any individual were, to this jealous favourite, sure causes of alarm; and he who had the misfortune to possess either, was sure to give offence. These acts of injustice were however counterbalanced during the first period of the elevation of Olivares by various useful regulations, in which he showed a wish to equalise the rights of the Spaniards and to promote the general prosperity of the country. Grants, both unmerited and profuse, which had been made by preceding kings, were recalled; marriage was encouraged by exemption from taxes; foreign artists and agriculturists were invited, by advantageous offers, to settle in Spain; about two-thirds of the idle officials were dismissed, and various sumptuary laws were enforced. Thus the revenue of the state was greatly increased, but the mass of the nation, the labouring part of the community, derived no benefit from these measures. Olivarez, while directing his attention to secondary means, neglected the vital principles on which depend the internal prosperity of a nation, the encouragement of agriculture, commerce, and the mechanical arts. These were suffered gradually to decline, an error which afterwards proved fatal to the popularity of the corrupt favourite; and the discontent excited by distress at home was increased by the constant failure of the minister's negociations abroad.

Cardinal Richelieu, then first minister of France, and the duke of Buckingham, the favourite and prime minister of Charles I., and particularly the former, possessed abilities which made them more than a match for the unprincipled Spanish minister. Independent of the personal dislike which Olivarez felt towards the cardinal, each of these statesmen entertained views which placed them in constant opposition. The aim of Olivarez was to raise the preponderance of the house of Austria; that of the cardinal, to depress both Austria and Spain. Buckingham sided with the French or Spanish favourite as it suited his interest. Thus though Spain exhausted her coffers in spreading her armies over Holland, Germany, and Italy, whatever advantages she obtained were rendered unavailing by the superior combinations of Richelieu. Olivarez was baffled in every attempt to regain the influence which Spain had once exercised all over Europe, and he brought the country to the verge of ruin.

The unpopularity of Olivarez, owing to these reverses and mistaken policy, had become general, when the insurrections of Catalonia and soon after that of Portugal took place, in 1640, in consequence of the minister's attempts to invade the rights of those states. These events, and more particularly his attempts to trample on the privileges of a proud nobility, in which he had only a selfish object in view, were a death-blow to the power of the minister. He still struggled for three years against his failing fortune, but was at length compelled to abandon the affairs of state. In 1643 he was requested by the king to resign, just at the moment when the death of Richelieu opened to him the prospect of success. Olivarez administered the affairs of Spain for the long period of twenty-two years, but more through the favour of the feeble king whom he governed than by his capacity, and his name has become historical not for the good which he did, but from the position which he occupied. Detested by the whole nation, he spent the short remainder of his life in obscurity. He died in 1643, shortly after his disgrace.

(Cespedes, *Hist. de Felipe IV.*) This writer is partial to Olivarez.

OLIVE OIL has already been mentioned as the produce of OLEA EUROPÆA. Olive oil, being so extensive an article of commerce, and the tree in consequence so important as to have been called by one author 'a mine upon earth,' requires separate mention. The olive flourishes only in warm and comparatively dry parts of the world, as the south of France and Spain, in Italy, Sicily, Syria, and the north of Africa. Humboldt has stated 'the olive flourishes between the parallels of 36° and 44°; wherever the mean annual temperature is from 62·6° to 58·1°, where the mean temperature of the coldest month is not below from 41° to 42·8°, and that of the whole summer from 71·6° to 73·4°.' Great cold is injurious to it, as that of 1709 was to the olive-trees of France; and as M. Bové states that the olive thrives in Egypt, and Delile that it contributes to the riches of the Fayoum, which is nearly in the latitute of Cairo, it is evident that it is capable of bearing a greater degree of heat, as is probable indeed from its being a native of Asia, having been cultivated in early times in Syria and Palestine by the antient Hebrews, and known to them by the name of *zait*, and to the Arabs by that of *zaitoon*. It is said to have been introduced by the Phocæans into Marseille.

Olive oil is largely produced in Spain, France, and Italy, though most extensively imported from the last-mentioned country into England. Thus, of 2,791,057 gallons of olive oil imported in 1830, 2,034,237 were from Italy; 639,468 from Spain, 52,004 from Malta, partly at second-hand 21,467 from Turkey, 11,300 from the Ionian Islands, and about 30,000 at second-hand from the Netherlands and Germany. Provence and Languedoc are the provinces best suited in France to the production of olive-oil, and the finest quality is prepared in the neighbourhood of Aix. It is produced in Lucca and Florence, and exported from Leghorn; also in the kingdom of Naples, chiefly in Apulia and Calabria, and largely exported from Gallipoli, on the east coast of the Gulf of Tarento, whence it is commonly known by the name of Gallipoli oil. The duty levied is 8*l.* 8*s.* a tun (252 wine gallons), and amounts to about 20 per cent., or one-fifth, of the price.

Olive oil is the lightest of the fixed oils, and is largely used in the south of Europe as an article of diet, and likewise in cookery and for salads in the north. It is also used in many of the arts where fine oil is required, as to make the best kinds of soap, and in the woollen manufacture. In a very interesting paper in the volume, 'Vegetable Substances employed as Materials of Manufactures,' it is stated that Gallipoli oil is purified to the highest degree by merely keeping it in cisterns hollowed out of the rock on which the town is built. See also M'Culloch's *Com. Dict.*; and for the culture of the olive, the works of Bernard, Amoreux, and Rozier.

OLIVE-TREE. [OLEA EUROPÆA.]

OLIVELLA, Mr. Swainson's name for a genus, or rather subgenus, separated by him from *Oliva;* and characterized as having two plaits on the columella.

OLIVER, ISAAC, an English painter, was born in the year 1556. He studied first under Hilliard, and received further instruction from Frederick Zucchero. His chief employment was in painting the portraits in miniature of the most distinguished personages of his time, and many very fine portraits by him are preserved in the collections of the English nobility and gentry. Among them there are some portraits of himself, of Queen Elizabeth, Mary queen of Scots, Prince Henry, son of James I., Ben Jonson, and others, which are admirably finished, and fully justify the high reputation which he enjoyed. A whole-length portrait of Sir Philip Sydney is especially admired. It is no mean testimony to his merit that Rubens and Vandyck painted King James I. after a miniature by this master. He was a good and correct designer, his touch was neat and delicate, and his works are still as highly esteemed as they were by his contemporaries. Though he generally worked in miniature, he frequently painted on a larger size, and sometimes attempted historical subjects, in which there is much merit. He occasionally worked in oil as well as in water-colours, but with little success. His drawings, many of which are copies from Parmegiano, are beautifully finished and highly prized. In the apartment called Queen Caroline's Closet at Kensington Palace, there is a fine drawing by Oliver, the subject of which is the Entombment of our Saviour, and another from Raphael's Murder of the Innocents. He died in 1617, at the age of 61.

OLIVER, PETER, the son and disciple of Isaac, was born in 1601, and though so young at the time of his father's death, had so well profited by his instruction and example, that he attained a degree of perfection in miniature portrait painting indisputably superior to his father or to any of his contemporaries, especially as he did not confine his subjects to a head only. He likewise painted historical pictures, nineteen of which were in the collection of Charles I. and James II. Seven of these are still preserved in Queen Caroline's Closet at Kensington.

OLIVES, MOUNT OF. [JERUSALEM.]

OLIVET, JOSEPH THOULIER D', was born at Salins, the 1st of April, 1682, of respectable parents. Having been admitted among the Jesuits, he was sent to their college at Reims in 1700, and afterwards to Dijon and Paris. At Paris he became acquainted with some of the most eminent literary men of the time, and took an active part in the controversy, which then existed in the French Academy, on the comparative merits of the antient and modern writers. He warmly supported the claims of the Latin and Greek writers to our attentive study, in opposition to the opinions of Fontenelle, La Mothe, and Perrault. Olivet left the society of the Jesuits about the year 1714, much to their regret, who offered him the place of instructor to the prince of Asturias to induce him to remain.

In 1723 Olivet was elected a member of the French Academy. He passed the remainder of his life at Paris, engaged in various literary works, and in occasional squabbles with his associates in the Academy. He died at the advanced age of 86, on the 8th of October, 1768. The personal character of Olivet appears, notwithstanding the attacks of some of his enemies, to have been without reproach. Among his numerous friends, who always spoke of him with the greatest respect, no one appears to have had a higher opinion of his talents and virtues than Voltaire, who was introduced by Olivet into the French Academy (*Discours de M. de Voltaire à l'Académie Française*, Œuvres complètes, vol. 46.) Several letters of Voltaire to Olivet are extant.

The principal work of Olivet is his edition of Cicero, which was originally published at Paris in 1740-1742, in 9 volumes 4to. This edition, which is of little critical value, contains many useful notes, chiefly extracted from preceding commentators. It was reprinted at Geneva in 1758, in 9 volumes 4to., and very incorrectly at Oxford in 1783, in 10 volumes 4to. Olivet's translations of Cicero are some of the best that have been published, though, like most of the French translations, they are deficient in accuracy. Of these the principal are, the 'De Natura Deorum,' 1721, 1732, &c.; the 'Tusculanæ Quæstiones,' 1737, 1747, of which the third and fifth books are translated by Bouhier; the Orations against Catiline, together with the 'Philippics' of Demosthenes, 1727, 1736, &c. He also edited extracts from Cicero with a translation into French, under the title of 'Pensées de Cicéron,' which has been frequently reprinted and extensively used in the French schools. The only other work of Olivet worthy of notice is his continuation of Pélisson's 'History of the French Academy' (*Histoire de l'Académie Française*), published originally in 1749, in 2 vols. 4to., and reprinted in 1730, in 2 vols. 12mo.

OLIVIER, CLAUDE MATTHIEU, born at Marseille in 1701, became councillor to the parliament of Paris, and distinguished himself as a pleader. He was one of the founders of the University of Marseille. He wrote several works, the principal of which is the 'Histoire de Philippe Roi de Macédoine et Père d'Alexandre le Grand,' 2 vols. 12mo., Paris, 1740, published after the death of the author. He wrote also a dissertation on the 'Critias' of Plato, which is in the 'Mémoires de Desmolets;' two 'Mémoires sur les Secours donnés aux Romains par les Marseillais pendant la Seconde Guerre Punique et durant la Guerre contre les Gaulois;' a 'Parallel of Tibullus and Ovidius,' and other minor productions. Olivier died at Marseille in 1736.

OLIVIER, GUILLAUME ANTOINE, born near Frejus in 1756, studied medicine at Montpellier, where he took his doctor's degree at the age of seventeen. He afterwards applied himself especially to the study of natural history, and having settled at Paris, published several memoirs which made him known to persons in office. At the time of the Revolution, the Girondin minister Roland, having conceived the idea of sending a mission to Persia for commercial and political purposes, appointed Olivier, and Bruguières, another naturalist. They set off for Constantinople in April, 1793, but soon after the Girondins having been replaced by Robespierre and the terrorists, Olivier and his companion were left without resources to prosecute their journey. They however took courage, and with the assistance of the French consuls in the Levant, they visited Egypt, Syria, and other parts of the Ottoman empire, and then proceeded by Mosul and Bagdad to Persia, and arrived at Teheran in July, 1796. The ruler of Persia was then the eunuch Aga Mehemet Khan, a ferocious tyrant. His minister however received the French envoys with courtesy, but owing to the distracted state of the country, nothing was effected towards the object of the mission. Olivier and his companion visited Kom, Ispahan, and other places, after which they retraced their steps to Bagdad in November, 1796. From Bagdad they returned to Syria, and thence by Cyprus and Asia Minor to Constantinople. They then repaired to Athens, and from thence to Patras and Corfu, where they embarked on board a French frigate for Ancona, at which place they arrived in September, 1798. After his return to France Olivier prepared a narrative of his travels, which were published in 3 vols. 4to., with an atlas, Paris, 1807. The style is plain and unassuming; the observations are generally sensible and correct, and the author has added a sketch of the history of Persia from the usurpation of Nadir Shah to the end of the eighteenth century, when Fetah Ali Khan took possession of the throne. There is also considerable information concerning Mesopotamia, the Koords, and Bagdad, as well as regarding the Greek islands.

Olivier continued his studies of natural history, and published the 'Histoire Naturelle des Coléoptères,' 6 vols. 4to., Paris, 1808; and also 'Dictionnaire de l'Histoire Naturelle des Insectes,' in which he was assisted by others, in 9 vols. 4to. He died at Lyon in 1814.

OLLMÜTZ is one of the six circles of the Austrian margravate of Moravia: it has an area of 1900 square miles, with a population of above 400,000 inhabitants.

Ollmütz, formerly the capital of the margravate, but now only the chief town of the circle, is a well-built and strongly fortified town, in 49° 33′ N. lat. and 17° 9′ E. long. It is situated between two arms of the river Marsh, by which it is nearly surrounded. The houses are substantial and lofty, but gloomy, and most of them are raised on square buttresses, with piazzas. Ollmütz has four gates, five suburbs, and several remarkable public buildings and institutions of various kinds. There are thirteen churches, including the cathedral, which is an antient venerable pile of building. A magnificent edifice, which was formerly a college of the Jesuits, is now converted into barracks. The University library is likewise a fine structure, formerly a seminary of the Jesuits; and its collection of books, which has been augmented by those of suppressed monasteries, consists of above 50,000 volumes. The town-hall is a handsome edifice, detached from any other building, with a tower 250 feet high, in which is a very remarkable and once celebrated clock, which however has long been out of repair. The palace of the archbishop is a very extensive building, magnificently fitted up, but the prelate generally resides at Kremsier. The University, founded in 1581, was transferred to Brünn in 1784, but re-established in 1827: it consists of four faculties, and has between 600 and 700 students. Among the public institutions are a gymnasium, an episcopal seminary, a school for military cadets, a great infirmary, lying-in-hospital and orphan asylum, and the central board for the management of the affairs of widows and orphans in all the Austrian hereditary dominions. The population is stated by Cannabich, in 1836, at 13,588, but the 'Conversations Lexicon,' 1836, makes it amount to 19,000. The town has considerable manufactories of woollen cloths, numerous tanneries, and a brisk trade, an important article of which is the sale of cattle from Russia and Moldavia. The bishopric of Ollmütz, which is very antient, was erected into an archbishopric in 1777, and is one of the richest benefices in Austria. In 1758 Ollmütz was besieged by Frederick II., but bravely defended by the garrison, assisted by the inhabitants, till Marshal Daun came to its relief. The empress Maria Theresa testified her satisfaction by conferring on the town various rewards and honours.

(Stein, *Geogr. Lexicon*; Hassel, *Handbuch*; Cannabich, *Geographie*; *Oesterreichische National Encyclopädie.*)

OLME'DO, a town in the kingdom of Leon in Spain, situated in 41° 18′ N. lat. and in 4° 37′ W. long. It is in the province of Valladolid, and within the bishopric of Avila, and is the chief town of the small *partido*, or district, which bears its name. It lies near the confines of the provinces of Segovia and Avila, and is 8 leagues from Valladolid, 3 from Medina del Campo, 11 from Segovia, and 22 from Madrid.

The town is situated on an eminence on the eastern side of an extensive plain, fertile in wheat, rye, barley, oats, wine, and fruits, and affording pasturage to large flocks of sheep, and a few horses and horned cattle. At the base of the hill flows the Eresma, and at the distance of a league to the west the plain is intersected by the Adaja, both tributaries of the Duero. Olmedo was formerly strongly fortified, and still preserves an enclosure of walls. The population, according to Miñano, was in 1826 about 2150. It contains six parish churches, seven convents (two of monks and five of nuns, all suppressed in 1835), two hospitals, a public granary, and a posting establishment. A brandy-distillery, a saw-mill, and two tile-works, are the only manufactories. Its annual contribution to the royal treasury is 32,000 reales, or about 340*l*.

Olmedo is celebrated in Spanish history as the seat of several cortes, and for two sanguinary battles fought in its neighbourhood, the first in 1445, in which Juan II. of Castile obtained a victory over the Aragonese; the second, fought in 1467, between Enrique IV. of Castile and the rebels headed by his brother the Infante Don Alonso.

(Miñano; Laborde; Mariana.)

OLNEY. [Buckinghamshire.]

OLONETZ is an extensive government of Great Russia, comprised between 60° 30′ and 66° 30′ N. lat. and 29° 40′ and 40° 20′ E. long. According to Schubert the area is 79,520[*] square miles, including the great lake Ladoga, and the population 359,800. It is bounded on the north and north-east by Archangel, on the south-east by Wologda, on the south by Novogorod, on the south-west by Petersburg, and on the west by Lake Ladoga and Finnland.

Face of the Country; Soil; Climate.—As this government extends to the polar circle, its northern half has entirely the character of the high northern latitudes, while the southern part has more of the character of the temperate zone. The Scandinavian mountains enter the country from the north-west, surround the two great lakes Ladoga and Onega, and run to the borders of Petersburg and Novogorod. This range is low and rocky, the highest summits scarcely rising more than from 300 to 420 feet above the general level, yet they are covered during a great part of the year with snow. The country at their base is in general low, wet, and swampy. The summits are clothed with thick forests of fir and other timber: the declivities are in some places open and susceptible of cultivation. Blocks of granite, some of them of enormous size, are scattered all over the mountains. The dry, open, and wooded parts contain under the greensward pure or clayey mould over clay mixed with boulders of the rocks of the country: in the morasses bog-iron ore abounds, with deep sand and clay. The surface may be said to be equally divided between mountains and forests, open tracts, morasses, and water.

This government contains 1998 lakes, and 858 rivers and rivulets. The two greatest lakes are La'doga and Onega: of the former, only the larger portion is in this government, the remainder being in Petersburg and Archangel; but we have included, after Hassel, the whole area of 6100 square miles in the area of this government. Lake Onega is nearly in the centre of the government: its mean length is 130 miles, and the breadth from 70 to 80 miles. Like Lake Ladoga, it contains numerous islands, most of which are covered with forests. Among the largest of the other lakes are Sego, Wiga, Kemscha, Leckta, Wodlo, Latscha, Kounta, and Nuk. The principal rivers are the Svir, which runs from Lake Onega into Lake Ladoga, and though full of boulders, is navigable; the Olonka, the Ruskola, and the Janez, all which run into Lake Ladoga. The following rivers run into Lake Onega:—the Wytegra, the Wode, the Lisch, and the Suma, all flowing from lakes of the same names, and the Losocha. The most considerable river however is the Onega, which issues from Lake Lussa, near Lake Onega, and running through the government of Archangel, falls into the White Sea. In many of these rivers there are waterfalls, the most remarkable of which is that called Kiwatscha, in the river Suna. With the exception of the circle of Kem, the climate is pretty uniform: the spring is long and damp, with frequent night frosts; the summer short, with many foggy days, the vegetation being however very vigorous, on account of the length of the days: the autumn is bleak; the winter long and severe. In 1787 quicksilver froze in Wytegra. The corn, notwithstanding, ripens well; but unforeseen accidents sometimes destroy the entire harvest. The health of the inhabitants does not suffer by the cold.

Natural Productions.—Notwithstanding the cold and severe winter and the short summer, agriculture is carried on in all the circles, even in that of Kem, which is between 64° and 66° 30′ N. lat. The inhabitants cannot however raise sufficient corn for their own consumption, and are obliged to import from other governments. Flax and hemp thrive, and are extensively cultivated. There is no fruit, but the want of it is in some measure compensated by the abundance of wild berries, such as cranberries, bilberries, &c. There are numerous small gardens, in which turnips, carrots, radishes, onions, and sometimes cucumbers and potatoes are cultivated. The government is well provided with timber; and the crown forests alone cover 8,956,795 dessatines. Except the oak and beech, almost all the forest trees common in Russia flourish here, except in the circle of Kem. The southern mountains, the islands in Lake Onega, and the circle of Karapel, are rich in forests, in which there are not only the finest larches, but pines fit for masts of 100 feet in length. The inhabitants in fact derive their chief means of subsistence from the forests, which supply them not only with fuel and timber for building their houses and boats, but likewise with rosin, turpentine, pitch, tar, charcoal, tanners'-bark, balks, planks, and laths for exportation.

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[*] This estimate includes the circle of Kem, which some writers assign to Archangel, as is done in the article Archangel. Hassel, 1821, follows Georgi, who expressly states that Kem was taken from Archangel and added to Olonetz, by order of Alexander, in 1801. Horschelmanu, 1835, gives Kem to Olonetz; Schnitler, 1835, and Cannabich, 1836, give it to Archangel. Without Kem, Olonetz is divided into seven circles.

The fur-bearing animals furnish a profitable article of commerce. The breeding of cattle is not carried on to any extent, because their maintenance in the long winter is too expensive. Almost every peasant however has a couple of horses, cows, sheep, swine, and some domestic fowls. The wild animals are bears, wolves, elks, gluttons, many greyish-red and a few black foxes, a great number of badgers, and wild reindeer. Seals are found in the two great lakes. Waterfowl of various kinds abound. The fisheries are very productive: great quantities of sturgeon and salmon are sent to St. Petersburg. The minerals are granite, serpentine in large masses and of excellent quality, porphyry of various colours, sandstone, quartz, lime, clay, slate, alabaster, talc in large tables, plaster of Paris, and marble, which is procured in great abundance, especially at Twidia, on the west side of Lake Onega. There is likewise a good deal of iron, which is partly smelted in six great furnaces, and partly by the inhabitants in small furnaces, and wrought into various articles for domestic use. One manufactory of copperas produces annually 36,000 lbs. Besides these metals and minerals, the province has copper and gold mines, but not sufficiently rich to defray the expenses of working them; there are also silver, lead, and sulphur. Salt is obtained from some springs, but not sufficient for the supply of the inhabitants.

Manufactures and Trade.—It may be presumed that in a country so far to the north, with a scanty population,* there can be few manufacturing establishments on a great scale. More might be done if the inhabitants did not prefer going to seek employment in the other provinces, particularly in harvest time. The articles exported are the natural productions of the government, cannon from a foundry belonging to the crown, cast-iron, and some tallow: by far the greater part of the exports goes to Petersburg, and the remainder to Archangel.

The great majority of the inhabitants are Russians: in the western part there are many Finns, some of whom have embraced the religion of the Russian-Greek Church, while a large portion are still Lutherans. There are a few nomade Laplanders in the circle of Kem.

Education.—Schnitler, in 1835, says: 'For public instruction Olonetz is under the university of St. Petersburg. In 1824 there were 10 schools, with 22 masters and 349 scholars, of whom 4 were girls; in 1832, 11 schools, with 31 masters and 402 scholars. We do not know the state of the ecclesiastical schools. There is not one bookseller in the whole government, and only one printing-office, which belongs to the crown.' There is no great town.

Olonetz, the former capital, is situated in 61° 0′ 45″ N. lat. and 32° 50′ E. long., on the river Olonka. It is an open town, with 2800 inhabitants. There are three stone and five wooden churches. A good deal of fine thread is manufactured here, and a considerable trade is carried on, partly across Lake Ladoga with Petersburg, and partly at the two annual fairs. The first dockyard established by Peter the Great was at Onega, and ship-building is still carried on.

Petrozavodsk, the present capital, is situated in 61° 47′ N. lat. and 34° 24′ E. long., on a bay of Lake Onega, and was so named by the empress Catherine II. from many manufactories (zavod) erected by Peter the Great, but now in ruins. It is an ill-built uninteresting town, remarkable only for the great imperial cannon-foundry.

(Hassel, *Handbuch*; Stein, *Geogr. Lexicon*; Cannabich, *Geographie*; Schnitler, *La Russie, la Pologne, et la Finlande*, 1 vol. 8vo., Paris, 1835.)

OLONNE, LES SABLES D'. [Vendee.]

OLYGY'RA, M. Say's name for a genus of operculated pulmoniferous gastropods, which, as well as *Ampullina* of M. de Blainville, M. Rang would refer to the genus *Helicina* of Lamarck. [Helicidæ, vol. xii., p. 109.]

OLYMPIAD. [Æra.]

OLYMPIAN GAMES, the chief of the four great national festivals of the Greeks, were celebrated at Olympia, a sacred spot on the banks of the Alpheus, near Elis, every fifth year. The exact interval at which it recurred was one of forty-nine and fifty lunar months alternately; so that it fell sometimes in the month of Apollonius (July), sometimes in the month of Parthenius (August). (Boeckh ad Pind. *Olymp.*, iii. 18, p. 138; Müller's *Dorians*, vol. i., p. 281, trans.) The period between two celebrations was called an Olympiad. It lasted five days.

The origin of this festival is concealed amidst the obscurity of the mythic period of Grecian history. Olympia was a sacred spot and had an oracle of Jupiter long before the institution of the games. The Eleans had various traditions which attributed the original foundation of the festival to gods and heroes at a period long before the Trojan War; and among these to the Idæan Hercules, to Pelops, and to Hercules the son of Alcmena. The Eleans further stated, that after the Ætolians had possessed themselves of Elis, their whole territory was consecrated to Jupiter; that the games were revived by their king Iphitus, in conjunction with Lycurgus, as a remedy for the disorders of Greece; and that Iphitus obtained the sanction of the Delphic oracle to the institution, and appointed a periodical sacred truce, to enable persons to attend the games from every part of Greece and to return to their homes in safety. This event was recorded on a disc, which was preserved by the Eleans, on which the names of Iphitus and Lycurgus were inscribed. (Plutarch, *Lycurg.*, 1; Pausan., v. 20, 21.) Other accounts mention Cleosthenes of Pisa as an associate of Iphitus and Lycurgus in the revival of the festival. 'All that can be safely inferred from this tradition, which has been embellished with a variety of legends, seems to be, that Sparta concurred with the two states most interested in the plan, and mainly contributed to procure the consent of the other Peloponnesians.' (Thirlwall's *History of Greece*, vol. i., p. 386.) The date of the revival of the festival by Iphitus is, according to Eratosthenes, 884 B.C.; according to Callimachus, 828 B.C. Mr. Clinton prefers the latter date. (*Fasti Hellenici*, vol. ii., p. 408, note h.) The Olympiads began to be reckoned from the year 776 B.C., in which Coroebus was victor in the foot-race. We have lists of the victors from that year, which always include the victors in the foot-race, and in later times those in the other games. (Pausan., v. 8. 3.)

This, like all the other public festivals, might be attended by all who were of the Hellenic race, though at first probably the northern Greeks and perhaps the Achæans of Peloponnesus were not admitted. Spectators came to Olympia not only from Greece itself, but also from the Grecian colonies in Europe, Asia, and Africa. Among them were solemn deputations sent to represent their respective states. Women however were forbidden to appear at Olympia, or even to cross the Alpheus, during the festival, under pain of death. But at a later period we find women taking part in the chariot-race, though it is doubtful whether they drove their own chariots. An exception was made to this law of exclusion in favour of the priestess of Ceres and certain virgins, who were permitted to be present at the games, and had a place assigned to them opposite the judges. The management of the festival was in the hands of the Eleans. Originally indeed Pisa, in which state Olympia lay, seems to have had an equal share in the administration: but in the fiftieth Olympiad the Eleans destroyed Pisa, and from that time they had the whole arrangement of the games. They proclaimed the sacred truce, first in their own territories, and then throughout the rest of Greece. This truce took effect from the time of its proclamation in Elis, and while it lasted the Elean territory was inviolable, any armed invasion of it being esteemed an act of sacrilege. On this privilege the Eleans founded a claim to have their territory always considered sacred, though in fact they themselves did not abstain from war. As the presiding nation, they gave laws for the regulation of the festival, imposed penalties on individuals and states, and had the power of excluding from the games those who resisted their decrees. They actually thus excluded the Lacedæmonians on one occasion and the Athenians on another.

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* According to Schubert (1835), only 5 inhabitants to an English square mile: it must however be remembered that the area of the two great lakes and of the numerous small ones is included.

The Eleans appointed the judges of the contests, who were called Hellanodicæ. (Paus., v. 9. 4, 5.) They were instructed in the duties of their office for a period of ten months before the festival by Elean officers, called Nomophylaces (Paus., vi. 24. 3): they were sworn to act impartially, and an appeal might be made from their decision to the Elean senate. (Paus., vi. 24. 3.) Their number varied at different periods: in the 106th Olympiad it was fixed at ten, which was the number ever afterwards. The judges had under them officers, called *ἀλύται*, whose business was to keep order. These officers were called *μαστιγόφοροι* in the other Grecian games.

The Olympian festival consisted of religious ceremonies, athletic contests, and races. The chief deity who presided over it was Jupiter Olympius, whose temple at Olympia, containing the ivory and gold statue of the god by Phidias, was one of the most magnificent works of art in Greece. (Paus., v.) The worship of Apollo was associated with that of Jupiter (Müller's *Dorians*, vol. i., p.279-281, trans.); and the early traditions connect Hercules with the festival. (*Ibid.*, p. 453.) This is another proof of the Dorian origin of the games, for Apollo and Hercules were two of the principal deities of the Doric race. There were altars at Olympia to other gods, which were said to have been erected by Hercules, and at which the victors sacrificed. The most magnificent sacrifices and presents were offered to Jupiter Olympius by the competitors and by the different states of Greece.

The games consisted of horse and foot races, leaping, throwing, wrestling, and boxing, and combinations of these exercises. 1. The earliest of these games was the *foot-race* (*δρόμος*), which was the only one revived by Iphitus. The space run was the length of the stadium in which the games were held, namely, about 600 English feet. In the 14th Olympiad (724 B.C.) the *δίαυλος* was added, in which the stadium was traversed twice. The *δόλιχος*, which consisted of several lengths of the stadium (seven, twelve, or twenty-four, according to different authorities), was added in the 15th Olympiad (B.C. 720). A race in which the runners wore armour (*ὁπλιτῶν δρόμος*) was established in the 65th Olympiad, but soon after abolished. 2. *Wrestling* (*πάλη*) was introduced in the 18th Olympiad (B.C. 708). The wrestlers were matched in pairs by lot; when there was an odd number, the person who was left by the lot without an antagonist wrestled last of all with him who had conquered the others. He was called *ἔφεδρος*. The athlete who gave his antagonist three throws gained the victory. There was another kind of wrestling (*ἀνακλινοπάλη*), in which, if the combatant who fell could drag down his antagonist with him, the struggle was continued on the ground, and the one who succeeded in getting uppermost and holding the other down gained the victory. 3. In the same year was introduced the *pentathlon* (*πένταθλον*), or, as the Romans called it, *quinquertium*, which consisted of the five exercises enumerated in the following verse, which is ascribed to Simonides:—

> Ἅλμα, ποδωκείην, δίσκον, ἄκοντα, πάλην,

that is, 'leaping, running, throwing the quoit, throwing the javelin, wrestling.' Others give a different enumeration of the exercises of the pentathlon. In leaping, they carried weights in their hands or on their shoulders: the object was to leap the greatest distance, without regard to height. The discus, or quoit, was a heavy weight of a circular or oval shape; neither this nor the javelin was aimed at a mark, but he who threw farthest was the victor. In order to gain a victory in the pentathlon, it was necessary to conquer in each of its five parts. 4. *Boxing* (*πυγμή*) was introduced in the 23rd Olympiad (B.C. 688). The boxers had their hands and arms covered with thongs of leather, called *cestus*, which served both to defend them and to annoy their antagonists. Virgil (*Æn.*, v. 405) describes the cestus as armed with lead and iron; but this is not known to have been the case among the Greeks. 5. The *pancratium* (*παγκράτιον*) consisted of boxing and wrestling combined. In this exercise and in the cestus the vanquished combatant acknowledged his defeat by some sign; and this is supposed to be the reason why Spartans were forbidden by the laws of Lycurgus to practise them, as it would have been esteemed a disgrace to his country that a Spartan should confess himself defeated. In these games the combatants fought naked. (Thuc., i. 6.)

The horse-races were of two kinds. 1. The *Chariot-race*, generally with four-horsed chariots (*ἵππων τελείων δρόμος*), was introduced in the 25th Olympiad (B.C. 680). The course (*ἱπποδρόμος*) had two goals in the middle, at the distance probably of two stadia from each other. The chariots started from one of these goals, turned round the other, and returned along the other side of the hippodrome. This circuit was made twelve times. The great art of the charioteer consisted in turning as close as possible to the goals, but without running against them or against the other chariots. The places at the starting-post were assigned to the chariots by lot. There was another sort of race between chariots with two horses (*δύωρις* or *σύνωρις*). A race between chariots drawn by mules (*ἀπηνή*) was introduced in the 70th Olympiad, and abolished in the 84th. 2. There were two sorts of *races on horseback*, namely, the *κέλης*, in which each competitor rode one horse throughout the course, and the *καλπή*, in which, as the horse approached the goal, the rider leaped from his back, and keeping hold of the bridle, finished the course on foot.

In the 37th Olympiad (B.C. 632) racing on foot and wrestling between boys was introduced. There were also contests in poetry and music at the Olympian festival.

All persons were admitted to contend in the Olympic games who could prove that they were freemen, that they were of genuine Hellenic blood, and that their characters were free from infamy and immorality. So great was the importance attached to the second of these particulars, that the kings of Macedon were obliged to make out their Hellenic descent before they were allowed to contend. The equestrian contests were necessarily confined to the wealthy, who displayed in them great magnificence; but the athletic exercises were open to the poorest citizens. An example of this is mentioned by Pausanias (vi. 10. 1). In the equestrian games moreover there was no occasion for the owner of the chariot or horse to appear in person. Thus Alcibiades on one occasion sent seven chariots to the Olympic games, three of which obtained prizes. The combatants underwent a long and laborious training, the nature of which varied with the game in which they intended to engage. Ten months before the festival they were obliged to appear at Elis to enter their names as competitors, stating the prize for which they meant to contend. This interval of ten months was spent in preparatory exercises; and for a part of it, the last thirty days at least, they were thus engaged in the gymnasium at Elis. When the festival arrived, their names were proclaimed in the stadium, and after proving that they were not disqualified from taking part in the games, they were led to the altar of Jupiter the guardian of oaths (*Ζεὺς ὅρκιος*), where they swore that they had gone through all the preparatory exercises required by the laws, and that they would not be guilty of any fraud, nor of any attempt to interfere with the fair course of the games. Any one detected in bribing his adversary to yield him the victory was heavily fined. After they had taken the oath, their relations and countrymen accompanied them into the stadium, exhorting them to acquit themselves nobly.

The prizes in the Olympian games were at first of some intrinsic value, like those given in the games described by Homer. But after the 7th Olympiad, the only prize given was a garland of wild olive, cut from a tree in the sacred grove at Olympia, which was said to have been brought by Hercules from the land of the Hyperboreans. Palm leaves were at the same time placed in the hands of the victors, and their names, together with the game in which they had conquered, were proclaimed by a herald. A victory at Olympia, besides being the highest honour which a Greek could obtain, conferred so much glory on the state to which he belonged, that successful candidates were frequently solicited to allow themselves to be proclaimed citizens of states to which they did not belong. Fresh honours awaited the victor on his return home. He entered his native city in triumph, through a breach made in the wall for his reception; banquets were given to him by his friends, at which odes were sung in honour of his victory; and his statue was often erected, at his own expense or that of his fellow-citizens, in the Altis, as the ground at Olympia which was consecrated to the games was called. At Athens, according to a law of Solon, the Olympic victor was rewarded with a prize of 500 drachms: at Sparta the foremost place in battle was assigned to him. Three instances are on record in which altars were built and sacrifices offered to conquerors in the Olympic games.

It seems to be generally admitted that the chief object of this festival was to form a bond of union for the Grecian states. Besides this, the great importance which such an institution gave to the exercises of the body must have had an immense influence in forming the national character. Regarded as a bond of union, the Olympian festival seems to have had but little success in promoting kindly feelings between the Grecian states, and perhaps the rivalry of the contest may have tended to exasperate existing quarrels; but it undoubtedly furnished a striking exhibition of the nationality of the Greeks, of the distinction between them and other races. Perhaps the contingent effects of the ceremony were after all the most important. During its celebration, Olympia was a centre for the commerce of all Greece, for the free interchange of opinions, and for the publication of knowledge. The concourse of people from all Greece afforded a fit audience for literary productions, and gave a motive for the composition of works worthy to be laid before them. Poetry and statuary received an impulse from the demand made upon them to aid in perpetuating the victor's fame. [Pindar.]

But the most important and most difficult question connected with the subject is whether their influence on the national character was good or evil. The exercises of the body, on which these games conferred the greatest honour, have been condemned by some philosophers as tending to unfit men for the active duties of a citizen (Arist., *Pol.*, vii. 14, 18; Athen., x., p. 413); while they are regarded by others as a most necessary part of a manly education, and as the chief cause of the bodily vigour and mental energy which marked the character of the Hellenic race.

The above description of the Olympian games will serve also for the most part for the other three great festivals of Greece. The chief points of difference between them will be seen by referring to the articles Isthmian Games, Nemean Games, and Pythian Games.

(Pausanias, v., vi., &c.; West's Pindar, *Preliminary Dissertation;* Wachsmuth's *Hellenische Alterthumskunde*, Th. i., p. 108; Potter's *Grecian Antiquities*, vol. i., p. 495; Thirlwall's *History of Greece*, vol. i., p. 384.)

OLY'MPIAS. [Philip of Macedon.]

OLYMPIODO'RUS. There were several Greek writers of this name.

Olympiodorus of Thebes in Egypt continued the chronicle of Eunapius to A.D. 425. Of the twenty-two books of his history (Ἱστορικοὶ λόγοι), which he entitled 'Materials for History,' only a fragment is preserved in the Myriobiblon of Photius (80). His history began with the seventh consulship of the emperor Honorius, and was brought down to the accession of Valentinian. The work was dedicated to the younger Theodosius. The historian appears to have been employed on public business, for he mentions being sent on a mission to Donatus, king of the Huns. In his description of the African oases he speaks of wells being made to the depth of 200, 300, and even 500 cubits, and of the water rising up and flowing from the aperture. Some have supposed that these must have been Artesian wells. [Artesian Wells, p. 414.] Olympiodorus was a heathen.

Olympiodorus of Alexandria, who is said to have lived in the latter part of the sixth century A.D., was a Peripatetic, and wrote a commentary on the 'Meteorologica' of Aristotle, which was printed by Aldus, Venice, 1561, fol. He is sometimes called the Younger, to distinguish him from the Peripatetic philosopher of the same name who was the master of Proclus, but who is not known to us by any extant work.

Olympiodorus, a Platonic philosopher, and also a native of Alexandria, lived probably in the latter part of the sixth century A.D. There are extant by him commentaries on the 'First Alcibiades,' 'The Phædon,' 'The Gorgias,' and 'Philebus' of Plato. The first-mentioned of these commentaries contains a life of Plato. His commentary on the 'Gorgias' was published by Routh, in his edition of the 'Gorgias' and 'Euthydemus,' Oxford, 1784; that on the 'Phædon,' by Andreas Mustoxydes and Demetrius Schinas, in the συλλογῇ ἀποσπασματίων ἀνεκδότων, Ven., 1817; that on the 'Philebus,' by Stallbaum, in his edition of the 'Philebus;' and that on the First Alcibiades, by Creutzer, in the 2nd and 3rd volumes of the 'Initia Philosoph. ac Theolog. ex Platonicis Fontibus,' Frankf., 1826.

OLYMPUS. [Anatolia; Crete; Thessaly.]

OLYNTHUS, a town in Macedonia, at the head of the Toronaic Gulf, was probably founded by the Chalcidians and Eretrians of Eubœa. (Strabo, x., p. 447.) It was sixty stadia from Potidæa, and was visible from the latter place. (Thuc., i. 63.) At the time of the invasion of Greece by Xerxes, Olynthus was in the hands of the Bottiæi, who had removed thither from Bottiæis on the Thermaic Gulf, but Artabazus, who was conducting Xerxes to the Hellespont after the defeat at Salamis, suspecting the fidelity of the Bottiæi, took the town from them and gave it to the Chalcidians. (Herod., viii. 127.) Olynthus, together with the other Greek towns on the coast of Macedonia, afterwards fell under the dominion of the Athenians; but it revolted from them at the beginning of the Peloponnesian war, and asserted its independence, which was completely secured by the conquests of Brasidas. From this time Olynthus became the most important of the Chalcidian towns, and the head of a powerful league, which was formed by admitting the citizens of the neighbouring towns to the enjoyment of the same civil and political rights as the Olynthians themselves possessed. Many of the principal towns of Macedonia, and among others Pella, joined this league; which soon became sufficiently formidable to excite the jealousy of the Lacedæmonians. They therefore gladly availed themselves of an opportunity which occurred for declaring war against Olynthus. The towns of Apollonia and Acanthus had been invited by the Olynthians to join the confederacy, with a threat of war in case they refused. Being unwilling to comply with the demands of the Olynthians, and unable to defend themselves, they applied to the Lacedæmonians for assistance, who sent an army of 10,000 men, under the command of Telentias, the brother of Agesilaus, B.C. 382. Telentias obtained some slight advantages at first, but in the spring of the following year (B.C. 381) his army was completely defeated, and he himself was killed in the battle. (Xen., *Hellen.*, v. 2, § 11-43; iii., § 1-6.) Telentias was succeeded in the command by Agesipolis, one of the kings of Sparta, who died however soon afterwards; and the conduct of the war accordingly devolved upon his successor Polybiades, who defeated the Olynthians and compelled them to sue for peace, which was granted (B.C. 379) on the condition that the Olynthians should acknowledge their dependence upon the Lacedæmonians, and assist them in all their wars. (Xen., *Hellen.*, v. 3, § 26.) We accordingly read of the Olynthian cavalry serving in the Lacedæmonian army against the Thebans. (Xen., *Hellen.*, v. 4, § 54.)

After the Spartan supremacy had been destroyed by the conquests of Epaminondas, the Olynthians again recovered their independence, and restored their confederacy. Their growing power however excited the jealousy of Philip, who entered into an alliance with the Athenians with the view of making war upon Olynthus. He took Potidæa and Torone, two of the most powerful of the confederate cities; but he made peace with the Olynthians after his quarrel with the Athenians.

In B.C. 349 the Olynthians broke off their alliance with Philip, and sent to Athens for assistance. The Athenians, by the advice of Demosthenes, who advocated the cause of the Olynthians in his three Olynthiac Orations [Demosthenes], sent troops to their aid, under the command successively of Chares and Charidemus; but the Olynthians were nevertheless defeated, and obliged to surrender their town, which was destroyed by Philip, B.C. 347. (Diod., xvi. 53.)

Mecyberna was the harbour of the Olynthians. (Strabo, vii., p. 330; compare Herod., vii. 122.) It appears to have been in the possession of the Athenians during the early years of the Peloponnesian war, and was not recovered by the Olynthians till B.C. 421. (Thuc., v. 39.)

Coin of Olynthus.
British Museum. Actual Size.

OMALAXIS, a name given by M. Deshayes to a form among the *Trochidæ*, closely allied to *Solarium*, if not dentical with it, and afterwards changed by the same author to *Bifrontia*. [TROCHIDÆ.]

OMAN. [ARABIA.]

OMAR I. (Abú Hafssah Ibn-al-Khattáb), successor of Abú Bekr, and second khalif of the Mussulmans, was the third cousin of Abdullah, the father of the prophet. The sworn enemy at first of Mohammed, whose life he attempted, and whose doctrines he opposed, he was converted to Islám in a manner apparently miraculous, and became one of Mohammed's most zealous and ardent followers; he accompanied him in all his military expeditions, and contributed by his experience and abilities to the success of his cause. [MOHAMMED.]

After the death of Abú Bekr (A.D. 634), whose *hdjeb*, or chamberlain, he was, Omar was sworn khalif according to the express wish of his predecessor. The first act of his administration was to remove from the command of the Syrian armies the celebrated Khâled Ibn Walíd, surnamed 'The sword of God,' who by his rapacity and cruelty towards the vanquished had made himself obnoxious. Omar replaced him by Abú Obeydah Ibn-al-Jerráh, another brave general who had distinguished himself in the wars against the Greeks; but Khâled had virtue enough to accept the second post in the army, and he continued to serve under the new general. These two commanders prosecuted the conquest of Syria, and took Damascus, its capital, in the month of Rejeb, A.H. 14 (August-September, A.D. 635).

After the capture of Damascus, the Moslems proceeded to the reduction of Emesa, Hamah, and Kennesrin. The emperor Heraclius sent a considerable force to stop the progress of the Arabs, but the Greeks were completely defeated at the bloody battle of Yermúk (636). The following year (637) Omar sent Amru Ibn-al-Ass and Sarjil to besiege Jerusalem. The city was stoutly defended by the garrison, but after a siege of several months the patriarch Sophronius, who commanded in it, agreed to surrender to the Moslems, but refused to treat with any other except the khalif himself. A messenger having been despatched to Omar, who was then residing at Medina, he hastened to Jerusalem followed by a scanty suite. Omar's journey from Arabia to Palestine has thus been described by the historian Tábari. 'He rode a sorrel-coloured camel, and was dressed in an old tattered habit of hair-cloth; he carried with him, in two bags, his provisions, consisting of dry fruits, barley, rice, and boiled corn, besides a skin for the water. Whenever he halted to make a repast, he permitted those who accompanied him to partake of it, eating from the same wooden dish: if he took any rest, the earth was his couch. During his march he administered justice to all applicants; in several instances he corrected the laxity of morals, and reformed several abuses, especially among the new converts; abolishing also many luxurious indulgences which had spread among the Moslems, such as the drinking of wine, the using of silken garments, &c. . . . Arrived at the camp, he caused several Moslems to be seized and dragged through the mud for having, in disobedience to his orders, arrayed themselves in the silken tunics of the conquered Greeks.' After a short conference with Sophronius, the terms of a capitulation were agreed upon, and the keys of the holy city were delivered up to Omar. The articles of the capitulation of Jerusalem have already been translated (*Mines de l'Orient*, vol. ii.), but as they were the model upon which the Moslems dictated many others to the subdued cities of Africa and Spain, we shall transcribe them here. 'The inhabitants shall retain their lives and property; they shall preserve the use of their churches, but they shall build no new ones; they shall neither place crosses upon those which they already have, nor hinder the Moslems from entering them night or day; they shall not ring their bells, but they shall be allowed to toll them; if a Moslem travels through the city, the inhabitants shall give him hospitality for three days. They shall not be enforced to teach their children the Korán, but they shall not try to convert any Moslem to their religion; they shall in every instance show respect for the Moslems, and give them the precedence; they shall wear turbans and shoes, and use names different from theirs. They shall be allowed to ride on horseback, but without either saddle or arms; they shall never go out without their girdles;* they shall not sell wine to the Moslems, and shall remain faithful to the khalif, and pay regularly the taxes imposed upon them.' Omar made his triumphant entry into Jerusalem towards the middle of the year 16 of the Hejira (A.D. 637). After conversing for awhile with Sophronius, and addressing to him several questions on the antiquities of the place, visiting the Church of the Resurrection, and saying his prayers under its portico, he desired to be conveyed to Bethlehem, where he also performed his devotions. Returning again to the city, he caused a magnificent mosque to be erected on the site of Solomon's temple, the same which still remains an object of great veneration to the Mussulmans. The taking of Jerusalem was followed by the reduction of all the principal cities of Palestine, while Khâled and Abú Obeydah made themselves masters of Laodicea, Antiochia, Aleppo, and Balbek.

Being master of Syria, Omar prepared to invade Persia, a kingdom then ruled by a king named Yezdejerd, against which he had at the beginning of his reign unsuccessfully contended (634). Saad Ibn Abí Wakkâss, who was now entrusted with the command of the army, penetrated far into Persia, defeated at Kádesiyyah a powerful army commanded by Rustam, who fell in the battle, took possession of Bahr-Shír, in the western quarter of the city of Madáyin, the antient Ctesiphon, founded the city of Kúfah near the Euphrates (638), crossed the Tigris, and at last took Madáyin, the capital of Yezdejerd's kingdom.

In the meanwhile Amru Ibn-al-Ass, who commanded the armies of Egypt, completed the conquest of that country by the reduction of Alexandria (640). It was then that the famous library founded by Ptolemy Philadelphus is said to have been destroyed by the conquerors. Upon an application from Amru to the khalif to know his pleasure concerning its contents, an answer was returned, commanding its destruction, 'for,' said Omar, 'if the books of the Greeks agree with the book of God (Korán), they are superfluous, and need not be preserved; and if they disagree, they are pernicious, and ought to be destroyed.' In consequence of this decision, we are told, and (notwithstanding all Gibbon's ingenuity to discredit the account) we are inclined to believe, that the manuscripts were delivered up to the four (others say five) thousand public baths in the city, to which they served as precious fuel for six months. [ALEXANDRIAN LIBRARY.]

The conquest of Egypt was followed by that of part of Africa. Amru pushed his victorious arms as far as the deserts of Tripoli and Barca. Armenia was in the meanwhile subdued by Mugheyrah (641), and Khorassán (642) by Ahnaf Ibn Kays, another of Omar's lieutenants. In the same year was fought the famous battle of Nehavend, which decided the fate of Persia. Firúz, who now commanded the armies of Yezdejerd, was killed, and the monarch himself obliged to seek an asylum at Farghanah among the Turks, where he died soon after in poverty.

The success which attended the arms of Omar, his unflinching severity towards the vanquished who would not embrace the religion of the prophet, and, more than all, the inexorable justice which he dealt among his own people, excited against him numerous enemies at home and abroad, and several attempts were made upon his life. Iabalah Ibn Ahyám, chief of the Arabian tribe of Ghosán, became one of his most implacable enemies. Although a tributary to the Greek emperor, in whose states he lived with his tribe, and though professing the Christian religion, Iabalah went to see Omar at Medina, swore obedience to him, and embraced Islám with all his followers. Omar then took him with him on a pilgrimage to Mecca. While the neophyte was making as usual seven times the circuit of the Kaabah, an Arab of low extraction happened to run against him, and was the cause of the prince's cloak falling off his shoulders. Iabalah resented the incivility by immediately striking the man a blow on the face. The man made his complaint to Omar, who, having summoned Iabalah to his presence, sentenced him to receive a similar blow from the complainant. Against this sentence, just as it was, Iabalah most warmly remonstrated, saying that he was a king among his own people, and that the offender deserved to be punished with death. 'My friend,' said Omar to him, 'the religion that thou and I follow makes no distinction between the king and the subject.' Rather than submit to the sentence, Iabalah secretly left Mecca with all his suite, abjured Islám, and sought the protection of the Greek emperor. He had moreover sworn to revenge the outrage

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* The girdle was distinctive of all Christians then living under the Mohammedan sway.

Having communicated his plans to a resolute young slave of his, Wáthek Ibn Musáfer by name, he promised him his liberty, if he should succeed in killing Omar. Having arrived at Medina (638), where the khalif was then residing, Wáthek was informed that Omar was in the habit of sitting down every day under a tree on his way to the mosque. Wáthek, having climbed up the tree, awaited the arrival of Omar, who took his seat beneath it and fell asleep. Wáthek was upon the point of coming down for the purpose of stabbing Omar with his dagger, when, lifting up his eyes, he saw a lion walking round him and licking his feet. Nor did the lion cease to guard the khalif until he awoke, when the lion instantly went away. Wáthek was so much struck by this circumstance, that he came down, kissed the khalif's hand, confessed his intended crime, and embraced the Mohammedan religion.

The life of Omar however was at length ended by assassination. A Persian slave of the Magian sect, whose name was Abú Lúlú Firúz, had been obliged by his master Al-mugheyrah Ibn As-shaabah to pay him two dirhems daily, in conformity with the Mohammedan custom, for the free exercise of his religion. Firúz, resenting this treatment, brought a complaint before the khalif, and requested that some part at least of the tribute exacted of him might be remitted; but this favour being refused by Omar, the Persian swore his destruction, and some days afterwards, while Omar was performing his morning devotions in the mosque at Medina, he stabbed him thrice in the belly with a sharp dagger. The people fell upon the assassin, but he made so desperate a defence, that although he was armed with no other weapon than his dagger, he wounded thirteen of the assailants, and seven of them mortally. At last one of the khalif's attendants threw his cloak over his head and seized him; upon which he stabbed himself, and soon after expired.

Omar languished five days. He died on a Friday, in the month of Dhu-l-hajjah, A.H. 23, answering to the month of November, A.D. 644. He was buried on the following Saturday, close to the prophet and Abú Bekr, in a mosque which he had founded at Medina, where his tomb is still visited with great respect by the Mussulmans. Having been asked, some time before his death, to name his successor, he refused; and upon the suggestion of one of his courtiers that he should leave the khalifate to his son Abdullah, he remarked, 'It is enough that one out of my family has been forced to bear this burden, and account afterwards to his God for the command and government of the faithful.'

Omar was sixty-three years old when he died. Authors are at variance as to the duration of his khalifate: the best-informed historians however say that he reigned between ten and eleven years. Abú-l-fedá (*An. Mosl.*, tom. i., p. 251) says ten years, six months, and eight days. Omar was tall; he had a clear complexion; his head was bald. Mohammedanism cannot boast of a more virtuous sovereign or a more zealous apostle. It has been said of him that he contributed more efficaciously to the advancement of the Mohammedan religion than the prophet himself. Khondemir, the celebrated Persian historian, thus recapitulates the praiseworthy acts of this khalif:—'He took from the infidels 36,000 cities or castles, destroyed 4000 temples or churches, and founded or endowed 1400 mosques.' The prophet had the greatest esteem for Omar, whose daughter Hafssah he married. On a certain occasion he was heard to say, 'If God had wished to send a second messenger to this world, his choice would undoubtedly have fallen on Omar.' The devotion, humility, and abstinence of this khalif have become proverbial among the Mussulmans. He never tasted any other food than barley-bread and dates; water was his only drink; and he was often found asleep under the porch of a mosque or beneath a tree. He complied most strictly with all the precepts of the Korán. Eutychius tells us that during his khalifate he performed nine times the pilgrimage to Mecca. In order better to conform to the regulations of the Korán, he lived by the work of his hands, supporting himself entirely by the sale of leather belts which he manufactured. But the quality for which Omar was most conspicuous was justice, which he is said to have administered with an even hand to infidels as well as believers. The historian Wákedí says that the staff of Omar was more dreaded than the sword of his successors. In the lifetime of Mohammed, a Moslem, condemned for his iniquitous treatment of a Jew, happening to appeal to Omar from the sentence of the prophet, he immediately cut him down with his scymitar for not acquiescing in the sentence of so upright a judge. From this circumstance Mohammed gave Omar the surname of Al-farúk, which he retained ever afterwards, a word meaning the divider, or the discriminator, thus doubly alluding to his action and the discernment which prompted it. Several of the best Mohammedan institutions date from the reign of Omar. It was in his time that the æra of the Hejira, or flight of Mohammed, by which all Mohammedan nations compute their years, was established, and its beginning fixed on the 16th day of July, A.D. 622. He was the first who kept armies under pay, and assigned pensions to officers out of the public revenue: he instituted a sort of police force to watch at night for the security of the citizens; and he promulgated some excellent regulations respecting the duties of masters towards their slaves. He was also the first who assumed the title of Amír-al-múmenín (commander of the faithful) instead of that of Khalifah-rasúli-llahi (vicar of the messenger of God), which his predecessor Abú Bekr had used. Omar's memory is an object of the greatest veneration among Mussulmans of the Sunni, or orthodox sect; not so among the Shiites, or partisans of Ali, who look upon the three first khalifs, Abú Bekr, Omar, and Othmán, as usurpers of the khalifate, to the prejudice of Ali, to whom, they pretend, it belonged as the nearest relative of the prophet.

(Abú-l-fedá, *Annales Moslemici*, translated by Reiske, Hafniæ, 1790, tom. i., fol. 250, et seq.; Al-makín, *Historia Saracenica*, apud Erpenium, Ludg. Batav., 1625, p. 20, et seq.; *Raudhatu-l-manádhir*, by Ibn Shihnah, MS.; *The History of the Saracens*, by Simon Ockley, p. 300; Ibn-al-Khattíb, *Historia Calipharum*, apud Casiri; *Bib. Ar. Hisp. Esc.*, vol. ii., p. 177, et seq.; D'Herbelot, *Bib.Or.*, in voc. *Omar Ben al-Khattab, Khaled, Damashk, Iskandriah*, et alibi; Gibbon, *Decline and Fall*, vol. ix., p. 222; &c.)

OMAR II. (Abú Hafss), the eighth khalif of the family of Umeyyah who reigned in the East, was the son of Abd-al-aziz, and the nephew of Abd-al-malek. He succeeded his cousin Suleymán, in the month of Safar, A.H. 99 (Sept., A.D. 717). This khalif, who on his mother's (Umm-Aássem) side was the great-grandson of the first Omar, imitated in every respect the conduct and the virtues of his illustrious ancestor. He was simple, modest, and frugal; he loved justice so much as to sacrifice to it his own interests and those of his family. He was religious and devout, and his mind was always occupied with the idea of a future world. One of the first acts of his administration was to suppress the maledictions which, since the time and by the order of Muawiyah, the first khalif of his family, had been read in all the mosques against the partisans and descendants of Ali: he also restored to the latter the lands which the prophet had given to Ali, and decreed that the produce should be equally divided among their posterity. These and other acts of justice towards the proscribed race raised alarm among the members and partisans of the family of Umeyyah, and especially Yezíd, his cousin and successor. They feared lest Omar, carried away by his love of justice and his respect for the family of the prophet, should appoint a grandson of Ali to succeed him in the empire, and they decided to get rid of him. This they accomplished by administering to him a slow poison, from the effect of which he died at Hásserah, in Syria, in the month of Rejeb, A.H. 101 (Jan., A.D. 720), after a reign of two years and five months, in the forty-first year of his age. Omar had been extremely economical in his person and household, but his excessive liberality exhausted all his revenues; and at his death there was not in the royal coffers a sum sufficient to cover the expenses of his funeral.

(Abú-l-fedá, *Annales Moslemici*, vol. i., p. 267, et seq.; Al-makín, *Historia Saracenica*, p. 75, et seq.; Abú-l-faraj, *Historia Dynastiarum*, transl. by Pococke, edit. nov., p. 136, et seq.; Ockley, *History of the Saracens*, p. 244.)

OMAR, IBN AL-AFTTAS AL-MUTAWAKEL ALA-ILLAH (he who trusts in God), was the fourth and last sovereign of the dynasty of Beni Al-afttas, who reigned in the west of the Peninsula from A.H. 408 to 487 (A.D. 1017-1094). After the death of his brother Yahya Al-mansúr (A.D. 1082), Omar succeeded him in a kingdom which extended over the greatest part of Extremadura and Portugal, and the capital of which was the city of Badajoz. At that time the once powerful empire of the Beni Umeyyah had vanished, and Mohammedan Spain was divided into sundry petty kingdoms, whose rulers were continually waging war against one another. [MOORS.] One of the most active and enterprising of these petty monarchs was Omar, who seems to have possessed all the qualifications of a good Eastern monarch—invincible courage, mild but impartial justice, and liberality touching upon prodigality towards the learned. Soon after his accession to the throne, hearing that Alfonso VII. was besieging Yahya, king of Toledo, in his capital, he sent his son Fadhl to his assistance with a considerable force; but after several sharp encounters, in which he lost the best of his men, Fadhl was obliged to retreat, and Toledo surrendered to the Christian king on the 25th May, A.D. 1085. The taking of that important capital, the rapidity with which Alfonso followed up his conquests, and, more than all, his declaration that he would not lay down arms until he had conquered the whole of Mohammedan Spain, threw alarm among the Moorish kings. After a meeting held at Cordova (A.D. 1086) as to the best means of humbling the pride and checking the power of Alfonso, it was agreed that Omar should write a letter, in the name of the other kings, to Yúsuf Ibn Táshefin, the Almoravide sultan of Marocco, and implore the help of his arms against the formidable Christian. Yúsuf, who was seeking for a pretext to leave his native deserts and settle with his ferocious bands in the fertile valleys of Andalusia, immediately seized on the opportunity offered him; and, crossing the strait, landed on the coast of Spain, in August, A.D. 1086. [ALMORAVIDES.] Omar and the other kings of Mohammedan Spain hastened to join the Africans with their best troops; and four months afterwards (December, A.D. 1086) was fought, not far from Badajoz, at a place called Zalaca, one of the most strongly-contested and most sanguinary battles on record. The flower of the Spanish chivalry remained on the field. Alfonso himself was severely wounded in the thigh, by the hand, as it is asserted, of Omar Ibn Al-afttas. Elated with success, the African conqueror soon turned his arms against those of his own faith, and the brave Omar became one of his first victims. After defending for some time his kingdom against the superior forces of his adversary, commanded by Seyr Ibn Abí Bekr, Omar was obliged to shut himself up in his capital, where he still held out for a considerable time. The inhabitants having at last obliged him to capitulate, Omar surrendered the city on condition that his life and property should be preserved. The African general agreed to the terms: but scarcely had Omar left Badajoz, with his family and a few faithful servants, when a body of cavalry, sent by Seyr, overtook them, and they were all put to death (Feb., A.D. 1090). This lamentable catastrophe has been recorded in a beautiful elegiac poem by an Arabian poet named Ibn Abdún. The poem is in the Bodleian Library at Oxford.

(Abú-l-fedá, *Annales Moslemici*, vol. iii.; Casiri, *Bib. Ar. Hisp. Esc.*, vol. ii., p. 178, et seq.; Conde, *Hist. de la Dom.*, vol. ii.; Cardonne, *Hist. de l'Afrique*, vol. ii.)

OMAR, IBN HAFSSU'N, a famous rebel who long defied all the power of the sultans of Cordova, was born at Ronda, of Christian parents, towards the middle of the third century of the Hejira. He was at first a tailor, but finding his profession beneath him, he repaired to Truxillo, a town in Extremadura, and enlisted himself as a soldier. We next hear of him as a captain of banditti in the hills of Andalusia, where he long baffled the pursuit of justice, and defeated all the troops sent for his apprehension. Some time afterwards, scorning his narrow limits, he went to the frontiers of Navarre, seized on a mountain fortress, and thence extended his ravages into Aragon. He appears to have soon subjected the neighbouring country. As his forces increased, he assumed the tone of a sovereign, excited the inhabitants to revolt against the sultans of Cordova, and made even an offensive and defensive alliance with Ordoño II., king of Asturias and Leon. Profiting by the internal troubles which at that time (A.D. 859) agitated the kingdom of Cordova [MOORS], then in the hands of a warlike but unfortunate prince, Mohammed I., this daring rebel, at the head of a powerful army, composed of Mohammedans and Christians, began to ravage the richest provinces of the empire, and to commit all manner of depredations, defeating in every encounter the royal armies sent against him. As might be expected, his success brought all the discontented under his standard: Abd-al-malek, the governor of Lerida, openly embraced his cause, and the example was followed by other local governors. Mohammed advanced to chastise the rebel at the head of his best troops (A.D. 866); but Omar, who had as much cunning as courage, seeing that he could not contend against the royal forces, had recourse to the following stratagem. By his messengers he persuaded Mohammed that his only object was to deceive their common enemies, the Christians, in order better to turn his arms against them; that he was still a true Mussulman, and a loyal subject. Mohammed praised him for his policy, promised him ample reward if he succeeded in his enterprise, and actually sent his own nephew, Zeyd Ibn Kásim, with a body of cavalry to strengthen Omar (A.D. 866); but no sooner had the prince and his followers reached the camp, than they were barbarously butchered by their treacherous allies. On receiving the news of this catastrophe, Mohammed swore to be revenged: he ordered his eldest son, Al-mundhir, to take the field against the rebels, enjoining him never to appear again in his presence unless he had completely crushed the perfidious outlaw. Al-mundhir sought Omar, who awaited his arrival without fear. In the bloody battle that ensued (A.D. 867) the rebels were cut to pieces, and their chief was obliged to seek refuge among the fastnesses of the Pyrenees. But Omar had too much spirit to be put down by one reverse, although he could scarcely depend on a few score of followers: he offered his services to the Navarrese, gained for them many fortresses, and received from them the title of king. The governors of Saragossa and Huesca having taken the field against him, he defeated their united forces, and conquered the whole country as far as the Ebro. This time the sultan Mohammed in person, accompanied by his son Al-mundhir, marched against the rebel. Omar endeavoured by light skirmishing to prevent a general engagement, but he was unsuccessful; and after a most bloody conflict, in which he himself was dangerously wounded, his army was completely defeated at Aybar, on the frontier of Navarre and Aragon, in A.D. 882. Omar contrived to escape from the field of battle, but he died the ensuing year from his wounds. He left a son, named Káleb, who inherited his courage, and who, more fortunate than his father, remained in undisturbed possession of Eastern Spain, where he had founded a kingdom, until he was ultimately put down by Abd-al-rahman III., in A.D. 919. Omar and his son Káleb have been often confounded by Cardonne and Casiri; and hence the error committed by M. de Sacy (*Biographie Universelle*, in voc. *Omar Ben Hafssoun*), who made one out of the two individuals.

(Conde, *Historia de la Dominacion de los Arabes en España*, vol. i., p. 294 et seq.; Casiri, *Bib. Ar. Hisp. Esc.*, vol. ii., pp. 34, 47, 108, et passim; Cardonne, *Hist. de l'Afr. et de l'Esp.*, vol. i., p. 289 et seq.; Roderici Toletani *Historia Arabum* ad calcem Erpenii *Historiæ Saracenicæ*, Lugd., Bat., 1625.)

OMAR, an eminent physician and mathematician, whose complete name and titles are Omar Ben Abderrahman Ben Ali Abulhâkem Al-Kermani (the Carmanian, probably so called from his family having been originally natives of the province of Kerman, or Carmania, a country on the south-east of Persia). He was born at Cordova, A.H. 368 (A.D. 990), and travelled into the East for the purpose of improving himself in geometry and medicine. On his return to Spain he settled at Saragossa, where he died, at the age of ninety, A.H. 458 (A.D. 1080). He was particularly famous for his skill in performing surgical operations, but left no works behind him either on medicine or mathematics.

((*Arab. Philosoph. Biblioth.*, in Casiri, *Biblioth. Arabico-Hisp. Escurial*, tom. i., p. 436.)

OMAR, BEN-AHMED BEN-CHALDUN ABU MOSLEM AL-HADHRAMI, was probably born (as his name would seem to imply) in Hadhramaut, a province of Arabia. He gave his chief attention to geometry, astronomy, and medicine, in all of which branches of science he acquired great fame, and was no less eminent for his moral character than for his philosophical attainments. He died A.H. 449 (A.D. 1071), at Seville, in Spain, where he had been for some time settled.

(*Arab. Philosoph. Biblioth.*, loco citato.)

OMAYYADES, or **UMAYYADES.** [MOORS.]

OMBI. [EGYPT.]

OMEN, a sign or prognostication of future events, supposed to be an intimation from a superior power. According to Varro (*De Ling. Lat.*, lib. v., c. 7), the word is derived from the language of a person speaking; 'Omen, quod ex ore primum elatum est, *osmen* dictum;' which was also the opinion of Cicero (*De Divin.*, i., c. 45), who says, 'Neque solum Deorum voces Pythagoræi observitaverunt, sed etiam nominum, quæ vocant *omina*' (the Pythagoreans attended to the words not only of gods but also of men, which they called omens). The term afterwards comprehended all signs of future events.

In all probability there is no nation that has not at some time entertained a belief in omens. We find traces of it in the Scriptures. Among the Greeks and Romans it was general. The Persians, the Arabians, the Scandinavians, the Germans, the Icelanders, the antient Britons, and the early Christians, were all imbued with this superstition.

Many curious instances of Roman superstition with reference to omens are enumerated in Pliny (xxxviii. 2). The unlucky omens which preceded the battle of Cannæ are enumerated by Silius Italicus, lib. viii., v. 626, &c.; see also Lucan, i., v. 522, &c. Pausanias (iv. 13) enumerates the omens which announced the fate of the Messenians in their struggle with the Lacedæmonians. Suetonius (*Jul.*, § 59) says that Cæsar, in landing at Adrumetum in Africa with his army, happened to fall on his face, which was reckoned a bad omen; but, with great presence of mind, he laid hold of the ground with his right hand, and kissing it as if he had fallen on purpose, he exclaimed, 'Teneo te, Africa' (I take possession of thee, O Africa).

A superstitious regard to omens in our own country formerly made a considerable addition to the stock of human misery. Generally speaking, we now look back with indifference on the trivial and ridiculous accidents which alternately afforded matter of joy or sorrow to our ancestors. Nevertheless, in remote parts of the kingdom, a superstitious regard to omens still exists.

Wythers, in his 'Abuses stript and whipt,' 8vo., Lond., 1613, p. 167, says:—

'For worthlesse matters some are wondrous sad,
Whom if I call not vaine, I must term mad.
If that their noses bleed some certain drops,
And then againe upon the suddaine stops,
Or, if the babling fowl we call a Jay,
A Squirrell, or a Hare but crosse their way,
Or if the salt fall toward them at table,
Or any such like superstitious bable,
Their mirth is spoil'd because they hold it true
That some mischance must thereupon ensue.'

Dryden and Lee's 'Œdipus,' act iv., sc. 1, also satirises this superstition:

'For when we think fate hovers o'er our heads,
Our apprehensions shoot beyond all bounds,
Owls, ravens, crickets, seem the watch of death;
Nature's worst vermin scare her godlike sons;
Echoes, the very leavings of a voice,
Grow babling ghosts, and call us to our graves
Each mole-hill thought swells to a huge Olympus,
While we, fantastic dreamers, heave and puff,
And sweat with an imagination's weight;
As if, like Atlas, with these mortal shoulders
We could sustain the burden of the world.'

Butler frequently alludes to omens in his 'Hudibras;' and by no writer have they been more successfully ridiculed than by Gay in his fable of the 'Farmer's Wife and the Raven.'

Dr. Hickes, in a Letter to Dr. Arthur Charlett, Master of University College, Oxford, dated January 23, 1711, preserved in the Bodleian Library, mentions 'the omens that happened at the coronation of King James II., which,' says he, 'I saw: viz., the tottering of the crown upon his head; the broken canopy over it; and the rent flag hanging upon the White Tower when I came home from the coronation. It was torn by the wind at the same time the signal was given to the Tower that he was crowned. I put no great stress upon these omens, but I cannot despise them; most of them, I believe, come by chance, but some from superior intellectual agents, especially those which regard the fate of kings and nations.'

Aubrey, in his 'Miscellanies,' 8vo., Lond., 2nd edit., p. 37-46, devotes a section to Omens.

OMENTUM is a broad band of membrane connecting two or more of the abdominal viscera. The chief of these membranes is the great omentum, or caul, which forms a large fold connecting the stomach with the transverse arch of the colon; others of less size and importance connect the stomach and liver, and the stomach and spleen. The great omentum always contains some fat surrounding its blood-vessels, so that it looks like a network of fatty tissue, and it is one of the chief seats of the accumulation of fat in corpulent persons, in whom it contributes largely to the peculiar prominence of the abdomen.

OMER, ST., a town in France, capital of an arrondissement in the department of Pas de Calais, 130 miles north of Paris in a direct line, or 138 miles by the road through Beauvais, Abbeville, and Hesdin, in 50° 45′ N. lat. and 2° 14′ E. long.

This town was antiently a village, with a castle called Sitieu; the sea is said then to have flowed up to the place. It was fortified with walls about the close of the ninth century, about which time it began to bear the name of its patron saint, Audomare, or Omer, bishop of Therouenne. It was included in the county of Flanders, and was among the possessions of the ducal house of Bourgogne, from which it was inherited by the Spanish branch of the Austrian family. The emperor Charles V. strengthened the fortifications; and in the sixteenth century the bishop's see was transferred hither from Therouenne. St. Omer was taken by the French in 1677, and confirmed to them the following year by the peace of Nimeguen. It was one of the places chosen by Napoleon for building his flotilla for the invasion of England. Part of the English contingent of the allied army of occupation encamped near the town in 1816. The diocese was suppressed at the Revolution.

St. Omer is a fortress of the first class; it is surrounded by fortifications between two and three miles in circuit, constructed of red bricks. It is strengthened by four forts and by entrenchments, and further protected by marshes, which can easily be flooded. There are four gates, of which only two will admit carriages. The town is traversed or surrounded by different branches of the canal of the Aa, and the canal of St. Omer, which unites the Aa and the Lys. The principal streets are broad, but there is only one *place*, or square. The houses are chiefly built of yellow or grey bricks, except some of the public buildings, which are of red bricks. There is a town-hall, forming one side of the square. There are four churches, two parochial and two subsidiary; two of the churches are fine Gothic buildings; that formerly attached to the abbey of St. Bertin is the finest, but was, in 1814, falling to ruin. The ex-cathedral is smaller than the church of St. Bertin, but in better preservation. The front of the church of the collège, or high-school, is surmounted by two towers. The ramparts, which are planted with elm trees, the quays on the banks of the canal, and the Calais road, are used as public walks. There are many fountains.

The town formerly depended for support on the expenditure of the troops in garrison and of the great number of monks and other members of the religious orders. There were formerly twenty-five or twenty-six convents, including the abbey of St. Bertin, one of the richest and most famous of the Benedictine order in France, where Childéric III., the last of the Merovingian kings, was confined after his deposition, and where he died. There were also a seminary for the priesthood, and a celebrated English college for the education of young Roman Catholics of England and Ireland. The building formerly occupied by this college is now converted into a military hospital. The inhabitants of St. Omer amounted, in 1831, to 19,344: in 1836, to 19,032. They are engaged in the manufacture of candles, soap, starch, glue, woollen cloth, blankets, lace, fishing-nets, cord, linen thread, leather, and wicker wares, of which last a considerable quantity is exported. There are refining-houses for salt, dye-houses, breweries, distilleries, potteries, oil-mills, and some other industrial establishments. Trade is carried on in corn, wine, flax, oil, and coal. There are two considerable fairs in the year. There are in the town an Ursuline convent, a house of the Sœurs de la Charité, an hospital for orphans and foundlings, a military hospital, another hospital, two almshouses, a high school, to which is attached a public library of from 16,000 to 20,000 volumes, a school of drawing and architecture, a theatre, public baths, an arsenal, four powder-magazines, and three prisons. The canals and roads, which converge at the town and communicate with Abbeville, Boulogne, Calais, Dunkerque, and other places, promote its commercial and general prosperity.

North of the town are two suburbs: Haut Pont, extensive and well-built, on the banks of the Aa; and Lizel, the inhabitants of which are of Flemish origin, and preserve their language. They are mostly gardeners, and cultivate the marshes which were drained by their forefathers. This drainage is effected by means of ditches so numerous as to form a complete labyrinth, and to insulate almost every single field or garden. Each proprietor keeps his boat, by which alone he can reach the land which he cultivates; and in which he conveys part of his family, his gardening tools, and his produce. Vegetables, especially cauliflowers, are cultivated rather than corn. The soil is remarkable for its fertility. The canals or pools of this marshy tract formerly contained many floating islands, of a few feet diameter, covered with grass and shrubs, which were regarded as objects of great curiosity; from neglect most of them have become attached to the bank or to the bottom of the ditches. Peat is dug in these marshes. The environs of St. Omer are fertile in corn, colza, flax and hemp, and afford excellent pasturage.

The arrondissement of St. Omer comprehends an area of 419 square miles, and includes 117 communes. It is subdivided into seven cantons, or districts, each under a justice of the peace. The population, in 1831, was 103,073; in 1836, it was 105,020.

OMERCUNTUC. [Hindustan, vol. xii., p. 205.]

OMMIADE, or UMEYYAH DYNASTY. [Moors.]

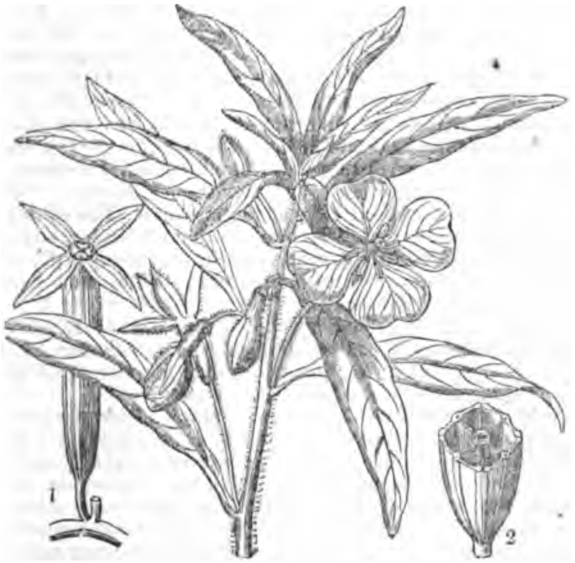
O'MNIBUS, a long-bodied coach or carriage, calculated to afford side-seats in the interior to twelve or fourteen persons. It was originated in Paris, in the year 1827, and derives its name from the last word of the inscription placed upon the sides of the earliest of those vehicles, namely, *Entreprise générale des* Omnibus. In the latter part of 1831 and beginning of 1832, omnibus carriages began to ply in the streets of London. Those from Paddington to the Bank were the earliest. Carriages of similar form were used in England as long stages more than forty years ago, but not answering the expectations of the proprietors in point of profit, they were soon laid down. Omnibuses began to run in Amsterdam in September, 1839.

OMSK. [Siberia.]

ON. [Egypt.]

ONAGGA, or DAUW, names of the *Equus montanus* of Burchell. [Horse, vol. xii., p. 314.]

ONAGRA'CEÆ. Under this name is comprehended a group of polypetalous exogenous plants, which, in their more complete condition, are certainly known by their inferior ovary, and by all the parts of the flower being four, or a constant multiple of that number. Thus in the plant now figured (*Jussiæa grandiflora*) there are four sepals, four petals, twice-four stamens, four stigmas, four cells to the ovary, and the fruit when ripe bursts into four valves. The species characterised by this peculiarity are chiefly herbaceous plants, inhabiting the more temperate parts of the world, and have white, yellow, or red flowers, such, for example, as the great genus of Œnotheras, or Evening primroses, and the Epilobiums, which are so common as wild plants. It is only in the Fuchsia, which has a succulent fruit, and forms an approach to Myrtaceæ, that a woody structure is met with.



Jussiæa grandiflora.

1, a fruit nearly ripe, and surmounted by its four sepals; 2, a transverse section of the same, to show the four cells.

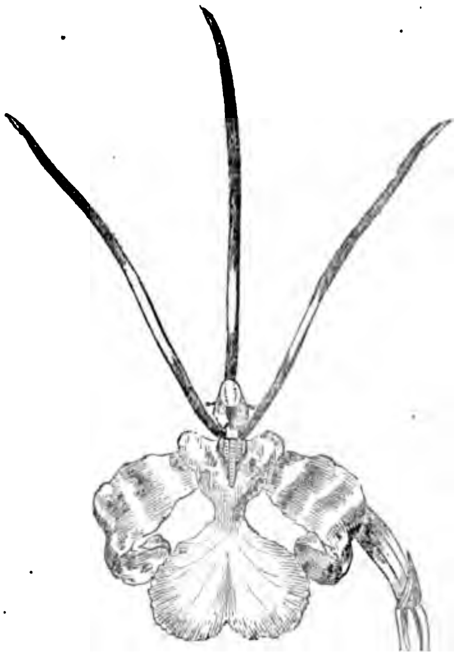
But although genuine Onagraceæ are thus plainly limited, botanists admit into the order other plants which do not possess the character proper to the order, and which are regarded as imperfect states of it. Thus *Hippuris*, which has only one stamen, no petals, and a one-celled ovary, is regarded as a case of degradation from the Onagraceous type; and *Lopezia*, with only one perfect stamen, one imperfect stamen, and two petals, is considered another but less degraded condition of the order. (De Candolle's *Prodromus*, vol. iii., p. 35.)

A large proportion of Onagraceous plants are ornamental, and consist of common garden flowers, especially the species *Œnothera*, *Godetia*, *Epilobium*, and *Fuchsia;* but none of of them possess any useful quality worth recording.

ONCHI'DIUM. [Cyclobranchiata, vol. viii., p. 249; Limacidæ, vol. xiii., p. 486.]

ONCHIDO'RIS. [Cyclobranchiata, vol. viii., p. 249.]

ONCI'DIUM is a very large genus of tropical and subtropical Orchidaceæ, found in the western hemisphere, where the species are common, especially in Mexico and some of the West Indian islands, Brazil, and Peru. They have usually yellow flowers spotted with a rich reddish-brown: sometimes the blossoms are purple, and more rarely white. They belong to the Vandeous section of their order [Orchidaceæ], and are known by their labellum being broad, more or less lobed, distinct from the column, and furnished at the base with a tuberculated disk, which usually presents some grotesque appearance. Their sepals and petals are spreading, their column has a membranous ear on each side, and they have two pollen masses attached to a long caudicula. The most remarkable species is the Butterfly-plant, so called in consequence of the supposed resemblance of its flowers to some insect upon the wing. This is found in Trinidad, growing on the branches of trees, and bears a long, jointed, compressed, spotted scape, from the apex of which swings lightly a large yellow and brown flower, whose labellum is compared to the body of an insect, the column to its head, a pair of processes arising from the column to short antennæ, and the long narrow sepals and petals to legs. It is now common in hothouses.



Oncidium Papilio, or Butterfly Plant.

ONDA'TRA. [Musquash.]

ONEGA, Lake. [Russia.]

ONE'GLIA, a province and town of the Sardinian States in the western Riviera of Genoa, between the provinces of San Remo on the south-west and Albenza on the north-east. The Apennines bound it to the north, and separate it from the valley of the Tanaro in Piedmont. The province of Oneglia consists of several valleys sloping from the foot of the Apennines to the sea, and watered by mountain torrents. The principal stream, called the Impero, flows by the walls of Oneglia. The chief produce of the country is oil, of which 100,000 barrels are exported annually, partly by sea and partly by land, to Piedmont and Lombardy. The average price of each barrel on the spot is about two pounds sterling. The population of the province is 52,770, distributed into 67 communes.

1. Oneglia, where the authorities reside, is a town of

5400 inhabitants: it has a fine collegiate church, and a college kept by the fathers Scholarum Piarum. Oneglia is the birthplace of the celebrated naval commander and statesman Andrea Doria. In 1792 the French admiral Truguet appeared with his fleet before Oneglia, and sent a boat to summon the town to surrender, France being then at war with the king of Sardinia. The few soldiers in the town fired upon the boat, and killed some sailors and wounded the officer in charge of the boat. Upon this Truguet began a furious cannonade upon the town and almost entirely destroyed it. The people ran away to the mountains. The town has been since rebuilt, and it carries on some trade by sea. 2. Porto Maurizio, a few miles south-west of Oneglia, a busy thriving seafaring town, has a small harbour for boats and a roadstead for larger vessels: it contains nearly 7000 inhabitants, many fine houses, a handsome collegiate church, and several other churches with good paintings of the Genoese school. The surrounding hills and valleys are planted with olive-trees and studded with country-houses. 3. Diano, which is divided between Diano Castello, or Upper Diano, and Diano Marina, or the lower town, contains altogether about 9000 inhabitants, distributed in several villages or communes. The valley of Diano is one of the most fertile districts of the Riviera of Genoa. It produces oil and good wine. A great part of the population are sailors.

Oneglia was formerly a feudal principality, and once belonged to the family of Doria, who sold it in 1576 to Emmanuel Philibert, duke of Savoy and prince of Piedmont. From that time it remained subject to the House of Savoy, until the French occupation in consequence of the wars of the Revolution. At the Restoration it was formed into a province with the neighbouring Genoese district of Porto Maurizio. A new road leads from Oneglia over a pass in the Apennines, about 3000 feet high, to Ormea in the valley of the Tanaro in Piedmont.

(Serristori, *Statistica dell' Italia*; Bertolotti, *Viaggio nella Liguria Marittima.*)

ONEIDA. [New York.]

ONGAR. [Essex.]

ONION. The species from which the varieties of the common onion have been derived is the *Allium Cepe*. Its uses are almost universally known, and its cultivation is practised in most countries. The range of latitude within which it may be grown extends from the tropics almost to the coldest verge of the temperate zone. Its leaves and roots are of an annual nature, inasmuch as they die in the course of a single summer, after perfecting a bulb; the latter however is biennial, and capable of putting forth fresh roots and leaves in the following season, and of acquiring an increase in its size. This property is taken advantage of in one of the modes of cultivation.

The following are the principal varieties:—

Early Silver-skinned—valuable only on account of its earliness.

Silver-skinned—moderately large, flat, shining, white, mild.

Portugal—large, oblate, imported largely from the country of which it bears the name, but only adapted for a supply during the early part of winter: quality rather mild.

Tripoli—the largest of all the varieties: oval, or somewhat flattened, light red, mild, but does not keep long.

Spanish, or *Reading*—large, flat, white, mild; resembles the Portugal onion, but is better adapted for cultivation in this climate.

Strasburg—large, flat or globular, light red tinged with green, strong-flavoured, and keeps well.

Deptford and *Globe*—are subvarieties of the preceding, of milder quality, and yield generally good crops.

James's Keeping—large, pyriform, brownish-red; keeps remarkably well; flavour strong.

Blood-red—middle-sized, flat, deep red; keeps well, but of the strongest flavour, on which account it is medicinally preferred to the other varieties.

Yellow or *Straw-coloured* (*Ognon paille ou jaune* of the French)—small, globular, firm, valuable for pickling.

Two-bladed—small, roundish, green, with little foliage.

Potato or *Under-ground Onion.*—This peculiar variety forms numerous bulbs below the surface, which attain maturity early in the summer.

Tree or *Bulb-bearing Onion*—bears, instead of flowers, small bulbs, which are only useful for pickling.

Onions will succeed in any good rich soil, provided it be neither too wet and adhesive, nor, on the other hand, too dry and light. They may even be grown successively on the same spot for a number of years, contrary to what happens with the majority of crops. Abundance of well-prepared manure should be thoroughly incorporated in digging the soil. The dung of pigeons and poultry is used with advantage; and some, particularly the French gardeners, prefer sheep-dung.

The time of sowing the general crop is from the middle of February to the middle of March, according to the state of the ground and of the weather. The seeds may be sown broadcast or in very shallow drills: the latter mode admits of the ground being more easily stirred on the surface and kept clean. In either case the seeds should be covered as lightly as possible.

When the leaves indicate, by the general yellowness of their points, that their office has been performed, the necks should be bent, and the bulbs pulled up soon after, and spread so that their fibres and stems may dry and wither in the sun. They may then be stored up in any dry airy situation.

Very large onions may be obtained by sowing thickly in April on poor soil, so that the produce in the first summer may be of small size. The crop is then taken up as above directed, and the smallest and firmest are selected for planting in rich and well-prepared soil in the following spring.

Onions intended for pickling should be sown thickly on poor and dry soil. The silver-skinned, yellow, and two-bladed onions are the best varieties for this purpose.

For a supply of young onions in spring, the sowing should be made in August. Onions are sometimes attacked by a grub at the root. Trenching the soil to a good depth, soot, charcoal-dust, and lime-water, have severally been successfully applied as remedies.

ONI'SCIA. [Entomostomata, vol. ix., p. 456.]

O'NKELOS was the author of the most celebrated of the Targums, or Chaldee paraphrases of the Old Testament. [Targums.] The age at which he lived cannot be determined with any certainty. Jahn concludes from his style that he wrote not later than the second or third century. The Babylonian Talmud states that he was contemporary with Gamaliel; this would place him about the time of Christ. From the mention made of him by the Babylonish Talmud, and from the purity of his language, which is much better Chaldee than that used in Palestine, and approaches more nearly than any other extant specimen of the language to the Chaldee in *Daniel* and *Ezra*, Eichhorn supposes that he was a native of Babylon. His Targum contains the Pentateuch only. It is a faithful version, and corresponds so exactly with the Hebrew text, that it used to be chanted to the same notes, alternately with the Hebrew, in the Jewish synagogues, down to the beginning of the sixteenth century. This Targum is not mentioned by Origen or Jerome, which may perhaps be accounted for by the circumstance that Origen did not know Chaldee, and that Jerome only learnt it late in life. The Targum of Onkelos is printed in the Antwerp and Complutensian Polyglotts, in Buxtorf's Hebrew Bible, and in Walton's Polyglott. It has been published separately at various times. The edition which has been generally followed is that of Venice, 1518, and 1525-6. It has been translated into Latin by Alfonso de Zamora, Paulus Fagius, Bernardinus Baldus, and Andrew de Leon of Zamora.

(Prideaux's *Connection*, pt. ii., bk. viii., p. 757; Horne's *Introduction*, vol. ii., p. 199; Jahn, *Introd. in Lib. Sac. Vet. Fœd.*, p. 59; Winer, *De Onkeloso ejusque Paraphrasi Chaldaica Dissertatio*, 4to., Lips., 1820.)

ONOMATOPE'IA (ὀνοματοποιΐα, ὀνοματοποίησις), which literally means 'the making of words,' is the name given to those words which are formed, or supposed to be formed, by an imitation of natural sounds. Thus, the words 'to neigh,' 'to murmur,' 'to bleat,' 'to creak,' and many others are supposed to be merely imitations of natural sounds: but the number of such words has been greatly exaggerated by some grammarians. Aristophanes imitates the croaking of the frogs by βρεκεκεκὲξ κοὰξ κοάξ (*Frogs*, l. 209), and Ennius the sound of the trumpet by the word *taratantara*. (Servius on *Æn.*, ix. 503.)

ONTARIO, LAKE. [Canada.]

ONYCHOTEUTHIS. [Teuthidæ.]

ONYCHOTHE'RIUM, Fischer's name for the *Megalonyx Jeffersonii*. [Megatheriidæ, vol. xv., p. 68.]

ONYX. [Quartz.]

OODIPOOR. [HINDUSTAN, vol. xii., p. 214.]

OOJEIN (*Ujjayini*), a principality in the province of Malwa, subject to Junkojee Scindia, situated on the right bank of the Sippra river, near to the south-western extremity of the province. The soil is very fertile, producing in ordinary seasons abundant harvests: but when the season is more than usually rainy, the ground is rendered so soft as to impede the operations of agriculture; and on the other hand, if the season should prove dry, the people are reduced to great extremity owing to the absence of wells and all other means for irrigating the lands. The town of Oojein is situated in 23° 11′ N. lat. and 75° 46′ E. long. Until the transfer of the seat of government to Gualior, Oojein was the capital of the Scindia Mahrattas; it was once a large and populous city six miles in circumference, the whole area being occupied with buildings, but many of the inhabitants have been drawn away since the departure of the court to Gualior and Indore, and the number of dwellings has rapidly and materially diminished. The greater part of the houses are low; scarcely any exceed two stories in height. Nearly all are built of mud throughout, walls, roofs, and floors being of that material. A few of the superior houses have wooden fronts, which are elaborately carved, and the roofs are tiled. Some of the members of the Scindia family still reside at Oojein. [HINDUSTAN.]

OOLITE, the characteristic rock of one of the great systems of secondary strata. [GEOLOGY.] One of the purest examples of oolite is the fine yellow freestone of Ketton in Northamptonshire, which is wholly composed of round grains of concretionary structure, *adherent* by their contiguous surfaces, so as to form a stone easily wrought with the chisel, and of a durable quality. The Bath freestone is another example, where the grains (often hollow) are *connected* by interposed calcareous matter; the Portland stone resembles the former, but contains disseminated or aggregated silex; and not to extend the catalogue, much of the Lincolnshire freestone is oolite, of which the round grains are firmly *compacted* in a general basis of crystallized carbonate of lime. The resemblance of the grains to small ova, or the roe of fishes, has given origin to the English term 'Oolite' (from the Greek *ὠόν, óon*, an egg), and the German 'Rogenstein,' or roestone.

Limestones possessing the oolitic character occur in different parts of the series of strata, but nowhere very abundantly except between the lias and the green-sands. Specimens may be found in the mountain-limestone at Clifton, Kirkby Lonsdale, &c., and in the magnesian limestone of Yorkshire and Derbyshire; and in this latter case the grains, large and distinct, show obviously the concentric lamination which belongs to certain oolites called 'pisolites,' and which may be detected in nearly all with the aid of the microscope.

OOLITIC SYSTEM. For the order of succession of the strata composing this great series of English strata see GEOLOGY. On the continent of Europe the corresponding strata receive, from their conspicuous development in the Jura Mountains, the titles of Jura Kalk and Calcaire Jurassique. [JURA.]

OONALASHKA is the most frequented of the Aleutian Islands, which stretch from the peninsula of Aliaska, a part of the continent of North America, across the Pacific towards the peninsula of Kamtchatka. It is situated in 54° N. lat. and 138° 20′ W. long., and extends from north-east to south-west about fifty miles in length, but it varies greatly in width. Black masses of rocks rise perpendicularly out of the sea to a great elevation, and their summits are covered with eternal ice. The highest summit, called Makushkaia-sobka, is more than 7000 feet above the sea-level, and continues to smoke without interruption. There is also another active volcano. In 1795 a volcano rose out of the sea, about thirty miles west of the north-eastern point of Oonalashka. The rocks however are not composed of lava, nor has real lava been found, so far as the island has been yet examined. But there are several hot springs; and earthquakes are common. The rocks consist of granite and porphyry.

Oonalashka and the islands lying west of it are entirely destitute of trees. Willows occur in damp places, but they hardly rise above the luxuriant growth of grass and herbs. Even the lower hills only support alpine plants. The moisture of the atmosphere maintains a perpetual verdure on the steep mountain-summits up to the snow. The Russians have brought cattle to the island, and Lütke, in 1826, was able to get beef. Potatoes, turnips, and radishes are the only vegetables that thrive. No kind of grain succeeds. The lower shores of the islands are often lined with drift wood, which consists of pines, and several kinds of trees which grow in a much warmer climate, as the camphor-tree.

The inhabitants live chiefly by fishing. The surrounding sea abounds in cod, halibut, &c., and especially in seals. Whales are also numerous. Wild geese and ducks are very abundant in spring and autumn; they are salted and smoked for winter food. The eggs of the sea-fowl, which hatch in the neighbouring islets and rocks, are also collected. The inhabitants are Aleutians: their number is very small. The Russian American Company has an establishment at Illiuliuk, or Illoaloak, towards the north-eastern extremity of the island, which, in 1826, was inhabited by twelve Russian and twenty Aleutian families. The harbour, being surrounded by high mountains, is very safe, but it has the disadvantage of being difficult of access, owing to the entrance being narrow, tortuous, and there being no bottom at 100 fathoms. The climate of this place is rather wet than cold. There are almost continual fogs during the winter, and rain is abundant all the year round. The mean annual temperature is as high as 40°, which is one degree above that of Trondhiem in Norway, and not quite two degrees less than that of Christiania.

(Sauer's *Account of a Geographical and Astronomical Expedition to the Northern Parts of Russia;* Langsdorf's *Voyages and Travels in various Parts of the World;* Kotzebue's *Voyage of Discovery into the South Sea and Behring's Strait;* Lütke's *Voyage autour du Monde.*)

OORT, ADAM VAN, son of Lambert Van Oort, was born at Antwerp in 1557. He derived his instruction from his father, and soon rose into esteem as a painter of history, and likewise as an able painter of landscapes. Van Oort's greatest honour however is, that he was the first instructor of Rubens, whose works have immortalised his master's name as well as his own.

Though in his best time his composition was agreeable and the drawing correct, he neglected the study of nature, and was entirely a mannerist. He seems not to have looked on painting as a fine art, but as a means of acquiring wealth. In his latter time his performances had little to recommend them except freedom of handling and good colouring. Yet, with all his defects, he was looked upon as a good painter; and Rubens used to say that if he had studied at Rome, he would have surpassed all his contemporaries. He died in 1641, aged 84.

OPAL. Of this mineral, which is essentially a hydrate of silica, there are mentioned by Mr. Brooke, in the 'Encyclopædia Metropolitana,' eleven varieties, and nearly as many are described by Phillips.

Precious Opal, or Noble Opal.—This mineral is white, bluish or yellowish white, and exhibits a beautiful variety or play of colours, as blue, green, yellow, and red, several of which appear together. Fracture conchoidal, with a vitreous or resinous lustre: it is easily broken, but scratches glass. Specific gravity 2·06 to 2·09. Infusible by the blowpipe, but becomes opaque and loses water. The most beautiful specimens occur in Hungary, but it has also been found in Saxony, South America, &c. Analysis of the Hungarian opal by Klaproth:—Silica, 90; Water, 10.

Fire Opal.—In this the internal reflection is bright red. It occurs with the precious opal in Hungary, and has also been found in Cornwall.

Hydrophane.—It is usually opaque, but is rendered transparent and exhibits the iridescent colours of the precious opal by immersion in water. According to Klaproth it contains a little alumina in addition to silica and water.

Common Opal.—This is of various shades of colour, as white, green, yellow, and red; but is entirely destitute of the play of colours exhibited by the noble opal. In other properties they greatly resemble each other. It is stated to contain a little oxide of iron mixed with the silica and water. It is found chiefly in Hungary and Saxony, but specimens have also been produced in Cornwall.

Semi-Opal.—This is more opaque than common opal, and is dull. It occurs either white, grey, yellow, brown, or green. It is found in the same places as the foregoing.

Wood Opal, so called from its showing the woody structure. It occurs of several tints of white, grey, brown, and black. It is generally harder than semi-opal, but does not materially differ from it in other properties. It occurs in Hungary and in Transylvania.

Cacholong is white opaque opal; harder than common opal; dull; brittle; fracture flat conchoidal. Specific gravity 2·2. Infusible before the blow-pipe. It is found on the banks of the river Cach in Bucharia, in loose masses. It occurs also in the Faroe Islands, Greenland, and Iceland.

Opal Jasper. Ferruginous Opal.—Opaque, or but feebly transparent on the edges. Colour generally deep shades of red, yellow, and grey. Fracture flat conchoidal. It appears to be a silicate of iron with water. Klaproth's analysis of a variety from Telkebanya gave—Silica, 43·5 ; Oxide of Iron, 47·0; Water, 7·5. It occurs in Hungary, Siberia, &c.

Menilite.—Occurs in irregular or reniform masses. Colour usually smoke-brown. Opaque, or slightly translucent. It occurs at Menil-montant, and St. Ouen near Paris, in beds of adhesive slate. According to Klaproth it consists of—Silica, 85·5; Alumina, 1· ; Water, inflammable matter, and traces of lime and iron, 11·.

Hyalite. Muller's Glass.—Occurs in small globular and botryoidal forms. Lustre vitreous. Brittle, but scratches glass. Specific gravity about 2·4. Infusible by the blow-pipe. It occurs in amygdaloid, near Frankfort-on-the-Main, in Hungary, &c. According to Bucholz it consists of—Silica, with a trace of alumina, 92· ; Water, 6·3.

Geyserite. Siliceous Sinter.—This mineral is white, or yellowish or greyish white. It is brittle. Specific gravity about 1·807. Infusible *per se* by the blow-pipe. It is deposited by the hot springs of Iceland and elsewhere. According to Klaproth it consists of—Silica, 98· ; Alumina, 1·5 ; Iron, 5·.

OP'ERA (Ital., *work*), a regular drama set to music, always accompanied by scenic representation, frequently by machinery, and sometimes by dancing. The true Opera, as found on all the Italian stages, whether in Italy or elsewhere, and as performed in the French language at the *Académie Royale*, admits no speaking; all is recitation or air, &c.; while what is called Opera in the national theatres of Germany and England, as well as the French *Opéra Comique*, is of a mixed kind—partly spoken, partly sung.

The constituents of an opera, says Rousseau, are, the Poem, the Music, and the Decorations. The poetry addresses itself to the mind, the music to the ear, the painting to the eye; and it is the duty of the three to unite their powers, in order to move and make an impression on the heart. Here, as in his well-known definition of music [MUSIC, p. 19], Rousseau degrades the art which is the vital part of the opera, to a mere sensual enjoyment; but in the very next sentence he betrays that inconsistency which we have before had occasion to notice, by declaring that music is able to paint every picture and excite every passion; to give to poetry new force, to decorate it with new charms, and thus at once to exalt and triumph over it. If the opera music of Rousseau's time, most of which is now deservedly forgotten, could embellish, could add a single beauty to the poetry of Apostolo Zeno and of Metastasio, how much more must the feeble lyric drama of a later period be indebted to the exquisite melodies, the soul-stirring harmonies, of a Cimarosa and a Winter, of a Mozart and a Rossini! The fact is, that the poetry of an opera has long ceased to be considered otherwise than as a vehicle for music, and, but for the scenery and decorations, the saying of the Abbé Arnaud, that *the Italian opera is a concert, of which the drama is the pretext*, would be applicable to nine in ten of all productions of the kind that have appeared during the last seventy or eighty years.

Rousseau, Algarotti, Arteaga, and most writers on the Opera, refer to it as performed at the *Académie Royale*, and on the stages of Milan, Turin, Naples, &c., where the accessories—the scenery, machinery, and decorations—have always been splendid and appropriate, and not such as are so frequently witnessed at the two Italian theatres of London and Paris. Voltaire, in the following panegyrical lines, had in view the *grand opéra* of the French capital, in which the *ballet* was, and still is, quite on an equal footing with the opéra.

> 'Il faut se rendre à ce palais magique,
> Où les beaux arts, la danse, la musique,
> L'art de tromper les yeux par les couleurs,
> L'art plus heureux de seduire les cœurs,
> De cent plaisirs font un plaisir unique.'

And in all Opera-Houses, properly so called, beautiful scenery, and rich decorations of every kind, which will never cease to captivate, will always be required; though it is probable that the increasing taste for music in France and England will soon lead to its being considered of such paramount importance in those countries, that the Ballet will lose much of its attraction, and by being reduced to a very subordinate and less costly condition, enable managers either to bestow more expense on the opera, in all its parts, or to diminish the prices of admission, now so exorbitantly high.

The moment that the Opera appeared out of its native country, and especially when it reached the British shores, it was attacked by a host of critics and wits. Addison and Swift were among the first to level the shafts of ridicule at it, and were followed by Pope, Young, and many others. Addison lived to retract his opinion, for some of the absurdities which the opera in its infant state presented were soon corrected; though certainly enough remained, and must for ever remain, to sanction the objections of those who tried, or may still judge, the melo-drama by the cold stubborn laws of unpoetical probability. There were not wanting however defenders of this favourite child of the gay and fashionable world, and foremost among them was the author of the verses above quoted, whose candid apology for the Opera—in the preface to his tragedy of *Oedipe*—we shall here translate.

'The opera,' says M. Voltaire, 'is a representation as whimsical as it is magnificent; where the eyes and ears are more satisfied than the judgment; where a subjection to music produces faults of the most ridiculous kind; where it is necessary to sing airs while destroying a city, and to dance around a tomb; where are seen the palace of Pluto and that of the Sun, together with gods, demons, magicians, monsters, and temples erected and destroyed in the twinkling of an eye. We tolerate these extravagancies, we even admire them, because we imagine ourselves in fairy-land; and as we find splendid scenes, elegant dances, fine music, and some interesting scenes, we are content. It would be as absurd to require unity of time, place, and action in *Alcestis*, as to introduce dances and devils in *Cinna* or *Rodogune*. Nevertheless, though operas are released from such rules, the best of the kind are those in which they are least frequently violated. . . . . I reasonably require more perfection in a tragedy than in an opera, because in the former my attention is undivided—because in that my pleasure does not arise from a saraband or a *pas de deux*, for it is my mind alone that is to be gratified.'

Some of the absurdities of the opéra are common to all dramatic representations, and those which are peculiar to it are now far less numerous than in 'the good old times.' This species of entertainment, though susceptible of much improvement, has not stood quite still while everything else, or nearly everything, has been advancing. That prominent feature however in the musical drama, which from the very first proved so obnoxious to ridicule, continues unaltered—the Recitative, which provoked the satire of our forefathers, and is yet rather tolerated than approved by the many—if a fault, is, we believe, a fault not imputable to the moderns, but to those whom it has hitherto been thought right to consider as the models of dramatic propriety and poetical taste. This leads to an inquiry concerning the origin of the melodrama—*i.e.* the musical drama, or opera.

That the opera, properly so called, whether Italian or French, is the offspring of the Greek drama—an opinion that for years past has been gaining ground—is supported by the most learned and able writers on the subject, and seems likely ere long to be universally adopted. The first that we have met with who has touched on this point is the 'philosopher of Malmsbury,' Hobbes, who, in a letter to Sir William D'Avenant, says, 'There is, besides the grace of style, another cause why the antient poets chose to write in measured language, which is this:—their poems were made at first with intention to have them sung, as well epic as *dramatic* (which custom hath long time been laid aside, but *began to be revived* in part *of late years in Italy*), and could not be made commensurable to the voice or instruments in prose—the ways and motions whereof are so uncertain and undistinguished (like the way and motion of a ship in the sea), as not only to discompoe the best composers,' but also to disappoint sometimes the most attentive reader, and put him to hunt counter for the sense. It was therefore necessary for poets in those times to compose in verse.' This letter is dated Paris, 1650; consequently written anterior to the establishment of the *Académie Royale*, or French opera.

Dryden, in the beginning of the preface to his *Albion and Albanius*, rather hastily calls the opera 'a modern invention, though built upon the foundation of the ethnic worship, and conjectures that it was borrowed from the Spanish Moors; but in a postscript to the same, he corrects himself in the following rather awkwardly-expressed manner: 'Possibly the Italians went not so far as Spain for the invention of their operas: they might have it in their own country, and that by gathering up the shipwrecks of the Athenian and Roman theatres, which we know were adorned with scenes, music, dances, and machines, especially the Grecian.' The learned Jesuit, *Père* Menestrier, in his work, *Des Représentations en Musique*, maintains that the antient tragedies were chanted. Metastasio, in his *Estratto della Poetica d'Aristotile*, expresses a most decided opinion that the Greek and Roman dramas, both tragedies and comedies, were sung, and cites in proof of this numerous classical authorities. Pye, in his *Commentary on the Poetic of Aristotle*, while disputing some of the inferences of Metastasio, is obliged, though unwillingly, to acknowledge that the opera 'most probably' is 'a lineal and legitimate offspring of the Greek tragedy,' and that the vastness of the Roman theatre 'turned the necessary means of modulating the voice into a real musical accompaniment;' that is to say, the magnitude of the place rendered chanting or recitative unavoidable.

Rousseau is disposed to combat the opinion that the opera is a derivative of the antient drama, but admits that the Greek tragedies were recited in a manner much resembling singing, that they were accompanied by instruments, and that choruses formed part of them. He afterwards says 'that all Greek poetry was delivered in recitative, because, the language being melodious, it was sufficient to add thereto the cadence of the metre, and a sustained recitation, to render such recitation perfectly musical.' Granting the recitative and chorus, it seems to us that the lineal descent of the opera is proved. The reader will find other evidence on this subject in our article MUSIC, pp. 24, 26, first columns.

But the resemblance of the opera, as it first appeared, to the antient drama, will amount to little less than identity, if the statement and reasoning of the erudite author of *A Dissertation on the Rise, &c. of Poetry and Music* are admitted. Dr. Brown (more known by his *Estimate of the Manners and Principles of the Times*), after showing, to us in a very satisfactory manner, that the Greek drama was musical, proceeds to state, that 'the same union was borrowed and maintained through the several periods of the Roman empire. If therefore we suppose, what is altogether probable, that the form of the antient tragedy had been kept up in some retired part of Italy which the barbarians never conquered, we then obtain a fair account of the rise of the modern Opera, which hath so much confounded all inquiry.'

'As Venice,' the writer continues, 'was the place where the opera first appeared in splendour, so it is highly probable that there the antient tragedy had slept in obscurity during the darkness of the barbarous ages. For while the rest of Italy was overrun by the nations from the north, the seas and morasses of Venice preserved her alone from their incursions. Hence, history tells us, the people flocked to Venice from every part of Italy; hence the very form of the republic hath been maintained for thirteen hundred years; and from these views of security, it was natural for the helpless arts to seek an asylum within her canals from the fury and ignorance of a barbarous conqueror. Other circumstances concur to strengthen this opinion. The Carnival first appeared in splendour at Venice, beyond every other part of Italy. Now the Carnival is, in many circumstances, almost a transcript of the antient *Saturnalia* of Rome.'

'That the modern Opera,' Dr. Brown proceeds, 'is no more than a revival of the old Roman tragedy, and not a new invented species, will appear still more evident, if we consider that it is an exhibition repugnant to the universal genius of modern customs and manners. We have seen the natural union of poetry and music as they rise in the savage state, and how this union forms the tragic species in the natural progression of things. Hence we have deduced the musical tragedies of antient Greece. But in antient Rome, it appears, they arose merely from imitation and adoption. Nor could it be otherwise, because the Romans wanted the first seeds or principles whence the musical tragedies of the Greeks arose. The same reasoning takes place with respect to the modern opera: it emerged in that very city where, most probably, it must have lain hid; in a city whose other entertainments are evidently borrowed from those of antient Rome. And if to these arguments we add, that the subjects of the very first Operas were drawn from the fables of antient Greece and Rome, and not from the events or achievements of the times; and further, that in their form they were exact copies of the antient drama; such accumulated proofs amount to nearly a demonstration that the Italian Opera is but a revival of the old Roman tragedy.' (pp. 201-203.)

Some writers imagine that the modern musical drama originated in Italy, towards the latter part of the fifteenth century. Menestrier believed, on the authority of Sulpitius, that the first opera was performed at Rome about the year 1480, and that a few years after, a gentleman of Lombardy, named Botta, entertained a duke of Milan with a sumptuous supper, accompanying each course with a kind of opera (*une espèce d'opera*). Performances of the latter kind certainly could not have exceeded a single scene. But after collating what has been stated by various authors, we are persuaded that no regular opera was produced and publicly performed till Ottavio Rinuccini wrote and Jacopo Peri composed the drama of *Euridice* for the nuptials of Henri IV. of France and Mary of Medicis. This was represented in a very splendid manner at Florence, in 1600, and there published in the same year. Dr. Burney tells us (*Hist.*, iv. 25) that he was never able to find more than one copy of Peri's *Euridice*, which was in the library of the Marchese Rinuccini, a descendant of the poet. Having the good fortune to possess this very rare work, which is now before us, we can corroborate what the musical historian has said of it, that it is printed in score and barred, two very uncommon circumstances at the time of its publication; that the recitative seems to have been not only the model of subsequent composers of early Italian operas, but of the French operas of Lulli; that figures are often placed over the base to indicate the harmony; that the time changes as frequently as in the old French serious operas; and though the word *aria* occurs, it is difficult to distinguish air from recitative by any superiority of melody, except in the choruses. There is no overture to this, but a musical prologue of seven stanzas instead, sung in the character of Tragedy. Peri, in an address to his *readers* (*à lettori*), gives an account of his orchestra, which was placed behind the scenes, and consisted of a harpsichord, a large guitar, a *lira grande* (i.e. a *viol da Gamba*, according to Burney), and an arch-lute.

The Bolognese dispute with the Florentines the honour of having first produced a musical drama, but it appears that the *Euridice* was performed in their city the year after it had been produced at Florence. The opera was introduced at Venice in 1637, at Naples in 1646, and at Rome in 1671.

The Italian Opera made its way to London by slow and cautious steps. The sudden introduction on the public stage of a foreign language, and that language delivered in recitative, would have put the tolerating spirit of our countrymen to a trial far too severe to be prudent; the event therefore, which was anxiously wished for by the higher orders, to whom novelty is everything, and by those who had acquired a new taste in their travels, was gradually brought about. In July, 1703, Italian *intermezzi*, or 'interludes and musical entertainments of singing and dancing,' were performed at York Buildings. Two years after, *Arsinöe*, translated from the Italian, the dialogue and narrative parts in recitative, and the singers all English, was produced at Drury Lane; the pit and boxes were allotted to subscribers. 'Before and after the opera, dances and singing, by Signora Margarita de l'Epine.' In 1706 *Camilla*, also a translation, was performed by the same persons in a similar manner. The next year witnessed a further and still bolder advance towards the final introduction of the exotic melo-drama; *Thomyris, Queen of Scythia*, was brought out at the same theatre, in which Urbani, a castrato, and two foreign women sang their parts in Italian, the other performers singing theirs in English! At length, in 1710, *Almahide*, written wholly in Italian, and performed exclusively by foreign singers, was presented to the public at the Queen's theatre in the Haymarket. Thus the Italian Opera gained a settlement in this country; and in spite of some opposition and much ridicule by which it was at first attacked, soon became firmly fixed, and at length seems to be as necessary, as a source of amusement to the metropolis of this kingdom, as any other favourite and long-established entertainment.

The Italian Opera was brought into France in 1646, by

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the Cardinal Mazarin, and continued for some years to be performed at the Louvre; but the establishment of the *Académie Royale de Musique*, in 1670, superseded it, and except in 1772, when a troop of Italians represented Pergolesi's *Serva Padrona* as an *intermezzo*, between the acts of Lulli's *Acis et Galatée*, it never again was heard in Paris till introduced there early in the present century.

The grand French Opera is the legitimate melodrama, being wholly musical, and was founded by Louis XIV. In 1669 that monarch granted letters-patent to the Sieur Perrin for the establishment of an '*Académie des Opera en Langue Françaíse*,' who taking as his partner the Sieur Cambert as composer, commenced his undertaking at the *Théâtre de l'hôtel de Guenégaud*, in 1671, where he produced *Pomone*, the poetry by himself, and set to music by his colleague. This is a pastoral drama, opening with a musical prologue of about thirty lines, in which the author has contrived to stuff a greater quantity of nauseous flattery of the *Grand Monarque* than perhaps was ever compressed into so small a compass. In 1672 the privilege was transferred to Lulli, who, with the assistance of Quinault, a lyric poet of very superior genius, conducted the *Académie* in a most able and successful manner till his death. [Lulli.] The *Opéra Comique* had its birth in France in 1750, in imitation of the Italian *Opera buffa*. This however is of the mixed kind, the dialogue being spoken.

The genuine Italian Opera has long flourished in Germany. 'The emperors,' says Burney, 'from the time of Ferdinand II. to Charles VI., seem to have had an invariable partiality for the Italian language and music. On the birth of an archduchess in 1724, an opera was exhibited at Vienna with uncommon magnificence. The performers were all persons of high rank, and his imperial majesty himself accompanied the voices on the harpsichord, as principal director.' The opera, entitled *Eurysteus*, was written by Apostolo Zeno, and composed by Caldara. That imperial poet-laureate was succeeded in office by Metastasio, who wrote many of his admirable lyric dramas for the Italian theatre at Vienna, which were set by the great masters of the day. His *Clemenza di Tito*, as composed by Mozart, will for ever be considered, by all true judges of dramatic poetry and music, as the most beautiful and finished example of the melodrama that human genius ever produced. For the different German courts some of the finest operas have been composed, but we can here only refer to the names of their authors, Handel, Graun, Hasse, Gluck, Winter, Mozart, &c.

What is called English Opera is, with two or three exceptions, of the mixed kind. The first that we have any account of that can be relied on is Shadwell's *Psyche*, composed by Matthew Lock, and brought out in 1673. Two years after, Dryden wrote his *Albion and Albanius*, an opera, set by a Frenchman, Louis Grabut, whom, to please the antinational king, Charles II., Dryden, in a preface to the work, praises in high though most undeserved terms, at the expense of his countrymen. But when that great poet wrote his *King Arthur*, he was fain to apply to Purcell for assistance, whose music has saved it from the oblivion to which it would otherwise be condemned. The poet, in an epistle-dedicatory to this, takes an opportunity of retracting his opinion of English composers. He says that music had then 'arrived to a greater perfection in England than ever formerly; especially passing through the artful hands of Mr. Purcell, who has composed it with so great a genius, that he has nothing to fear but an ignorant ill-judging audience.' Addison's *Rosamond* was, it is to be supposed, a real opera, the dialogue in recitative. This was represented in 1707, but failed, as Hawkins tells us, owing to the poverty of the music by one Clayton. *The Beggar's Opera* is so well known that it need only be named. The music is a good selection of the airs most popular at the time, arranged by the celebrated Dr. Pepusch. *Artaxerxes*, by Dr. Arne, is the only opera, strictly so called, that keeps its place on the stage. This is nearly a translation of Metastasio's *Artaserse*, by the composer himself, and though at the time severely criticised, is far superior to most of the musical dramas that have since been written. The music is rich in beautiful melody, and if other attempts at an English recitative opera had proved equal to this, the melodrama might now have been firmly rooted in British ground. Arne composed many other charming musical pieces; his *Love in a Village* will never be superannuated; and in truth, if the dramatic music of some of our countrymen who charmed the public ear during the latter half of the last century could be heard without prejudice, and without that yearning after what is foreign and new which characterises 'the fashionable world,' and others who yield to its influence, it would be admitted that in original expressive melody we are inferior to no nation in Europe, startling as the proposition may be to those who have not impartially and duly considered the subject. [Arne; Jackson; Linley; Dibdin; Shield; Arnold; Storace.]

OPERA. [English Drama, vol. ix., p. 409.]

OPERATION. This article is to be considered as a continuation of Negative and Impossible Quantities, and as a development of the views of the nature of algebra there laid down. It cannot be read entire, except by students who have some acquaintance with the Differential Calculus, &c.

The great considerations on which the mathematics are founded have always, until lately, been stated as those of number and space; so that arithmetic and geometry have been called the wings of the exact sciences. This similitude, suggested by the twofold character of its objects of comparison, may be carried a step further; for as wings will not enable a bird to fly without nerves and sinews, so the mere consideration of space and number will never make a mathematician, without an organised method of using the ideas of both. We have already [Mathematics] suggested that the science of operation must be a constituent part of mathematics; but it has always been so mixed up with the sciences bearing names derived from number and measure, that until lately it has had neither separate name nor existence: and even now, what has been done in it is only the mere beginning of a system.

The use of symbols of operation not standing for magnitude but for directions how to proceed with magnitudes, began with Leibnitz and Newton, before whose time all algebraical characters denoted simple numbers. The progress of the Differential Calculus forced the attention of mathematicians upon modes of denoting, not results of processes, but ways of proceeding. The generalizations arising out of the organization which notation gave to processes led to the use of indefinite and arbitrary symbols of operation. [Function.] Finally, it was observed that the symbols of operation employed in many general theorems would give simple and well-known relations if their meaning as symbols of operation were forgotten, and they were considered as symbols of quantity. For example, if $\Delta\phi(x)$ denote $\phi(x+1)-\phi x$, Δ being a symbol, not of a quantity multiplying ϕx, but of an operation to be performed upon ϕx: and if $D\phi x$, $D^2\phi x$, &c. denote the successive differential coefficients of ϕx, Taylor's theorem gives

$$\Delta\phi x = D\phi x + \frac{1}{2}D^2\phi x + \frac{1}{2.3}D^3\phi x + \dots$$

If Δ and D had stood for quantities (which they do not), the preceding equation might have been divided by ϕx, and the result would have been

$$\Delta = D + \frac{1}{2}D^2 + \frac{1}{2.3}D^3 + \dots = \varepsilon^D - 1 \dots (A)$$

If such a result had been obtained by those mathematicians who first ventured on the use of a negative quantity, they would doubtless have given to operations a sort of existence as quantities, and would have felt no repugnance to say that the direction to change ϕx into $\phi(x+1)-\phi x$ was equal to ε raised to the power of a direction to differentiate ϕx diminished by a unit. This might have beat their negative quantity (or arithmetical quantity less than nothing) in the complication of its absurdities, but not in absolute impossibility. Let two persons be required, the one to take four pebbles out of three, and the other to subtract a unit from (not the differential coefficient of ϕx, but) the direction to take the differential coefficient of ϕx, and it could hardly be said that the first had a more hopeless task than the second.

The modern mathematicians, with Lagrange at their head, had had too much experience of the nature of extensions to hazard any assumption upon the properties of symbols of operation, when separated from the quantity to be operated upon. The first step made was the observation that certain theorems involving symbols of operation might be easily remembered by the resemblance of the formulæ to well-known expressions, in fact, by the coincidence of these formulæ with the expressions, on the supposition that the symbols of operation are changed in meaning, and become symbols of quantity. And if it be said that these mathematicians were saved from introducing a difficulty analogous to that of negative quantities by the want of resemblances to the course they might have adopted already existing in common modes of speaking and common views of arithmetic, it may be answered that such was not the case, but that it would have been easy, and was not without precedent, to consider arithmetic itself as a science of operations upon one single magnitude, the unit. If we always express the unit by I, we may, if we please, consider 2 not as I+I, but as the direction to perform upon I the operation I+I; so that 2 being merely a direction what to do, 2 I may represent the result of so doing: similarly 3 may be the direction to proceed as in I+I+I, and 3 I its result. And 3 × 2 would be a direction to perform 3 upon the result of 2, or to take 2I+2I+2I, or (I+I)+(I+I)+(I+I), or 6I. If then we say $3\times(2\text{I})=6\text{I}$, we have an equation between magnitudes; but if we throw away I, as we just now did ϕx, we have $3\times 2=6$, an expression of equivalence of operations. Now it might very reasonably have been asked whether *these* operations must be the only ones which will admit of being treated by themselves and viewed independently of the subjects of operation; and a direct assumption of such modes of notation as that marked (A), even when Δ and D were considered independently, though it might not have been fully explicable, would have appeared to be nothing but a natural extension of views which had already been taken to a limited extent.

The process however which was actually followed was this: forms similar to (A) having been observed, in which, whatever might be thought of them as they stood, were found ready means of returning to well-known truths, it was natural to ask whether an application of algebra to the form (A), producing of course a transformation of both sides, would lead to a result from which, by the same method of returning, another known truth might be produced. For example, assume that D and Δ are to be treated as quantities, and $\Delta=\varepsilon^{\text{D}}-1$ gives $1+\Delta=\varepsilon^{\text{D}}$, $\log.(1+\Delta)=\text{D}$, or

$$\text{D}=\Delta-\frac{1}{2}\Delta^2+\frac{1}{3}\Delta^3-\ldots.$$

Now restore ϕx to every term, and let D and Δ reassume their operative meanings, so that $\text{D}\phi x$ is the differential coefficient, and $\Delta\phi x$, $\Delta^2\phi x$, &c. are the successive DIFFERENCES of ϕx, x being changed into $x+1$ at each step. We have then

$$\text{D}\phi x=\Delta\phi x-\frac{1}{2}\Delta^2\phi x+\frac{1}{3}\Delta^3\phi x-\ldots.$$

a theorem which must be true if the preceding method be legitimate. This theorem is found to be true by other and certain modes of demonstration: consequently the legitimacy of the preceding method has some presumption in its favour, arising from its leading to an otherwise known truth.

In this way many theorems were investigated, upon the following plan of proceeding:—1. Throw away symbols of quantity from a known theorem, and proceed in any manner which may appear eligible with the symbols of operation, treating them as if they were quantities. 2. When a result has been obtained, restore the symbols of quantity to their old places, and those of operation to their old meanings. 3. The result as thus viewed has all the presumption in its favour which arises from its being the legitimate consequence of a method which, whether accurate or not, has never been found to lead to anything but what could otherwise be satisfactorily shown to be true. And though Lagrange himself, Arbogast, the English translators of Lacroix, Brinkley, &c. may have used language in reference to this method which would seem to imply that they considered it as one of demonstration, yet it is obvious, from the care taken by them to have abundant external verification in every case, that their results were considered by themselves as resting on such a presumption as that above noted; though it is also evident that they considered the presumption as amounting to moral certainty, which indeed they were justified in doing.

A student who reads on this subject for the first time, will be apt to let his ideas run farther than they should, and to imagine that this treatment of operations may be made universal. For instance, if $\phi x=x^2$ and $\psi x=x^3$, and if $\phi+\psi$ be taken as representing x^2+x^3, he might suppose that $\phi+\psi$ performed twice, or

$$(x^2+x^3)^2+(x^2+x^3)^3$$

represented by $(\phi+\psi)^2$, should be the same thing as

$$\phi^2+2\phi\psi+\psi^2,\text{ or }(x^2)^2+2(x^3)^2+(x^3)^3.$$

This however will be found not to be the case, and thus it appears that a line is to be drawn, distinguishing operations which may be used independently of quantities from those which may not. Until this line can be properly drawn, nothing like demonstration of the method, when true, can be given; or rather perhaps the converse, that is to say, a method of demonstration of such cases as give truths will draw the line which separates these from the rest. We proceed to give some account of this method of demonstration.

We do not know how far those who used the *separation of the symbols of operation and quantity* (as it was called) had before their minds those views which would have made their method intelligible in a rational point of view, which was all it wanted of mathematical exactness. But, looking only at their modes of expression, we cannot find anything of the kind. Lagrange (*Mém. Acad. Berlin*, 1772) gave only theorems without any mode of deducing them. Arbogast assumes the 'séparation des échelles' without remark Laplace, by the aid of his theory of generating functions, must be held to have strictly demonstrated some isolated classes of the theorems which this method gives. But nothing like a general account of the reason why this separation of the symbols of operation and quantity leads to truth in certain cases and not in others, ever appeared, to our knowledge, before the publication of a memoir by M. Servois in the 5th volume of the 'Annales de Mathématiques,' (Lacroix, vol. iii., p. 726). The author exhibits those properties of the separable operations on which the legitimacy of the separation depends; and making a separate species of calculus of functions out of those properties, fully succeeds in demonstrating that differences, differentiations, and multiplications by any factors which are independent of the variables, may be used as if their symbols of operation were common algebraical quantities.

The last step was virtually made by Dr. Peacock, in his *Algebra* (1830); for though this work does not mention the subject, yet it is the first which lays down the principles on which the theory of separation is neither a resemblance of algebra, nor a calculus of functions founded on algebra, but *an algebra*, or if the reader pleases, algebra itself; so that its conclusions rest upon the same foundation as those of ordinary algebra.

We have [NEGATIVE AND IMPOSSIBLE QUANTITIES, p. 132, 133] pointed out what is meant by symbolical algebra, as distinguished from explained or interpreted algebra. Granting a certain number of fundamental relations, which are to be true, the logical consequences of combining those relations must be true also: thus, if it be universally true that $a+b=b+a$, and that $xy=yx$, it follows, even before a, b, $+$, x, xy, &c. have any meaning assigned, that $(a+b)z=z(a+b)=z(b+a)$. If, as in the article cited, we select all the primary relations on which algebraical transformations depend, and then bear in mind that the truth of all their consequences depends on the truth of those relations only, not on the relations being true for one meaning or another meaning of the symbols, but on the truth only of the relations, come how it may—we shall then see that all formulæ of algebra may be used as expressions of truths, whatever may be the meaning of the symbols employed, provided only that, such meanings being given, the fundamental relations are true. We have already seen that this may be carried the length of extending the meanings of all the symbols of algebra, in such manner that a science is created with definitions wide enough to include among its rational objects not only the negative quantity, but also its square root. This was *extension* only (p. 134); we shall now show a process which, though it is still extension, is of another character. It is remarkable that all the additions which have been made to the interpretations of algebra by modern writers have been pure extensions; that is to say, in no one instance has a new interpretation been given to a symbol of which the preceding ones were not particular cases. It yet remains to see whether a real alteration of interpretations is possible.

In our present inquiry, we need not trouble ourselves to make any particular consideration of the signs + and −

They retain their algebraical meaning, so that whatever A and B may stand for, $+(+A)=+A$, $-(+A)=-A$, &c.

If we now ask, what are the fundamental symbolical relations of algebra which remain, after those which depend on + and − are taken away, we shall find them to be as follows:—1. The *distributive* character, as it is called, of the operation ab, with respect to + and −, as shown in $a(b+c-e)=ab+ac-ae$. 2. The *commutative* or *convertible* character of the same operation with respect to others of the same kind and itself, as shown in $abc=acb=bca$, &c., and $ab=ba$. 3. The *depressible* character of operations of the species a^m, when performed upon other operations of the same kind, as shown in $a^m a^n=a^{m+n}$, $(a^m)^n=a^{mn}$. These laws of operation being granted, no matter what the nature of the interpretation under which it is found possible to grant them, all that is necessary to the mechanism of algebra will be found to have been granted. It will be remembered that we speak of $1\div a$ under the symbol a^{-1}.

In arithmetic, as already seen, we may, if we please, consider the symbols 2, 3, &c., as indicative of operations performed upon the unit. Let us extend this notion, and, instead of the unit, make ϕx, any function of a variable x, the subject of operation; this function being always understood, if not expressed. Thus any symbol E has an operative meaning in itself, but when written in an equation stands for the result obtained by performing that operation upon ϕx, which may also be signified by $E(\phi x)$. Also let $E+F$ and $E-F$ stand for the algebraical sum and difference of the results of the operations E and F performed upon ϕx. Let us now appropriate E to stand for the simple operation of changing x into $x+h$, or $x+$ any quantity independent of x in value: and to distinguish the different increments, let E_h, E_k, &c. denote the operations of changing x into $x+h$, $x+k$, &c. It is then very easily shown that E possesses the distributive, convertible, and depressible characters essential to its being logically the object of algebraical transformation. Take two functions, ϕx and ψx, either assumed independently or resulting from preceding operations: it follows then that $E_h(\phi x\pm\psi x)$ is $\phi(x+h)\pm\psi(x+h)$, which is $E_h\,\phi x\pm E_h\,\psi x$· or the distributive character is established. Again, consider $E_h(E_k\,\phi x)$ and $E_k(E_h\,\phi x)$: first, $E_k\,\phi x$ means $\phi(x+k)$, on which perform E_h, or change x into $x+h$, giving $\phi(x+h+k)$; next, $E_h\,\phi x$ is $\phi(x+h)$, on which E_k being performed, gives $\phi(x+k+h)$, the same as $\phi(x+h+k)$. Consequently $E_k\,E_h\,\phi x=E_h\,E_k\,\phi x$, or the convertible character of E is established. Thirdly, consider $E_h^3\,E_h^2$, meaning that the operation E_h having been twice performed, E_h is to be three times performed upon the result: we have evidently $\phi(x+5h)$, or $E_h^5\,\phi x$; and if E_h^3 were to be performed four times running, we should have E_h^{12}. Hence the depressible character of the successive operations is established: and, though it is a wide step for the beginner to make, the applicability of all the formulæ of algebra is now proved, subject, as in common algebra, to difficulties of interpretation occurring in results.

A simplification of the preceding notation may be made as follows: if E or E^1 be simply a direction to increase x by unity, and E^0 a direction to let it remain unaltered, it is clear that $EE\,\phi x$ must mean $\phi(x+1+1)$, or $E_2\,\phi x$; so that $E^2\phi x$ and $E_2\phi x$ are the same. Similar reasoning applies to E_h whenever h is a whole number; and shows that it is E^h and nothing else. Similar reasoning also applies to E^{-h} where h is a whole number: for E^{-h} must be so interpreted that E^h performed upon it may give E^{h-h} or E^0; that is $E^{-h}\,\phi x$ with x changed h times into $x+1$ must be $E^0\,\phi x$, or ϕx; or $E^{-h}\phi x$ must be $\phi(x-h)$. In like manner it may easily be shown that *one of the meanings* of $E^h\phi x$, where h is fractional, is $\phi(x+h)$: but, as in common algebra, of which all the conclusions, as shown, here apply, when h is a fraction, E^h may be any one out of operations as many in number as there are units in the denominator of h. To take a very simple case, required $E^{\frac{k}{2}}\,\phi(x)$, meaning an operation which, twice repeated, gives $E^k\phi x$, or $\phi(x+k)$. This condition is evidently satisfied by $\phi(x+\frac{1}{2}k)$, but it is also satisfied by $-\phi(x+\frac{1}{2}k)$, for if part of the operation consist in change of sign, two repetitions of the operation reproduce the original sign.

It must not be forgotten that, in finding new objects of algebraical reasoning, we have not lost our rights over the old ones; thus any letter may stand for a multiplier or divisor of the universal subject of calculation, ϕx. *But these independent multipliers must not contain x*: for if they did contain x, the convertibility of the multipliers with E would not any longer be practicable. If, for instance, we consider $a\,E\phi x$, which is $a\,\phi(x+1)$, we find it to be the same as $E(a\phi x)$, for a, being independent of x, is not affected by E. But if we consider $xE\phi x$, and $E(x\phi x)$, we find the first to be $x\phi(x+1)$, and the second to be $(x+1)\,\phi(x+1)$.

To generalise the preceding, we may suppose $E^0\phi x$ to mean ϕx as before, and $E\phi x$ to stand for $\phi(x+a)$, where a may have any value we please independent of x. And it is in our power to abbreviate any collection of operations by using a single symbol to stand for it. Thus Laplace uses $\nabla\phi x$ to stand for such a set of operations as

$$A_0\,\phi(x)+A_1\,\phi(x+a)+A_2\,\phi(x+2a)+\ldots.$$

which we should denote by

$$\nabla=A_0+A_1\,E+A_2\,E^2+\ldots..$$

Again, if in common algebra fy were $A_0+A_1\,y+\ldots..$, we might abbreviate the preceding into fE instead of ∇.

But it may be said that this, though intelligible as to a simple operation E, its repetitions E^2, E^3, &c., its inverse and repetitions of it E^{-1}, E^{-2}, &c., ceases to have meaning when we come to apply it to other functions of algebra. What, for instance, is log. $(1+E)$? How can the direction to add $\phi(x+a)$ to ϕx have a logarithm? This question arises from the student having carried with him into purely symbolical algebra (in which it is the first requisite to drop all meanings) significations of symbols derived from ordinary arithmetical algebra. Now it is to be remembered that as far as we have yet gone, all the transcendental symbols of algebra, a^E, $\log E$, $\sin E$, $\cos E$, &c. have not been mentioned, far less defined; they are not therefore absurd, but only, for the present, unmeaning. The question is, how are we to give them meaning; at our pleasure, or by deduction? Evidently the latter, for we are bound to retain the power of using algebraical transformations as they now exist. Since then a^x in common algebra is equivalent to $1+\log a.\,x+\frac{1}{2}(\log a.)^2\,x^2+\ldots\ldots$ we must lay it down that $a^E=1+\log a.\,E+\ldots.$, or that a^E must be viewed, when it means an operation to be performed upon ϕx, as an abridgement of

$$\phi x+\log a.\,E\phi x+\tfrac{1}{2}(\log a.)^2\,E^2\,\phi x+\ldots.$$

This is unquestionably the most difficult step of the whole we shall have occasion further to consider it in the article RELATION, but for the present the following may be sufficient. Since the total operation $A_0+A_1\,E+A_2\,E^2+\ldots.$ can be easily understood, consisting merely of the successive performance of the operation E, the multiplication of the results by given quantities of common algebra, and the addition of the products; and since all the transcendentals of common algebra can be expanded in series of the above form, in such manner that the series have all the algebraical properties of the transcendentals they stand for; let us consider the transcendental symbols of operation as abbreviations of the series, supposed to stand for series of operations.

We shall now proceed to some examples. First, let it be required to transform the series $A_0\,\phi x+A_1\,\phi(x+a)+A_2\,\phi(x+2a)+\ldots.$ This may be represented by $A_0+A_1\,E+A_2\,E^2+\ldots$ performed upon ϕx. Let the latter series in common algebra be fE, then fE, considered as a symbol of operation, stands for the preceding complex operation. Let the transformation be required to be made into a series of terms containing ϕx and its differences: let $\phi(x+a)-\phi x=\Delta\phi x$, then $E-1$ is Δ, or $E=1+\Delta$. But fE or $f(1+\Delta)$ is $B_0+B_1\,\Delta+B_2\,\Delta^2+\ldots.$ where B_0, B_1, &c. are the values of fy and its successive differential coefficients when $y=0$, divided by 1, 1, 1.2, 1.2.3, &c. Consequently the preceding series is the same as

$B_0\phi x + B_1\Delta\phi x + B_2\Delta^2\phi x + \ldots.$ For instance, let the series be $\phi x - \phi\,(x+a) + \phi\,(x+2a)\ldots$ or $(1-E+E^2-\ldots.)\,\phi x$ or $(1+E)^{-1}\,\phi x$. Write $1+\Delta$ for E, and we have $(2+\Delta)^{-1}\,\phi x$ or

$$\left(\frac{1}{2}-\frac{1}{4}\Delta+\frac{1}{8}\Delta^2-\ldots\right)\phi x, \text{ or}$$

$$\frac{1}{2}\,\phi x-\frac{1}{4}\Delta\phi x+\frac{1}{8}\Delta^2\phi x-\ldots$$

We have chosen this result as one which is very easy to verify. Let ϕx, $\phi\,(x+a)$, &c., be denoted by X_0, X_1, &c., then [DIFFERENCES] we have

$$\phi x = X_0,\ \Delta\phi x = X_1 - X_0,\ \Delta^2\phi x = X_2 - 2X_1 + X_0,$$
$$\Delta^3\phi x = X_3 - 3X_2 + 3X_1 - X_0, \text{ \&c.}$$

Substitute these in $\frac{1}{2}\phi x - \frac{1}{4}\Delta\phi x + \ldots$, and we have $\frac{1}{2}X_0 - \frac{1}{4}(X_1 - X_0) + \ldots.$: take a few terms, developing the fractional multiplication, and we shall find the preceding to be identical with

$$\left(\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\ldots\right)X_0-\left(\frac{1}{4}+\frac{2}{8}+\frac{3}{16}+\ldots\right)X_1+$$
$$\left(\frac{1}{8}+\frac{3}{16}+\frac{6}{32}+\ldots\right)X_2-\ldots.\text{ or}$$

$$\frac{1}{2}\left(1-\frac{1}{2}\right)^{-1}X_0-\frac{1}{4}\left(1-\frac{1}{2}\right)^{-2}X_1+\frac{1}{8}\left(1-\frac{1}{2}\right)^{-3}X_2-$$

or $X_0 - X_1 + X_2 - \ldots$ or $\phi x - \phi\,(x+a) + \phi\,(x+2a) - \ldots$

We shall now take an example of interpretation. Required the meaning of Δ^{-1} by means of E? Since $\Delta = E-1$, we have $\Delta^{-1} = (E-1)^{-1} = E^{-1} + E^{-2} + E^{-3} + \ldots$ or

$\Delta^{-1}\phi x$ means $\phi\,(x-a) + \phi\,(x-2a) + \ldots.$ *ad infinitum.*

This is easily shown to be consistent with the relation $\Delta\Delta^{-1} = 1$ or $\Delta\Delta^{-1}\phi x = \phi x$, for if the preceding series be called ψx, we have $\Delta\Delta^{-1}\phi x = \Delta\psi x = \psi\,(x+a) - \psi x = (\phi x + \phi\,(x-a) + \ldots.) - (\phi\,(x-a) + \phi\,(x-2a) + \ldots.) = \phi x$.

As yet we have nothing which might not have been done with tolerable ease by common methods, nor shall we have done more in proving Taylor's Theorem, but the step which we shall make to follow that proof will be an instance of the deduction of a theorem which is of a more difficult character.

Let $(\phi\,(x+\theta) - \phi x)$: θ be called D_θ: then the smaller θ becomes, the more nearly is $D_\theta\phi x$ the differential coefficient of ϕx, or $\phi' x$. Let θ be the *n*th part of the given quantity *a*: then the smaller θ is, the greater must *n* be. We have then

$$\phi\,(x+\theta) = (1+\theta D_\theta)\,\phi x,$$
$$\phi\,(x+2\theta) = (1+\theta D_\theta)^2\phi x, \text{ since}$$
$$\phi\,(x+2\theta) - \phi\,(x+\theta) = \theta D_\theta\phi\,(x+\theta) \text{ or}$$
$$\phi\,(x+2\theta) = (1+\theta D_\theta)\,\phi\,(x+\theta) = (1+\theta D_\theta)^2\,\phi x.$$

Proceeding in this way we obtain $\phi\,(x+n\theta)$ or $\phi\,(x+a)$ $= (1+\theta D_\theta)^n\,\phi x = \phi x + n\theta D_\theta\phi x + n\frac{n-1}{2}\,\theta^2 D^2_\theta\phi x + \ldots.$ For $n\theta$ write *a*, and the preceding becomes

$$\phi x + a\,D_\theta\phi x + a\,\frac{a-\theta}{2}\,D^2_\theta\phi x + \ldots.$$

which being always $= \phi\,(x+a)$, has a limit also $= \phi\,(x+a)$. Take that limit by diminishing θ without limit, and we see that $D_\theta\phi x$, $D^2_\theta\phi x$, &c., become $\phi' x$, $\phi'' x$, &c., or

$$\phi\,(x+a) = \phi x + \phi' x.\,a + \phi'' x\,\frac{a^2}{2} + \ldots.$$

which is Taylor's Theorem. Suppose we denote the operation of differentiation by D, and $\phi\,(x+a) - \phi x$ by $\Delta\phi x$, we have then

$$1+\Delta = 1 + aD + \frac{a^2}{2}D^2 + \ldots. = \epsilon^{aD};$$

a particular case of which (when $a=1$) was chosen as our illustration at the beginning of this article. This relation $1+\Delta = \epsilon^{aD}$ gives us a very great power of converting series which contain differences into those containing differentials, and *vice versâ.*

We now propose to interpret D^{-1}. This symbol must satisfy $DD^{-1}\phi x = \phi x$, and $D^{-1}D\,\phi x = \phi x$, the first of which is satisfied by $D^{-1}\phi x = \int\phi x\,dx + C$, where C may have any constant value: but the second is only satisfied by $\int\phi x\,dx$, beginning at a value of *x* which makes $\phi x = 0$. We shall however see that we need not enter on this question in reference to the theorem immediately following.

Let it be required to express $\Delta^{-1}\phi x$, or $\phi\,(x-a) + \phi\,(x-2a) + \ldots$ ad inf., by means of operations of the differential and integral calculus. Since Δ is $\epsilon^{aD} - 1$, we have to find $(\epsilon^{aD} - 1)^{-1}$ expanded in powers* of D. Now common algebraical processes show that $(\epsilon^t - 1)^{-1}$ can be developed in the series

$$\frac{1}{t} - \frac{1}{2} + B_1\frac{t}{2} - B_3\frac{t^3}{2.3.4} + B_5\frac{t^5}{2.3.4.5.6} - \text{\&c.},$$

where B_1, B_3, B_5, &c., are the NUMBERS OF BERNOULLI,† of which an ample stock is given in the article cited: thus $B_1 = \frac{1}{6}$, $B_3 = \frac{1}{30}$, &c. Write *a*D for *t*, restoring ϕx, and for $D\phi x$, &c., write $\phi' x$, &c., but for $D^{-1}\phi x$, write $\int\phi x\,dx + C$. We have then

$$\phi\,(x-a) + \phi\,(x-2a) + \phi\,(x-3a) + \ldots \textit{ ad. inf.}$$
$$= \frac{1}{a}\int\phi x\,dx + C - \frac{1}{2}\phi x + \frac{B_1 a}{2}\phi' x - \frac{B_3\,a^3}{2.3.4}\,\phi''' x + \ldots.$$

The determination of the constant might in many cases be troublesome, but if we only want a finite number of terms of the series, we can avoid it altogether as follows. Let $x - na = y$, and suppose that $\phi\,(x-a) + \ldots.$ ending with $\phi\,(x-na)$ is sought. Write *y* instead of *x* in the preceding, remembering that $y - a = x - (n+1)\,a$, &c.: subtract the result thus obtained from the preceding, and we have

$$\phi\,(x-a) + \phi\,(x-2a) + \ldots. + \phi\,(x-na)$$
$$= \frac{1}{a}\int\phi x\,dx - \frac{1}{a}\int\phi y\,dy - \frac{1}{2}\,(\phi x - \phi y) + \frac{B_1 a}{2}(\phi' x - \phi' y)$$
$$- \ldots.$$

But $\int\phi x\,dx - \int\phi y\,dy$ is $\int\phi x\,dx$ taken from *y* to *x*, or if $\phi_1 x$ differentiated give ϕx, it is $\phi_1 x - \phi_1 y$.

For further developments of the results of this subject, see the Appendix to the Translation of Lacroix; Herschel's 'Examples of the Calculus of Differences;' Lacroix's large work on the Differential Calculus, vol. iii.; 'Library of Useful Knowledge—Differential Calculus;' a paper by Mr. Murphy in the Phil. Trans. for 1837; and various papers in the numbers of the 'Cambridge Mathematical Journal.' In several of these works further references will be found. The student may make an attempt at the demonstration of the following theorem a test of his understanding the method which we have explained, and the points of analysis which are most essential as preliminaries. Whatever *a* may be, the differential coefficient of ϕx is an algebraical equivalent of the following series:

$$\frac{\phi\,(x+a) - \phi\,(x-a)}{a} - \frac{\phi\,(x+2a) - \phi\,(x-2a)}{2a}$$
$$+ \frac{\phi\,(x+3a) - \phi\,(x-3a)}{3a} - \ldots.$$

Instead of supposing ϕx, a function of *x* only, to be the fundamental subject of operations, we might make it $\phi\,(x, x_1)$ and suppose E and E′ to represent the operations of changing *x* into $x+a$ and x_1 into $x_1 + a_1$. We can only briefly note some of the results of this extension. If D and $D_{,}$ represent the operations of differentiation with respect to x and to $x_{,}$, we have in

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* We transfer this word, with extension of meaning, to the calculus of operations.

† We have examined these numbers, and find them to contain no variation from the authorities cited.

$$EE_{,} = \varepsilon^{aD+a_{,}D_{,}} = 1 + (aD+a_{,}D_{,}) + \ldots .$$

the means of obtaining the common extension of Taylor's Theorem to a function of two variables. Again, if we take $\phi x \psi x$, and let D and $D_{,}$ represent operations of differentiation, which separately affect ϕx and ψx, we have in the development of $(D+D_{,})^n \phi x . \psi x$, the formula for forming the nth differential coefficient of the product.

Since writing the above, we have found in the collection of Abel's works (vol. ii., p. 7) a paper in which this subject is treated on a foundation which, though limited, is peculiar and elegant. It is a theory of generating functions, in which

$$\phi x \text{ being } = \int \varepsilon^{xv} fv . dv,$$

the limits being fixed, f is called the *determinant* of ϕ. The legitimacy of the separations made in this article is very easily deduced.

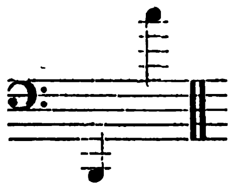
OPERCULI'FERA, one of the families of Polypiaria Membranacea of Blainville, also called Eschariæa. [Polypiaria Membranacea.]

OPERCULI'NA. [Foraminifera, vol. x., p. 348.]

OPER'CULUM (Malacology). The plates or pieces which protect the apertures or exposed parts of certain mollusks. In many of the testaceous gastropods it becomes a cover or door, which fits the aperture of the shell more or less accurately when the animal has retired within it. *Opercula* of this kind vary much in structure and shape. Thus they are sometimes horny, as in Trochus and Murex; sometimes shelly, nay almost stony, as in Turbo; and in construction they are for the most part either spiral, concentric, or unguiculated. The *opercula* or opercular valves of the Cirrhipeds are figured and described in the articles Balanus and Cirripeda.

OPE'RCULUM. In Botany this term is chiefly used for the cap which forms the upper extremity of the theca, or sporangium, of a moss, covering over the peristome, and usually falling off when the spores are ready for dispersion. [Mosses.] It has also been applied to the lid which covers in the Pitcher of Nepenthes, where it is the lobe of a modified leaf. [Pitcher Plants.]

OPHICLEIDE (ὄφις, *a serpent* or *snake*, and κλεὶς, *a key*), a musical instrument of the inflatile kind, made of brass or copper, and intended to supersede the Serpent—of which it is a decided improvement—in the orchestra and in military bands. It is a conical tube, the longest nearly nine feet in length, terminating in a bell, like the horn. It has ten ventages, or holes, all of which are stopped by keys, similar to those of the bassoon, only of larger dimensions, and is furnished with the same kind of mouth-piece as the Serpent. The scale of the base Ophicleide is from B, the third space below the base staff, to C, the fifth added space above it,—



including every tone and semitone within this compass. Music for the Ophicleide is written in the base clef; for the alto, or *ophicleide quint*, in the treble clef. When the two instruments play together, the music for the alto is written an octave higher than that for the base.

The Ophicleide is quite a new invention, ascribed to M. Halary. It was used in the military bands of the northern sovereigns, when the troops of the allies occupied Paris. M. Labbaye, a manufacturer of musical instruments in that city, added new keys to it, and otherwise much extended its capabilities: besides which, he discovered a better mode of constructing the tube than had been practised, and thus greatly ameliorated its tone. These improvements were reported to the French Society of Arts in 1821, by M. Francœur, in consequence of which Labbaye obtained a patent for five years The Ophicleide first reached England in 1834, one of extraordinary dimensions having been manufactured abroad for the Birmingham Musical Festival of that year. In the *Supplement* to the *Musical Library* for November, 1834, it is thus mentioned:—'A new instrument, the *Double-Base Ophicleide*, made for this festival, and now first introduced into England, proved eminently serviceable in the choruses, and whenever strength was required. The volume of sound it emits is immense, but the tone is rich, round, and blends well with the voices. We are much deceived if this instrument is not destined to operate a great change in the constitution of our orchestras: well played, it will answer the purpose of four double-bases, and is well calculated to form a third part to the bassoons, which has long been a desideratum. As a contra-basso to the trombones, it will not be found less useful.' This prognostic has proved correct; the instrument is now become indispensable.

OPHIDIANS. [Serpents.]

OPHIO'DES, Wagler's name for a genus of *Scincoidean Lizards* (*Pygopus*, Spix; *Bipes*, part. Cuvier; and *Pygodactylus*, Fitzinger and Wagler—according to MM. Duméril and Bibron). [Scincoideans.]

OPHIO'MORUS, a genus established by MM. Duméril and Bibron for a form placed by them in their first subfamily (*Saurophthalmes*) of *Scincoidean Lizards*.

Generic Character.—Nostrils lateral, each opening between two plates, viz. the nasal and superonasal. Tongue flat, arrow-headed in shape, scaly, and slightly notched at the point. Teeth conical, obtuse, and erect. Palate not toothed, and with a longitudinal groove. Body anguiform. Tail long, rounded, and pointed. Scales smooth.

This genus is distinguished from the *Orvets* (*Anguidæ*), 1st, by their teeth, which are not so long in proportion, nor so slender, neither are they directed backwards; 2nd, by the tongue, which is hardly notched at the point, and only offers a transverse furrow near its anterior extremity. It is furnished with only one sort of papillæ over its whole surface, and they are flattened and imbricated from before backwards like scales; 3rd, by their nostrils, which do not terminate in the middle of a small plate, but between the nasal and superonasal, which are rather large. There is a *meatus auditorius*, but as small and as difficult to perceive as that of the *Orvets*.

Example, *Ophiomorus miliaris*. Total length 15″. Yellow above, grey at the sides, lower parts whitish with many rows of very small black points; those on the sides being generally more dilated and thicker together than those on the back and belly.

Localities.—The Morea and 'Algérie' (Duméril and Bibron, who add however that they know that this form, like many other Herpetological productions of those countries, is found in South Russia, where it was observed by Pallas).

OPHIOPHTHALMES, the name assigned by MM. Duméril and Bibron to their second subfamily of *Scincoidean Lizards*, having all naked eyes, but only one of them (*Gymnophthalmus quadrilineatus*) being completely without the eyelid. In the others there exists a rudiment surrounding the orbit either entirely or in part, under the form of a ring or demi-ring, often very narrow and immoveable, sometimes rather enlarged at the upper part, and susceptible of being folded back under the orbital border, or of advancing a little upon the eye-ball, as in some species of *Ablepharus*. The genera placed by the authors above quoted under the *Ophiophthalminæ* are few, and the species not numerous. The former are *Ablepharus*, *Gymnophthalmus*, *Lerista*, *Hysteropus*, and *Lialis*.

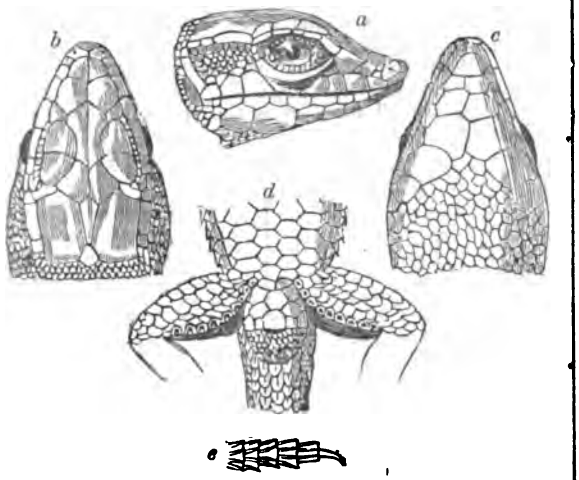
O'PHIOPS, a name given by M. Ménestriés to a genus of Lacertians (*Pristidactyle Cœlodonts* of Duméril and Bibron, *Amystes* of Wiegmann).

Generic Character.—Tongue arrow-headed in shape, moderately long, notched at the end, covered with imbricated squamiform papillæ. Intermaxillary teeth conical, simple. Maxillary teeth rather compressed, the anterior simple, the posterior tricuspidate. Two slightly convex naso-rostral plates, between which is opened the nostril situated on the line of the *canthus rostralis*. No eyelids. A tympanic membrane extended within the auricular opening. No scaly collar under the neck. A small fold in front of each shoulder. Ventral *lamellæ* quadrilateral, smooth, and disposed quincuncially. Femoral pores. Feet with five toes slightly compressed, carinated below, but not dentilated laterally. Tail cyclotetragonal at its root, but rounded throughout the rest of its length.

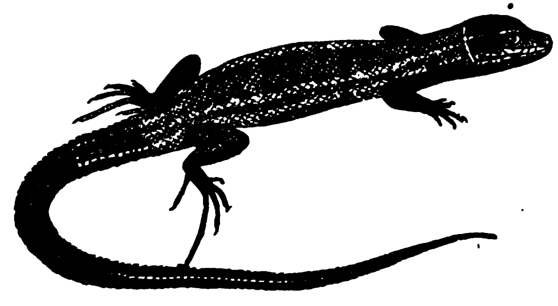
MM. Duméril and Bibron remark that the principal character of this genus is the absence of eyelids, a conformation which distinguishes it from all the other known *Pristidactyle Cœlodonts.*

Example, *Ophiops elegans* (Mén.)—*Amystes Ehrenbergii.* Wiegm. Olive or bronzed above. Two yellowish lines extend along each side of the trunk; each of these yellowish or whitish lines separates two rows of black spots, which are small and very distinct in young individuals, but are more or less dilated and confused in adults. White below.

Locality.—Smyrna; Bakou.



a, head of Ophiops (profile); *b*, same, seen from above; *c*, throat and lower jaw; *d*, lower part of the body, interior surface of the thighs, &c.; *e*, under side of a posterior toe.



Ophiops elegans.

OPHIR (אוֹפִיר), a place which was known to the Hebrews and to the neighbouring nations, as early as the time of Job, as producing such an abundance of excellent gold, that 'the gold of Ophir' became a proverbial expression for fine gold. (1 *Chron.* xxix. 4; *Job*, xxii. 24; xxviii. 16; *Psalms*, xlv. 9; *Isaiah*, xiii. 12.) The position of this place is very difficult to determine. We are informed that Solomon, in conjunction with Hiram, king of Tyre, sent a navy from Ezion-geber, at the head of the Red Sea, to Ophir, and that this navy returned bringing four hundred and twenty (in *Chronicles* 450) talents of gold, sandal-wood (called in our translation almug or algum trees), and precious stones (1 *Kings*, ix. 26-28; x. 11, compared with 2 *Chron.* viii. 17-18; ix. 10): and also that Jehoshaphat built ships of Tarshish to go to Ophir for gold (in *Chronicles* it is said that he built ships *to go to Tarshish*), which were wrecked at Ezion-geber. (1 *Kings*, xxii. 48, 49, compared with 2 *Chron.* xx. 36, 37.) We are also told in 1 *Kings*, x. 22, that Solomon had at sea a navy of Tarshish with the navy of Hiram; once in three years (or every third year) came the navy of Tarshish, bringing gold and silver, ivory, and apes, and peacocks.

Now since both Solomon and Jehoshaphat built the navies bound for Ophir at Ezion-geber, at the head of the Red Sea, it is clear that we must seek for Ophir somewhere on the shores of the Indian Ocean, for it is highly improbable that Solomon's ships went farther than the Cape of Good Hope in one direction, or than the Indian Archipelago in the other: it is not likely indeed that they went so far either way. Nearly all the inquiries into the position of this place have proceeded on the assumption that the passage in 1 *Kings*, x. 22, refers to the same navy which is spoken of in 1 *Kings*, ix. 27, 28, &c., and consequently that Tarshish and Ophir were visited in the same voyage. It has therefore been necessary for those who make this assumption not only to find a place which suits the description of Ophir, and which produces 'gold, sandal-wood, and precious stones,' but also to account for the 'silver, ivory, apes, and peacocks,' which were brought by the navy of Tarshish, and for the three years consumed in the voyage. But Tarshish was probably the same place as Tartessus in Spain, and therefore, if Tarshish and Ophir are to be connected, we must make the gratuitous supposition that there was another Tarshish in the East. [TARSHISH.] Besides, Tarshish and Ophir are not mentioned together in the account of Solomon's voyages; the ships that went to Ophir (1 *Kings*, ix. 28) seem to have made only a single voyage for the purpose of fetching a specified quantity of gold, while the 'navy of Tarshish' which 'the king had' (not going to Ophir, but) 'at sea' made its voyage every three years; and moreover the products of the voyages were different, gold being the only article common to the two. For these reasons we think Major Rennell correct in saying 'that two distinct kinds of voyages were performed by these fleets: that to Ophir from the Red Sea; and that to the coast of Guinea' (or to Tarshish, wherever it was) 'from the Mediterranean.' (Rennell's *Geography of Herodotus*, vol. ii., p. 353.) The conjoint mention of Ophir and Tarshish in the account of Jehoshaphat's navy admits of easy explanation; either there may be some mistake in the account in 2 *Chron.* xx. 36, 37, which differs materially from that in 1 *Kings*, xxii. 48, 49, or 'Tarshish' in the former passage may mean only 'a distant voyage,' and we know that the phrase in the latter passage, 'ships of Tarshish,' is frequently used in the Old Testament for large strong ships. The question therefore as to the position of Ophir must not be encumbered with any considerations that refer to Tarshish. The principal conjectures on the subject are the following:—

1. That Ophir was in India. This was the opinion of Josephus. (*Antiq.*, viii. 6. 4.) A town *Σουπάρα* (the *Οὔππαρα* of Arrian), at or near Goa, is mentioned by Ptolemy, Ammianus, and Abulfeda; and Sophir was the antient Egyptian name of India. The Septuagint translates Ophir by *Σουφίρ*, *Σωφίρ*, *Σωφάρα*, and similar words. This opinion is held by Vitringa, Reland, and others.

2. John dos Sanctos (a Portuguese friar quoted in Purchas's 'Pilgrims'), who is followed by Bruce, D'Anville, and Robertson, places Ophir at Sofala, on the eastern coast of Africa, opposite Madagascar, chiefly on the ground of a supposed resemblance in the name.

3. Some place it on the Persian Gulf, but on very insufficient grounds.

4. The most probable opinion is, that Ophir was in the south of Arabia. It is mentioned in connection with the names of Arabian tribes in *Gen.* x. 29. The 'gold of Ophir' is mentioned in the book of *Job*, which is most probably of Arabian origin. The products of the voyage might easily have been obtained from Arabia, for though gold is not found there now, we have the testimony of several antient writers that it was in antient times. It is however very probable that Ophir was an emporium of the Phœnicians for their eastern trade; if so, the difficulty as to the productions is removed. This opinion is held by Michaelis, Gosselin, Vincent, Rosenmüller, and most modern historians.

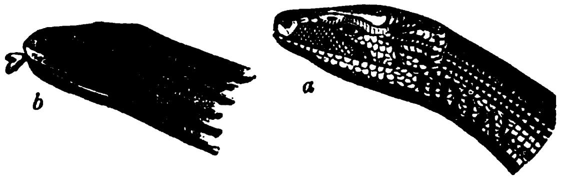
(Gesenius's *Hebrew Lexicon*; Winer's *Biblisches Realwörterbuch*; *Pictorial Bible*, vol. ii., p. 347, 364.) [ARABIA, vol. ii., p. 214; HINDUSTAN, vol. xii., p. 222.]

OPHISAURUS, Daudin's name for a genus of reptiles (*Hyalinus* of Merrem) nearly allied to the Scheltopusiks (*Pseudopus*, Merrem), and, according to Cuvier, one of the subgenera of the *Anguidæ*. [BLINDWORM, vol. iv., p. 528.] The genus is placed by MM. Duméril and Bibron among the *Ptychopleures* the first subfamily of their *Chalcidian Lizards*.

Generic Character.—Tongue arrow-headed in shape, notched triangularly in front, free for one-third of its extent anteriorly, which part has granular papillæ, whilst the other two posterior thirds exhibit filiform papillæ. Many rows of palatal teeth. Intermaxillary teeth conical. Maxillary teeth subcylindrical, simple. Nostrils lateral, each with its opening in a single plate. External orifice of the ear very small. Eyelids; cephalic plates numerous. Body serpentiform. No vestige of limbs externally. Two rather deep lateral furrows. No fold across the lower surface of the neck.

This form is one of those transitions by which nature passes from one type to another. The animal, in effect, has the head of a Lizard on a serpentine body. There appears to be but one species, viz. *Anguis ventralis*, Linn.; *The Glass Snake, Cæcilia maculata*, Catesby.

Description.—Colour yellowish green, spotted with black above. Tail longer than the body. Head very small, and the tongue of a singular form, according to Catesby.

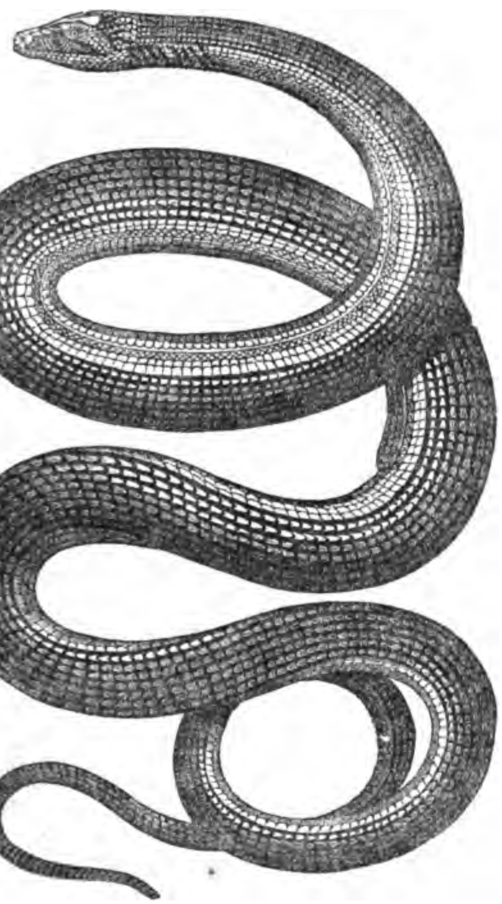


a, Head of Ophisaurus ventralis; *b*, head of the same from Catesby, showing the tongue.

It is probable that this species is subject to slight variations of colour. Catesby says that the 'upper part of the body is of a colour blended brown and green, most regularly and elegantly spotted with yellow; the belly yellow, the undermost part of which is brightest. Their skin is very smooth and shining, with smaller scales more closely connected, and of a different structure from other serpents.' General length about eighteen inches.

The fragility of this animal equals if it does not exceed that of the Blindworm; and hence, probably, its name of *Serpent de Verre*, or *Glass Snake*. The author last quoted says, 'a small blow with a stick will cause the body to separate, not only at the place struck, but at two or three other places; the muscles being articulated in a singular manner, quite through to the vertebræ. They are generally said to be harmless.' There is no doubt that the species is innocuous.

Geographical Distribution. — The Southern United States. Catesby states that the Glass Snakes appear earlier in the spring than any other serpent, and that they are numerous in the sandy woods of Virginia and Carolina.



Ophisaurus ventralis.

OPHIU'CHUS (the Serpent-bearer), one of the old constellations, representing a man holding a serpent, which is twined about him. But the moderns make a separate constellation of the serpent. [SERPENS.] Ophiuchus has also been called Anguitenens and Serpentarius. The figure of the man rests his feet upon the back of Scorpius, and is surrounded by Scorpius, Libra, Bootes, Corona, Hercules, and Aquila. It is not a constellation of any note, containing no star of the first, and one only of the second magnitude. The number and insignificance of the mythological traditions connected with it are rendered less surprising by this paucity of remarkable stars, since the latter is a presumption that the constellation itself is of a later date than Orion or Ursa Major.

The following is a list of the principal stars: it will be observed that the letters *o*, *p*, *q*, and *r*, have been given twice; the second is in all three cases the star so designated by Flamsteed.

Character. (Not in Bayer.)	No. in Catalogue of		Magnitude.	Character. (Not in Bayer.)	No. in Catalogue of		Magnitude.
	Flamsteed. (Piazzi.)	Astron. Society.			Flamsteed. (Piazzi.) [Bradley.]	Astron. Society.	
δ	1	1859	3	σ	49	2000	5
ε	2	1869	3½	*e*²‡	51	2005	6
υ	3	1884	5		52	2011	6
ψ	4	1874	5	*f*	53	2015	6
(ρ)*	5	1877	5		54	2014	6
χ	7	1882	6	α	55	2017	2
φ	8	1891	4	μ	57	2021	6
ω	9	1893	5	(D)§	58	2032	6
λ	10	1894	4	β	60	2036	3
	12	1901	6	γ	62	2045	4
ζ	13	1902	3	(*z*)	63	2049	5
(*l*)	16	1912	6	ν	‡‡64	2055	4
(*u*)	18	1917	6½	(*n*)	66	2064	4½
(*r*)	20	1920	5½	*o*	67	2066	4
	21	1923	6	(*k*)	68	2072	4
	22	1928	7	τ	69	2075	5
(*q*)	23	1931	5½	(*p*)	70	2082	4
	24	1936	7	(S¹)	71	2089	6
ι	25	1932	4	(S²)	72	2090	4
(*x*)	26	1941	6	(*q*)	73	2092	6
κ	27	1940	4	(*r*)	74	2108	6
	28	1946	6		(33)	1974	6
(*s*)	29	1944	6		(43)	1979	6½
(*p*)	30	1945	6		(90)	1995	6½
	32	1953	6		(99)	1998	5½
	34	1955	6		(112)	2004	6
η	35	1961	3	*h*	(127)	2008	6
A	36‖	1967	5¾		(195)	2033	7
	37¶	1966	6		(203)	2034	6
o	39	1973	6		(232)	1934	6
ξ†	40	1981	4		(248)	1939	6
(*o*)	41	1975	4½		(251)	1942	7
θ	42**	1986	3¾		(277)	1951	6
(*y*)	43	1988	6		(289)	1956	6
b	44	1993	5		(297)	1958	6½
d	45††	1994	6		(303)	1959	6
	47	1997	6		[2070]	1865	6

OPHIU'RA, Lamarck's name for a genus of Star-fishes. M. de Blainville makes it the first genus (*Euryale* being the other) of his *Asterophydea*, or more correctly, *Asterophidia*, the second family of his *Stelleridea* (*Asterias*, Linn.)

ASTEROPHIDIA.

Body small, disciform, very much flattened, the circumference furnished with appendages more or less elongated, serpentiform, squamous, and without inferior furrows.

The organization of this family differs in many points from that of the true *Asteriæ;* and there is also a difference in their habits.

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* *g* of Flamsteed.

† Erroneously called ρ by Flamsteed.

‡ Called *e* by Flamsteed, but probably *c* of Bayer.

§ This letter was given because Flamsteed had erroneously supposed it to be *d* of Bayer.

‖ Neither this nor any other star agrees with A in Bayer's map.

¶ Flamsteed's 38 Ophiuchi is also his 31 Scorpii.

** Does not agree with Bayer.

†† 46 Ophiuchi of Flamsteed does not exist, but is an error of computation.

‡‡ 65 of Flamsteed was either a mistake or has disappeared.

Ophiura.

Body discoid, depressed, rather small, subquinquelobate, covered with a coriaceous skin, and provided at its circumference with five simple, very long, very slender, squamous rays, without any trace of an inferior furrow, but always accompanied laterally with spines more or less moveable, and with two rows only of large cirrhi, or suckers, one on each side below.

Mouth in the midst of five very short slits, not exceeding the demi-diameter of the body, and furnished with a few papilliform suckers (eight), and on the edges with five groups of scales, which are often dentiform.

Orifices of the ovaries very large, in the shape of a slit on each side of the root of the rays.

No madreporiform tubercle. (Blainv.)

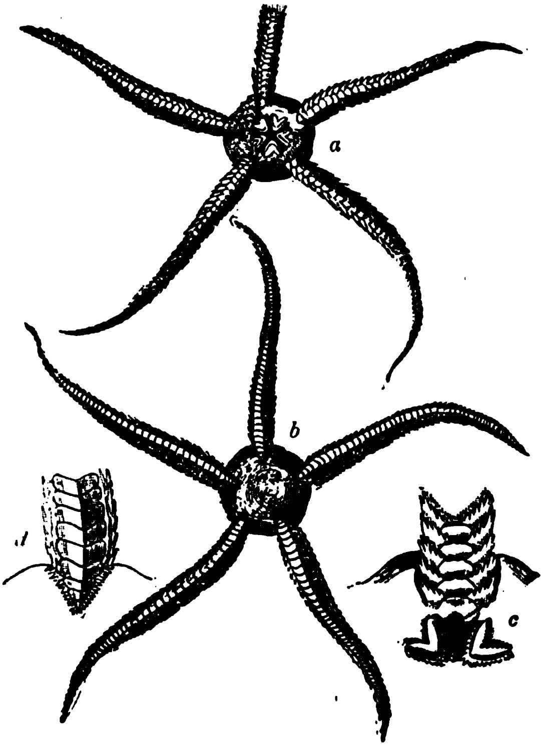
α.

Species the spines of whose rays are very short and applied (appliquées).

Example, *Ophiura texturata.* (*Stella lacertosa,* Link.)

Description.—Brownish or brownish white; rays smoothly subulate; the scales on the lower surface disposed trifariously; the papillæ of the sides very small and adpressed.

Geographical Distribution.—The European Seas. Lamarck adds the Atlantic Ocean. It was taken very abundantly in the trawl in Davis's Strait in Sir Edward Parry's first voyage; and occurs on the British coasts.



Ophiura texturata

a, front; b, back; c, portion of centre and arm magnified (front); d, the same (back).

β.

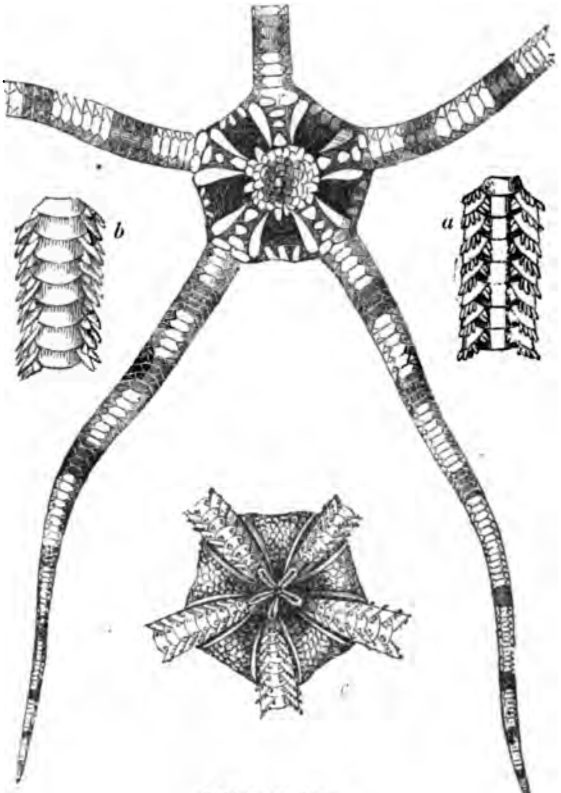
Species the spines of whose rays are long, and not applied.

Examples, *Ophiura annulosa* and *Ophiura granulata.*

Ophiura annulosa.

Description.—Brownish, rays long, smoothly subulate, spinous at the sides, the spines annulose, and subadpressed; back of the disk echinulate.

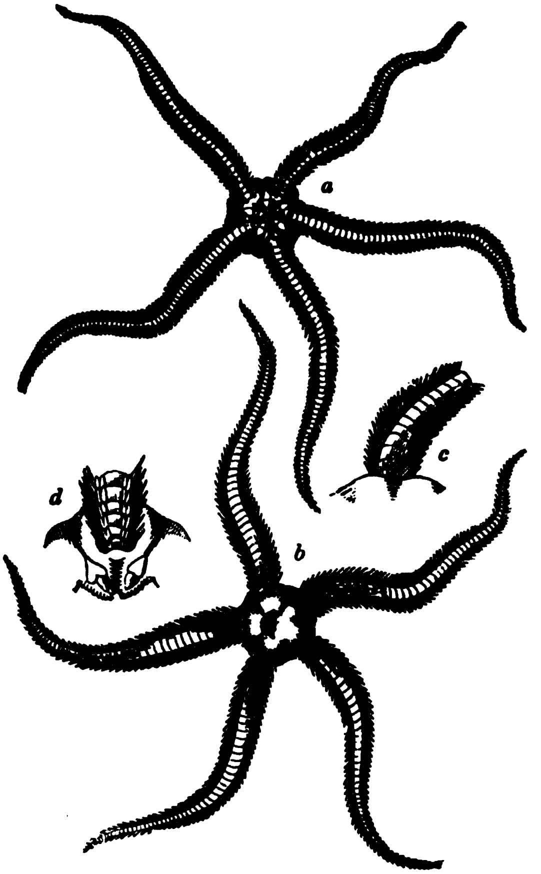
Geographical Distribution. — Australasia; first made known apparently by the voyage of Péron and Le Sueur.



Ophiura annulosa.

View of back (principal figure). a, Portion of arm, under side, magnified b, the same, upper side, c, front view of centre.

Ophiura granulata (*Ophiura echinata,* Lam., *Stella granulata,* Link.).



Ophiura granulata.

a, front, b, back; c, portion of arm at the back (nat. size); d, the same (front).

Description.—Blackish; disk granulated above; rays echinato-spinose; spines thick, rather longer than the width of the rays.

Geographical Distribution.—European seas, those of the West Indies, the Atlantic, &c.

M. de Blainville states that he has made observations on three species at least of this genus in the three seas which bathe the coasts of France. The genus, he observes, is evidently very distinct from that of the true *Asteriæ* both in the singular disposition of the appendages of the body and from the absence of the madreporiform tubercle. The mouth is also much more efficiently armed in consequence of the manner in which the spines or tubercles unite at the angles of the interfissural spaces of the mouth, so as to form a kind of teeth as thick as the body itself. The eggs are united in considerable oviform masses.

M. de Blainville is further of opinion that the best characters are to be drawn from the number and the length of the lateral spines of the rays, and perhaps from the proportion of these last compared with the diameter of the body; and better still by the disposition and number of the rows of plates which cover the rays. This last appears to him the most certain, and is that to which he has had recourse in his monograph.

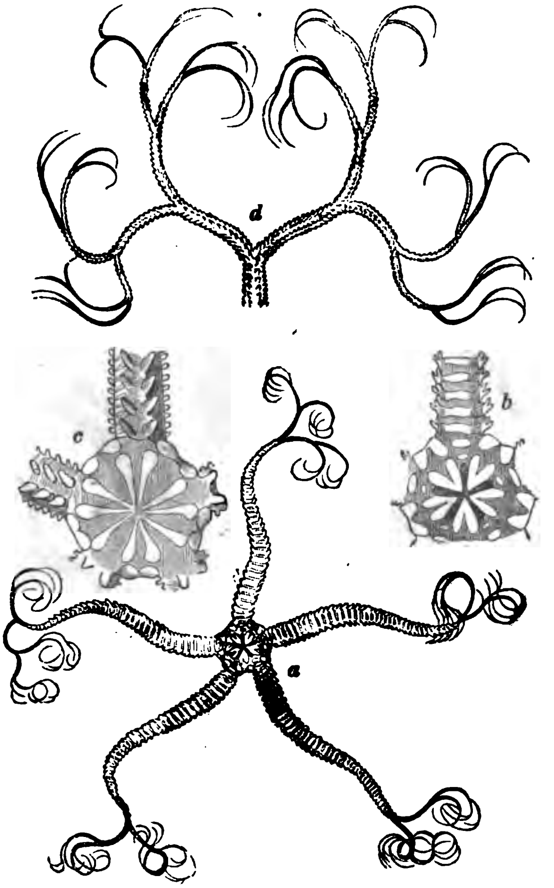
Geographical Distribution.—Very general; hardly any seas are without species of this genus; and there are many in those of Europe, though M. de Blainville thinks that zoologists have exaggerated the number.

Habits.—The *Ophiuræ* swim and creep often with much facility in all directions, agitating the appendages of the arms in a serpent-like manner.

Euryale. (Astrophyton, Link.; Gorgonocephalus, Leach.)

Body regular, depressed, rather small, pentagonal, provided with five appendages or rays rounded above, flattened below, dividing, dichotomizing, and attenuating more and more to the extremities, which are cirrhous.

Mouth at the centre of five converging furrows, in form of holes, not extending to the circumference of the body, and bordered with papilliform suckers. (Blainv.)



Euryale palmifera.

a, front view; *b*, centre and part of arm (front—nat. size); *c*, the same (back —nat. size); *d*, extremity of one arm (nat. size).

α.

Species whose rays dichotomize but little, and at a distance from the root.

Example, *Euryale palmifera.*

Description.—Rays simple below, dichotomo-palmate at the apex; back muricated with two rows of tubercles.

β.

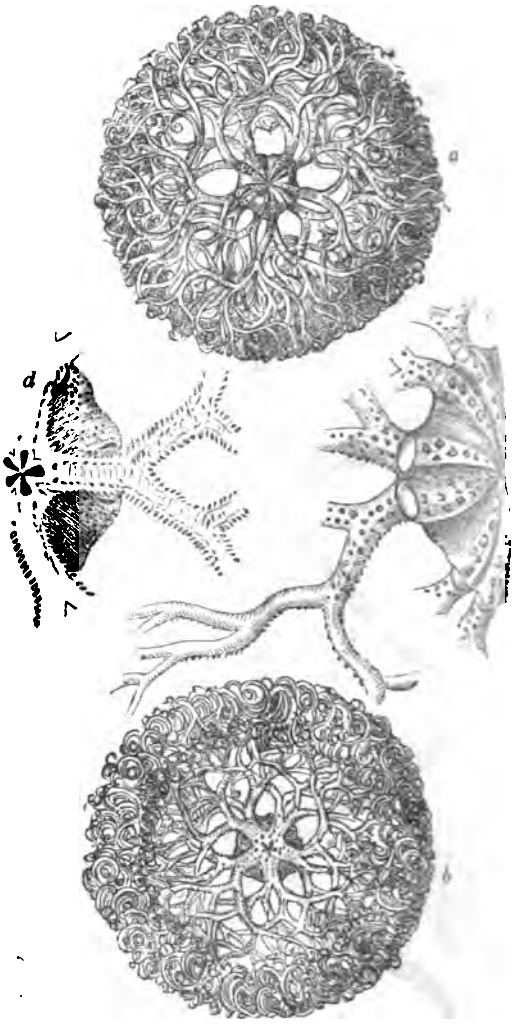
Species whose rays are divided and dichotomized from the base or root.

Examples, *Euryale scutata* and *Euryale costosa.*

Euryale scutata (*Euryale verrucosum*, Lam.; *Astrophyton scutatum*, Link.; *Asterias Caput Medusæ*, Linn.).

Description.—Disk wide, radiated above with warty ribs; rays beneath planulate, bifariously papillose; papillæ very small and submarginal.

Geographical Distribution.—Indian seas and those of the North; said to have been taken on the coasts of Scotland



Euryale scutata.

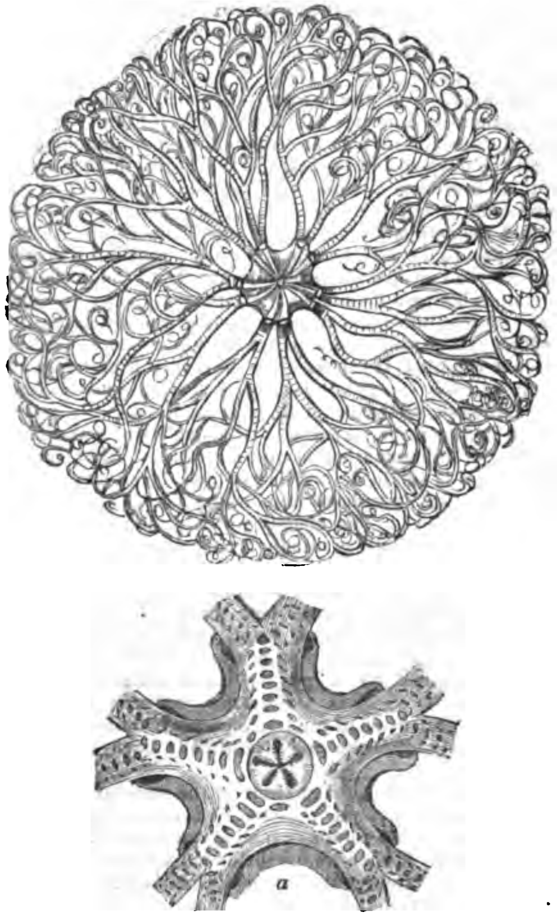
a, back; *b*, front; *c*, central portion of back (nat. size); *d*, the same (front —nat. size).

Euryale costosa. (*Astrophyton costosum*, Link.)

Description.—Back of the disk with ten unarmed ribs in pairs, truncate at the apex; rays dichotomous, very ramose and transversely rugose.

Geographical Distribution.—Seas of America.

Habits.—M. de Blainville remarks that he knows of no author who has observed an *Euryale* alive, or at least who has published his observations; but it is nevertheless said that these animals make use of the cirrhi of their rays to entrap their prey and bring it to the mouth; that they adhere strongly by their upper disk, and that it is even difficult to detach them. We have often seen them clinging by their arms to the branches of *Gorgoniæ*, &c., and such specimens are to be found in most museums.



Euryale costosa.
a, centre (front—nat. size).

Geographical Distribution of the genus.—Though the species do not appear to be numerous, the form seems to be found in all seas.

Fossil Asterophidia.

Ophiura.

Professor Phillips, in his 'Geology of the Yorkshire Coast,' figures a species (*Ophiura Milleri*, Phillips) from the marlstone. Mr. Broderip (*Geol. Trans.*, vol. v., 2nd series) describes and figures another (*Ophiura Egertoni*), found in masses of micaceous sandstone which had fallen from the cliffs about half a mile west of Bridport harbour. The last-named species, Mr. Broderip states, approaches very nearly to the recent *Ophiura texturata*.

OPHTHA'LMIA (from *ophthalmos*, ὀφθαλμός, the 'eye') is an inflammation of the eye. General ophthalmia, or an inflammation of the whole globe of the eye, is a very rare occurrence. Cases however do occur, from severe injuries or other causes, in which the signs of all the special forms of ophthalmia are combined, and they are the most formidable affections to which the eye is liable. Unless met by the most active antiphlogistic treatment, they usually terminate in complete destruction of the organ.

In the large majority of inflammations of the eye, one part of it is alone or especially affected. Hence there have been described numerous varieties of ophthalmia, a distinct name being formed for the inflammation of each part or tissue by appending the termination *itis* to its anatomical name; as conjunctivitis, iritis, and corneitis, for the inflammations of the conjunctiva, iris, and cornea. [Eye.]

Of all the varieties of ophthalmia, slight inflammation of the conjunctiva is the most frequent. It is the common result of all slightly irritating bodies being introduced between the eyelids, and of the application of cold, in which case it is often called catarrhal ophthalmia. Its symptoms are redness, varying from a pale-pink to a scarlet colour, of the external membrane of the eye and of the lining of the eyelids, the blood-vessels (which are naturally invisible) appearing swollen and tortuous, and making the front of the eye what is commonly called blood-shot; swelling of the eyelids and increased thickness and puffiness of the conjunctiva of the ball; and an increased secretion of opaque white or yellow tenacious mucus which agglutinates the eyelids. The pain is seldom acute, except in severe cases, in which it has a peculiar character, as if there were dust or fine sand rubbing between the eyelids. There is rarely any intolerance of light or any constitutional affection, and the vision is not at all affected, except by the swelling of the eyelids and the accumulated mucus.

In this, the common inflammation of the eyes, no active means need be employed. In the most severe cases, blood should be taken from the arm; but in general, the application of leeches, cooling lotions applied to the eyes, and mild purgatives or sweating medicines, are sufficient for the removal of the inflammation, which, as it does not affect a part directly important to vision nor spread beyond the tissue first affected, rarely leaves any inconvenience behind. In the mild cases of this kind, a lotion composed of two grains of sulphate of zinc to the ounce of water is the best, and generally a sufficient remedy; the eyes should be washed with it three times a day.

That which is commonly called purulent ophthalmia is a much more serious form of inflammation of the conjunctiva. It was observed in its greatest severity in the European armies engaged in Napoleon's campaign in Egypt, and is therefore sometimes called Egyptian ophthalmia; and from its appearing to spread from one individual to another by the contact of the purulent matter secreted by the inflamed eyes, it has also received the name of contagious ophthalmia. In this form, which has often appeared as an epidemic,* and is generally acknowledged to be liable to spread by contagion, all the symptoms of the preceding are greatly aggravated. The conjunctiva is intensely red, and so swollen that it is raised in a deep ring round the cornea, whose edges it overlaps so as almost totally to obstruct the sight. The conjunctiva of the eyelids is at the same time excessively inflamed, and by effusion into their loose cellular tissue they often become so distended that they completely cover the front of the eye. A considerable quantity of acrid yellow puriform discharge constantly flows between the eyelids, producing excoriations of them and of the cheeks. The pain is often extremely acute, vividly smarting, or hot and burning, and it is accompanied by some intolerance of light. From the conjunctiva, which it first affects, the purulent ophthalmia often spreads rapidly to the other tissues of the eye; producing ulceration and sloughing, or excessive opacity of the cornea, and all the worst results of inflammation of the several tissues, even to suppuration and destruction of the whole of one or both eye-balls.

The treatment of this form of ophthalmia must be active in proportion to the rapidity of its destructive effects when unchecked. Large bleedings, both general and local, should be employed, and repeated till the inflammation is evidently reduced; and purgatives and the various other antiphlogistic means should be administered, as in the treatment of an acute inflammation of the most vitally important organ. When the inflammation is somewhat checked, the greatest benefit is derived from the application of powerful astringents to the eye, a mode of treatment which may be adopted with equal advantage in these and in the severer cases of catarrhal ophthalmia. The best material is a solution of from two to four grains of lunar caustic to the ounce of water; of which one or two drops should be let fall into the eyes once or twice a day, according to the severity of the inflammation. This remedy produces considerable pain for a short time after its application, but is generally productive of the most beneficial results.

One of the most common effects of the purulent ophthalmia, when prevented by active treatment from producing its worst results, is a thickening and roughness of the inflamed lining of the eyelids, to which the name of granular conjunctiva is given. The affected surface looks like that of a florid ulcer, and the friction of its irregularities upon the front of the eye-ball keeps up a constant slight inflammation, of which the common consequence is a complete opacity of the cornea. The granular conjunctiva may be treated by the application of powerful astringents or caustics; the most efficient, though a severe remedy, is to rub the rough surface with a piece of sulphate of copper, taking care after its application that no considerable portion of it comes in contact with the front of the eye.

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* A severe epidemic of purulent ophthalmia is now raging in the Belgian army. It first appeared in 1814, but it is chiefly since 1830 that it has raged with such extreme intensity as to have attacked an eighth and in some regiments half the soldiers. Since its commencement it has affected more than a hundred thousand persons, and has deprived many of their sight. (See the Report on the ophthalmia of the Belgian army, recently presented to the French Academy of Medicine, by M. Caffe, in their Bulletin of January 15, 1840.)

Infants of three or four days old are often the subjects of a very severe form of inflammation of the conjunctiva, to which the name of the ophthalmia of new-born children has been given. Its course and effects are similar to those just described, and it sometimes produces entire destruction of the eye before it attracts proper attention, for the eyelids are commonly agglutinated together by the discharge, and are so swollen that they obscure the front of the eye. Its severest form may be suspected when the upper eyelid is much swollen and is externally of a bright red colour. The treatment must be similar in its principles to that for the corresponding disease in the adult; in severe cases a leech should be applied to the temples and purgatives should be administered in all; and when the inflammation is somewhat relieved, or from the first, if it be not very severe, astringent lotions should be dropped into the eyes. The best form is composed of from two to ten grains of alum in an ounce of water, beginning with the smaller quantity and gradually increasing the strength.

Another form of inflammation of the conjunctiva is that called strumous ophthalmia. It occurs in children of scrofulous habit, and is chiefly remarkable for the extreme intolerance of light by which it is accompanied. The patient cannot be induced to open the eyes, or even to raise them to the light, but keeps his head down, with the eyelids pressed together upon the ball of the eye, and carefully covered with his hands or his clothes. The degree of inflammation is by no means proportionate to the severity of this symptom; the conjunctiva is usually only a little reddened, but in many cases little pustular elevations form upon the edges of the cornea. The treatment of these cases should be chiefly that adapted for the constitutional disorder on which their peculiarities depend. [Scrofula.] Pure air and exercise, mild aperients and tonics, and especially bark and iodine, should be administered, and the general health should be carefully attended to. In the earlier stages a few leeches may be applied, but afterwards counter-irritation by blisters placed behind the ears, or by tartar-emetic ointment rubbed on the same parts, is most useful. Slightly astringent lotions may also be applied to the eyes, and the ulcers or little pustules on the cornea touched with the solid nitrate of silver (lunar caustic).

The characters of inflammation of the sclerotica are very different from those of inflammation of the conjunctiva, but very often the two affections are coincident, so that the appearances belonging to each are confounded. In sclerotitis, as this form of ophthalmia is sometimes called, the redness of the eye has a rose-pink or violet tinge, rather than the scarlet hue which is seen in the preceding form; for the distended vessels are fewer and smaller, and are to a certain extent obscured by the conjunctiva, beneath which they lie. This redness is most intense in a zone around the cornea, at which the enlarged vessels are concentrated like rays, and from whose outer border the redness diminishes in brightness till it is nearly lost at the angles of the eye; and by this circumstance sclerotitis is further distinguished from inflammation of the conjunctiva, in which the redness increases with the distance from the cornea. In sclerotitis there is always considerable pain of a dull heavy kind, which often extends all round the orbit, or over the forehead and head, and is accompanied by intolerance of light and a profuse secretion, not of mucus or pus, as in the preceding cases, but of hot tears. The pain is very often aggravated in the evening, or throughout the night.

The treatment of inflammation of the sclerotica must, as far as general means are concerned, be the same as for acute inflammation of the conjunctiva. The application of astringents or stimulants is useless, and sometimes injurious; the vapour of hot water and other warm fomentations are the local means which are most agreeable to the patient. The moderate use of mercury is generally useful. In rheumatic and gouty conditions of the system, with which this form of ophthalmia is often connected, and is then called rheumatic or arthritic ophthalmia, the treatment adapted to the general disorder should, as far as possible, be combined with those means which are proper for the local disease. [Gout; Rheumatism.]

Inflammation of the cornea, corneitis, or keratitis, is very generally connected with some degree of the preceding. Its signs are those which are common to the inflammations of all the deep-seated tissues, viz. dull pain, intolerance of light, and profuse discharge of hot burning tears; at the same time a few vessels passing inward from the red zone around the cornea become visible upon its surface; it loses its transparency and becomes hazy, or assumes a greyish and often an opaque chalky-white hue, from the deposition of lympth between its laminæ. [Leucoma.] In very severe cases suppuration takes place in the cornea, and it acquires a yellow colour and ulcerates; or matter is poured into the anterior chamber [Hypopium], or the cornea is perforated by ulcers and the iris protrudes; or it sloughs and becomes soft and weak, so that staphyloma is produced.

The treatment of corneitis in its active state is the same as that for inflammation of the sclerotica. After the inflammation is subdued, its effects (which the situation of the cornea renders peculiarly important) admit of but little useful treatment. The opacity which remains, when it is superficial, is usually gradually removed, and that process may be in some degree assisted by the application of a weak solution of nitrate of silver or some other stimulant; the ulcerations generally proceed best when left to themselves, the chasms which they leave being gradually filled up, and the yellow tinge of the cornea which accompanies them being exchanged for a grey or bluish colour; the more serious effects, such as staphyloma, extensive leucoma, sloughing, protrusion of the iris, &c., are irremediable.

Inflammation of the iris has already been treated of. [Iritis.]

Inflammation of the membrane of the aqueous humour is not uncommon in young persons; it is marked by dullness and haziness of the cornea (which is surrounded by the vascular red zone formed by the distended vessels of the sclerotica), an alteration in the colour of the iris, which assumes a dull reddish hue, and a turbid or purulent appearance of the aqueous humour, with, in some cases, hypopium. The proper treatment does not differ essentially from that of inflammation of the iris or sclerotica, with which this form of ophthalmia, like all the affections of the deep-seated tissues of the eye, is very generally conjoined.

The inflammations of the parts of the eye which are still more deeply seated are much rarer than any of the preceding; their symptoms also are more obscure, and they are seldom found uncombined with those of some other form of ophthalmia. Their signs are similar to those of the inflammations of the sclerotica and cornea; but the intolerance of light and the loss of vision are usually greater than would arise from the degree of inflammation which exists in the visible tissues. The treatment must be similar to that for the acute inflammation of the iris or cornea, and be actively administered for the nature of the parts affected renders the least disorganization of them of the highest importance.

All kinds of ophthalmia may either become chronic after having existed for some time as acute diseases, or may be chronic from their commencement. Their symptoms in either case differ only in degree from those of the corresponding acute forms, and the treatment of them should be the same in principle, though less active. Counter-irritation by blisters or other means, applied to the neighbourhood of the eyes, or setons in the back of the neck, are among the most useful means; and of the milder forms of astringent lotions, the *vinum opii* is the best for all the more superficially seated of the chronic ophthalmiæ.

O'PICI. [Osci.]

OPIE, JOHN, the son of a carpenter at St. Agnes near Truro in Cornwall, in which parish he was born in 1761, was one of those artists who may be said to have been gifted with an intuitive feeling guiding them towards a destination against which all circumstances appear to conspire. In this respect there was a striking similarity between Opie and Carstens. [Carstens.] The humble condition of his family was the least obstacle; for besides that, there was nothing around him either to awaken his perceptions of art or to encourage his early attempts in it. Intending to bring him up to his own trade, his father was much more disposed to check what he considered an idle boyish pastime than to foster proofs of dawning talent. Opie however was not to be deterred by his father's disapprobation; he began to take likenesses of his relations and neighbours, the fame of which productions caused him to be regarded as a prodigy, and attracted the notice of Dr. John Wolcot (Peter Pindar), then practising as a physician at Truro. The Doctor possessed considerable knowledge of painting, and took Opie into his house in the double capacity of his protégé and his footboy. How long he remained beneath Wolcot's roof is not known, nor what immediately led to his quitting it. Opie afterwards came to the metropolis under the doctor's immediate care and protection. In the time between leaving his service and coming up to town, he pursued his art as an itinerant portrait-painter, and with such success, that though his charges never amounted to the value of any gold coin, he was able not only to make a smart appearance, but to remit money to his mother.

On arriving at London with Wolcot (1781), he was introduced to Sir J. Reynolds, whom he found more liberal of advice than lavish of expressions of astonishment at the talents of an untaught lad. Wolcot's object however was to secure immediate fame for his protégé as a miraculous genius, and distinction for himself as a discriminating and generous patron.

Aware that the public are always ready to meet any novelty or wonder more than half way, the doctor took his measures accordingly, and with such success, that within a very short time his Cornish lad became almost the rage among the fashionable world. Visitors and sitters so thronged around him, that their carriages literally crowded the street where he resided. But people cannot wonder for ever: the fever of fashionable admiration subsided almost as rapidly as it had come on; not that Opie was absolutely left all at once without sitters, but he was comparatively deserted:—public curiosity had been gratified. In fact he was ill suited to become a permanent favourite with the fashionable; there was nothing engaging in his person and address, no flattery either in his language or his pencil, which latter possessed much more of vigour and homely truth than of grace and artificial refinement; and he succeeded far better with male heads and strongly marked countenances than with females and with pretty faces. When it had subsided, however, the tide of fashionable patronage left him in comfortable circumstances. He further sought to establish his independence by marrying the daughter of a wealthy pawnbroker, but the match proved a most unhappy one, and he was glad to obtain a divorce. In 1798 he ventured upon a second union, and married Amelia, the daughter of Dr. Alderson, a physician at Norwich. In this lady, who subsequently became one of the most popular novelists of the day, he found an intellectual companion and judicious adviser.

Instead of abandoning portrait-painting on the discouragement immediately following his first success, Opie divided his attention between that and historical painting, in which latter his best known productions are—'The Murder of James I. of Scotland;' the 'Death of David Rizzio;' 'Arthur taken prisoner;' 'Hubert and Arthur;' 'Belisarius;' 'Juliet in the garden,' &c. None of these works affect ideal beauty or refined poetical conception, but they are stamped by a peculiar energy of style, and by a vivid reality, for instead of attending to conventional beauties, the artist adhered closely to his models; one fortunate consequence of which was the striking and remarkable truth of his colouring.

Opie's education had been exceedingly limited, and was in no degree a literary one. Sensible of his deficiency in that respect, he sought to repair it in after-life by studying the best English authors, and having a clear judgment and a strong memory, distinguished himself in conversation by his force of intellect. Thus qualified he aspired to the professorship of painting at the Royal Academy, having previously delivered a course of lectures at the British Institution; but he withdrew on finding himself opposed by Fuseli. When the latter was obliged to resign on being appointed Keeper, Opie again offered himself as candidate, and was chosen. He delivered only four lectures (afterwards published by his widow), in the months of February and March, 1807. On the 9th of the following April he died, and was buried on the 20th in St. Paul's cathedral, near Sir J. Reynolds.

OPI'LIUS. [Macrinus.]

IMP C M OPEL SEV MACRINVS AVG
P M TR P II COS P P
S C

Coin of Opilius.

British Museum. Actual size.

OPISTHO'COMUS. [Cracidæ, vol. viii., p. 131.]

OPITZ, MARTIN, considered the father of modern German poetry, was born at Bunzlau in Silesia, in 1597. While at the gymnasium at Breslau, he produced several Latin poems, which were printed. On quitting Breslau, he studied successively at Beuthen, Frankfort, and Heidelberg; and it was at the first-mentioned place that he composed his dissertation entitled 'Aristarchus, sive de Contemptu Linguæ Teutonicæ,' 1618, in which he vindicates the merits of his native tongue. At Heidelberg he formed many literary friendships, and met with patrons whose attachment afterwards proved highly serviceable to him.

Having renounced his legal studies, he began to employ his pen very industriously both in Latin and German composition. Yet, whether from restlessness of disposition or some other cause, he was continually changing his place of abode. Scarcely had he been a year at Heidelberg when he quitted it for Strasburg, and in the course of a short time after (1820) visited the Netherlands, when he became acquainted with Vossius, Rutgersius, and Dan. Heinsius. The example of this last eminent scholar determined him to cultivate his native tongue with still greater assiduity, and to do for the German language and poetry what had already been accomplished in that of Holland. In the following year he accompanied his friend Heinrich Albert Hamilton, a young Dane of noble family, to Holstein; and while he was his guest composed his 'Trostgedicht,' or poem on Consolation in the Disasters of War, which however he did not publish until nearly thirteen years afterwards (1633), when war was raging in Germany. In 1622 he was invited by the Prince of Siebenbürgen (Gabriel Bethlen) to become teacher of philosophy and humanities at the school of Weissenburg. It was during his residence there that he commenced his 'Dacia Antiqua,' an historical work of great labour and research, on which he employed himself for sixteen years, but which was left incomplete, and lost when his MSS. were dispersed after his death. He returned to Liegnitz in 1623, and in the following year appeared the first edition of his poems. Not very long after he spent some time in travelling through Saxony, and subsequently proceeded to Vienna, where he was noticed by Ferdinand II., who even bestowed a laurel crown upon him for his poem on the death of the archduke, which production however was rather a triumphal song in honour of the Austrian monarchy.

In 1626 he accepted the post of private secretary to Count von Dohna, a nobleman equally eminent as a soldier, a statesman, and a scholar; and notwithstanding his patron was a Catholic, and Opitz a Lutheran, with very little taste moreover for military affairs, they lived together upon the very best footing, and the poet was enabled to gratify his passion for travelling, by accompanying the count to Paris, where he became acquainted with Hugo Grotius and other eminent literary persons. His patron dying shortly after (1633) their return from France, Opitz (who had previously had a patent of nobility conferred upon him by the emperor, with the style of Opitz von Boberfeld) met with another protector in the Duke of Brieg, who enabled him to visit Prussia, in order that he might there pursue his studies at a distance from the troubles which then agitated Germany. For some time he continued settled at Danzig, where, having recommended himself to Uladislaus IV. of Poland, by a poem on his campaign against Russia—one of his most masterly and energetic productions—he was appointed Polish historiographer. But while his literary reputation was daily increasing, and his circumstances becoming more prosperous, a dreadful plague broke out in Danzig, to which he fell a victim, August 20th, 1639, in his forty-second year. Owing to the fear of contagion, his papers and manuscripts were put away and irrecoverably lost.

His published works however sufficiently attest the important services he performed for German literature, more especially as regards the language and its mechanical structure! As a poet he can be considered great only by comparison with his predecessors and contemporaries. Though strong native good sense and amiable feelings display themselves in his productions, together with great correctness and purity of style, and occasionally great felicity of expression, there is more of the orator than of the poet in his compositions; more of elaborate study and sound judgment than impassioned feeling. Still he rendered most essential services to the literature of his country; and but for his labours in refining the language, the poets of the eighteenth century would have had to contend with nearly all the difficulties which the labours of Opitz had helped to remove. Opitz succeeded best in moral and didactic subjects, such as his 'Preis der Gemuthsruhe,' 'Vielgut,' &c. Among his lyric productions his version of the Psalms contains some of his most successful efforts. His prose style has also much merit, and recommends itself by the qualities of correctness, precision, and clearness, in which respect his translation of Barclay's 'Argenis' (1626) is a masterpiece, considering in what condition the language was at the time when it was produced.

OPIUM. [PAPAVER.]

OPIUM TRADE. The cultivation, mode of preparing, and medical properties of opium, are treated of under PAPAVER: in the present notice we shall confine our attention to the consumption and commerce of opium.

The principal countries in which opium is medicated are India, Turkey, and Persia. The poppy is cultivated in Egypt and Arabia; in Italy, France, and several other parts of Europe; but, with the exception of the two former countries, rather for the sake of its capsule and the oil extracted from its seeds than for the inspissated juice. Indian opium is distinguished into two kinds, the Patna, grown in the province of Bahar, and that grown in the province of Benares, the former of which is most esteemed. The opium produced in the district of Malwa is still less esteemed than that of Benares, being, it is said, not so 'pleasant,' and the flavour less 'mellow;' and the best Indian opium is inferior to that of Turkey. For some time the quantity of opium produced and brought to the Eastern markets from all parts was not equal to the demand, and the Malwa and Turkish opium were introduced to supply the deficiency. At first there was a strong prejudice against the latter. The Turkey opium was introduced into the Indian Archipelago in 1815, and the merchants reluctantly consented to its constituting one-fourth of the supply for the year; but two years afterwards they expressly stipulated for one-half, and in the following year for three-fourths, although the price rose, while Indian opium was stationary. A strong preference has also been shown in China for the Turkish opium, which has been introduced by the Americans. The annual imports of Turkey opium into China are estimated at about 1500 chests. Several thousand persons are engaged in the cultivation in Turkey. They are generally very poor, and the quantity annually brought to market by each cultivator does not usually exceed one or two baskets. The annual average produce of Turkey is estimated at 3000 baskets, or about 400,000 lbs., equal in weight to 2666 chests of the Indian opium. The whole quantity of land under the poppy cultivation in India is said not to exceed 50,000 acres, and perhaps about as many persons are employed in the cultivation. It is under a strict monopoly, and the advances made by the government are a great inducement to the peasant to engage in the cultivation. Milburn (*Oriental Commerce*, p. 294) gives the following account of the opium monopoly:—'The monopoly in the trade of opium, or the cultivation of the poppy, may be traced at least as far back as the commencement of the British influence in Bengal. The advantages resulting from it were for several years merely considered as a part of the emoluments of certain officers under the government. In the year 1773 it was taken out of their hands, and the profit of the trade assumed for the benefit of the Company. The provision of the article was for many years let out upon contract. The opium concern continued under the direction of the Board of Revenue till 1793, when it was transferred to the Board of Trade. On the expiration of the contracts, in 1797, the cultivation of opium was restricted to Bahar and Benares and discontinued in Bengal: the mode of provision by agency was resorted to, and still continues in practice. In July, 1799, some regulations were published "for the guidance of all persons concerned in the provision of opium on the part of government, and for preventing the illicit cultivation of the poppy and the illicit importation or traffic in the article of opium." Under these regulations, which were further modified in 1807, the cultivation of the poppy, except on account of government, is expressly forbidden; but it is left entirely at the option of the cultivator to enter into engagements on account of government at a settled price, or to decline it altogether. The quantity grown, which is limited, is sold by public auction at two annual sales at Calcutta, in December and February.' The monopoly is said in some years to have yielded 1,000,000*l*. It has not been possible to extend it to Malwa, but the East India Company grant passes for the transit of Malwa opium to the place of shipment. (Report of a committee of the House of Lords 'On the Affairs of the East India Company,' 1830.)

Opium is often adulterated with the pulverised leaves and stalks of the poppy, which are mixed up into a mucilaginous mass with gum arabic or some similar substance. Milburn (*Oriental Commerce*) gives the following directions for testing the quality and purity of opium:—'Opium is very heavy, of a dense texture, commonly soft enough to receive an impression from the finger. It should be chosen moderately firm; its colour a very dark-brown yellow, so dark that, unless held to the light, it appears black; of a strong smell and bitter taste; as free from leaves as possible; and care should be taken, by rubbing it between the finger and thumb, that there is no roughness or grittiness. That which is soft should be rejected.' In Sumatra the opium prepared for smoking is frequently adulterated with pine-sugar, and crude opium with the fruit of the pisang, or plantain.

The East India opium is exported in chests, of 150 lbs. each, lined with hides. The principal market is China; but it is also in demand in all Eastern countries, the Malay Peninsula, Sumatra, Borneo, Celebes, and other islands of the Indian Archipelago. In 1821, of the total quantity exported from Calcutta, three-fourths were for China and Macao, a fifth for Penang, and between a seventh and an eighth for Java. Mr. Crawfurd states (*Indian Archipelago*, vol. ii., p. 520) that in the islands opium sold at an advance upon the monopoly price of Bengal of 168 per cent., and upon the first cost of 3025 per cent. It is a lawful trade throughout all the islands, but the article pays a heavy duty. In Java the native princes monopolise the sale, and farm it to the European government. In 1820 the consumption of the island was about 550 chests, but varied with the annual price. Previous to 1811, under the Dutch government, the annual consumption varied from 800 to 1200 chests; but while Java was in our possession, Sir Stamford Raffles fixed it at 300 chests, without exciting any disturbance or creating an illicit trade. The opium trade is farmed in Sumatra. In Siam opium is a prohibited article; and in a commercial treaty which the Siamese entered into with the East India Company in 1833, it is declared liable to be seized and destroyed whenever found.

Mr. Davis states ('China,' vol. ii., p. 453) that an engrossing taste for opium pervades all classes in China, and that it has spread with astonishing rapidity. From the superior classes, who were the first to practise it, the habit of opium smoking has descended and become general. 'Worthless subordinates in offices and nefarious traders first introduced the abuse; young persons of family, wealthy citizens, and merchants adopted the custom; until at last it reached the common people. I have learned on inquiry, from scholars and official persons, that opium smokers exist in all the provinces, but the larger proportion of them are to be found in the government offices; and that it would be a fallacy to suppose that there are not smokers among all ranks of civil and military officers below the station of provincial governors and their deputies.' (Memorial to the Emperor, from one of the Chinese Censors.) Mr. Gutzlaff ('Journal of Three Voyages,' p. 61) says of the Chinese sailors, that most of them are smokers of opium, and that when the weather is rough, and more than ordinary attention is required from them, they turn in and intoxicate themselves with this drug; and on shore they indulge in smoking it until all their wages are squandered. The drug is prepared for smoking by being boiled or seethed to separate the resinous parts, and the remainder is made up into small balls, one of which is placed in a wooden pipe with some combustible substance, when as many whiffs are taken as the habit of the smoker will permit. At convivial entertainments a dish of the prepared opium is often brought in with a lamp, and the host, taking up a large pipe, lights it, and after two or three whiffs, passes it to his guests, the pipe making its rounds until all are intoxicated. The whole of the tribes of the Indian Islands more frequently smoke opium than eat or chew it. They in fact chew tobacco and smoke opium, while the practice of the Turks and other people of Asia is directly the reverse. Raffles states ('Java,' vol. i., p. 112) that in this island the opium prepared for smoking is used along the coast, and crude opium is chewed by the people of the interior. He tells us that 'the use of opium, though carried to a considerable extent, is still considered disgraceful, and persons addicted to it are looked upon as abandoned characters.' (Vol. i., p. 114.) On the west coast of Celebes, the principal rajah and his family, and the various smaller rajahs amongst whom the country is divided, are the chief opium smokers, persons of inferior rank not being able to command the luxury. In Sumatra and Borneo the drug is subjected to nearly the same preparation as in China. (J. H. Moor's *Notices of the Malayan Archipelago.*) Marsden states ('Sumatra,' p. 277) that in that island the opium, after being seethed, is strained and then boiled. The leaf of the *tambaku*, shred fine, is then mixed with it, and the whole is made into pills of the size of a pea, one of which is put into the pipe, and a light being applied, it is consumed at one whiff or inflation of the lungs. In some parts of India, opium is presented at visits and entertainments in the same familiar manner as a snuff-box. The prohibition of intoxicating liquors by the Mohammedan law has, it is believed, encouraged the habit of taking opium; and in consequence of the Turks of the present day being far less bigoted than formerly, the consumption of opium is said to have declined with the more frequent indulgence in wine and arrack. The race of *Theriakas*, or habitual opium-eaters, has not however become extinct. The habit is believed to be more prevalent at present in Persia than in Turkey, though it is not often carried to the same excess. The opium stalls in the bazaars, around which the wretched and haggard victims of opium-eating assemble for their daily supply, remind the Englishman of gin-drinking in his own country.

In Europe opium is almost wholly employed as a medicine. It has been made in England from the native poppy, but the cultivation is not likely at any time to become worthy of attention on a large scale. The abuse of opium is said to have been latterly increasing in England, and the cause of this has been attributed to the Societies whose members are pledged to total abstinence from fermented and spirituous liquids; but although this statement has been made by members of the medical profession, it does not appear to rest upon any good evidence. It is said, we believe with some truth, that opium is taken for its intoxicating properties rather extensively in Lincolnshire, the practice having originated in its use as a remedy for the ague; and in the manufacturing districts in Lancashire it has been asserted that its use was rather common, but the fact is not at all well established. Laudanum, a preparation from opium, is made use of to a very great extent by ignorant and careless mothers and nurses. From a Return to the House of Commons in 1839, which however is not quite complete, it appears that out of 543 persons in England and Wales who died from the effects of poison in 1837 and 1838, and on whom inquests were held, the fatality was occasioned by opium or its preparations in not fewer than 186 cases; and nearly one-seventh (72) of the whole number of cases were young children, most of them under one year, to fifty-two of whom an overdose of opium, or some medicine of which it formed the chief ingredient, had been given, and in twenty other cases the children had been poisoned by taking such medicines by mistake. The coroner for Nottingham stated in his Return, that at a shop in that town, in which the attendants were two girls, one of them was in the habit of selling twice as much laudanum for a penny as the other. There is every reason to believe that the deaths which occur without exciting public attention, and which arise from the indiscriminate and injudicious use of cordials and other made-up medicines for children, of which opium is the basis, are as numerous as those which come under the cognizance of the coroners

The opium consumed in this country is chiefly from Turkey. From 1827 to 1834, the total quantity imported into the United Kingdom was 688,443 lbs., of which 581,380 lbs. were from Turkey. Opium in small quantities is a permanent article of import from Italy and France; occasionally, but in still less quantities, it is imported from Russia, Germany, Holland, and Belgium; and but rarely from India. Within the last few years Egypt has exported opium to England, and the quantity has been yearly increasing. In 1838 the total quantity of opium imported into the United Kingdom was 95,832 lbs. from the following countries:—Turkey, 80,554 lbs.; Egypt, 12,324 lbs.; Holland, 270 lbs.; France, 102 lbs.; Gibraltar, 409 lbs; Italy, 895 lbs.; Syria, 571 lbs.; East Indies, 580 lbs. The quantity re-exported was only 13,028 lbs. In 1837 the imports were 79,651 lbs.; and 67,476 lbs. were exported to the undermentioned countries —Russia, 836 lbs.; Germany, 1289 lbs.; Holland, 2199 lbs.; Belgium, 116 lbs.; France, 243 lbs.; Portugal, 337 lbs.; Turkey, 234 lbs.; China, 58,874 lbs.; United States of America, 3180 lbs.; Egypt, 53 lbs.; and in trifling quantities to several other parts. The supply received from each country is liable to great fluctuations. In 1833 the quantity imported from France was 11,508 lbs., and from Italy, in the same year, 9452 lbs. In 1830 the supply from Turkey was 192,136 lbs.; in the following year 8184 lbs.; and again in 1834 it amounted only to 12,438 lbs., though the importation in the previous year had not exceeded 72,020 lbs. On the 5th January, 1832, the quantity of opium in bond in London, Liverpool, Bristol, and Hull, was 10,674 lbs.; and on the 5th January, 1833, 20,517 lbs. Up to 1828 the duty was 9*s.* per lb., but in that year it was reduced to 4*s.*, by 9 Geo. IV., c. 76; and in 1836 to 1*s.*, by 6 and 7 Wm. IV., c. 60. The price of Turkey opium in bond, in 1831, was from 17*s.* to 18*s.*; in 1838, 14*s.* to 14*s.* 6*d.*; and in November, 1839, the price had fallen to 10*s.* per lb. The low price in the latter case was in a great measure, occasioned by the then existing state of the opium trade in China; but it has since risen to 12*s.*, and a Greek house in London holds a thousand chests at a still higher price.

Mr. Davis states ('The Chinese,' vol. ii.) that opium has always been prohibited in China; but this does not appear to have been the case. It was a legitimate branch of trade down to the close of the last century, prohibitory regulations having been first made in 1796. From this period the trade has always been contraband, and yet in little more than forty years the consumption of Indian opium in China has risen from 1000 to about 27,000 chests per annum. Opium has constituted about one-half of the total value of British imports at Canton and Lintin, and tea has formed something less than the same proportion of our exports, that is, the value of the opium sent to China has exceeded the value of the tea which we have taken from that country. This fact is shown in a table in Mr. Davis's work:—

Imports in 1833.	Dollars.	Exports in 1833.	Dollars.
Opium	11,618,617	Tea	9,133,749
Other imports	11,858,077	Other exports	11,309,521
	23,476,244		20,443,270

Nothing but the extraordinary corruption of the Chinese authorities can account for this increase of a trade prohibited by the laws; but it is another proof of the difficulty of putting in force regulations which are at variance with the popular habits and taste.

Macao was at first the centre of the Indian opium trade, but in 1802, in consequence of the conduct of the Portuguese towards the British merchants, the trade was removed to the island of Lintin. Here the opium is kept stored in armed ships, and delivered to the Chinese by written orders from Canton, on the sale being concluded and the money paid at that place.

In 1832 the number of chests of opium imported into China was 23,670, of the total value of 15,338,160 dollars, or above 3,000,000*l.* The price had been falling for several years, and at the same time the quantity imported had increased. Mr. Davis, writing in 1836, expresses an opinion that this increase had rendered the Chinese rather more strict in the prevention of opium smuggling. The Chinese censor showed, in the memorial to the emperor already quoted, that the 'magistrates of districts issue proclamations interdicting the clandestine sale of opium, at the same time that their kindred and clerks and servants smoke it as before. Then the nefarious traders make a pretext of the interdict for raising the price. The police, influenced by the people in the public offices, become the secret purchasers of opium, instead of labouring for its suppression; and thus all interdicts and regulations become vain.' In 1833 the emperor was induced to issue some fresh regulations for checking the introduction of opium, awarding punishments of various kinds to the different classes of offenders. 'Let the buyers and smokers of opium be punished with one hundred blows, and pilloried for two months. Then let them declare the seller's name; and, in default of this declaration, let the smoker be punished, as an accomplice of the seller, with a hundred blows and three years' imprisonment. Let mandarins and their dependents who buy and smoke opium be punished one degree more severely than others; and let governors and lieutenant-governors of provinces, as well as the magistrates of subordinate districts, be required to give security that there are no opium smokers in their respective departments. Let a joint memorial be sent in at the close of every year, representing the conduct of those officers who have connived at the practice.' From a communication in the 'Colonial Gazette,' No. 39, and also from a pamphlet published by an American merchant at Canton, it appears probable that the Chinese government is less alarmed about the introduction of opium, than at the drain of bullion which the opium trade occasions. Formerly the produce of China was paid for in silver, but opium has so successfully served the purpose as a medium of commercial exchange, that it has been less necessary to employ coin or bullion. The opium trade has thus been the means of draining China of the precious metals; and this process has been going on for the last twenty years, until their price has risen. The Chinese do not regard gold and silver as signs of wealth merely, but as wealth itself, and in many of their public documents relating to the opium trade the export of silver is also noticed; and in some cases it is difficult to ascertain which is considered the paramount grievance. In 1836 an officer of the Chinese government proposed that opium should be rendered a legitimate article of commerce, and that the cultivation of the poppy should be permitted. Extraordinary as it may appear, the poppy is cultivated in China through the connivance of the local functionaries, who are the most corrupt officials in the world. The cultivation is carried on in at least six different provinces in opposite extremities of the empire, and in one of these provinces the quantity of opium prepared annually amounts, it is said, to several thousand chests, that is, about as much as was imported into the whole of China forty years ago; and, adding the quantity prepared in the other five provinces, the growth of Chinese opium is already considerable; and it will be very powerfully stimulated by recent circumstances connected with the supply of the foreign article.

In March, 1839, the Chinese authorities appear to have taken active steps with a view of putting a stop to opium smuggling, by seizing a number of British merchants, and retaining them in custody until the stock of opium on hand belonging to all foreigners was delivered into their hands. On the recommendation of Captain Elliot, the superintendent of the British trade at Canton, 20,283 chests of opium, worth nearly 3,000,000*l.* sterling, were delivered to the Chinese authorities. The whole of the opium was subsequently destroyed by the Chinese, foreigners being invited to witness the operation. Three vats, 175 feet by 75, were prepared, and each chest being re-weighed and broken up in the presence of superior officers, the contents were thrown into the vats. The destruction was partly effected by salt and lime, and a large number of men were employed from day to day with long rakes in macerating the opium until it had become a fetid mud, when sluices were opened which communicated with the river, and the whole was washed away. The spot where this operation took place was well guarded, the workmen were ticketed, and the Chinese government, in the destruction of the drug at least, acted with perfect sincerity. About 300 chests per day were destroyed. The merchants then retired to Macao, but after a residence of three months they were expelled by the Chinese on the 27th of August, in consequence of Captain Elliot's refusal to give up for punishment a seaman (whose name could not be discovered) charged with killing a Chinese in a brawl. They retired on board the English merchantmen at Hong-Kong, but the fleet being in want of provisions, Captain Elliot, on the 4th of September, attempted to procure a supply from the natives, but was opposed by three Chinese war-junks, and a conflict ensued in which several Europeans were wounded and some Chinese killed. A fresh attack, which was to have taken place at day-break on the 5th, was countermanded by Captain Elliot. This affair has complicated still more our commercial relations with the Chinese. The receipts which Captain Elliot gave to the British merchants, on behalf of the English government, promising indemnity for the sacrifice of their property, have been offered as 'opium scrip' in the markets of Calcutta, Madras, and Bombay, and have also been remitted to London for negotiation. Captain Elliot holds his appointment under the 3 & 4 William IV., c. 93, passed for 'regulating the trade to China and India.' This act provides for the establishment of a British authority in the dominions of the emperor of China, and invests the superintendent with many important powers relating to the trade. The decision of the English government in reference to this subject, whether it will honour Capt. Elliot's opium drafts or what steps it may order to be taken in China, are at this moment (January, 1840) unknown in England. A communication was sent in November, 1839, by the Foreign Office to the East India and China Association, in reply to an address from that body, from which it appears that the propriety and expediency of Captain Elliot's proceedings, so far as they were then known, were approved of by the government; but in a second communication, dated on the following day (November 28th, 1839), the secretary of state for foreign affairs declined notifying the intentions of the British government in reference to a blockade of the Chinese ports. In the Queen's speech on the opening of parliament, January 16, 1840, the state of the British interests in China was alluded to in the following terms:—'Events have happened in China which have occasioned an interruption of the commercial intercourse of my subjects with that country. I have given, and shall continue to give, the most serious attention to a matter so deeply affecting the interests of my subjects and the dignity of my crown.' In the meantime the government sales of opium at Calcutta are not discontinued, and 18,932 chests are advertised to take place in the agencies of Bahar and Benares, from January to June, 1840. The general belief is, that it will not be possible under any plan, however rigorous, to check the smuggling of opium into China.

I. An account of the quantity of Opium imported, exported, and cleared for consumption in the United Kingdom.

Cleared for Consumption. Years.		lbs.	Cleared for Consumption. Years.		lbs.
1820	(duty 9*s.*)	16,169	1830	.	22,668
1821	.	18,080	1831	.	25,937
1822	.	18,391	1832	.	30,258
1823	.	20,985	1833	.	35,407
1824	.	22,752	1834	.	28,467
1825	.	20,582	1835	.	31,247
1826	.	28,329	1836	(duty 1*s.*)*	38,943
1827	.	17,322	1837	.	37,487
1828	(duty 4*s.*)	20,680	1838	.	30,435
1829	.	23,970			

Average Annual Quantities at various periods, each year inclusive:—

		Imported. lbs.	Exported. lbs.	Home Consumption. lbs.
From 1786 to 1798	(Great Britain)	13,068	2,037	11,029
„ 1798 to 1801	(ditto)	23,715	2,792	18,297
„ 1820 to 1827	(United Kingdom)	71,714	40,848	20,311
„ 1829 to 1834	(ditto)	81,852	56,868	27,784

II.—Consumption and Value of Indian Opium in China.

From April 1 to March 31.	Patna and Benares. Chests.	Malwa. Chests.	Total Chests.	Total Value. Dollars.
1816-17	2610	600	3210	3,657,000
1821-22	2910	1,718	4628	8,314,600
1826-7	3661	6,308	9,969	9,610,085
1827	5134	4,401	9,535	10,425,075
1828	5965	7,771	13,132	12,533,115
1829	7143	6,857	14,000	12,057,157
1830	6660	12,100	18,760	12,904,263
1831	5960	8,265	14,225	11,501,584
1832	8267	15,403	23,670	15,332,759

Average annual number of chests of Patna and Benares and Malwa, from 1816 to 1823, 4455; from 1824 to 1831, 11,953.

Average price per chest.—From 1816 to 1823, Patna and Benares, 1446 dollars; Malwa, 1073 dollars. From 1824 to 1831, Patna and Benares, 965 dollars; Malwa, 862 dollars.

Range of Prices from 1816 to 1832.—Patna and Benares, highest price per chest, 2550 dollars, in 1822-3; lowest, in 1830-1, 790 dollars: Malwa, highest price, in 1820-1, 1800 dollars; lowest price, in 1830-1, 520 dollars.

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* From August 13th.

OPOPO'NAX CHIRO'NIUM (Koch), a native of the south of Europe, and also of Asia Minor, a tall plant often eight feet high, from the base of the stem or summit of the root of which, when wounded, flows a yellow milky juice, which hardens on exposure to the sun and air. It occurs either in tears or in masses called placentæ. The tears are globose or angular, fatty to the touch, externally brownish-yellow, fragile, and, on being triturated, yielding a yellow powder. The odour is strong, somewhat nauseous, resembling ammoniacum with a bitter balsamic taste. The specific gravity is 1·622.

Its constituents are resin, gum, and volatile oil. In its action on the human system it corresponds with the other gum-resins of the Umbelliferæ. [ASSAFŒTIDA.] The Ferula Hooshee, a native of Beloochistan, produces a gum called hooshee, which, though not collected, resembles the Opoponax of the European shops. (Royle, *Flora of the Himalaya*, p. 231.)

OPORTO (O PORTO, 'the Port'), the largest city in Portugal, Lisbon excepted, and a seaport in the province of Entre-Douro-é-Minho, is situated on the declivity of a hill in an elevated situation on the northern bank of the river Douro, and about three-fourths of a league, or two English miles, from its mouth, in 41° 11′ N. lat., 8° 40′ W. long., about 160 miles north of Lisbon. Seen from the river, the city presents a very striking and romantic appearance; the houses, being all white-washed, give it an air of excessive cleanliness, but, on a closer inspection, most of the streets, especially those on the declivity of the hill, are found to be narrow, crooked, and dirty. Oporto is, however, on the whole, considered to be the cleanest city in Portugal. It contains many broad straight streets, with a number of new and handsome houses, having gardens attached to them filled with vines and orange-trees. In one of the principal thoroughfares is situated the English factory-house, a large handsome building, erected about twenty years ago, in which the British consul has his office. It is a sort of club-house, designed to bring merchants and foreigners together, and contains a fine library, a reading-room, and a spacious ball-room. The steep declivity of the hill on which the town is built makes it a very laborious task to ride on horseback or in carriages, although this inconvenience has been somewhat remedied by recent improvements. On the east side of the town, houses are built against so steep a part of the declivity over the stream, that they can only be approached by steps cut out of the rock.

The river affords a tolerably secure harbour without any artificial aid except an elevated and walled quay, to which the ships' cables may be fastened during the floods, which often come down with such force, that, without this support, the vessels would inevitably be carried out into the sea. The mouth of the Douro is however obstructed by rocks and quicksands, which render its entrance difficult. This obstacle once surmounted, the river is well adapted to the purposes of trade, being very deep in front of the town. Two-masted vessels can come close to it, those with three masts within a quarter of a league, and the large Brazilian ships alone used to unload their cargoes in the road. The quay, which is of a simple construction, extends the whole length of the town.

Oporto was occasionally the residence of the antient kings of Portugal, until Alfonso I., assisted by a fleet of English crusaders under the command of William Longsword, wrested Lisbon from the hands of the Almoravides, in October, 1147. During the middle ages Oporto was famous for the strength of its fortifications; it is now partly surrounded by an old wall five or six feet thick, flanked at intervals by strong towers. To the westward, along the declivity of the hill, is the market-town of Gaya, where, in antient times, a place named *Cale*, mentioned by old writers, is said to have stood. Oporto being afterwards built, and being found more convenient for ships owing to the greater depth of the river, the former was abandoned by its inhabitants, who migrated to the latter. Hence the name of Oporto, or *Portus Cale*, that is, the harbour of Cale, whence *Portucal*, and at last Portugal, were derived. To the east lies the considerable and populous town of *Villanova do Porto*, chiefly inhabited by wine-coopers and other people employed by the merchants of Oporto; and between that town and Gaya, on a small plain along the bank of the river, are the immense vaults, or lodges, as they are there called, where the wine is kept till it is stored. Between the village where these vaults are and Oporto there is a communication across the river by a bridge of boats, the expense of which is defrayed by each person paying a small copper coin as he passes and repasses. All communication is however suspended during a few weeks in the spring, when the river is so much swollen by the heavy rains and the melting of the snow on the mountains of Spain, that the water often rises to the height of twenty feet, as in 1820, when it did incalculable damage to the shipping then in the river. On a rocky eminence near Villanova is the celebrated convent and garden called Mosteiro da Serra, which once belonged to the religious order of Austinian monks. It was there, during the Peninsular War, that the British crossed the Douro under a tremendous fire from the batteries erected by the French on the north side, and it was from there also that in 1832 Don Pedro, aided by the British, repulsed the royalist troops commanded by the usurper Don Miguel.

Oporto contains four suburbs—Mazarelos, Cedofeita, San to Ovidio, and La Lapa, which, together with the city, cover an extent of ground of about two miles. It has 11 public squares called *campos*, of which the most spacious are As Ortas, San Roque, and Vitoria; 14 hospitals, or charitable asylums; 90 churches, besides a fine and spacious cathedral rebuilt by Henry of Besançon, first count of Portugal, A.D. 1105; and 17 monasteries, now uninhabited, the religious orders having been, in Portugal as well as in Spain, suppressed since the establishment of the liberal system. It is the see of a bishop, who resides chiefly at Mezanfrio, but has a very fine modern-built palace within the city. A theatre, in the highest part of the town, built by an Italian architect named Mazzolleschi, is very much admired.

The principal trade of Oporto consists in wine, white or red, but chiefly the latter, which is made in the province of Tras-os-Montes, to the north-west, and in some districts of Entre-Douro-é-Minho, to the north. It is exported in large quantities to various parts of Europe and America, but the greatest consumption is that of this country, where it is known as 'Port wine.' The amount yearly exported varies from 50,000 to 70,000 pipes. There are other articles of export, such as oil, sumach, linen, lemons, and oranges, of which last fruit no less than nine millions were exported in 1789. The imports are woollen, cotton, iron, and hardware manufactures, mainly from England; salt-fish, hemp, and flax; wheat and rice from the United States. There are also at Oporto some manufactures of hats, silks, linen stuffs, and pottery, besides ropewalks and dockyards, none of which however are in a thriving condition.

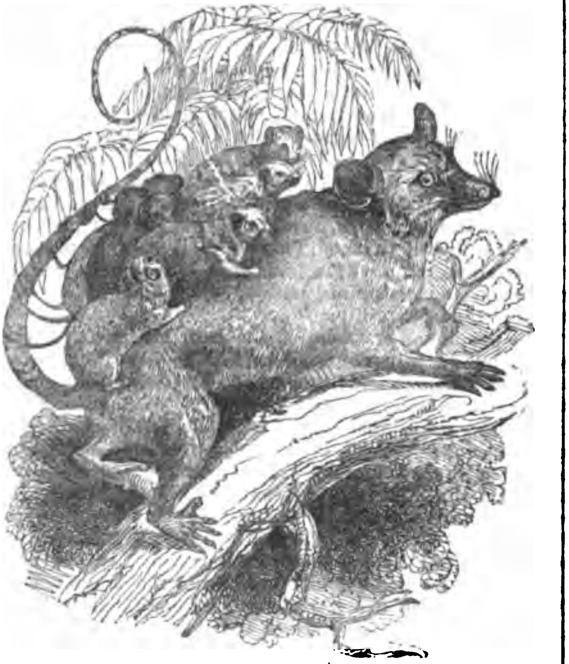
The population of Oporto is stated by Murphy at 63,000 souls; but he no doubt forgot to include the two annexed towns of Villanova and Gaya, which in 1827 made it amount to eighty thousand. That number however must have diminished rather than increased by the loss of the Portuguese colonies, a death-blow to the commerce of Oporto, as well as by the ravages of war to which the town has been subjected since the beginning of the present century. It was first taken and sacked by the French during the Peninsular war. It became afterwards, in 1831-33, the scene of a fierce contest for the throne of Portugal, between Don Pedro, the ex-emperor of Brazil, and his brother Don Miguel, who had usurped the crown from his niece Doña Maria. During the siege, which lasted upwards of one year, the town of Oporto was partly destroyed by the artillery of the assailants, and several wealthy mercantile houses were entirely ruined by the complete stoppage of trade, and the wanton destruction of property by the troops of the usurper, who, on their retreat from before the lines of Oporto, blew up with gunpowder several wine-cellars belonging to the merchants of the city.

The climate of Oporto is damp and foggy in winter, in consequence of its mountainous situation; but although, owing to the above circumstance, the air is cooler than anywhere else in Portugal, it seldom freezes. In summer the heat is excessive, especially in the narrow valley formed by the hills on the southern declivity of which Oporto is situated. Most of the plants of the Cape of Good Hope grow in the open air, as well as gooseberries, currants, and other fruits of the colder countries of Europe. The soil, though well cultivated, is not fertile, and few of the productions which are annually exported by the Douro are grown within any short distance of the town. The dress of the inhabitants somewhat differs from that of the southern provinces, and the peasants use wooden shoes. (Miñano; La Clède, *Histoire Générale de Portugal*, vol. ii.; Link's *Travels*.)

OPOSSUM. The term *Opossums* is generally used to designate the *Didelphidæ*, now confined to the American continents. The former existence of this type in Europe in association with *Palæotherium*, *Anoplotherium*, and other extinct pachydermatous quadrupeds, is proved by the fossil remains in the Paris basin (Eocene of Lyell).

The dentition of these scansorial Marsupials bears more resemblance to that of the *Bandicoots* (*Perameles*) than to that of the *Dasyuri*, if the structure of the molar teeth be excepted.

The whole of this subfamily have the inner toe of the hind foot converted into a thumb, destitute however of a claw, and this development is apparent in nearly all the species which have a scaly prehensile tail. Professor Owen remarks that in some of the smaller *Opossums* the subabdominal tegumentary folds are rudimental, or merely serve to conceal the nipples, and are not developed into a pouch; and in these the young adhere to the mother by entwineing their little prehensile tails around hers, and clinging to the fur of her back; whence the specific name *dorsigera*, applied to one of the species. He further observes that few facts would be more interesting in the history of the Marsupialia than the condition of the new-born young, and their degree and mode of uterine development in these Opossums. Since the Marsupial bones serve not, as is usually described, to support a pouch, but to aid in the function of the mammary glands and testes, they are, he adds, of course present in the skeleton of these small pouchless Opossums, as in the more typical Marsupials. (Professor Owen's interesting paper *On the Classification of the Marsupialia*, in *Zool. Trans.*, vol. ii., part iv.; and the article MARSUPIALIA.)



Didelphys dorsigera.

(From the specimen in the British Museum.)

OPPELN is one of the four governments of the Prussian province of Silesia, and comprises the greater part of what was formerly called Upper or Higher Silesia, from its almost wholly consisting of hills and mountains. It is bounded on the north-west by the government of Breslau, on the east by the kingdom of Poland and the republic of Cracow, on the south-east by Galicia, and on the south and south-west by Austrian Silesia. Its area is 5000 square miles, and it is divided into ten circles. It has extensive forests of fine timber, and abounds in valuable minerals. This part of the province is less fertile and much colder than Lower Silesia. The snow falls early and lies late, so that the inhabitants are obliged to use snow-shoes and sledges. The old Sclavonic dialect, still in use in some parts of the province, is almost wholly confined to these mountains. The Roman Catholic religion preponderates more than in any other part of Silesia. Of a population of 740,000, only a fifteenth part are Protestants.

There are some manufactures in the government; and a considerable export trade in the natural products of the country is carried on by means of the Oder, which traverses the country in its whole extent.

OPPELN, the capital of the government, is situated in 50° 36′ N. lat. and in 17° 57′ E. long. It is a walled town with four gates, and is situated on the Oder, in which there is an island called Pascheke, which is laid out like a park, and contains some dwelling-houses, a coffee-house, and a bathing-house. The island is connected with the left bank by the great bridge, and with the town by two bridges over an arm of the Oder. The public buildings are not remarkable. There are several churches, a synagogue, a gymnasium, a town-hall, some schools, an hospital, and other charitable institutions. The population, according to the latest census (to 1st January, 1839), is 6821. Besides tanneries and manufactories of earthenware, there are manufactures of linen, tape, and leather. The town has a good trade in timber, zinc, lead, calamine, hardware, leather, woollen cloths, and Hungary wines.

(Müller's *Handbuch*, 1836; Fischer's *Handbuch über Schlesien*, 1817; Hassel's *Handbuch; Preussische Staats-Zeitung*, 1839, which gives the latest official returns of the population.)

OPPENHEIM is the capital of a district of 20 parishes, with 15,000 inhabitants, on a steep declivity on the left bank of the Rhine, in the grand-duchy of Hesse Darmstadt, on the site of the Roman Bauconia. The inhabitants, 2400 in number, carry on a considerable trade by the Rhine. Oppenheim has one Roman Catholic and one Protestant church, four hospitals, and a Protestant consistory. This town was formerly a free imperial city, and a diet was held in it in 1076. It was a place of some celebrity in the Thirty Years' War, when it was almost destroyed by Gustavus Adolphus, and afterwards in 1689 by the French under Melac. The beautiful cathedral of St. Catherine, a monument of German architecture of the thirteenth century, and an imitation on a smaller scale of the cathedral of Cologne, still lies partly in ruins. The ruins of Landscronenburg and the Swedish pillar are worthy of notice. In the vicinity of Oppenheim is the romantic Nierstein, called by the Romans Neri, famous for its wine; and in the celebrated Wonnegau (which may be translated the Vale of Delight) is the spa called Sironabad, which was known to the Romans, and has been again in use since 1802.

OPPIAN ('Οππιανὸς), an eminent grammarian and poet of Cilicia (Hieronymus, in *Ezek.*, 47; Athen., *Deipnos.*, lib. i., p. 13 b., ed. Casaub.), two of whose works are still extant under the titles 'Cynegetica' and 'Halieutica.' His father's name was Agesilaus, and his mother's Zenodota, but as to the time and place of his birth authorities are not quite agreed. Syncellus (*Chronogr.*, p. 352, 353) and Jerome (in *Chronic.*) place him in the reign of Marcus Aurelius Antoninus; but Sozomen (*Præfat. ad Hist. Eccles.*), Suidas (in voce 'Οππιανὸς) and others state him to have lived in the time of Severus; and though Oppian in both his poems (*Halieut.*, lib. i., v. 3; and lib. iv., v. 5; *Cyneget.*, lib. i., v. 3) addresses the emperor by the name 'Antoninus,' it is probable that Caracalla is meant, as this appellation was conferred upon him when he was associated with his father in the empire, A.D. 198 (Herodian, lib. iii., cap. 10), and is the name by which he is commonly designated by the antient historians, Herodian, Dion Cassius, &c. As to his birth-place, Suidas supposes it to have been Corycus, but the anonymous author of the Greek life of Oppian and most other authorities say that he was born at Anazarba, a city which also gave birth to Dioscorides. Stephan Byzant., in voce 'Αναζαρβά.) Indeed Oppian himself seems to refute the assertion of Suidas, for in the third book of the 'Halieutics,' v. 205, sq., he distinguishes his fellow-countrymen from their neighbours the Corycians. His father appears to have been a person of some consideration in his native city, for he was banished to the island of Melita in the Hadriatic by Severus, for suffering himself to be so entirely engrossed by his philosophical studies as to neglect coming in person along with his fellow-citizens to pay his respects to the emperor when, in taking a progress through Cilicia, he made his entrance into Anazarba. He was accompanied in his exile by his son Oppian, who had enjoyed the advantage of an excellent education under the superintendence of his father, and who now began to devote himself to poetry. Accordingly he composed his poem on fishing, and presented it either to the emperor Severus (Sozomen, *Præfat. ad Hist. Eccles.*), or more probably (Suidas, in voce Ὀππιανὸς; Oppian, *Halieut.*, i. 3; iv. 5) to his son Caracalla, who was so much pleased with it, that he not only repealed the sentence of his father's banishment, but also presented him with a piece of gold for each verse that it contained.* He died of the plague shortly after his return to his native country, at the early age of thirty; leaving behind him three poems, on Hawking (Ἰξευτικὰ), Hunting (Κυνηγετικὰ), and Fishing (Ἁλιευτικὰ).

The 'Ixeutics' consisted of two books according to Suidas, or rather of five, according to the anonymous Greek author of Oppian's life, and are no longer extant, but a Greek Paraphrase in Prose, by Eutecnius, of three books, was published, Havniæ, 1702, 8vo., Gr. and Lat., ed. E. Windingius, which is also inserted in Schneider's edition of Oppian, Argent., 8vo., 1776.

The 'Cynegetics' are written in hexameter verse, consist of about 2100 lines, and are divided into four books: they display a very fair knowledge of natural history, with which however a good many absurd fables are mixed up. He says expressly that the tusks of the elephant are not teeth but horns (lib. ii., v. 491, sq.), and mentions a report that these animals are able to *speak* (v. 540, sq.): he states that there is no such thing as a *female* rhinoceros, but that all these animals are of the *male* sex (v. 563); that the lioness when pregnant for the first time brings forth five whelps at a birth, the second time four, the next three, then two, and lastly only one (lib. iii., v. 58, sq.); that the bear brings forth her cubs half formed and licks them into shape (v. 159, sq.); that so great is the enmity between the wolf and the lamb, that even after death, if two drums be made of their hides, the wolf's hide will put to silence the lamb's (v. 282, sq.); that the hyænas annually change their sex (v. 288, sq.); that the boar's teeth contain fire inside them (v. 379, sq.); that the ichneumon leaps down the throat of the crocodile while lying asleep with its mouth wide open, and devours its viscera (v. 407, sq.). [ICHNEUMON.] He thinks it necessary to state expressly that it is *not* true that there are no *male* tigers (v. 357, sq.). He gives a very spirited description of the giraffe, 'the exactness of which,' says Mr. Holme ('Earlier Notices of the Giraffe,' in 'Trans. of the Ashmol. Soc.,' vol. ii.), 'is in some points remarkable; particularly in the observation that the so-called horns do not consist of horny substance (οὔτι κέρας κερόεν); and in the allusion to the pencils of hair (ἀβληχραὶ κεραῖαι) with which they are tipped.' He adds, 'That the animal must have been seen alive by Oppian is evident from his remark on the brilliancy of the eyes, and the halting motion of the hinder limbs.'

The 'Halieutics' are also written in hexameter verse, and consist of five books, of which the two first contain the natural history of fishes, and the three last the art of fishing. In this poem, as in the 'Cynegetics,' the author displays considerable zoological knowledge, though it contains several fables and absurdities,—more perhaps than we meet with in Aristotle, but certainly not so many as in Pliny and Ælian. He mentions (lib. i., v. 217, sq.) the story of the Remora, or sucker (ἐχενηΐς), being able to stop a ship when under full sail by sticking to the keel, and reproves the incredulity of those who doubt its truth (*Plut. Sympos.*, lib. ii., Quæst. 7); he was aware of the peculiarity of the Cancellus, or hermit-crab (καρκινὰς), which is provided with no shell of its own, but seizes upon the first empty one it can find (v. 320, sq.); he gives a beautiful and correct description of the Nautilus (v. 338, sq.); he says that the Muræna, or lamprey, copulates with land serpents, which for the time lay aside their venom (v. 554, sq.); he notices the numbness caused by the touch of the Torpedo (νάρκη) (lib. ii., v. 56, sq.; and lib. iii., v. 149, sq.); and the black fluid emitted by the Sepia or cuttle-fish, by means of which it escapes its pursuers (lib. iii., v. 156, sq.); he says that a fish called Sargus (σαργος) copulates with goats, and that it is caught by the fisherman's dressing himself up in a goat's skin, and so enticing it on shore (lib. iv., v. 308, sq.); he several times mentions the dolphin, calls it, for its swiftness and beauty, the king among fishes (as the eagle among birds, the lion among beasts, and the serpent among reptiles) (lib. ii., v. 533, sq.), and relates an anecdote, somewhat similar to those mentioned by Pliny (*Hist. Nat.*, lib. ix., cap. 8), and which he says happened about his own time, of a dolphin that was so fond of a little boy that it used to come whenever he called it by its name, and suffered him to ride upon its back, and at last was supposed to have pined away with grief on account of his death (lib. v., v. 448, sq.).

The 'Halieutics' are much superior to the 'Cynegetics' in point of style and poetical embellishment, and it is partly on account of this great disparity that it has been supposed that the two poems were not composed by the same person. But there are other and stronger reasons in support of this opinion (which was first put forth by Schneider in the preface to his first edition of Oppian's works), rendering it almost certain that, though by the universal consent of antiquity Oppian wrote a poem on hunting, yet it cannot be that which now goes under his name. Oppian was (as we have seen) a Cilician, but the author of the 'Cynegetics' tells us distinctly, in two different passages, that his native place was a city on the Orontes in Syria (probably Apamea), (lib. ii., v. 125-127, and ibid., v. 156, 157). This has been denied by Belin de Ballu, who published an edition of the 'Cynegetics,' Argentor., 1786, 4to. and 8vo., Gr. and Lat., and who (as Dibdin says) 'seems to have entered upon the task almost expressly with a determination to oppose the authority and controvert the positions of Schneider;' but it is only by altering the text in both passages (and that too not very skilfully) that he has been able to reconcile them with the commonly received opinion that the poem is the work of Oppian. In Schneider's second edition he continues to hold the same opinion, and replies to the objections of Belin de Ballu. It appears, from an allusion to fishing and the sea deities, in the first book of the 'Cynegetics' (v. 77-80), that this poem was composed after the 'Halieutics,' and as a sort of supplement or companion to it; and this has tended to confirm the common opinion that both poems were written by the same author.

With regard to the poetical merits of Oppian, he seems to be one of those poets whose works have been more praised than read. Julius Cæsar Scaliger pronounces him 'to be a sublime and incomparable poet, the most perfect writer among the Greeks, and the only one of them that ever came up to Virgil.' (*Poet.*, lib. v., cap. 9.) Sir Thomas Browne calls him 'one of the best epic poets,' and 'wonders that his elegant lines should be so much neglected' (*Vulgar Errors*, book i., chap. viii.); and, if, as Rapin says, he is sometimes *dry* (*Réflex. sur la Poétique*, p. 176), it may fairly be accounted for and excused when we consider the unpropitious nature of his subject. His style is florid and copious, the language upon the whole very good, though (as was noticed by Dan. Heinsius, *Ad Nonni Dionysiaca*, p. 197), it is now and then deformed by Latinisms.

The first edition of the 'Halieutics' was published Florent., 1515, 8vo., Gr., ap. Ph. Juntam. A Latin translation in hexameter verse, by Laurentius Lippius, was published 1478, 4to. They were translated into English verse by Diaper and Jones, Oxford, 8vo., 1722; into French by Limes, Paris, 8vo., 1817; and into Italian by Salvini, Firenze, 8vo., 1728. The 'Cynegetics' were first published (together with the 'Halieutics') Venet., in Ædib. Aldi, 8vo., 1517. They were translated into Latin verse by Bodin, Paris, 4to., 1555; into English by Mawer, Lond., 8vo., 1736 (containing the first book only); into French by Florent Chrestien, Paris, 4to., 1575, and by Belin de Ballu, Strasb., 8vo., 1787; into German by Lieberkühn, Leipz., 8vo., 1755; and into Italian, with the 'Halieutics' noticed above, by Salvini. Fabricius states (*Biblioth. Gr.*), on the authority of Lambecius, that a paraphrase both of the 'Cynegetica' and of the 'Halieutica,' in Greek prose by Eutecnius, still exists in MS. in the library at Vienna. The last and (as far as it goes) the best edition of Oppian's two poems is Schneider's second edition, which unhappily is unfinished, 8vo., Lips., 1813, Græcè, with a Latin verse translation of the 'Cynegetics,' by Pfeifer, published for the first time though executed in 1555. The most complete edition is that published by Schneider, Argentor., 1776, Gr. and Lat., 8vo., containing also the paraphrase of the 'Ixeutica,' by Eutecnius, men tioned above. Schneider published some addenda to this addition in his *Analecta Critica*, 8vo., Francof., 1777; Fascic. i., p. 31, sq.

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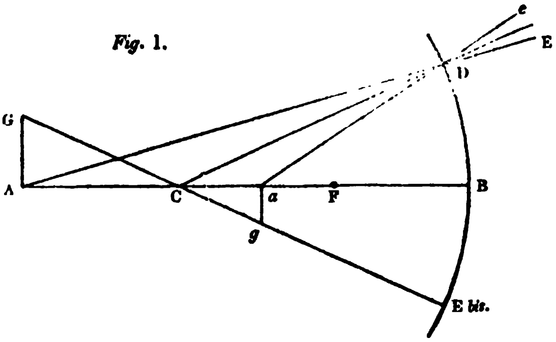
* Suidas says 'twenty thousand,' but he must have counted the verses contained in *all* Oppian's poems, as the 'Halieutics' consist of only about 3500; for which, if we reckon the *aureus* to be equal to twenty-five denarii, and worth (according to Hussey, 'Antient Weights and Money, &c.') 15s. 7½d., he must have received about 2734l. 7s. 6d. If (according to the common computation) we take the *aureus* to be worth 16s. 1½d., it would amount to 2825l. 10s. 5d. In either case they might well be called χρυσᾶ ἔπη, 'golden verses!' Sozom., *loco cit.*

OPPOSITION. [CONJUNCTION AND OPPOSITION.]

OPTICS is that branch of physical science which explains the formation of images, as depending on the known laws by which the modifications of light are governed. [LIGHT.] These images are formed either by polished reflecting surfaces or by transparent refracting media. In the former case the angles of incidence and reflection are equal; in the latter the sines of the angles of incidence and refraction are in a constant ratio for one and the same medium. The position and magnitude of the image of an object is easily ascertained, when we have previously ascertained the position of the image of a point, in reference to the position of the point itself and of the reflecting or refracting instrument; in other words, when we have found the relation between the conjugate *foci*, so called because it universally holds in optics, that whichever focus be considered the object, the other will be the image. The *principal focus* of an instrument is that to or from which a pencil of parallel rays falling perpendicularly (or nearly so) on the instrument is made to converge or diverge after reflexion or refraction. In a plane mirror the conjugate foci are similarly situated at opposite sides of the mirror [LIGHT]; consequently in this instance the instrument has no principal focus. Generally the distance of the principal focus from the instrument is called the focal length of that instrument, whether a reflector or a refractor. Since conjugate foci are mutually such, it follows that rays proceeding from the principal focus will, after reflexion or refraction, emerge in a *parallel* pencil. We shall now proceed to the relations existing between the conjugate foci of spherical reflectors, observing that the axis of the instrument is the right line containing the centre of the spherical surface and the conjugate foci. The rays under consideration are those which are directed nearly along the axis, and which therefore fall exceedingly nearly perpendicularly on the reflector.

Fig. 1.



Let DBE represent the section of a spherical reflector made by a plane passing through its axis, C its centre, A the focus of incident rays, AD an incident ray, ADC is the angle of incidence; make the angle aDC=ADC, then aDC is the angle of reflection, and if the point of incidence D were infinitely near to the point B in the axis, then all the reflected rays of which the incidence was nearly perpendidicular would converge to a, the latter would then be the focus conjugate to A, for if rays diverged from a they would after reflexion evidently converge to A.

Now if a straight line as CD bisect an angle of a triangle, as the angle ADa, it will divide the base into segments AC, Ca proportional to the adjacent sides AD, Da (Euc., book vi.), that is, AC : Ca :: AD : Da, but when D is infinitely near to B we may write AB and Ba instead of AD and Da, in which case we should have AC : Ca :: AB : Ba. Let AB = Δ, aB = Δ', and the radius CB = r; then AC = $\Delta-r$; Ca = $r-\Delta'$; whence $\Delta-r : r-\Delta' :: \Delta : \Delta'$, or $\Delta'(\Delta-r) = \Delta(r-\Delta')$; therefore $2\Delta\Delta' = r(\Delta+\Delta')$, which may be also written in the form $\frac{1}{\Delta}+\frac{1}{\Delta'}=\frac{2}{r}$. We should have precisely the same investigation if we had supposed rays as ED to fall on the convex side converging to a focus A; but being reflected in the direction De, they would appear to diverge from the conjugate focus a: hence the above formula applies to two cases, viz. when diverging rays fall on the concave surface, or converging rays on the convex surface, of a spherical reflector.

Example 1.—A candle is placed before a concave speculum at a distance of 3 feet from it: what will be the distance of its image from the same, the radius of the speculum being 2 feet?

Here, we have given $\Delta=3$ feet, $r=2$ feet, and to find Δ' we substitute these numbers in the general formula $\frac{1}{\Delta}+\frac{1}{\Delta'}=\frac{2}{r}$ which thus becomes $\frac{1}{3}+\frac{1}{\Delta'}=\frac{2}{2}=1$; whence $\frac{1}{\Delta'}=\frac{2}{3}$ and therefore $\Delta'=\frac{3}{2}=1\frac{1}{2}$ foot; the image will consequently be 1 foot 6 inches in front of the speculum.

It being sometimes convenient to measure the distances of the foci from the centre instead of the surface of the speculum, it is easy to find a proper formula from the proportion we have established, viz. AC : Ca :: AB : Ba. Let AC=ρ, Ca=ρ'; then AB=$r+\rho$, aB=$r-\rho'$, whence $\rho:\rho' :: r+\rho : r-\rho'$, or $\rho(r-\rho')=\rho'(r+\rho)$ therefore $r(\rho-\rho')=2\rho\rho'$ consequently $\frac{1}{\rho'}-\frac{1}{\rho}=\frac{2}{r}$; thus in the example given above we find (since $\rho=1$ and $r=2$) $\frac{1}{\rho'}-1=1$, or $\frac{1}{\rho'}=2$; therefore $\rho'=\frac{1}{2}$, which is agreeable with the former result.

When the incident rays proceed from a point exceedingly distant (as the sun, for instance) then Δ being very great $\frac{1}{\Delta}$ will be exceedingly small and may be rejected, in which case we have $\frac{1}{\Delta'}=\frac{2}{r}$ or $\Delta'=\frac{r}{2}$, that is, parallel incident rays are made after reflexion to converge to F, the middle point of the radius CB. Hence the focal length of a spherical speculum is one half that of its radius.

In examining the formula for the positions of the conjugate foci, viz. $\frac{1}{\Delta}+\frac{1}{\Delta'}=\frac{2}{r}$ we find that when $\Delta=r$ we also must have $\Delta'=r$; hence when the focus A is at C the centre, the conjugate focus a will be at the same point. If A move to the left of C (in the *fig.*) Δ being then greater than r, $\frac{1}{\Delta}$ is less than $\frac{1}{r}$ and therefore $\frac{1}{\Delta'}$ must be greater than $\frac{1}{r}$ or Δ' is less than r, and as Δ increases to greater magnitudes, Δ' accordingly diminishes, until Δ becomes infinite, when Δ' as we have seen becomes $\frac{r}{2}$; hence whilst A moves on the left indefinitely from C, the other focus moves on the right from C as far as the principal focus F.

With respect to the images formed by concave specula, let AG represent a small object at A; join GC, then GCE will be the axis of the speculum when G is considered the focus of incident rays, and its conjugate focus g can be found by the preceding formula; hence ag will be the image if AG, its position is evidently inverted, and by similar triangles, the linear dimensions of the image ag are to those of the object AG as Cg : CG or as $\rho' : \rho$. Now the formula $\frac{1}{\rho'}-\frac{1}{\rho}=\frac{2}{r}$ gives $\frac{\rho'}{\rho}=\frac{r}{2\rho+r}$; hence the image (in respect to linear dimensions) is less than the object in the ratio of $r : 2\rho+r$ (or since $\rho=\Delta-r$) as $r : 2\Delta-r$; on the contrary, if the object be placed between the centre and principal focus, as at ag, then AG would become the image; for AG : ag :: $\rho : \rho'$; but $\frac{\rho}{\rho'}=\frac{r}{r-2\rho'}=\frac{r}{2\Delta'-r}$; therefore AG : $a'g$ :: $r : 2\Delta'-r$; which shows that the image is then greater than the object, or magnified. From the principles of geometry it follows that the surfaces of the image and object are as the squares of the linear dimensions, and the apparent volume, or bulk, as their cubes.

Example 2.—An object is placed at a distance of 12 feet in the axis of a concave speculum of two feet radius: to find how much it will appear diminished in its image, with respect to its linear, superficial, and solid dimensions.

Here $r=2$, $\Delta=12$, $2\Delta-r=22$; therefore
for linear dimensions Image : Object :: 2 : 22,
that is :: 1 : 11;
for superficial do. the ratio is as 1 : 121, and for apparent bulk it is as 1 : 1331.

Heat being capable of reflection, like light, the rays of the sun may be collected by a concave speculum in its principal focus (or burning-point) F.

Example 3.—To find how much an object will be magnified by the same speculum, when placed 1 foot 6 inches in front of it.

Here $\Delta'=1\frac{1}{2}$, $r=2$, $2\Delta'-r=1$; therefore in linear dimensions the ratio is as 2 : 1;
in superficial as 4 : 1;
and in cubical as 8 : 1.

Let us next consider the relation between the conjugate foci when diverging rays fall on a convex spherical speculum, which will also be the relation when converging rays fall on a concave speculum as will be evident by inspection of the figure (*fig.* 2). Employing the same letters with the diagram as before, C will be the centre, A the focus of incident rays, *a* of reflected rays, &c.

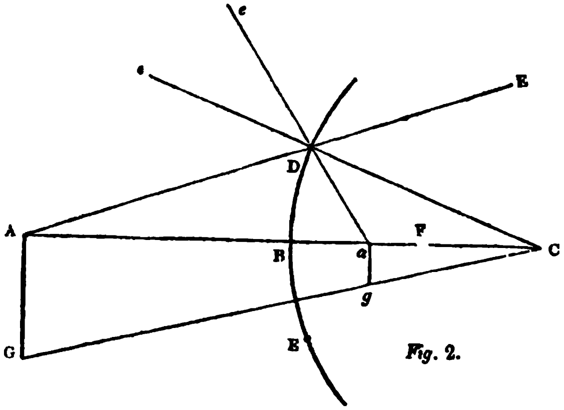


Fig. 2.

Let AD be an incident ray near the axis AC, join CD and produce to *c*; make the angle of reflexion *c*D*e* equal to the angle of incidence AD*c*, and produce the reflected ray D*e* to meet the axis in *a*; then when D is infinitely near B, *a* is the focus conjugate to A. The same figure would equally apply if we had supposed rays ED converging to A to fall on the concave surface, for since the angles AD*e*, *c*D*e*, *a*DC, CDE are all equal, D*a* would then be the actual reflected ray and therefore *a* would be yet the focus conjugate to A. Now since the external angle *a*DE of the triangle AD*a* is bisected by the straight line DC, it follows (Simson's *Euc.*, book 6) that AC : C*a* :: AD : D*a* (and D being supposed infinitely near to B in order that the rays may be incident nearly perpendicularly) :: AB : B*a*. Let $AB=\Delta$, $aB=\Delta'$, $CB=r$, $CA=\rho$, $Ca=\rho'$, then we have

$$\rho : \rho' :: \Delta : \Delta', \text{ or } r+\Delta : r-\Delta \ : \Delta \cdot \Delta', \text{ hence}$$

$$\Delta'(r+\Delta)=\Delta(r-\Delta'),$$

therefore $2\Delta\Delta'=r\,(\Delta-\Delta')$ whence $\frac{1}{\Delta'}-\frac{1}{\Delta}=\frac{2}{r}$. Again the same proportion $\rho : \rho' :: \Delta : \Delta'$ may be written $\rho : \rho' :: \rho-r : r-\rho'$; hence $\rho\,(r-\rho')=\rho'\,(\rho-r)$ therefore $r\,(\rho+\rho')=2\rho\rho'$ whence $\frac{1}{\rho}+\frac{1}{\rho'}=\frac{2}{r}$.

If we suppose $\rho=r$, we find $\rho'=r$, which shows that the foci are together at B, and as ρ increases, ρ' diminishes, until ρ becomes infinite, when $\rho'=\frac{r}{2}$, showing that *a* will then reach the principal focus F. Hence, in general, the principal foci move in contrary directions, and meet both at the centre and circumference. In the formula just given one of the conjugate foci lies between the principal focus and the surface of the speculum; while in the first set, one lay between that point (F) and the centre.

With respect to images, if AG be the object and *g* the focus conjugate to G, then *ag* will be the image of AG; and conversely, if *ag* be the object, AG will be the image, and their proportion may be easily calculated, for AG : *ag* :: CA : C*a*, that is, as $\rho : \rho'$, or as $\Delta : \Delta'$, which we have seen is the same ratio.

Example 4.—In the concave speculum of two-foot radius, an object is placed within 6 inches of its interior surface: how far will the image appear at the back of the speculum and how much will it seem enlarged?

Here $r=2$ foot, $\Delta'=\frac{1}{2}$ foot, and since $\frac{1}{\Delta'}-\frac{1}{\Delta}=\frac{2}{r}$ we have $2-\frac{1}{\Delta}=1$, therefore $\Delta=1$, or the image will appear a foot behind the convex side and will be enlarged in linear dimensions as Δ to Δ', that is, as 2 to 1; in surface 4 : 1; in volume 8 to 1.

Example 5.—An object is placed 10 feet distance from a convex speculum of 3 feet radius; find the position and magnitude of its image.

Here $r=3$, $\Delta=10$, therefore $\frac{1}{\Delta'}-\frac{1}{10}=\frac{2}{3}$, whence $\frac{1}{\Delta'}=\frac{23}{30}$, therefore $\Delta'=1\frac{7}{23}$ feet, or 1 foot 3 inches, 8 parts nearly, at which distance in the concavity of the speculum the image will seem to be, and (in linear dimensions) Object. Image :: $\Delta : \Delta'$. $10 : \frac{30}{23}$, that is as 23 : 3; the surfaces as 529 : 9, &c. Thus the reader with only a moderate knowledge of simple equations will be able to solve all questions relative to the images of objects formed by spherical specula, concave or convex. The images in the last two examples are erect. Generally the image will be erect or inverted according as one of the conjugate foci is between the principal focus and surface, or between that point and the centre; for it is easily seen that in every case one of the foci is in some part of the radius between the centre and surface.

In the preceding calculations, we have confined ourselves to such rays as fall nearly perpendicularly on the reflecting surfaces. The rays which are at a considerable distance from the axis of a spherical speculum are not reflected accurately to the same point as those incident near the axis; hence arises a diffusion of the reflected rays arising from the sphericity of the speculum and denominated the *spherical aberration;* and when measured *along* the axis, it is called the *longitudinal aberration;* but when perpendicular to it, through the focus, the *lateral aberration.* It will be sufficient in this article to calculate their amount in the most usual case when the incident rays are parallel, as those which proceed from the heavenly bodies.

Let SD represent a ray falling parallel to the axis CB, BD being the intermediate arc of the section of the speculum, D*a* the reflected ray; if this figure revolve round CB, it is evident that all rays incident on the annulus through which D moves will likewise be reflected to *a*, which is therefore strictly the focus of that annulus. Now F, the middle point of CB, is the point to which rays falling near the axis are reflected; hence *a*F is the longitudinal and F*b* the lateral aberration corresponding to the above annulus. To calculate the amount of these we may observe that the angle SDC (of incidence) is equal to CD*a* (of reflexion), and also to DC*a* (by the theory of parallels); and since the angles *a*DC, *a*CD, are thus equal, therefore C*a* = *a*D. Let DT be a tangent at D, then *a*DT and *a*TD, being respectively the complements of *a*DC and *a*CD, are also equal, whence *a*T = *a*D, but also C*a* = *a*D, therefore *a* is the middle point of CT; and since F is the middle of CB, it follows that *a*F is the half of BT; thus the longitudinal aberration is known; and since the angle F*ab* is the the double of DCB, the lateral aberration is from thence known. Let the angle DCB = θ, and radius CB = r, then CT = r sec. θ and BT = r (sec. θ − 1), hence we obtain the exact values of the two aberrations, viz. the longitudinal $=\frac{r}{2}(\sec.\theta-1)$, and the lateral F*b* $=\frac{r\tan.2\theta}{2}(\sec.\theta-1)$. Hence in order that the aberrations may be inconsiderable, we ought to have the extreme magnitude of

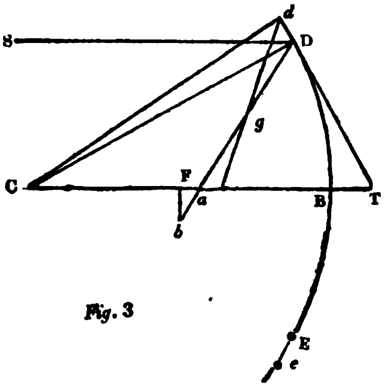


Fig. 3

θ, viz. the angle BC*d* (in *fig.* 3), also small. On this supposition formulæ sufficiently approximate may be deduced from the above and better adapted for practice. For sec. θ put $1+\frac{\theta^2}{2}$, and for tan. 2θ put 2θ, which are respectively the approximate values; thence we get, longitudinal aberration $=\frac{r.\theta^2}{4}=\frac{\mathrm{BD}^2}{4\mathrm{BC}}$, and lateral aberration $=\frac{r.\theta^3}{2}=\frac{\mathrm{BD}^3}{2\mathrm{BC}^2}$, both of which are evidently very small, particularly the latter. The least circle of aberration is the smallest that would be formed on a card placed perpendicular to the axis near the focus F to receive the reflected rays; now if the intersection *g* of a reflected ray D*g* with the final one *dg* be taken the most remote possible from the axis CB, it is evident that all the other reflected rays will pass between *g* and the axis, and hence the perpendicular distance from *g* to the axis is the radius of the circle of least aberration or diffusion. The question is thus reduced to one of maxima and minima, and may be easily solved in the usual manner by means of the Differential Calculus.

We have hitherto considered only such rays as fall nearly perpendicularly on the reflecting surface; but since rays fall at all incidences from a luminous point, each pencil of rays, at whatever incidence, when in the same plane, after reflexion, converges to or diverges from some point (unless reflected parallel); a line of light containing all such points in that plane forms a *caustic* line, and in all possible planes constitutes a caustic surface. Caustics formed by reflexion have been distinguished from those produced by refraction by giving the name of diacaustics to the latter and catacaustics to the former, in the same manner in which that part of optics connected with refraction has been denominated dioptrics, and that with reflexion catoptrics. In both cases the caustic line is the curve which each reflected or refracted ray *touches:* hence the equation to the caustic curve, whether produced by parallel, diverging, or converging rays, is easily obtained by taking the equation to one of the reflected or refracted rays, and then applying the Differential Calculus to find the curve touched by all such straight lines; viz. differentiate the equation to the reflected or refracted ray relatively to the constant in its equation, and then eliminate the constant between the two equations, which will then produce the equation to the caustic. If the sun or a candle shine on a vessel containing liquid, and polished in the interior (such as a china cup of tea), a caustic line of light will be observable on the surface of the liquid, which line is a horizontal section of the caustic surface by that of the liquid.

We now come to the consideration of refracting transparent media; and if we suppose the constant ratio of the sine of incidence to that of refraction to be as $m:1$, then m is called the index of refraction for the particular medium employed, the incident light being supposed to pass from vacuum. But if the light pass from the medium into vacuum, then the ratio of the sine of incidence to that of refraction would be as $1\cdot m$, and $\frac{1}{m}$ would be the refractive index; m is evidently greater than unity, since the ray after entering the medium is turned towards the perpendicular, and $\frac{1}{m}$ is less than unity, because after the ray emerges from the medium into vacuum, it is turned from the perpendicular. If m be the index of refraction from vacuum into one medium which we may call A, and m' that from vacuum into a different medium B, then $\frac{m'}{m}$ is the index when the light passes from the medium A to B. [Light.] A table of refractive indices is given in Optics, Practical.

Diverging rays fall from vacuum on the *plane* surface of a uniform and transparent medium: it is required to find the relation between the conjugate foci.

Let A be the focus of incident rays, DBE the surface of the medium, AB a perpendicular on DE, AG an incident ray near this perpendicular, GC (AG produced) the course of the ray if unrefracted, G*c* its actual course nearer to the perpendicular than GC, then *c*G to an eye placed in the medium will appear to proceed from the point *a*, the conjugate focus; the question is to determine the relative situations of *a* and A.

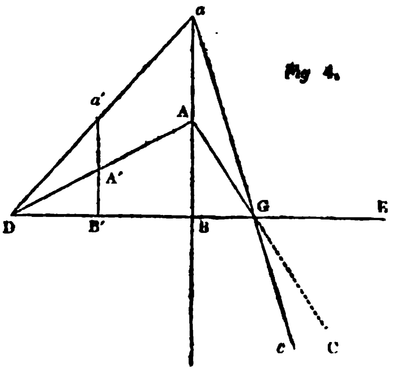


Fig 4.

Let AB = Δ, *a* B = Δ′, and m be the index of refraction; then BAG, the complement of AGB, is equal to the angle of incidence, and B*a*G to that of refraction. Let these angles be respectively denoted by I′ and R and BG = *k*; then *k* = Δ tan. I, and also to Δ′ tan. R, therefore $\frac{\Delta'}{\Delta}=\frac{\text{tan. I}}{\text{tan. R}}=\frac{\text{sin. I}}{\text{sin. R}}\cdot\frac{\text{cos. R}}{\text{cos. I}}=m.\frac{\text{cos. R}}{\text{cos. I}}$; but when C is very near B, the angles I and R are exceedingly small, and their cosines may be taken as units, in which case $\frac{\Delta'}{\Delta}=m$, therefore $\Delta'=m\Delta$; and since m is greater than unity, Δ′ is greater than Δ in the ratio of $m:1$. Conversely, if a ray from a medium bounded by a plane surface pass into vacuum, $\frac{1}{m}$ is then the index of refraction, and we should have $\Delta'=\frac{1}{m}.\Delta$, in which case Δ′ is less than Δ. This explains why the bottom of a clear river seems nearer to the surface than it really is by about one-fourth of its true depth.

The image of a straight line in vacuo seen from such a medium will be another straight line; for let AA′ be such a line, produce it to D, and join D*a*, then since *a*′B′ : A′B′ : *a*B : AB :: $m:1$; therefore *a*′ is the focus conjugate to A′, and consequently *aa*′ is the image of AA′. It must however be observed that AA′ must be of small dimensions, in order that the rays reaching the observer's eye may be considered as nearly perpendicular to DE, otherwise the above proportion would require to be modified, and the image would be curved. In the above case the image *aa*′ is more remote from the surface DE than the object; but the contrary happens when the object is in the medium, when the image will be nearer the surface than the object is. Hence many familiar optical phenomena may be understood. Thus, when a shilling is placed in an empty vessel, and the eye is so situated that the sides of the vessel just conceal the shilling, upon pouring into it a small quantity of water the shilling will appear as if raised up and becomes visible. For a like reason the sun and stars are visible before they actually rise above the horizon or set below it; and when a straight stick is partly immersed in water, the image of the immersed part being raised nearer to the surface than the true object, will cause the stick to appear bent or broken, as well as shorter than it really is; but when immersed perpendicularly to the surface, the stick appears to be only contracted about one-fourth of the part immersed, for the image and object are then in one straight line.

As refracting media bounded by a single curved surface rarely if ever can occur in practice, we shall proceed to consider lenses, particularly the double convex lens, as known most generally. For their various species see Lens.

Let DBEB′ represent a plane section of a double convex lens, that plane including the centres CC′ of the bounding surfaces DBE and DB′E; let A (in the *axis* CC′) be the focus of incident, and *a* of the emergent rays. Let m be the index of refraction for incident, and therefore $\frac{1}{m}$ for emergent rays; and let AGK*a* represent the track of a ray near the axis; let CB=r; C′B′=r', AB=Δ, *a*B′=Δ, and the thickness BB′=t, we have to determine the relation existing between these quantities. First we have sin AG*c*= m sin KG*c*, let GAC=θ, GCA=α, and the inclination of KG to the axis be φ; while δ is the distance of the point at

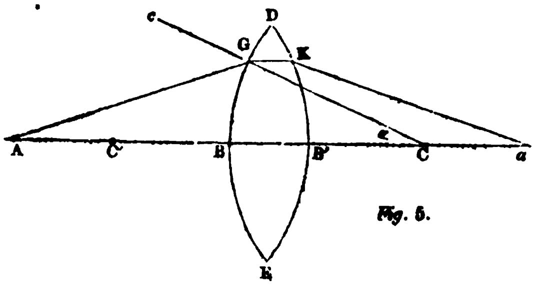


Fig. 5.

which CK cuts the axis from B; then the above equation is the same as $\sin(\theta+a)=m\sin(\phi+a)$, from which, by trigonometry we deduce $\frac{\sin\theta-m\sin\phi}{\sin a}=\frac{m\cos\phi-\cos\theta}{\cos a}$. Now $\frac{\sin\theta}{\sin a}=\frac{\text{CG}}{\text{AG}}$, of which the ultimate value, when G is at B, is $\frac{\text{CB}}{\text{AB}}=\frac{r}{\Delta}$, for the same reason the ultimate value of $\frac{\sin\phi}{\sin a}$ is $\frac{r}{\delta}$, and the ultimate values of $\cos\theta$, $\cos\phi$, and $\cos a$ are each unity; therefore we get $\frac{r}{\Delta}-\frac{mr}{\delta}=m-1$, or $\frac{1}{\Delta}-\frac{m}{\delta}=\frac{m-1}{r}$; hence δ, which determines the focus of the first set of refracted rays, is known; and therefore also $\delta+t$, which is its distance from the second surface. Now, since the ray would traverse the same course if we supposed it to commence at a, and proceed through aKG to A, it follows in the same way that $\frac{1}{\Delta'}+\frac{m}{\delta+t}=\frac{m-1}{r'}$, from whence Δ' is known.

If we neglect t as being small, we may eliminate $\frac{m}{\delta}$, and thence obtain $\frac{1}{\Delta'}+\frac{1}{\Delta}=(m-1)\left(\frac{1}{r'}+\frac{1}{r}\right)$; the spherical aberrations may be found by a similar process to that we have employed for reflexion, and the inverse or erect positions of the images ascertained by the like method.

When we have one side plane, we have only to suppose r infinite, and thus one general formula, by proper attention to the signs, may be made to apply to all forms of lenses.

There is a cause of aberration for refracted light, which does not exist for reflected rays, and it is of more consequence in deforming and colouring images than all the effects of spherical aberration. The chromatic dispersion [DISPERSION] arises from the fact that all the coloured rays which compose solar or other light have different refractive indices for one and the same refracting medium; hence the prismatic spectrum, which only consists of successive circular images of the sun, of the different colours of the rays, overlapping each other. This aberration has, by the successive labours of Dollond, Frauenhofer, and others, been successfully combated. [OPTICS, PRACTICAL.]

OPTICS, PRACTICAL, is that part of science which applies the physical properties of LIGHT and the mathematical laws of OPTICS to the construction of useful optical instruments. By the former we determine the constants necessary to render the formulæ of the latter convertible into numbers. The refractive and dispersive indices peculiar to transparent media are constants of this nature, and the instruments adapted to the easy vision of near or distant objects, to great or small objects, and to other optical purposes, are, according to the plan of this work, described under their proper heads. [CAMERA LUCIDA; EYE; HELIOSTAT; MICROSCOPE; TELESCOPE; &c.]

The refractive indices of transparent and semi-transparent media have been a subject of research to many experimenters, and were considerably advanced by Newton. (Newton's *Optics*.) The additional properties of light discovered since his time have enabled philosophers to calculate to a far greater degree of accuracy the indices both of refraction and dispersion than was then practicable.

The theory of achromatism, or the method of correcting the aberrations of the rays of light, has been pursued by Euler, D'Alembert, Herschel (Sir J.), and many others; but the earliest successful construction was made by Mr. Hall in 1733. The same was effected in 1757 by Dollond, whose labours, together with that of his son, gave a great impulse towards the complete accomplishment of an object of which Newton seems almost to have despaired. In the same career of late years we must distinguish Frauenhofer, of Benediktbeuern, in Bavaria, who obtained at an early age from the French Academy the prize for the actual construction of achromatic glasses. Not only were the necessary manual operations conducted by himself with patience and the minutest attention to all the practical details of the quality of his glasses and the accuracy of grinding and polishing, but he had also the merit and advantage of observing the dark lines which cross the prismatic spectrum, and which are of the greatest utility in determining the indices above alluded to. From the liability to oxidisation of some of the ingredients in the composition, some of his finest telescopes have of late become considerably tarnished, particularly those in exposed situations. This could not have been easily foreseen, and many of his telescopes remain still in good condition.

The first account of his remarkable optical discoveries is given in a paper which he published in the 'Memoirs of the Academy of Bavaria' for 1814-15. By means of a theodolite furnished with a telescope, he measured the distances of the principal lines; and by applying a photometer to the different coloured rays, he has drawn a curve, the ordinates of which express the illuminating powers of the several rays. To these researches he soon afterwards added some beautiful experiments on the diffraction of light, an account of which he published at Munich, and they also appeared in an abridged form in the 'Bibliothèque Universelle,' January, 1822. It is believed that his close application to those and similar researches accelerated his death, which followed soon after.

The accurate determination of the refractive and dispersive indices has also been pursued with great success in this country, and simultaneously by some of the following distinguished men:—Dr. Thomas Young, Dr. Brewster, Dr. Wollaston, Sir J. Herschel, Prof. Faraday, &c.; and in France, by Biot, Dulong, &c., the results of whose experiments, in a very compressed form, are given in the two following tables:—

Refractive Indices.

Hydrogen	1·00014	Glass—English plate	1·500
Oxygen	1·00027	Dutch	1·514
Air (atmospheric)	1·00029	Frauenhofer's crown (No. 13) ray E	1·533
Nitrogen	1·00030	Rock crystal	1·563 to 1·575
Aqueous humour of eye	1·337	Amber	1·547
Vitreous	1·339	Ruby red glass	1·601
Salt-water	1·343	Sulphur	1·958
Albumen	1·360	Glass of antimony	2·000
Crystalline lens of eye	1·384	Diamond (S. G. = 3·4)	2·439
Oil of almonds	1·470		
Oil of turpentine	1·475		
Camphor	1·500		

Dispersive Powers.

Chrom. lead	0·400	Oil of turpentine	0·042
Oil of cassia	0·139	Amber	0·041
Green glass	0·061	Gum Arabic	0·036
Flint glass	0·052	Oil of cloves	0·062
		Sulphate of lead	0·060

OPU'NTIA is the name given by botanists to those cactaceous plants which gardeners call *Indian Figs*, and which are so remarkable for their stems consisting of flat joints, broader at the upper than the lower end, but which eventually lose that appearance, becoming both cylindrical and continuous. On one of them, Opuntia cochenillifera, the cochineal insect is fed, and others yield a pleasant subacid fruit, which is eaten in hot countries. The lavas of Ætna are in some places covered with the spiny bushes of Opuntia vulgaris, whose large purple juicy fruits are carried for sale to the neighbouring markets. It is however only a naturalised plant, its native country being South America within the tropics.

ORA (from the Saxon ope, metal), a money of account among the Anglo-Saxons, whatever it might have been in other parts of Europe. In the Domesday Survey, and, as Dr. Hickes assures us, in his 'Dissertatio Epistolaris,' in antient contracts of buying and selling, it is used for the ounce, or a twelfth part of the nummulary pound.

There appear to have been two sorts of ora in use in the Saxon times, one of sixteen pence to the ora, the other of twenty pence. The ora of Domesday Book is perpetually valued at twentypence: as in tom. i., fol. 2 b.: 'Cxi. solid. de denariis xx. in Ora.' Ibid., fol. 11 b.: 'Cxxv. lib. et x. solid. de xx. in Ora.' Tom. i., fol. 164: 'Modo redd. xxiii.

lib. candidorum nummorum de xx. in Ora.' The ora of sixteen pence was of earlier date; but its existence is recognised as late as in the Placita of the 37 Hen. III., Rot. 4. In the Laws of Canute, art. 31, 'De ponderibus,' it is said 'xv. Oræ libram faciunt.' (Clarke, *Connection of the Roman, Saxon, and English Coins*, 4to., Lond., 1771, p. 316; Hickesii *Thesaurus*, *Diss. Epist.*, pp. 111, 112; Ellis's *General Introduction to Domesd. Book*, vol. i., pp. 165, 166.)

ORACLE (from the Latin *oraculum*, and that from *os*, *or-is*, a mouth). Oracle was the Roman name used to denote the place where answers were supposed to be given by any of the divinities to those who consulted them respecting the future. Sometimes also it was used to signify the response which was delivered, and sometimes the deity from whom this response was imagined to proceed. Its primary and proper signification indeed is that of a response. Cicero (*Topic.*, 20) says that oracula were so called, 'quod inest in his *Deorum Oratio*.' Those who were sent to consult them were sometimes called *oratores*. (Livy, v. 15.) Oracular responses were called *chresmi* (χρησμοὶ) or *manteia* (μαντεῖα) by the Greeks; the name *manteion* (μαντεῖον) was also often given to the oracular place, or the seat of the oracle.

Curiosity regarding futurity, and the desire to penetrate its mysteries, are dispositions which exert a powerful control over the minds of men in every stage of society; among nations that have made little advancement in civilization and intelligence, they operate with peculiar force; and in these dispositions, combined with the belief that the gods had both the ability and the inclination to afford the knowledge so eagerly longed after, the oracles of the pagan world had their origin. Of these oracles the most famous were those of Greece, and among them that which had claims to the highest antiquity was the oracle of Jupiter at Dodona. According to the account of the priests of Dodona, it was established in the following manner. (Herod., ii. 55.) Two black doves took their flight from Thebes in Egypt. One flew to the temple of Jupiter Ammon in the Libyan desert; the other to Dodona, where, in human language, it proclaimed to the inhabitants of the district that they must establish an oracle (μαντήϊον) of Jupiter there. The account of the priests of Thebes was somewhat different. (Herod., ii. 54.) But the most celebrated of the Grecian oracles was that of Apollo, at Delphi, a city built on the slopes of Parnassus in Phocis. It had been observed at a very early period that the goats feeding on Parnassus were thrown into convulsions when they approached a certain long deep cleft in the side of the mountain. This was the result of a peculiar vapour rising out of the cavern, and one of the goatherds was induced to try its effects upon himself. Inhaling the intoxicating air, he was affected in the same manner as the cattle had been, and the inhabitants of the surrounding country, unable to explain the circumstance, imputed the convulsive ravings to which he gave utterance, while under the power of the noxious exhalations, to a divine inspiration. The fact was speedily circulated widely, and a temple was erected on the spot. The honour of the prophetic influence was at first variously attributed to the goddess Earth, to Neptune, Themis, and others; but it was at length assigned to Apollo, with whom it ever after remained. A priestess was appointed, whose office it was to inhale the hallowed air, and who was named the Pythia. She was prepared for this duty by previous ablution at the fountain of Castalia, and being crowned with laurel, was seated upon a tripod similarly adorned, which was placed over the chasm whence the divine afflatus proceeded. Her inspired words while thus situated were interpreted by the priests. The announcements of the oracle to those by whom it was consulted were originally made in verse; but it having been sarcastically remarked that Apollo, the god of poetry, was himself sadly deficient in the art of which he was the patron, they were subsequently given in prose. It was usual for those who took the advice of the oracle to make rich presents to the god. By this means a vast amount of wealth was amassed at Delphi, as we learn more particularly from the minute descriptions of Herodotus and Pausanias, and the institution rose to great splendor. From the universal veneration in which it was held, it came also to be chosen as a safe depository for much of the riches of the several states of Greece. Its sacred character however did not always prove a sufficient defence against violence and rapacity, and more than once it was plundered of its treasures. [DELPHI.] Besides the oracles of Jupiter and Apollo at Dodona and Delphi, that of Trophonius, near Lebadeia in Bœotia, may be mentioned, as having been held in high estimation. There were many other oracles in Greece, but of less repute.

Among the other most noted oracles of antiquity were that of Jupiter Ammon in the desert of Libya, that of the Branchidæ in Ionia, of Pella in Macedonia, of Sinope in Paphlagonia, of the head of Orpheus at Lesbos, &c. Most of the heathen deities and even the demigods and heroes had oracles of their own. There were also current in Greece numerous so-called prophecies, the productions of individuals who were probably supposed to speak under a divine influence. Such were those of Bacis and Musæus, in which the battle of Salamis was predicted, and that of Lysistratus, an Athenian. (Herod., viii. 96.) But these productions are perhaps more appropriately considered under the head of PROPHECY; though Herodotus applies to them the same name (χρησμὸς) as to the responses from Delphi and other oracular places. As to the Sibylline oracles see SIBYL.

Though the Romans had various modes of ascertaining the will of the deities, it does not appear that oracles like those of Delphi or Dodona were ever established among them; and we find that the oracles of Greece, and particularly the far-famed oracle of Delphi, were consulted by them on many important occasions. (Livy, v. 15; xxii. 57, &c.)

Among the Jews, the Urim and Thummim, which by an extraordinary brightness made known the will of Jehovah, bore a striking resemblance to the heathen oracles; and the oracle of Bathcol, or *daughter of the voice*, which was originated after the death of Malachi, was completely identical with them.

The modes in which oracular responses were delivered were very various. At Dodona they issued from the hollow of an oak, at Delphi they were delivered by the Pythia, and at the oracle of Ammon they were pronounced by the priests. At Memphis a favourable or unfavourable answer was understood to be returned, according as Apis received or rejected what was presented to him. [APIS.] Sometimes the reply was given by letter; and sometimes the required information could be obtained only by casting lots—the lots being dice with certain characters engraved on them, the meaning of which was ascertained by referring to an explanatory table. Dreams, visions, and preternatural voices also announced the will of the divinities.

The importance attached by the Greeks and Romans to oracular responses is a striking feature in the history of those people. Hardly any enterprise, whether public or private, of any moment, was undertaken without recourse being had to them, and their sanction being obtained. In later times indeed their influence was greatly diminished; and thus gradually fell into disrepute. Cicero affirms that long before his age even the Delphic oracle was regarded by many with contempt; and there is little doubt that oracles were considered by philosophers as nothing different from what they really were, and by politicians as instruments which could be used for their purposes. The reply of Cato to Labienus, who wished him, after the battle of Pharsalia, to consult the oracle of Jupiter Ammon, embodies the opinion of that eminent Stoic respecting the propriety of thus questioning the gods. 'On what account, Labienus, would you have me consult Jupiter? Should I ask him whether it be better to lose life than liberty? Whether life be a real good? We have within us, Labienus, an oracle that can answer all these questions. Nothing happens but by the order of God. Let us not require of him to repeat to us what he has sufficiently engraved on our hearts. Truth has not withdrawn into these deserts; it is not engraven on the sands of Libya. . . . Let the inconstant and those that are subject to waver according to events have recourse to oracles. For my part I find in nature everything that can inspire the most constant resolution. The coward, as well as the brave, cannot escape death. Jupiter can tell us no more.' (Lucan, *Pharsalia*, lib. ix., v. 566-584.)

The question has been gravely discussed, whether oracular responses ought to be ascribed to mere human ingenuity and wisdom, or to diabolical agency. Most of the Christian fathers maintained that they ought to be ascribed to the latter. Allusion is made to this opinion in the first book of 'Paradise Lost,' where the spirits of Pandemonium are described as having taken possession of the various idols of the heathen world. There is nothing however in the history of the antient oracles to countenance such a notion, or to lead to the belief that a supernatural cunning and skill directed them. Their replies to those who consulted them were for the most part obscurely and equivocally expressed, and so as to admit of different explanations, according as the wishes of the inquirer might suggest, or the event determine. And even in those instances where trial was designedly made of the reality of their pretensions, it is not difficult to account for the success with which they stood the test, without calling in the assistance of demoniacal instrumentality.

Another circumstance respecting the oracles, which has given birth to much controversy, is, the time when they ceased altogether to give responses. Eusebius was the first who propounded the opinion that they became silent ever after the birth of Christ, and many writers, willing thus to do honour to the author of Christianity, have given it their support. Milton makes allusion to this theory also in the most magnificent of all his minor poems, 'The Hymn of the Nativity;' and in lines of solemn and elevated beauty, of which the following are the commencement, pictures the consternation of the heathen idols at the advent of the Saviour:—

> 'The oracles are dumb,
> No voice or hideous hum
> Rings through the arched roof in words deceiving.
> Apollo from his shrine
> Can no more divine,
> With hollow shriek the steep of Delphos leaving.
> No nightly trance or breathed spell
> Inspires the pale-eyed priest from the prophetic cell.'

But the circumstance that may thus be made available for the purposes of poetical ornament, happens unfortunately to be contrary to fact. It appears from the edicts of the emperors Theodosius, Gratian, and Valentinian, that oracles existed and were occasionally at least consulted till so late as A.D. 358. About that period they entirely ceased, though for several centuries previous they had sunk very low in public esteem. So few resorted to them, that it was no longer a matter of interest to maintain them. Towards this consummation Christianity powerfully contributed, by the superior enlightenment which it carried along with it wherever it was introduced, and by the display which it made of the falsehood and folly of the superstitions which it was destined to overthrow. The following works treat of oracles:—Cicero, *De Divinatione et Fato;* Clusens (Daniel), *De Oraculis Gentilium*, 1673; Dale (Anton. Van), *De Oraculis Ethnicorum*, 1683; *An attempt to prove that the Greeks borrowed the Story of their Oracles from the Holy Scriptures*, by E. Dickinson, 1686; Fontenelle (Bernard le Bovier), *Histoire des Oracles*, 1687; Bulenger (Julius Cesar), *De Oraculis et Vatibus*, 1699; Dr. Bengo Collier's *Christianity compared with Hinduism, Mohammedanism, the Antient Philosophy, &c.;* Clavier, *Mémoire sur les Oracles des Anciens*, 1819.

ORAN. [ALGIERS.]

ORAN-ELF. [BOTHNIA.]

ORANGE. In the article CITRUS the different species of this genus have been described, as well as the more remarkable varieties of the orange. It is there stated that India and China are probably the native countries of the orange tribe; and also that from the observations of Dr. Wallich and other Indian botanists, the orange, the lemon, lime, and citron were all that could be distinguished as distinct species. Since then Dr. Royle has stated (*Illust. Him. Bot.*, p. 130), that he has found two plants, having the characters of the *lemon* and *citron*, growing wild in the jungly valleys at the foot of the Himalayas, in the tract between the Ganges and Jumna rivers, which, when transferred to gardens, retained their characters. He further states that from the Rungpore forests a round kind of *lime* is obtained; while in those of Silhet, as well as on the sides of the Neelgherries, the *orange* is described as being found wild.

Captain Turner, in the account of his journey to Teshoo Loomboo, mentions the orange as delicious; and Mr. Saunders, who accompanied him, describes many orange and lime trees as found at the foot of the hills in approaching Buxedwar. The various kinds of sweet lime and lemon are also common in India; though the shaddock is probably of foreign origin, as it is usually called Batavi nimbo, or Batavian lemon. Hence there can be no doubt of the orange, lemon, lime, and citron being natives of India, though it is probable that some of the species are also indigenous in China, as is the case with many genera and even species which are common to the Himalayan mountains and to the flora of China. That it was introduced into Europe from India, either directly or through the medium of the Arabs or Persians, is probable from the similarity of the names; the orange being in Sanscrit *nagrungan*, Hindu *narungee*, Arabic *narunj*, Spanish *naranja*, Italian *arancee*, while the lemon is in Sanscrit *neembooka*, Bengalee *neeboo*, Hindu *neemoo* and *leemoo*, Arabic *limon*, whence the European *limon* and *lemon*. But nothing in the history of vegetables is more difficult to determine than the native country of cultivated plants. There was always much communication between India and the Red Sea, and the Arabs also introduced many Indian plants into their dominions. The lemon and orange are common in Abyssinia. Bruce says the lemon is indigenous; and Alvarez speaks of lemons and oranges in parts which Bruce did not visit. (See the *Travels* of Alvarez.)

The orange has been adduced (*Spectator*, No. 155) as a rare instance of a plant vigorous enough to have at once beautiful shining leaves, fragrant flowers, and delicious nourishing fruit. But it is still more remarkable as a fruit of very warm southern countries which has been transferred to Europe and succeeds well in the open air in some parts of Italy. This is probably owing to its being a shrub which does not ripen its fruit even in India until the cold weather or winter of that country. It is thus naturally disposed to bear a greater degree of cold, and thus has been able to travel from India and China 'to the southern shores of Europe, and find a congenial climate in the equable and temperate climate of the Azores.' It is often made a subject of discussion whether the orange, lemon, and citron were known to the antients. There does not appear to be any evidence of sufficient weight in favour of the two former, but it is extremely probable that the citron was the Assyrian, Median, or Persian apple of the antients. Dr. Royle has remarked it as worthy of notice that the Persian and Arabian authors, when describing them, do not give any Greek synonymes of either the orange or lemon. But of the citron they state *marseeska* to be the Greek and *atrogha* the Syrian name, the former of which has not yet been traced out, but the latter appears of the same origin as the Arabic *ooteruj*. The Sanscrit name of the citron is *Beeja poora*, and the Persian *toorunj;* by the latter name it is also known in the north-western provinces of India.

The orange-tree, being a native of warm southern latitudes, is a remarkable instance of one which gives employment to and forms even an article of commerce from the southern to the more northern European nations. Thus, it is exported from Italy and Malta, as well as from the south of Spain and from Portugal, but in very large quantities from the Azores. Its cultivation is profitable not only on account of the esteem in which the fruit is held, but also from the extreme prolificness of the tree, so that the fruit is sold even in England at a price not much above and sometimes even for less than our own apples and pears.

Oranges are imported, as well as lemons, packed in boxes, and wrapped up separately in paper. The entries for home consumption, in 1831 and 1832, as calculated by Mr. M'Culloch, amounted on an average to 270,606 boxes a year, and assuming each box to contain 700 oranges and lemons, the numbers amounted to 189,424,000, and the duty, on an average of the above years, to 61,036*l.* a year.

The citron is considered to have been first cultivated in Italy by Palladius, in the second century, but the orange not until the fourteenth century; it is probable, from the name, that it was first introduced by the Arabs into Spain, 'where fruits of fragrance blush on every tree,' and where are seen 'the orange tints that gild the greenest bough.' They can bear the open air also at Nice, Genoa, and Naples, but at Florence and Milan, and often at Rome, they require the temporary protection of a shed. They are usually planted in boxes, and removed from the conservatory into the open air in summer, in France as well as in England; but since the introduction of the great variety of flowers from all countries, orangeries and fine specimens of orange and citron trees have been less in fashion, though none are more desirable on account of the combination of elegant verdure, the grateful odour of the flowers, and the rich appearance of the fruit. They have been cultivated in England since 1492; and Mr. Loudon states that at the Wilderness, Kent, there are three trees in boxes, not surpassed by any trees so grown in Europe; and that at Saltcombe in Devonshire there are in a few gardens orange-trees which have withstood the winter in the open air for upwards of a hundred years. They are propagated either by seeds, by cuttings, by layers, by grafting, or inoculation. The plants grown from seeds require so long to come to perfection, that they are seldom so propagated in England. The most regular and garden-like culture is in the orange orchards at Nervi, Monaco, and other places in the neighbourhood of Genoa. At the former are the orange nurseries which may be said to supply all Europe with trees, though the cultivation is of a very indifferent character, but the fine climate, strong clayey soil, and abundant manurings supply the place of more skilful treatment. Budding and grafting are performed in England at the usual season for such operations, but they may be performed at any time when the sap is in motion. Mr. Henderson, of Woodhall, one of the most successful growers of the Citrus tribe, has given a full description of the practices he adopts (*Caled. Hort. Mem.*, iii. 308; and Loudon's *Encycl. of Gardening*), and considers cuttings as the quickest mode of getting plants. At Genoa and Florence the trees are grown in a strong yellow clay which is richly manured. The French, in preparing a compost, compensate for quantity by richness of manure. Henderson takes one part of light brown mould from a piece of ground that has not been cropped or manured for many years, one part of peat earth such as is used for growing heath, two parts of river-sand, or pit-sand, if it be free from mineral substances, and one part of rotted hot-bed dung, with one part of rotted leaves of trees, and mixes them all well together, so as to form a compact soil of uniform quality.

Though orange-trees grow exceedingly well in pots and boxes, yet to have them produce the finest crop of fruit, they should be planted in the ground like peach-trees, or as standard cherry-trees in a conservatory, but the largest fruit is produced when the trees are planted against the back wall trellis of a narrow house.

(See the work of Risso of Nice and Poiteaux of Versailles, *Histoire Naturelle des Oranges*, where 169 sorts are described, and 105 of them figured; also that of Gallezio, *Traité du genus Citrus*, who has given an account of the 40 different kinds cultivated in Italy; and Mr. Loudon's *Encycl. of Gardening*.)

ORANGE, a town in France, capital of an arrondissement, in the department of Vaucluse, on the road from Paris to Avignon, Aix, and Marseille, 414 miles from Paris through Auxerre and Lyon, in 44° 8′ or 44° 9′ N. lat. and 4° 48′ E. long.

This town existed in the Celtic and Roman periods, and was called Arausio. It is mentioned by Strabo as one of the towns of the Cavares: Mela and Pliny call it Arausio Secundanorum, and the latter describes it as a Roman colony. The epithet Secundanorum has been derived from the designation of the soldiers who were quartered or settled as colonists. Orange contains more Roman antiquities than most other towns in France, and may vie with the cities of Italy. A triumphal arch, called by the inhabitants of the district the arch of Marius, but which is probably of the age of Augustus, stands in the middle of a field on the north side of the town, near the road from Paris and Lyon: it is about 60 feet high, and has three archways, of which the middle one, intended for carriages, is larger than the other two. The vault of the centre arch is richly sculptured. Between the arches are fluted columns of the Corinthian order, most of them much decayed through age, and others are entirely destroyed. The attics are adorned with reliefs, much decayed, but of great archæological interest: on one of these the name Mario, among others, inscribed on a trophy, has given rise to the general opinion as to the person to whom the arch was erected. The sides of this triumphal arch are decorated with columns and reliefs. Another remarkable antiquity, a ruined wall, the back of the scene or stage of a theatre, is in the centre of the town: it is composed of large stones, joined without cement, and is altogether a magnificent piece of masonry. The amphitheatre, of which the traces were visible till of late years, has gradually disappeared, the stones having been carried away to be used in the erection of new houses. Of an aqueduct which brought water to the town there are no remains, except at Vaison, which is several miles distant. There are various fragments of antiquity in private houses

The Visigoths and Burgundians got possession of the town on the downfal of the Roman empire, and from them it passed to the Franks. In the middle ages it was the capital of a principality, which, after passing through different families, came to that of Nassau. On the death of William III. of England, who held it, it was claimed by the king of Prussia as his heir; and the king of Prussia ceded it to the king of France in exchange for the town and territory of Guelder. It was annexed to Dauphiné until the establishment of the division into departments. The title Prince of Orange is retained by the royal family of Holland. [NASSAU, HOUSE OF.]

The town of Orange is in a delightful country, and presents a pleasing appearance: it is however really ill built, with narrow, crooked, and ill-paved streets. There are several squares, and some tolerably handsome fountains. There are several parish churches, one of which was formerly a cathedral, for Orange was the seat of a bishopric before the Revolution; and a Protestant place of worship, remarkable for the boldness of its architecture. The population, in 1831, was 6211 for the town, or 9123 for the whole commune; in 1836, 8874 for the commune. The inhabitants manufacture printed calicoes, handkerchiefs, and thrown silk; and trade in corn of all kinds, fruits, wine, brandy, honey, oil, wool, silk, saffron, madder, and truffles. There are five yearly fairs. The cultivation of the olive commences in the neighbourhood of Orange. There are in the town several government offices, a high-school, a society of agriculture, science, and arts, and an hospital.

The arrondissement of Orange comprehends an area of 377 square miles, and includes 48 communes. It is divided into seven cantons, or districts, each under a justice of the peace. The population, in 1831, was 66,653; in 1836 it was 67,443. (*Communication from Orange*, &c.)

ORANGE, River. [CAPE OF GOOD HOPE.]

ORANG-UTAN, or ORANG OUTANG, names by which the *Pithecus Satyrus* of Geoffroy (*Simia Satyrus*, Linn.), *the Red Orang*, is now generally designated. In the articles APE and CHIMPANZEE much will be found relating to this curious form and its approximations. But the animal is so interesting, that nothing but want of space, which readers not zoological might think unjustifiably occupied, prevents us from entering at large into the subject and giving a correct figure from the life; for, with few exceptions, artists are in the habit of depicting this animal, as well as the *Chimpanzee*, sometimes with and sometimes without support, in an erect position—an unnatural attitude, against which its whole form and structure militate. We must here however confine ourselves to a mere description of the species, with figures of the skeletons of the young and adult, from Professor Owen: these skeletons will, at once, strike the observer with their admirable adaptation for quadrumane or cheiroped machinery and arboreal habits, and their inaptitude for erect progression.

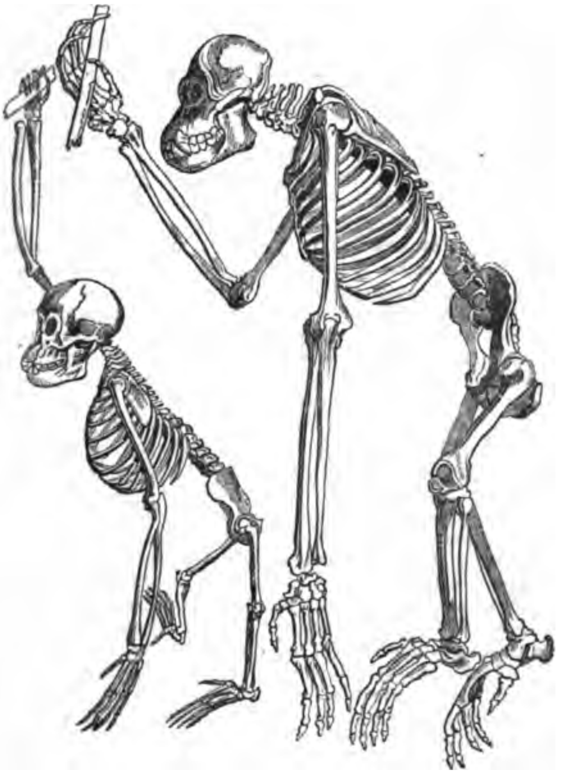
Subgenus Pithecus.

Muzzle large, elongated, somewhat rounded anteriorly; forehead sloping backwards; slight supraciliary ridges, but strong sagittal and lambdoidal crests. *Facial angle* 30°. *Auricles* small. Twelve pairs of *ribs;* bones of the *sternum* in a double alternate row. *Arms* reaching to the ankle-joint. No *ligamentum teres* in the hip joint. *Feet* long and narrow; *hallux* not extending to the end of the metacarpal bone of the adjoining toe; often wanting the ungueal phalanx and nail. *Canines* very large, their apices extending beyond the intervals of the opposite teeth. *Intermaxillary bones* anchylosed to the maxillaries during the second or permanent dentition. *Height* under five feet.

Habitat.—The islands of Borneo and Sumatra. (Owen.)

Professor Owen remarks that the young individual exhibits the anthropoid character in the relative smallness of the face to the cranium, resulting from the state of dentition, but that it corresponds with the adult skeleton in the number of ribs and in the relative proportions of the upper and lower extremities. With regard to the number of vertebræ, he observes that the figure of the adult skeleton, which was taken by permission of the board of curators from the specimen in the museum of the Royal College of Surgeons, exhibits the abnormal number of five lumbar vertebræ instead of four, which is the number existing in the trunk of the mature *Orang* preserved in the museum of the Zoological Society of London, and in the skeleton in the museum of comparative anatomy in the Jardin des Plantes

The student will do well to study carefully the whole of the Professor's valuable remarks and beautifully accurate illustrations relating to the *Orangs*, or great tailless *Apes* of Asia and Africa, in the *Transactions of the Zoological Society of London*. The form of the living animal and its habits in captivity will have been familiar to most of our London readers from their opportunities of observing the deportment of *Jenny*, the *Red Orang*, which died this year (1839) in the gardens of that Society in the Regent's Park.



Side view of the skeletons of Pithecus Satyrus, young and adult (from Owen).

ORATO'RIO (Ital.), a sacred musical composition, consisting of airs, duets, &c., and choruses. The text is generally a dramatic poem, as Handel's *Samson* and Cimarosa's *Sacrifizio d'Abramo*. Sometimes it takes the form of a narrative, as *Israel in Egypt;* and occasionally it is of a mixed kind, as Haydn's *Creation*. *The Messiah* is a collection of passages from our received translation of the Scriptures.

Concerning the origin of the Oratorio, Dr. Brown, Sir John Hawkins, and others seem to have misunderstood the *Père* Menestrier, who, in his work *Des Représentations en Musique*, attributes to the pilgrims, on their return from the Holy Land, not the introduction of what we term oratorios, as those writers suppose, but of the sacred dramas called *Mysteries*. And the learned Jesuit is perhaps himself in error on this subject. It is Warton's opinion that about the eighth century the merchants who frequented the fairs, employing every art to draw numbers together, were accompanied by jugglers, minstrels, and buffoons, who were the source of great amusement to the people. The clergy, thinking that such entertainments tended to irreligion, proscribed them; but their censures and fulminations being disregarded, they took into their own hands the management of popular recreations—they turned actors—and, instead of profane mummeries, presented stories taken from legends or from the Bible. (*History of Poetry*.) Voltaire conjectures that religious dramas came from Constantinople, where, about the fourth century, Gregory of Nazianzus, an archbishop, and one of the fathers of the church, banished plays from the stage of that city, and introduced stories from the Old and New Testament. As the antient Greek Tragedy was originally a religious representation, a transition was made on the same plan, and the choruses turned into Christian hymns. 'This opinion,' says the candid Warton, 'will acquire probability, if we consider the early commercial intercourse between Italy and Constantinople.' Admitting this, we need seek no further for the original source of the sacred musical drama.

As regards the more recent introduction of the Oratorio, Crescimbeni, in his *Comentarj*, tells us that it is attributable to San Filippo Neri, born in 1515, who, in his chapel,—(' *nel suo oratorio* ')—after sermons and other devotions, in order to allure young people to pious offices, and to detain them from earthly pleasure, had hymns and psalms sung by one or more voices. [NERI.] Bourdelot is rather more circumstantial on this subject. He says, S. Philippe de Nery, a native of Florence, founder, in 1540, of the congregation of the Priests of the Oratory in Italy, observing the taste and passion of the Romans for musical entertainments, determined to afford the nobles and people the means of enjoying them on Sundays and festivals in his church, and engaged for this purpose the ablest poets and composers, who produced dialogues in verse on the principal subjects of Scripture, which he caused to be performed by the most beautiful voices in Rome, accompanied by all sorts of instruments. These performances consisted of airs, duets, trios, and recitatives for four voices: the subjects were, Job and his Friends; the Prodigal Son received by his father; the Angel Gabriel with the Virgin; and the Mystery of the Incarnation. Nothing was spared to render these attractive, the novelty and perfection whereof drew a crowd of auditors, who were delighted with the performances, and contributed largely, by admission money, to the expenses incurred. Hence are derived what we now call Oratorios, or sacred representations. (*Histoire de la Musique*, 1743, i. 256.) Some of these poems were printed, under the title of *Laudi Spirituali*, and among the first authors of them was P. Agostino Manni. One of the most remarkable was entitled *Rappresentatione di Anima e di Corpo, del Signor Emilio del Cavalieri, per recitar cantando*. It was the first attempt in the recitative style, and performed in action, on a stage erected in the church of *Santa Maria della Vallicella* at Rome, with scenes, dances, &c., as appears from the editor's dedication to Cardinal Aldobrandini, and the composer's instructions for the performance. From the latter Dr. Burney (*Hist.*, iv. 88) gives some curious extracts, among which are the following:—

The accompanying instruments—namely, a double lyre, a harpsichord, a large guitar, and two flutes—to be behind the scenes; but the performers are desired to have instruments in their hands, as the appearing to play would help the illusion.

The books of the words were printed. Instead of the modern overture, a madrigal, with all the parts doubled, and fully accompanied, is recommended.

When the curtain rises, two youths, who recite the prologue, appear. Then *Time*, one of the characters, comes on, and has the note with which he is to begin given him by the instruments behind the scenes. The *chorus* is to be placed on the stage, part sitting and part standing; and when they sing they are to be in motion, with gestures.

Il Corpo (the body), at the words *Si che hormai alma via*, throws away his ornaments. The *World* and *Human Life* are to be gaily dressed; and when divested of their trappings, are to appear poor and wretched; and finally dead carcasses.

The performance may conclude with or without a dance. If without, the last chorus is to be doubled in all its parts. But if a dance is preferred, a verse beginning '*Chiostri altissimi*' is to be sung, accompanied reverentially by the dance. During the ritornels the four principal dancers are to perform a ballet, *saltato con capriole* (danced with *capers*), without singing. They may sometimes use the *galliard* step, sometimes the *canary*, and sometimes the *courant*.

The name of *Oratorios* was given, some think, to these performances, because they owed their birth to the *priests of the Oratory;* we are however more inclined to derive the term from the place, the *oratorio* (*oratorium*, oratory, or small chapel), in which they were first heard. But the word does not appear to have been in use till about the year 1630, when Balducci applied it to two of his sacred poems.

The unfortunate Stradella was one of the first of those who distinguished themselves in this exalted kind of composition [STRADELLA]; his '*Oratorio di S. Gio. Battista*,' produced about the year 1670, is analysed and much praised by Burney (iv. 105). A fine chorus from this, in five parts, is printed in the 4th vol. of *The Fitzwilliam Music*. The increasing popularity of the sacred drama at length induced poets of eminence to employ their pens in its service. Apostolo Zeno, the Imperial poet-laureate, produced seventeen works of this kind, under the title of *Azioni Sacre*, most of which were set by Caldara, Imperial vice-chapel-master to Leopold I., whose reputation as a composer of sacred music deservedly stands high. The first of them, *Sisara*, was performed in 1717. Metastasio wrote seven *Azioni*, of which Caldara set two; the first, *La Passione*, in 1730. This was re-set by Jomelli, and is justly reckoned among the best of his works.

The Oratorio was introduced into England in 1720, when Handel set *Esther*—Racine's tragedy abridged and altered by Mr. Humphreys—for the chapel of the duke of Chandos (Pope's *Timon*) at Cannons. This, in 1731, was performed by the Children of the Chapel-Royal, at the house of their master, Bernard Gates. The next year it was publicly produced, as appears from the following advertisement in the *Daily Journal*:—'By His Majesty's command, at the King's Theatre in the Haymarket, on Tuesday, the 2nd of May, will be performed the sacred story of *Esther*, an oratorio in English, formerly composed by Mr. Handel, and now revived by him, with several additions, and to be performed by a great number of voices and instruments. N.B. There will be no acting on the stage, but the house will be fitted up in a decent manner for the audience.' The success of this was of the most decided and encouraging kind: but for an account of the great master's other oratorios, and of his inducement for first producing them, we refer to a former volume. [HANDEL.] The custom of performing oratorios on the Wednesdays and Fridays in Lent is to be dated from 1737, from which time they were, with few intermissions, continued till a very recent period. Handel was succeeded in this musical speculation by his friend J. C. Smith, who was followed by Stanley and the elder Linley. [STANLEY; LINLEY.] Linley and Dr. Arnold then in conjunction most successfully carried on the oratorios, which were continued by the latter, on the retirement of his colleague. [ARNOLD.] An opposition was now started by Ashley, who had been active as a subordinate agent at the Commemoration of Handel in 1784. This person soon transformed the performances into secular and often vulgar concerts, though retaining the original name; and from that time the oratorios began to degenerate; till at length, having been for some years carried on by different persons, and generally at a loss, they ceased altogether. Though it would be unjust not to admit that, even during this unfavourable interval, there were two or three seasons that reflected some credit on the managers, in which *The Messiah*, with Mozart's added accompaniments, was first publicly produced in London, and also Beethoven's *Mount of Olives*.

ORATORY. The principal design of oratory is to convince or persuade. It contemplates the investigation of truth only as a secondary object. Assuming as its basis certain supposed or admitted principles or facts, its aim is, by presenting these in the form best adapted to win the assent of the understanding and impress the heart, to deter from or incline to a particular mode of resolution and action. This, the chief end of oratory, ought never to be left out of sight in any disquisition on that subject, inasmuch as upon it the general theory of the art is founded.

At a very early period, as appears from the 'Iliad,' the oratorical art was held in high estimation among the Greeks. According to Quintilian however nearly the first person by whom it was properly cultivated was Empedocles, the date of whose birth is unknown; but his flourishing period was about 450 B.C. Corax and Tisias, the earliest writers on the art, were both natives of Sicily. (Quintil., *Instit. Orat.*, iii., c. 1.) Contemporary with them was Gorgias, also a native of Sicily, who was so distinguished for his eloquence that a golden statue was erected to him at Delphi. He, together with Protagoras of Abdera, Prodicus of Ceos, and Thrasymachus of Calchedon, are mentioned as the first who treated of common-places (*communes loci*). The most celebrated disciple of Gorgias was Isocrates, whom Cicero describes as the greatest master and teacher of the art. The treatise of Aristotle on Rhetoric is the oldest extant treatise on the rhetorical art, and one of the most valuable books which has been preserved from antient times. Demosthenes, who probably enjoyed the instruction both of Isocrates and of Isæus, by incessant application overcame the obstacles which nature had placed in the way of his becoming an orator, and attained a degree of excellence in his art which has immortalised his name. His opponent and rival, Æschines, after his banishment, is said to have taught rhetoric at Rhodes. We have no treatise on the art by either of these great masters, but we possess, in their extant orations, models which are more valuable than any treatise could have been. Theodectes and Theophrastus, scholars of Aristotle, were both authors of rhetorical treatises (Fabric., *Bibl. Gr.*, v. 2, p. 241); and after them the philosophers, particularly those of the Stoic and Peripatetic sects, bestowed much attention upon the rules of oratory. A valuable extant treatise upon composition (περὶ 'Ερμηνείας) is ascribed to Demetrius Phalereus; and Dionysius of Halicarnassus is the author of a treatise of Rhetoric, and of critical remarks on the Greek orators, which deserve a careful perusal. Besides those that have been named, other Greek orators of later times are spoken of by Quintilian, among whom are Hermagoras, Athenæus, Apollonius Molon of Rhodes, who was one of Cicero's masters, Arius Cæcilius, Apollonius of Pergamus, and Theodorus of Gadara. After Quintilian, the writers of chief note are Hermogenes and Longinus.

The art of oratory was in a state of maturity in Greece, before it even began to be studied at Rome. So late as B.C. 161, the senate passed a decree expelling the philosophers and rhetoricians from the city. (Gell., xv. 1.) Six years after however, Carneades, Critolaus, and Diogenes, having come as ambassadors from Athens to Rome, the Roman youth were so attracted by their eloquence that they determined to commence the study of the art. It is stated by Seneca that Lucius Plotinus, a Gaul, was the first who taught oratory at Rome. This profession was for awhile confined to freedmen, but it was at length adopted by Blandus of the equestrian order. He was succeeded by others, of whom some particulars have been recorded by Suetonius. The following names of Roman rhetorical writers are given by Quintilian: Marcus Cato the censor, Antony the orator, Cornificius, Stertinius, and Gallio; and in Quintilian's own age, Virginius, Pliny, and Rutilius. Cicero, whose name we have intentionally omitted in the above list, as he was the most illustrious of the Roman orators, was also one of the most copious and elegant of the antient writers on oratory. His treatises on this subject, which are numerous, are respectively entitled: 'Of Invention;' 'Of Topics;' 'Of the Divisions of Oratory;' 'The Orator, or Brutus;' 'Of Famous Orators;' and 'Of the Orator.' The last-mentioned work is comprehended in three books, and is in the form of a dialogue. The chief speakers are L. Crassus and M. Antonius; and into the mouth of the former Cicero puts his own opinions. The first book is general, relating to the difficulties of the art of oratory, and the branches of study with which the accomplished orator ought to be conversant. According to Crassus the qualifications of the orator must be of the highest order. The object of his art is to give to speaking the greatest power of which it is susceptible, and he ought to make himself familiar with all departments of learning. √ Eloquence does not consist in the observance of artificial rules; such rules are rather deduced from an examination of the qualities of eloquence. The practice of reading, of delivery, and the improvement of the memory, should be diligently attended to by the orator, and above all, he must possess an intimate acquaintance with matters of law. These and other similar positions are controverted by Antonius, who maintains that an extensive and minute knowledge of law is not indispensable, and that he is an orator who can speak on civil and common affairs readily and persuasively.

The second book treats of invention, of disposition, and memory. The first is considered in a threefold point of view, according as it is the design of the speaker to instruct, to persuade, or to delight. Under disposition the various parts of an oration are discussed, viz. the exordium, narration, division, confirmation, refutation, and conclusion. The three kinds of orations, the deliberative, the judicial, and the demonstrative, are also considered, and the book concludes with observations concerning an artificial memory.

In the third book the subject of elocution is taken up: the characters of words, the structure and embellishments of sentences, and other circumstances connected with language and style, are commented on at considerable length. A discussion on action terminates the whole work.

Quintilian, who was himself a rhetorician of high reputation, wrote after Cicero. He had consequently the advantage of the writings of the latter, and his 'Institutions o

Oratory,' in twelve books, are generally regarded as the most complete work on the subject. Certain orations or declamations ascribed to him are still in existence; but as they little accord with his own rules, their genuineness is not universally admitted. [QUINTILIAN.]

It may be observed that the reign of eloquence in Greece was of much longer duration than in Rome. Among the Greeks it took its rise with republican institutions, and continued to flourish down to the time of Alexander the Great, a period of 150 years; in the latter, it began and ended with the age of Cicero. The difference has been ascribed to the more free and popular forms of government that obtained in many Grecian states, and this idea seems to receive countenance from the fact that eloquence and the liberties of Greece were coeval: the one ceased when the other was destroyed. The age of rhetoricians succeeded among the Greeks to that of the orators; and though oratory such as that of Demosthenes and Æschines was no longer permitted by circumstances, yet the teachers of rhetoric among the Greeks cultivated the art as a discipline and also employed it as a kind of theatrical exhibition. Among this class of orators we may enumerate Aristides and others. [ARISTIDES.]

It was the Archbishop of Cambray's opinion that the proper method of forming a system of oratory is to collect it from the best precepts of Aristotle, Cicero, Quintilian, and Longinus. The opinion has been repeated and acted upon by Ward, in one of the few systems which this country has produced.

The elements of oratory are usually comprehended under the four following divisions: *invention*, *disposition*, *expression* or *language*, and *delivery*. The first has respect to the character of the thoughts, the second to the manner of their arrangement, and the third and fourth to words, sentences, style, utterance, &c.

Besides the common observations that may be made on any subject, there are peculiar ideas appropriate to the exposition and illustration of each peculiar subject, and among these some which are more appropriate for this purpose than others. These it is the business of the orator to discover, and the discovery of them is termed *invention*.

Where argument is requisite, those arguments which are most powerful ought to be adduced; where objections are apprehended, they must be refuted; and where declamation is resorted to, the incentives best adapted to excite the passions and engage them in behalf of the cause which the speaker advocates must be brought forward. The Greek rhetoricians specified under invention a great variety of particulars intended to assist the orator, whatever might be the matter on which he was required to employ his eloquence: these they called *topics* (*τοπικά*, the *loci* of Cicero, *Topic.*, c. 2), and divided them into internal topics, or commonplaces, and external topics, or testimonies. Internal topics are such as arise out of the subject itself. As given by Cicero and Quintilian, they amount to sixteen in number. These are—definition, enumeration, notation, genus, species, antecedents, consequents, adjuncts, conjugates, cause, effect, contraries, opposites, similitude, dissimilitude, comparison. The first three comprehend the whole thing to which they have reference: definition explains the nature of a thing; enumeration takes in all its parts; and notation gives the signification of words. Of the remaining thirteen, some contain part of the thing spoken of, and the others its various properties, circumstances, &c. Genus comprehends several species of things of different kinds. Species, all individuals of the same kind. Antecedents are such things as, being admitted, imply the necessary or probable existence of others. Adjuncts are adventitious qualities of things and circumstances not necessarily connected with them. Conjugates are words having the same origin with one another, as *wise*, *wisely*, *wisdom*. A cause is that by which anything exists; and an effect, that which proceeds from a cause. Contraries are things which, included in one genus, are the farthest removed from each other, so that what is affirmed of the one is denied of the other. Opposites are things which, though repugnant, are not directly contrary. Similitude and dissimilitude are the agreement or disagreement of things in quality. Comparison traces contrarieties or resemblances in other particulars, as when a thing is compared with its greater or its equal or its less.

External topics, or testimonies, are such as do not arise from the subject itself, but are furnished from without: they are either divine or human. The first, where clearly ascertained, are sufficient of themselves to determine any question; the last are reduced to three, writings, witnesses, and contracts.

The antient rhetoricians paid great attention to what were termed the states of a controversy, or the principal points in dispute. These are all comprehended by Cicero in the inquiries, whether a thing is, what it is, and how it is.

In addition to the general sources of argument furnished by the topics, others more particular were specified, suited respectively to demonstrative, deliberative, and judicial discourses.

When the materials of which an oration is to consist have been procured, it next remains to arrange them in a proper form. The thoughts may be excellent in themselves and in relation to their object, yet if they be produced in a confused and disorderly shape, their application perhaps will not be readily apparent, and certainly they will be deprived of much of their force. Hence the second element of oratory, *disposition*, which concerns the right distribution of the ideas. It is necessary that they should succeed each other, if not by a natural connection, at least by an easy sequence, and that the orator should proceed from what is of less to what is of greater importance. Everything inconsequential ought to be avoided, and care must be taken lest the introduction of what is of little moment to the attainment of the purpose in view should obliterate or obscure the recollection of graver and more important considerations previously advanced.

Rhetoricians differ in their statement of the several parts of which an oration consists. In Cicero's work concerning the orator they are mentioned as five—the exordium, narration, division, confirmation, refutation, and conclusion: to these may be added, if necessary, digression, transition, amplification. It is not of consequence however that these divisions should in every case be minutely observed. The orator may on certain occasions, to be determined by his own judgment, break forth without prefatory remark in the middle of his subject. Cicero's often cited oration against Catiline may be mentioned as an instance of this, in which he commences at once with an energy and vehemence that would, under other circumstances, have been reserved for a more advanced stage of his harangue.

Another object to be attended to by the orator is the language and style of his oration. This falls under the head of *expression*. This department of oratory comprehends elegance, composition, dignity.

Elegance consists in perspicuity and purity. Low, obsolete, and foreign terms are to be avoided, as having a disagreeable effect upon the hearer, and being in so far opposed to the object for which oratory is employed. Clearness, on the contrary, must be constantly aimed at, inasmuch as without it the speaker will only be partially understood, and consequently cannot hope to produce the full effect to which he may aspire

Composition supplies rules for the formation of sentences with the various members, words, and syllables of which they are made up. It is divided into period, order, juncture, and number. The first treats of the structure of sentences; the second, of parts of sentences, namely, words and members; and the last two, of parts of words, or syllables and letters.

Dignity consists in the proper use of tropes and figures.

Style is distinguished into the plain or familiar, the middle or elegant, and the sublime. The characteristics of each are sufficiently indicated in the terms by which they are designated. All of them may with propriety find a place in the same oration; none of them can perhaps be long employed effectually without being relieved by an interchange with the others. The familiar, however entertaining for awhile, is apt to appear vapid at last; the elegant becomes insipid; and the sublime calls for an effort on the part of the listener that can only be sustained for a short time. In lengthened harangues therefore variety is requisite, if the attention and interest of the hearers are to be secured. In the choice of his style the orator must be chiefly determined by the nature of the subject and the character of the audience. On a common and familiar subject, to use lofty and figurative language would be ridiculous, as to use mean and insignificant expressions on a subject in itself noble and elevated would be offensive. In like manner, to address in the same strain a plain and unlettered audience, and a learned and dignified assembly would be impertinent and absurd.

Delivery includes everything connected with the utterance of speech, the modulation of the voice, gesture, &c.

The division of oratory by the antient rhetoricians into the demonstrative or laudatory, the deliberative, and the judicial, has been adverted to. The classification is judicious, and comprehends the several kinds of public speaking still in use. These may be conveniently arranged in the following order: the oratory of the Senate, of the Bar, of the Pulpit, and of the Mob. The oratory of the Stage occupies a place by itself: it is not contemplated in any of the remarks that have yet been made, and requires separate consideration.

The oratory of the senate, or popular oratory, as it is sometimes termed, has respect generally to the welfare and honour of states, which involve an immense number of topics differing in nature and importance. Accordingly this branch of oratory admits of a corresponding variety of style and character. It may be deliberative, or controversial, or declamatory, according to the subject about which it is occupied, or the end to be accomplished. There is perhaps no department of rhetorical excellence which it does not include, and nowhere therefore will the orator find a wider field for the exercise of his powers. It is supposed that in this case he addresses a well-instructed audience; and this circumstance must be allowed to have its due influence in the construction of his oration. He ought, it has been said, to unite the dignity of the statesman with the propriety of the scholar. It may be questioned whether, in this country at least, Demosthenes's thrice-inculcated quality of action is deemed a very essential element of good oratory. It is for the most part but sparingly resorted to, and its employment to the extent that would seem to be implied in the earnestness with which it was enjoined by the Grecian orator, would be considered a better qualification for the orator of the mob than the orator of the senate.

The oratory of the bar is the same as the judicial oratory of the antients. It supposes two parties, plaintiff and defendant. The matters about which it is conversant are the rights of property and the lives and characters of individuals. The object of the orator is to secure success to the party whose interests he advocates, by proving, to the satisfaction of those by whom the cause is to be decided, the justice of his claims or the innocence of his conduct. His oration therefore must be in a great measure strictly argumentative, and constructed with the design of producing conviction. The nature of such an oration may be illustrated by reference to the arguments laid down by the antient rhetoricians as appropriate to judicial discourses in criminal cases. First, there occurs the conjectural state of the question, in which it is inquired whether the party accused would, could, or did do what is laid to his charge; and next the definitive, where the proper name to be assigned to the fact is discussed; further, admitting the truth of the accusation, the criminality of the action may be disputed; and lastly, even granting this, the accused may be defended, and the offence palliated, by pleading the absence of wilful design or bad intention. The province of the oratory of the bar is manifestly more circumscribed than that of the senate. The forensic eloquence of the Greeks and Romans, and particularly the former, differed considerably from what such eloquence must now be, and bore a closer resemblance to the senatorial. Among the Athenians at least the orator was not so much fettered by the provisions of a complex and intricate system of law, or by the existence of innumerable precedents. Besides, the judges in criminal causes were always far more numerous, so that the orator, instead of addressing himself to a few persons, in reality spoke to a small assembly. Even yet however, in all cases which involve great principles, or which possess intrinsic elements of interest, as well as in reply, the forensic orator has full opportunity for the display of the highest rhetorical ingenuity and skill. It may also be observed, that as all courts of justice are open to the public in this country, and as important cases always attract a large audience, the speaker though in form only addressing a few persons, and sometimes even a single person, with whom the decision rests, is nevertheless actually addressing a large body. This was also the case at Rome, where the judices were frequently few in number, but the bystanders were many.

Some of the public orations of Demosthenes and Cicero are noble specimens of antient eloquence, senatorial and forensic. The eloquence of antiquity indeed generally occupies a more elevated place than that which can be claimed for modern eloquence. The one is the result of profound and incessant study; the other too frequently the result of hasty and extemporaneous effort.

The influence which the great orators of Greece and Rome were enabled to exercise, in the popular assemblies, in the senate, and in judicial cases, gave to oratory a high degree of importance as a branch of liberal education; and accordingly those who aspired to political distinction, either at Athens or Rome, qualified themselves to appear as public speakers by the most assiduous industry, and by following the instruction of the best masters of their art. The painful labour by which Demosthenes overcame the impediments which nature seemed to have put in the way of his becoming an orator, and the unwearied diligence of Cicero (*Brutus*, c. 90, &c.), are well known. But in modern times little or no attention has been bestowed on oratory as a separate branch of study, and eloquence has come to be more admired as one of the rare gifts of nature than sought after as one of the fruits of art. This seems the principal reason why the orations transmitted to us from antiquity have been so rarely approached, and still more rarely equalled, even by the most distinguished modern speakers, and even in those states whose constitutional forms permit and invite the exercise of oratorical power.

The diffusion of opinions and arguments by means of the press has perhaps contributed in some degree to the present neglect of oratory; for a speaker is mainly known to the public through the press, and it is often more important to him to be *read* than to be *heard*.

Still the power of oratory, in all modern constitutions into which the democratic element enters, is considerable enough to induce any person who has the requisite gifts of nature to cultivate oratory as an art; and it is rather singular that those who aspire to political distinction in states which have such constitutions, do not prepare themselves for their career by a special study. One reason may be that rhetoric, along with many other antient studies, has been banished from our course of instruction, so that even he who has the desire cannot find the opportunity of perfecting himself under a master. He therefore attains such excellence as he may, solely by practice in those places which under another system he would not have approached without due preparation. The great Roman orator, though disciplined for his profession by assiduous study, left Rome after he had been practising for two years at the bar, and had already begun to be known, for the purpose of improving himself under the best Grecian masters.

Pulpit oratory was unknown to the antients, being the growth of later times. It has for its chief aim to impress men with their duty as moral and religious beings; to deter from vice and excite to the pursuit of virtue; to encourage, to elevate, and to awe, by the prospects of immortality. As the topics with which it is conversant are of transcendant importance, and ought to be profoundly interesting to all classes of mankind, we can scarcely conceive how oratory could find a more favourable sphere. It admits of nearly every diversity of oratorical excellence; but the chief qualities which ought to be exhibited by the preacher are sincerity, solemnity, and fervour, combined with moral dignity. That so few should have excelled in this department of eloquence must be matter of wonder, as well as of regret. No subjects are so easily susceptible of being made impressive as those which it is the duty of the preacher to proclaim; and every means ought to be employed by which the truths of revelation may be made to penetrate more deeply into the heart of man.

Mob oratory is principally directed to the producing of excitement. Being intended to influence minds which are little cultivated or refined, it requires the plainest and least ornamental style. Here the maxim of Demosthenes formerly alluded to might, as has been hinted, be admitted in all its force. The utmost familiarity of thought and allusion is admissible; and it must be the care of the speaker to give utterance to his thoughts in brief sentences. He must place himself on a level with those whom he addresses; nor can he expect to gain them over to his own purposes without seeming to partake of their prejudices.

The oratory of the stage differs from every other kind of oratory. Its characteristic peculiarity is imitation. Its design is to represent human nature, as embodied in particular individuals and modified by particular circumstances. In order to excellence in this art, an extensive acquaintance with the general principles of human nature is requisite.

and also an accurate knowledge of their workings and developments in individual character. Success must be measured by the closeness of the resemblance. We now proceed to speak more particularly of that part of oratory which relates to *delivery* or, as we shall here term it, *Elocution*.

Elocution is that pronunciation which is given to words when they are arranged into sentences and form discourse. It includes the tones of voice, the utterance, and enunciation of the speaker, with the proper accompaniments of countenance and gesture. The art of elocution therefore may be defined to be that system of rules which teaches us to pronounce written or extemporaneous composition with justness, energy, variety, and ease; and agreeably to this definition, good reading or speaking may be considered as that species of delivery which not only expresses the sense of the words so as to be barely understood, but at the same time gives them all the force, beauty, and variety of which they are susceptible

The Greeks and Romans paid great attention to the study of elocution, and there can be no doubt that their most celebrated orators attained to a high degree of excellence in this branch of their art; but they have left nothing on record which shows that they had made a minute analysis of the speaking voice. They did indeed distinguish its different qualities by such terms as hard, smooth, sharp, clear, hoarse, full, slender, flowing, flexible, shrill, and rigid. They were sensible to the alternations of heavy and light in syllabic utterance: they knew the time of the voice, and regarded its quantities in pronunciation: they gave to loud and soft appropriate places in speech: they perceived the existence of pitch, or variation of high and low; and noted further that the rise and fall in the pronunciation of individual syllables are made by a *concrete* or continuous slide of the voice, as distinguished from the *discrete* notes produced on musical instruments. They designated the pitch of vocal sounds by the term *accent*, making three kinds of accents, the acute, the grave, and the circumflex, which signified severally the rise, the fall, and the turn of the voice, or union of acute and grave on the same syllable. But beyond this they did not go, and it was left to modern inquirers to give that clear and full description of the elements of speech, on which alone any definite instruction can be founded. For the advance which has been made in elocutionary science in modern times we are indebted to the useful labours of Steele, Odell, Walker, Thelwall, Chapman, Smart, and Rush, especially to the last, who has done much to perfect what was begun by others, and whose 'Philosophy of the Human Voice'[*] contains a more minute and satisfactory analysis of the subject than is to be found in any other work. From his book chiefly we shall borrow the substance of this article.

When the letter *a*, as heard in the word *day*, is pronounced simply as an alphabetic element, without intenseness or emotion, and as if it were a continuation and not a close of utterance, two sounds are heard continuously successive: the first has the nominal sound of this letter, and issues from the organs with a certain degree of fulness; the last is the element *e*, as heard in *eve*, which gradually diminishes until its close. During the pronunciation, the voice rises, by the concrete or continuous movement, through the interval of a tone, the beginning of the *a* and the termination of the *e* being severally the inferior and superior extremes of that tone. This sound commences full and somewhat abruptly, and gradually decreases in its upward movement, till it finally dies away in the upper extreme of the tone, having the increments of time and rise, and the decrement of fulness, equally progressive. The first portion therefore, or base of this sound, is called the *radical movement*, and the second portion the *vanishing movement*. This sound is called a concrete, or slide, to distinguish it from musical sounds, which (in their *pure* character) continue for a given space of time on a certain point of the scale, and then leap, as it were (*discretely*), to another point either higher or lower. These slides may extend through the space of a tone, or they may be carried up to any point on the scale to which the voice can attain, those intervals which are the most distinctly recognisable by the ear and the most easy of execution being the tone (or second), the third, the fifth, and the octave. The direction also which they take may be either upwards or downwards, the full opening radical however always occupying the first place, and the vanish the second. It also frequently happens that there is a union of the upward and downward, or of the downward and upward movement, on the same syllable: these are called *waves* or *circumflexes;* they may rise and fall through the extent of a tone, or of a third, or of any wider interval of the scale; they are then called *direct* waves: or they may fall and rise through the same extent of pitch, being then called *indirect* waves; they may be *equal*, having their constituent rise and fall through the same extent of pitch; or they may be *unequal*, having either the ascent or the descent longer than the other part.

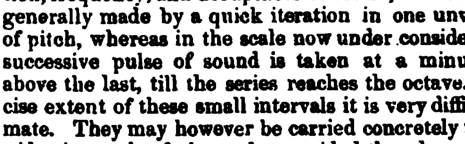
The succession of the seven sounds of any one series, to which the octave is usually added, is called the Natural or Diatonic Scale. In speech, as in music, it consists of five tones and two semitones, the latter being the spaces between its third and fourth and its seventh and eighth degrees. But a progression may also be formed by semitones; these have only half the extent of pitch which the full tones have: like them, they may be carried upwards or downwards, and they often occur in the form of waves. They serve for the expression of animal distress.

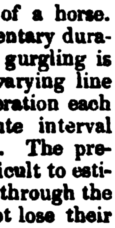
But the succession of discrete sounds may be exhibited under still more minute divisions. These consist of a transition from place to place in pitch, over intervals much smaller than a semitone, each point being, as it were, rapidly touched by a short and abrupt emission of voice. This description may be illustrated by that noise in the throat which is called *gurgling*, and by the neighing of a horse. The analogy here regards principally the momentary duration, frequency, and abruptness of sound, for the gurgling is generally made by a quick iteration in one unvarying line of pitch, whereas in the scale now under consideration each successive pulse of sound is taken at a minute interval above the last, till the series reaches the octave. The precise extent of these small intervals it is very difficult to estimate. They may however be carried concretely through the wider intervals of the scale, provided they do not lose their distinctive character of momentary time and abruptness of utterance. These concretes are used both in laughter and in crying. In the descending scale, the direction not only of the radicals but of the vanishes is downwards. *Intonation* is the act of performing the movements of pitch through the several scales.

There are then *four* scales of pitch for the speaking voice:—

1. The *Concrete*, in which from the outset to the termination of the voice there is no appreciable interval, or interruption of continuity.
2. The *Diatonic*, the transitions of which are principally by whole tones.
3. The *Semitonic*, or *Chromatic*, consisting of an entire succession of semitones.
4. The *Tremulous*, consisting of minute intervals smaller than the semitone.

Concrete Scale.





The *alphabet* is, in our grammars, usually divided into vowels, consonants, mutes, and semivowels; but it will be more useful to class the elements according to their use in intonation. As the number of these elementary sounds in the English language exceeds the literal signs, and some of the letters are made to represent various sounds without any rule of discrimination, it is necessary to use short words of known pronunciation, containing the elementary sounds, with the letters which represent them marked in italics. The elements of articulation are thirty-five, and they may be arranged under three general heads.

I. The first division embraces those sounds which display the properties of the radical and vanish in the most perfect manner. They are twelve in number, and are heard in the usual sound of the separated italics in the following words:—*a*-ll, *a*-rt, *a*-n, *a*-le, *o*-ur, *i*-sle, *o*-ld, *ee*-l, *ou*-ze, *e*-rr,[*] *e*-nd, *i*-n.[†] From their forming the purest and most plastic material of intonation, these are called *Tonic* sounds. They have a more musical quality than the other elements; they are capable of indefinite prolongation; admit of the concrete and tremulous rise and fall through all the intervals of pitch, and may be uttered more forcibly than the other elementary sounds, as well as with more abruptness.

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[*] Second edition, 8vo., Philadelphia, 1833. A copy of this will be found in the library of the British Museum, where the student may also consult Mr. Steele's 'Essay towards Establishing the Melody and Measure of Speech, to be expressed and perpetuated by peculiar symbols,' London, 1775. The second edition was published in 1779, with the title of 'Prosodia Rationalis.' Mr. Odell's work is entitled 'An Essay on the Elements, Accents, and Prosody of the English Language,' 12mo., London, 1806.

II. The next division includes a number of sounds possessing variously among themselves properties analogous to those of the tonics, but differing in degree. They amount to fourteen, and are marked by the separated italics in the following words:—*B*-ow, *d*-are, *g*-ive, *v*-ile, *z*-one, *y*-e, *w*-o, *th*-en, a-*z*-ure, si-*ng*, *l*-ove, *m*-ay, *n*-ot, *r*-oe.

From their inferiority to the tonics in all the emphatic and elegant purposes of speech, whilst they admit in some measure of being intonated, or carried concretely through the intervals of pitch, they are called *subtonic* sounds.

III. The remaining nine elements are aspirations, and have not that sort of sound which is called vocality. They are produced by a current of the whispering breath through certain positions of the enunciative organs. They are heard in the words—U-*p*, ou-*t*, ar-*k*, i-*f*, ye-*s*, *h*-e, *wh*-eat, *th*-in, pu-*sh*.

As they admit of little or no pitch, and supply no part of the concrete when breathed among the constituents of syllables, they are termed the *Atonic* sounds.

The name of *Abrupt* sounds is also given to three of the subtonics and three of the atonics, namely *b, d, g, p, t, k*, since they confer an *explosive* character on the following tonic, the breath bursting out after a complete occlusion.[‡]

In conformity to the above division of the letters, and with especial reference to the time which is occupied in pronunciation, syllables are divided into three classes—1st, *Immutable*, such as *at, ap, ek, hap*-less, *pit*-fall, ac-*cep*-tance; 2nd, *Mutable*, as *yet, what, grat*-itude, des-*truc*-tion; 3rd, *Indefinite*, as *go, thee, for, day, man, till*, de-*lay*, be-*guile*, ex-*treme*, er-*ro*-neous. It is the peculiar nature of this last class of syllables, that to whatever necessary degree their quantity is prolonged, their character is still preserved, while the mutable and the immutable in some cases almost lose their identity by too great an addition to their time. The use of these distinctions will appear in the sequel.

Thus much having been premised, it will be the more easy to understand the general divisions of vocal sound. All the varieties of sound in the human voice may be referred to the following general heads:—

Quality, Force, Time, and *Pitch*.[§]

I. The terms by which the *Quality* or kind of voice is distinguished are rough, smooth, harsh, full, thin, slender, soft, musical, and some others of the same metaphorical structure.

There are three different sorts of voice, the *natural*, the *falsette*, and the *orotund*, to which must be added the *whisper*, which, strictly speaking, is not *voice*. The *natural* is that which we employ in ordinary speaking. It includes a range of pitch from the lowest utterable sound up to that point at which the voice is said to break. At this point the natural voice ceases, and the higher parts of the scale are made by a shriller kind, called the *falsette*, of which the cry, the scream, the yell, and all shrillness are various modes. The name of *orotund* (from *os rotundum*) is given to that natural or improved manner of uttering the elements, which exhibits them with a fulness, clearness, strength, smoothness, and a ringing or musical quality rarely heard in ordinary speech, and which is never found in its highest excellence except as the effect of long and careful cultivation. This voice is highly agreeable to the ear; it is possessed by actors of eminence, and is peculiarly adapted to set forth the beauties of epic and tragic composition. The *whisper* is the constituent of the atonic elements; but all the tonics, and the greater part of the subtonics, may likewise be uttered in this mode of sound. The subtonics *v, z, w, th*-en, *zh*, when whispered, are not respectively different from the atonics *f, s, wh, th*-in, *sh*.

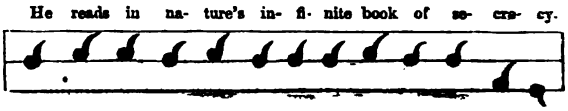
II. For the specifications of *Force* we use the words strong, weak, feeble, loud, soft, forcible, and faint. These are indefinite in their indication, and without any fixed relationship in degree.

III. *Time*, in the art of speaking, is divided into long, short, quick, slow, and rapid. These distinctions may suffice for the common purposes of discourse; if more precision is required, a notation will be found in Mr. Steele's *Prosodia Rationalis*. The distinction of immutable, mutable, and indefinite syllables has reference to time, and has been already treated of.

IV. The meaning of the term *Pitch*, as applied to speech, has been already explained.

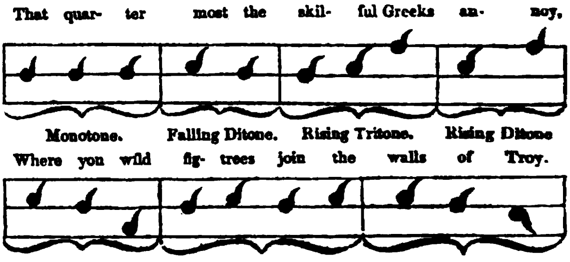
We come now to the application of these elements and distinctions to the practical purposes of reading and speech.

In plain narrative or description, the concrete utterance of each syllable is made through the interval of a tone, and the successive concretes have a slight difference of pitch relatively to each other. The appropriation of these concretes to syllables, and the manner in which the succession of their pitch is varied, are exemplified in the following notation·—



If these lines and the enclosed spaces be supposed, each in proximate order, to denote the difference of a tone in pitch, the successions of the radical points, with their issuing vanish, will show the places of the syllables of the superscribed sentence in easy and unimpassioned utterance, though it is not denied that a somewhat different arrangement might also be agreeable. The perception of the successions here exemplified is called (in a restricted meaning of the term) the melody of speech.

In simple phraseology, which conveys but little feeling or emphatic sentiment, most of the syllables, except one or two of the last in the sentence, consist of the upward radical and vanishing tone. The succession of these concrete tones is made with a variation of pitch, in which any two proximate concretes never differ from each other more than the interval of a tone, nor do there occur more than three successive tones in one direction either upwards or downwards. This is called the *diatonic melody*. The rise of each separate syllable is called the *concrete pitch* of melody, and the place which each syllable assumes above or below the preceding, the *radical pitch*. The *current* melody of sentences in plain discourse admits of considerable variety, but the forms of radical pitch are all reducible to a limited number of aggregates of the concrete tones, which may be called the *phrases of melody*. Their forms are pointed out in the notation of the following lines:—



The *melody of the cadence*, as distinguished from the current melody, is formed on the two or three last syllables of a sentence, and is effected by a descent of radical pitch through three conjoint degrees, with a downward concrete always on the last, and frequently on the preceding. One form of the cadence has been illustrated in the sentence, the notation of which has been given above; but there are various forms according to the component parts and the sense.

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[*] The writer of this article has personal opportunity of knowing that by this word Dr. Rush meant to designate that sound which Mr. Cull represents by *her*.

[†] If *oi* or *oy*, as in *voice* and *boy*, be added as perhaps they ought, the number of the tonics will be thirteen.

[‡] It is difficult to decide on the analysis of the elementary sounds represented by the alphabet. That of Dr. Rush is given in the text. The following has been furnished to the writer of this article by Mr. Cull, and, although not free from objections, is more complete.

I. Vowels, as heard in the following syllables:—*all, arm, an, ale, end, eel, her, isle, in, old, ooze, on, us, cube, pull, our, oil*.

II. Consonants. 1. *Voice Consonants*:—*be, do, go, lo, me, no, roe, vat, we, ye, zone, sing, azure, then, jew*. 2. *Voiceless Consonants*:—*up, at, ark, if, hope, quit, sin, chin, shin, thin, when*. In all forty-three elements.

[§] To these Dr. Rush adds a fifth, namely, *Abruptness*; but this appears to be resolvable into force and time.

Plain declarative sentences generally take one form or other of the cadence, in order to mark the satisfactory close of the period; and downward concretes are also frequently introduced into what are called loose sentences, to denote that the sense is complete, and that the succeeding clause does not modify that which precedes it. Where, on the contrary, the sense is suspended, as it most commonly is in the middle of a sentence, the concretes must have an upward direction.

For conveying the peculiarities of sentiment or feeling, or, in other words, for the *expression of speech*, a much more varied apparatus is necessary. This expression is effected by quality, time, pause, melody, pitch, the waves, the semitones, the tremor, force, and rhythm, all which are only so many forms of the four general divisions of vocal sound above specified.

I. Most of the elements which range under the general head of *Quality* have already been enumerated. It must however be remarked that they are susceptible of combination with the various modes and degrees of force, time, and pitch. In short, quality of voice must necessarily be united with some of the degrees of the other genera; for, whatever be the kind, it will be either strong or weak; its time must be long or short; and it must be of some definite radical or concrete pitch. Certain qualities of the voice are however exclusively congenial with particular conditions of these other accidents; thus smoothness will more generally affect the moderate degrees of force.

II. *Time.*—The degrees of duration of the voice represented by the terms long, short, and the rate by quick and slow, are among the most effective means of expression; rage, mirth, raillery, and impatience affecting a quick time; and slowness of time being the symbol of sorrow, grief, respect, veneration, dignity, apathy, contrition, and all other sentiments which embrace the idea of deliberation. A slow time of discourse, if not made by long quantities on single syllables, would be offensive from its pauses; these two forms of time therefore necessarily involve each other. Slowness of time and long quantity are generally joined with the element of the wave, since the return, or contrary flexure of intervals, is one of the means for producing an extension of time without destroying the equable concrete of speech, or, in other words, without passing into song. The wave of a tone will be perceived in the dignified and appropriate utterance of the syllables marked in italics in the following lines:—

'*Pardon* me, thou *bleeding* piece of earth,
That I am meek and gentle with these butchers.'

'*Hail*, *holy* light, offspring of heaven, first-*born*,
Or of the *eternal*, *co*-eternal beam,
May I express thee, *unblamed?*'

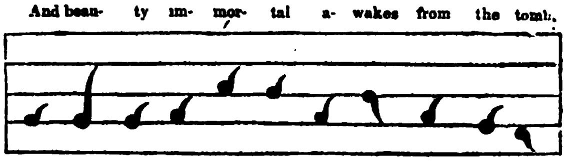
III. The use of *Pause* for the more conspicuous display of sense and sentiment, by separating certain words or aggregates of words from each other, is of great consequence in elocution, but cannot be gone into at length in this article. To these pauses the grammatical points are by no means a sufficient guide. [PUNCTUATION.]

IV. A comprehensive account of *Melody* would properly represent it as produced by a variation in the time, pauses, force, and pitch of the voice, since the well-appointed uses and dispositions of these accidents make up the agreeable impression of speech; but we use it here as relating solely to the successions of radical pitch. Under this head it may be remarked that a predominance of the *monotone* is suited to feelings of dignity, grief, tenderness, solemnity, and serious admonition; that the *alternate phrase* well describes the earnest excitement necessarily produced by the rapid succession of incident; and that a *progression* gradually rising and falling through *the whole compass of the voice* corresponds with a wide variation of force in the sentiment. For illustrations of these modes see Dr. Rush's *Philosophy of the Voice*, pp. 112, 144.

V. *Pitch.*—Discrete pitch is illustrated by the word *must* in the following passage. As it is a syllable which does not admit of prolongation, it is raised discretely a third above the preceding:—

'If I *must* contend, said he,
Best with the best, the sender, not the sent.

We have an example of a *concrete* rising *fifth* on *beau-*, and of a *discrete third* on *mor-*, in the following:—



If we suppose that the following words are spoken *interrogatively*, and that they express surprise, the concrete rising fifth must be given to the emphatic syllables:

Give Brutus a statue with his ancestors?

If, on the other hand, the line be read as a *command*, the direction of the concretes will be downwards.

On the word *know*, in the following clause, not only does the voice descend concretely a third or a fifth, but the descent begins discretely a third above the preceding word:—

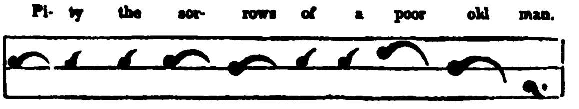
We know what we worship, for salvation is of the Jews.

As the diatonic melody is suited to plain narration and description, so will the emphasis be the more strongly marked in proportion to the wider extent of the intervals, whether of concrete or of discrete pitch, which are employed. It may also be remarked in general, that the upward concretes denote interrogation, doubt, or what is concessive, conditional, hypothetical; the downward concretes denote what is strong, certain, authoritative, as also wonder, admiration, surprise, and exclamation, when not conjoined with an interrogative meaning.

VI. *The Wave* is a very frequent element of expression, and performs high functions in speech. In its minor forms it is used to give length and emphasis to syllables and dignity to utterance; in its wider intervals it is admirably expressive of irony and derision. Thus the irony of the following passage can be brought out only by the indirect wave of a fifth in both places in which it occurs:—

But it is foolish in us to compare Drusus Africanus and ourselves with Clodius: all our other calamities were tolerable, but no one can patiently bear the death of Clodius.

VII. *The Semitones.*—These are used for the expression of complaint, pity, grief, plaintive supplication, and other sentiments congenial with these. The intonation by the concrete semitone is universally the symbol of nature for animal distress. It affects generally a slow time and long quantity in utterance, and is therefore most commonly heard in the form of the wave. The interjective exclamations of pain, grief, love, and compassion, are prolongations of the tonic elements on this interval; but it may be executed on the short time of immutable syllables, such as *cup*. The appropriate utterance of the following line will exhibit the wave of the semitone on the most important syllables, *poor* and *old* being distinguished by direct unequal waves of the same interval. It must be taken as an isolated line, and not in conjunction with the verse of which it forms part:—



VIII. *The Tremor.*—When the tremulous function is made through the second, third, fifth, or octave, or through the wave of these intervals, it joins the sentiment of derision, mirth, joy, or exultation, to that of interrogation, surprise, command, or scorn, conveyed by the smooth concrete of those intervals. In short, it is the introduction into speech of what is transferable in the function of laughter, and it adds thereto all the meaning and force of its satisfaction. Thus

'Thou art the ruins of the noblest man,
That ever lived in the tide of times.'

There is a sentiment of exultation and a superlativeness of compliment in this eulogy, which cannot be properly expressed by the smooth movement of the concrete; but if the first syllable of the emphatic word *noblest* be uttered with the tremulous intonation of the wave of the third or second, this will give the vocal consummation to the feeling which suggests the exceeding measure of the praise.

The *chuckle* is an example of a somewhat similar application.

When the tremor is formed of a single tonic, in the semitone or its waves, it constitutes the function of crying; and when employed in the syllabic intonation of the chromatic melody, it sets a more marked distinction on those emphatic words which express the sentiments of tenderness, grief, supplication, and other connatural states of feeling. This may be illustrated on the emphatic syllables of the line just quoted:—'Pity the sorrows,' &c.

IX. The application of the different degrees of *Force* to the purposes of expression is almost too obvious to require illustration. Thus the *distance* of a person spoken to is pictured by loudness, and *nearness* by abatement of force; *secrecy* muffles the voice against discovery, and *doubt* adopts the subterfuge of an undertone. *Certainty* and *anger* assume force and strength. All sentiments which are *unbecoming* or *disgraceful* smother the voice into softer degrees, in the desire to conceal even the voluntary utterance of them. *Joy* is loud, and so are *bodily pain, fear,* and *terror.*

Such are some of the uses of force when applied to phrases, or to one or more sentences, in order to distinguish them from adjacent phrases or sentences in discourse. There are other applications of it, to single words, to syllables, and to certain parts of the concrete movement, into which, though of some consequence, it is not within the purport of this article to enter. They will be found described in Dr. Rush's *Philosophy of the Voice.*

The common idea of *Emphasis*, it may be remarked, is that of mere force; but it is more correctly defined to be the expressive but occasional distinction of a syllable, and consequently of the whole word, by one or more of the specific modes of time, quality, force, and pitch. Most of these have been illustrated under the above heads.

X. *Rhythm* is one of the applications of force and quantity. It may be defined to be the metrical arrangement of speech. It is not mainly dependant on custom or on the genius of any language whatever, but arises from the very manner in which speech is produced, and is as involuntary as the throb or remission of the pulse, or the inhaling and respiration of the breath. In the formation of speech there is a regular action and reaction of the organs which produce it. To form a *heavy* syllable, or one which has accentual stress upon it, these organs are necessarily placed in a certain position; and from their very nature it is necessary that, before they form another heavy syllable, they should recover their first position; but the time which is occupied in this recovery of their position is not always lost to the purposes of speech, for it may be filled up with one or more syllables, which have no stress, and which are therefore very properly denominated *light;* if it is not filled up in this way it is a pause or rest. To illustrate this, let us take the words—

One, two, three, four, five.

These monysllables, if distinctly and deliberately pronounced, have two peculiarities; each has the organic stress or emphasis, and each has a pause after it. Let these pauses be filled up with the light syllable *and;* and then the two lines, viz.:—

One and two and three and four and five and

and

One, two, three, four, five,

will be of exactly the same length as to time in music, or rhythm in speech, the syllable *and* occupying no more time than what necessarily intervenes between the syllables under organic emphasis.

This alternate action and reaction of the organs of speech was called by the Greeks by the significant terms *Thesis* and *Arsis:* the former denoting the *setting down* of a syllable, as the setting down of the foot in walking; the latter denoting the *raising of it up*, like the lifting of the foot from the ground; the former producing the heavy syllables, the latter the light ones.

The weight of syllables, or in other words, the stress with which they are enunciated, must be carefully distinguished from their quantity, since the weight or stress with which the syllable is uttered does not always correspond to the relative time which the utterance requires. Thus in the word *pensive*, the syllable *pen* is the heavier, but it is not longer than the syllable *sive*. So also in the word *inward*, there is an equality of time in the two syllables, but not of weight. In *banish, banner, banter*, the first syllable is heavy but short; in *paper, taper, vapour*, it is both heavy and long; and the same observation applies to *misery, middle, mistress*, compared with *miser, minor, mitre.*

Those emphatical divisions into which, from the very nature of the organs, all speech naturally falls, are called by writers on this subject *cadences.** Every full *spoken* cadence consists of a heavy syllable, and of one or more light ones, but pauses may be substituted to make up the time which any of these syllables would occupy. Measure, or metre, therefore in speech naturally distributes itself into two kinds: common measure, which, according to Mr. Steele, is the allotment of two crotchets or their equivalents to each cadence; and triple measure, which is the allotment of three crotchets or their equivalents to each cadence; emphasis however will sometimes prolong the duration of a cadence beyond the allotted time, just as an *ad libitum* is allowed in solos in music. Without entering further into minute distinctions or exceptions, the following may serve as specimens of each kind. This mark § indicates a short pause, this ‖ a longer, and this ¶ a still longer one:—

Common Measure.

So § | spoke the | guardian | § of the | Trojan | state, |
‖ Then | rush'd im- | petuous § | through the | Scæan | gate; |
‖ Him | Paris | follow'd | § to the | dire a- | larms: |
Both § | breathing | slaughter, § | both re- | solv'd in | arms.' |
Pope's *Iliad*, b. vii.

Straight mine | eye § hath | caught new | pleasures, |
Whilst the | landscape | round § it | measures, |
Russet | lawns § and | fallows | grey, |
Where the | nibbling | flocks § do | stray; |
Mountains § | on whose | barren | breast
The | labouring | clouds § do | often | rest.' |

Triple Measure.

'‖§ At the | close of the | day § when the | hamlet is | still, §
And | mortals § the | sweets of for- | getfulness | prove; ‖ |
¶ When | nought but the | torrent § is | heard on the | hill, §
And | nought but the | nightingale's | song § in the | grove.' ‖ |

If this system of measuring verse were adopted, the prosody not only of our own but of the learned languages would be greatly simplified. The list of feet which is usually given at the beginning of the 'Gradus ad Parnassum,' would be reduced to four or five; we should hear of no such unnatural foot as an iamb or an anapæst, and the syllable at the beginning of an iambic line would either of itself form a cadence, or would be the close of a cadence, of which a pause or the last syllable of the preceding line would form the commencement. Those lines of Anacreon would then be reduced to the trochaic measure, thus:—

‖ Θελ- | ω λε- | γειν 'Α- | τρειδας, |
‖ Θελ- | ω δε | Καδμον | ᾀδειν, |
§ ἁ | βαρβι- | τος δε | χορδαις |
‖ ε- | ρωτα | μουνον | ηχει. |

From the above examples it is clear that there is a regular rhythmus in poetry; and it cannot be necessary to insist on this being strictly attended to, if we would read verse in an agreeable and expressive manner. Prose also has its rhythmus, for the alternate action and reaction of the organs of speech necessarily proceeds, whether what is spoken be prose or verse; and the only difference (so far as sound is concerned) between these two species of composition is, that verse consists of a regular succession of similar cadences, or of a limited variety of cadences, divided by grammatical pauses and emphasis into proportional clauses, so as to present sensible responses to the ear at regular proportioned distances; prose, on the other hand, is composed of all sorts of cadences, arranged without attention to obvious rule, and divided into clauses which have no obviously ascertained proportion, and present no responses to the ear at any legitimate or determined intervals.

There is nothing which contributes more to the rhythmical flow of prose than giving a light sound to monosyllables. If this be done, they then form the latter part of cadences, of which either pauses, or emphatical monosyllables, or the emphasized syllables of longer words form the beginning; but if they be pronounced heavy, it is then necessary that they should themselves form the beginning of new cadences, which is the occasion of many pauses being introduced, and of a heavy and halting character being communicated to the piece. Thus the clause 'Let not your | heart be | troubled,' | will be rhythmical if *your* be thus made a light syllable; but the effect will be very different if it be read thus:—'Let not | your § | heart be | troubled.' |

Of the advantage of cadences in triple measure we have a beautiful illustration in the first verse of the 136th Psalm:—

‖ 'O | give ‖ | thanks unto the | Lord; ‖ | § for he is | good, ‖ | ‖ for his | mercy en- | dureth for | ever.' ‖ |

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* More properly *rhythmical cadences*, to distinguish them from the cadences of *melody*. Mr. Cull would prefer the term *measures*.

On the other hand, a succession of heavy syllables, with a pause intervening, is one of the most expressive forms of emphasis both in prose and verse. Thus the following line from Milton would lose all its force, if read so as to form only the usual number of six cadences: emphasis prolongs it to eight, thus:—

‘Rocks, ‖ | caves, § | lakes, § | fens, ‖ | bogs, ‖ | dens and | shades of | death.’ ‖ |

Independently of its agreeable effect upon the ear, and its power as an element of expression, there can be no doubt that, as rhythm arises from the very manner in which speech is produced by the organs, he who speaks agreeably to its laws will speak easily to himself. The practice of reading or speaking aloud, with a due attention to the rhythmus, may even be recommended as a means of improving the health, since it brings into regular and natural action the muscles of the face, the throat, and the chest; and no attempt completely and permanently to remove impediments of speech can be successful, which is not based on the principle here developed.

(A succinct account of rhythm will be found in Wood's *Grammar of Elocution*, ch. iv. and v.; and the subject is treated much more at length in Steele's *Prosodia Rationalis*; in Thelwall's *Illustrations of English Rhythmus*; in Roe's *Principles of Rhythm*; and in Chapman's *Music, Melody, and Rhythmus of the English Language*, 8vo, Edinburgh, 1819; as well as in his *Rhythmical Grammar*, 12mo, 1821.)

Method of Training and Strengthening the Voice.—In order to read and speak well, it is necessary to have all the vocal elements under complete command, so that they may be duly applied whenever they are required for the vivid and elegant delineation of the sense and sentiment of discourse. The student therefore should first practise on the thirty-five alphabetic elements, in order to ensure a true and easy execution of their unmixed sounds. This will be of more use than pronouncing words in which they occur; for when pronounced singly, the elements will receive a concentration of the organic effort, which will give them a clearness of sound and a definite outline, if we may so speak, at their extremes, making a fine preparation for their distinct and forcible pronunciation in the compounds of speech. He should then take one or more of the tonic elements, and carry it through all the degrees of the diatonic and concrete scales, both in an upward and a downward direction, and through the principal forms of the wave. He should next take some one familiar sentence, and practise upon it with every variety of intonation of which it will admit. He should afterwards run through the phrases of melody, and the forms of the cadence; and lastly he should recite, with all the force that he can command, some passage which requires great exertion of the voice. If he would acquire power and volume of utterance, he must practise in the open air, with his face to the wind, his body perfectly erect, his chest expanded, his tongue retracted and depressed, and the cavity of his mouth as much as possible enlarged; and it is almost unnecessary to add that anything which improves the general tone of the health will proportionably affect the voice. If to this elementary practice the student add a careful and discriminating analysis of some of the best pieces which our language contains, both in prose and verse, and if he strenuously endeavour to apply to them all the scientific principles which he has learned, there can be no doubt that he will acquire a manner of delivery, which will do ample justice to any subject on which he may be called to exercise his vocal powers.

Intimately connected with the subject of delivery is that of *Action*. Oratorical action has been defined to be the just and elegant adaptation of every part of the body to the nature and import of the subject on which we are speaking. As every man who feels his subject will necessarily have some action, it is of consequence that it should be graceful and significant. The first point to be attained is to avoid awkward habits, such as resting the chief weight of the body first on one foot and then on the other, swinging to and fro, jerking forward the upper part of the body on every emphatic word, keeping the elbows pinioned to the sides, and sawing the air with one hand with one unvaried and ungraceful motion. As for the attainment of excellences, more specific rules must be sought for in professed treatises on the subject, but the following general directions will be found to embrace much that is useful: ‘Keep the trunk of the body erect; let your hands be at liberty; feel your subject, and the action will come; recollecting at the same time that the right hand is essentially the instrument of action, and that the left should be used only as subordinate to it.’

As gesture is used for the illustration and enforcement of language, so it should be limited in its application to such words and passages as admit of or require it. A judicious speaker will not only adapt the general style and manner of his action to the subject, the place, and the occasion, but even when he allows himself the greatest latitude, he will reserve his gesture, or at least the force and ornament of it, for those parts of his discourse for which he also reserves his boldest thoughts and his most brilliant expressions.

(On the subject of *action* very minute directions will be found in Austin's *Chironomia*, London, 4to., 1806; see also Chapman's *Music of the English Language*, p. 112; and Walker's *Elements of Elocution*.)

ORB, ORBIT. The word *orbis* signifies the circumference of a circle or of any round body; *orbs* among the antient astronomers meant the vast crystal spheres in which the heavenly bodies were supposed to be placed and with which they revolved; hence orb came to be used for a sphere, as when the sun is called the *orb of day*. The word orbit now means the relative path [Motion] in which a planet travels round the sun or a satellite round its primary.

We should perhaps rather say that by the orbit of a planet, technically speaking, is meant the approximate path, circular or elliptic, in which the planet may for a time be supposed to move without sensible error. Thus when for some particular purpose, as the explanation of the seasons, we say the earth moves round the sun in a circle, we make an orbit which is exact enough for that purpose; and when, to explain the equation of time, we are obliged to have recourse to a more exact supposition, that of an elliptic motion, we are still said to speak of an orbit of the earth. But if we were to speak of the closely-folded interlacing spiral in which the centre of the earth actually moves round the sun, usage (and nothing else) would require us, if we would be understood, not to call this the orbit of the earth, but its real path, or real orbit, or some such distinctive term; for it is generally understood that the word orbit applies at most to the ellipse, which for a time does not differ sensibly from the real path. Theoretically speaking, this ellipse only touches the real path in one point; and the ellipse which most exactly tends to coincidence with the real path, consistently with satisfying other desirable conditions, is called the instantaneous ellipse. [Gravitation, vol. xi., p. 364.]

The *elements* of the orbit are those quantities by which the position and magnitude of the (*pro tempore*) orbit are fixed, such as the major axis and eccentricity, which determine its magnitude; the longitude of the node and inclination of its plane to the ecliptic, which determine the position of that plane in space; and the longitude of the perihelion, which determines the direction of the major axis. One more determining quantity is tacitly supplied in the condition that one focus of the ellipse is always to be in the centre of the sun. The only remaining element is the periodic time of the planet, or its time of revolution round the sun; this however is not a separate element for each planet, but, all the other elements being given, is known for every planet when it is known for any one.

ORBITELLO. [Siena, Province of.]

ORBITOLITES. [Milleporidæ.]

ORCANNETTIN, the colouring matter of alkanet root (*orcanette, lithospermum tinctorium*). It was extracted from the root by Pelletier, in 1814. It is procured by treating it with æther, and evaporating the solution. This substance has a resinous appearance, is fusible at 140° Fahr., and is of so deep a colour as to appear black. Water dissolves a mere trace of it, but alcohol and æther become of a red colour by dissolving it, and liquefied fatty substances are also coloured by it. Acetic acid and the alkalis dissolve it, the latter forming blue solutions; acetate of lead precipitates it blue, chloride of tin crimson, and the salts of iron and of alumina of a violet colour.

ORCHARD. Apples, pears, and cherries are the fruits principally cultivated in orchards. The term orchard is likewise used to signify enclosures in which filberts or walnuts are grown: the word yard is commonly used for similar spaces appropriated to the production of figs and grapes.

Orchards of apples and pears are more numerous, because more productive, on the old and new red-sandstone formations than on any other strata; a very large proportion of all the cider and perry that is manufactured is grown upon these soils. The principal orchards of England are in Devonshire, Somersetshire, Gloucester, Herefordshire, and Worcestershire; on the continent, in Normandy and in the vale of Stuttgard; and in America, in the New England states.

For an orchard of apple-trees, a deep unctuous soil should be selected, in a situation sheltered from the north and north-west winds, and open to the south and south-east; and a bank is preferable to a low spot, for not only is the blossom more liable to be injured by spring frosts where fogs and damp prevail, but the trees themselves become mossy, and perish from excess of moisture. Dr. Lindley (*Guide to Orchard and Kitchen Garden*, p. 117) recommends an early and effectual preparation of the soil, and the early transplanting of the trees: 'They cannot be removed from the nursery too soon after the wood has become ripe and the leaves have fallen off; for between this time and the winter many of them will make fresh roots, and be prepared to push forth their young shoots with more vigour in the spring than those whose transplanting has been deferred till a late period of the season.' Young trees will require to be watered if a dry spring should succeed the autumn of their planting, and their roots should be occasionally dug round and manured. Pruning is advantageous to young trees when skilfully performed, for it is desirable that branches should not be crowded together, especially in the centre of the tree: we are of opinion that it is seldom beneficial to old trees, excepting for the removal of misletoe; and recommend that under no circumstances should a pruner be employed who amputates large limbs and leaves wounds which injure the alburnum or sap-wood by exposing it to the atmosphere, and produce canker in the stem or principal branches. It may frequently be useful in an exposed situation to plant two or three rows of pear-trees to shelter the apple-trees from the prevailing storms, as pear-trees are on the whole less liable to suffer from wind than their more brittle kindred. The trampling of heavy cattle is at all times injurious to orchards.

For pear-orchards a lighter soil is desirable than for apples; the same rules may be observed for their planting and preservation. Washes for the destruction of the eggs of insects, and the preservation of orchard-trees from barking by hares, rabbits, and sheep, may be seen in Lindley, ut sup. 509; Forsyth *On Fruit Trees*, p. 323; Loudon's *Arboretum*, vol. ii., 903, &c.; for further information see articles Apple, Cider, and Pear.

The principal cherry-orchards in England are in Buckinghamshire and Kent; from the latter county a large supply is sent to the London markets. In Alsace, Würtemberg, Berne, and Basle, 'kirschwasser,' an ordinary spirit, is distilled from cherries. There are likewise orchards of a small acid cherry called 'marasca' in the neighbourhood of Trieste, and also near Zara in Dalmatia, from which Maraschino is derived: in the Bergstrasse, near Heidelberg, there are cherry-orchards which furnish an early supply to the London market.

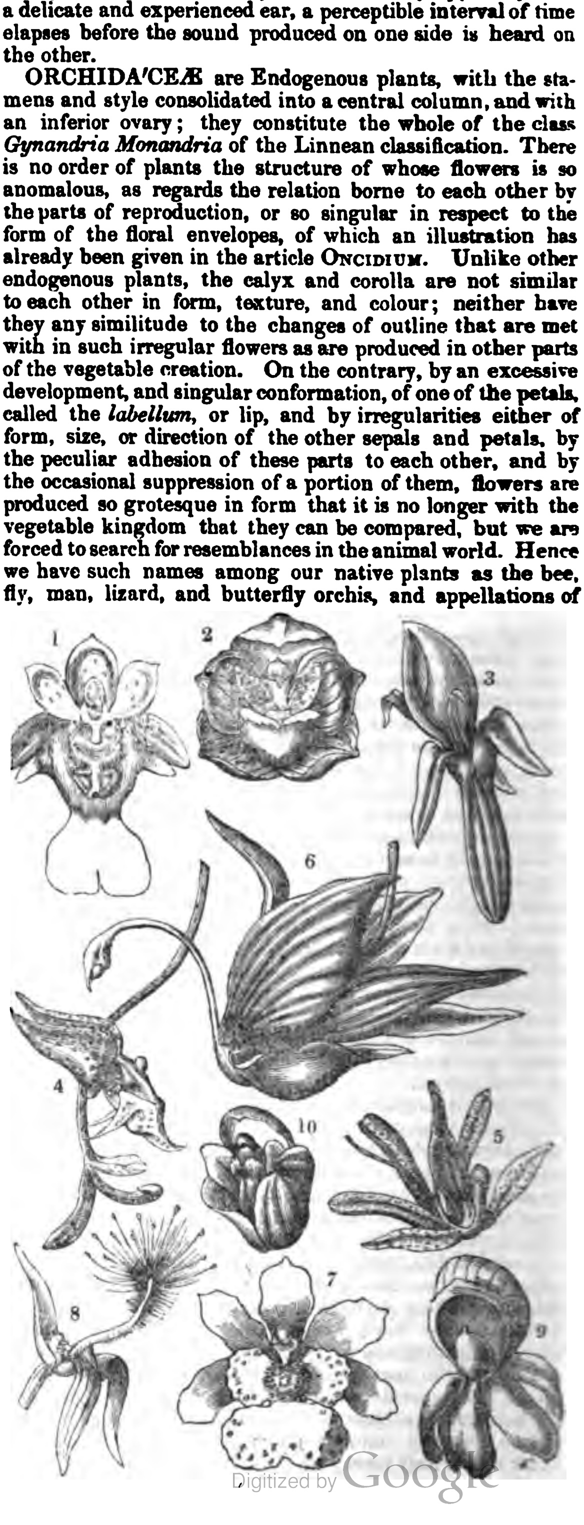
For filbert and walnut orchards see Filbert and Walnut. (Forsyth *On Fruit Trees;* Lindley's *Guide to the Orchard and Kitchen Garden; A Treatise on the Culture of the Apple and Pear*, by T. A. Knight, Esq.; Marshall's *Rural Economy of the West of England*, vol. i., p. 213; Loudon's *Arboretum;* Kenrick's *American Orchardist*.)

ORCHES'TRA (Gr. ὀρχήστρα, which contains the same element as the verb ὀρχεῖσθαι, *to dance*), that part of the Greek theatre in which the chorus was situated—where the dances were performed. With the moderns, the Orchestra is the place in the theatre allotted to the instrumental band, and that portion of a concert-room which is assigned to the musical performers, both instrumental and vocal. We not only apply the word to the place set apart for the musicians, but often use it to designate the whole of them collectively; in which case, *orchestra* and *band* are treated as synonymous terms.

Till the end of the seventeenth century, or the beginning of the last, the instrumental performers of our theatres were stationed in a box on the side of the stage, and out of view of the greater portion of the spectators. They were then few in number. But, however desirable in some respects, it would be impossible so to dispose of the large bands of the present day; and all things considered, they could not be better placed than where they now are—just below the stage, so as not to interrupt the sight, and between the singer and the audience, thus enabling the former to have in view the conductor and leader, a matter of great importance in the musical drama, where all is sung by memory.

The Orchestra of a concert-room should be so contrived that the front, when no passage beneath it is required, is about five feet higher than the level of the room, and it should rise, rather steeply, to the back, the corners of which ought to be rounded off, in order that the whole body of sound may be directly reflected. Had this precaution been attended to in building the Hanover-square Concert-room, its orchestra would, for its size, want nothing to render it perfect. An orchestra may be too wide, which is the fault, but not an irremediable one, of Exeter Hall, in the Strand; the distance in that room from one side to the other is so great, that the various sounds do not blend with the required nicety: and, extraordinary as the fact may appear, yet, to a delicate and experienced ear, a perceptible interval of time elapses before the sound produced on one side is heard on the other.

ORCHIDA'CEÆ are Endogenous plants, with the stamens and style consolidated into a central column, and with an inferior ovary; they constitute the whole of the class *Gynandria Monandria* of the Linnean classification. There is no order of plants the structure of whose flowers is so anomalous, as regards the relation borne to each other by the parts of reproduction, or so singular in respect to the form of the floral envelopes, of which an illustration has already been given in the article Oncidium. Unlike other endogenous plants, the calyx and corolla are not similar to each other in form, texture, and colour; neither have they any similitude to the changes of outline that are met with in such irregular flowers as are produced in other parts of the vegetable creation. On the contrary, by an excessive development, and singular conformation, of one of the petals, called the *labellum*, or lip, and by irregularities either of form, size, or direction of the other sepals and petals, by the peculiar adhesion of these parts to each other, and by the occasional suppression of a portion of them, flowers are produced so grotesque in form that it is no longer with the vegetable kingdom that they can be compared, but we are forced to search for resemblances in the animal world. Hence we have such names among our native plants as the bee, fly, man, lizard, and butterfly orchis, and appellations of



the like nature in foreign countries. Of these things some idea may be formed by the following cut, where 1 represents *Oncidium raniferum*, or the Frog Oncidium, so called because its lip bears at its base the figure of a frog *couchant;* 2, *Peristeria elata*, the Spirito Santo or Holy Ghost plant of Panama, in whose flower we find the likeness of a dove in the act of descending upon the lip; 3, *Prescottia colorans*, whose lip is a fleshy hood; 4, *Gongora fulva;* 5, *Cirrhæa tristis;* 6, *Cycnoches ventricosum*, singularly like a swan, the arched column forming the head and neck; 7, *Oncidium pulvinatum;* 8, *Bolbophyllum barbigerum;* 9, *Catasetum viride;* and 10, *Peristeria cerina*.

In consequence of their singular forms, their gay colours, and the delicious fragrance of many of these plants, they have of late years been cultivated with great zeal, both in this country and abroad, as has been stated in a former article [Epiphytes], to which we refer for information concerning their natural habits. In this place we proceed to give such a technical account of the structure of the order as will enable the reader to understand the principles of their classification, and to reconcile their structure, irregular as it is, with regular types observable in other parts of the vegetable kingdom.

Orchidaceous plants inhabit all parts of the world, except those which are excessively dry or excessively cold, both of which appear uncongenial to their nature, and they are most abundant in such as have an equable mild climate, moist and warm during the greater part of the year. Thus we have not a single species from Melville Island, or Nova Zembla, or from the upper regions of northern mountains, nor from the deserts of Africa; and the whole province of Mendoza, one of the dry western states of South America, produces but one, and that in a marsh. On the contrary, the woods of Brazil and equatorial America, of the lower ranges of the Himalayas, and of the Indian Archipelago, possess countless myriads of these productions. In general in hot countries the species are epiphytes, inhabiting the branches of trees, or the sides of rocks and stones, to which they cling by means of long twisting fleshy roots; and terrestrial species, that is to say, such as grow exclusively in the ground, are rare and unknown: in colder countries, on the contrary, the former are unknown and the latter only represent the order. Thus in North America, where Orchidaceous plants are plentiful, the epiphytal species are almost unknown, a single species only occurring in Florida upon the branches of the Magnolia. Some of them are true parasites, deriving their food from the roots of trees upon which they grow. In this country we have two cases of the kind, one the *Neottia Nidus avis*, or bird's-nest Orchis, a brownish scaly plant springing up occasionally in woods, and the other the *Corallorhiza innata*, or coral root, an occasional but very uncommon inhabitant of marshes.

The roots are of the following kinds:—Firstly, annual slender fibres, simple or branched, of a succulent nature, incapable of extension, and burrowing under ground, as in the genus Orchis. Secondly, annual fleshy tubercles, round or oblong, simple or divided, as in the various species of the same genus; they are always combined with the first, and appear, from their containing amylaceous granules in large quantity, to be intended as receptacles of matter fit for the nutrition of the plant. Tubercles of this kind have always a bud at their extremity, and may be considered the principal inferior prolongation of the axis. Thirdly, fleshy, simple, or branched perennial bodies, much entangled, tortuous, and irregular in form, as in Corallorhiza, Neottia, &c., or nearly simple and resembling tubers, as in Gastrodia. And fourthly, perennial round shoots, simple or a little branched, capable of extension, protruded from the stem into the air, adapted to adhering to other bodies, and formed of a woody and vascular axis covered with cellular tissue, of which the subcutaneous layer is often green and composed of large reticulated cells. The points of these roots are usually green, but sometimes red or yellow. In a very few instances of leafless species, as Chiloschista usneoides, they become entirely green, and then appear to perform the functions of leaves.

The stem is found in its most simple state in the terrestrial Ophrydeæ, where it is only a growing point, surrounded by scales and constituting a leaf-bud when at rest, which eventually grows into a secondary stem or branch, on which the leaves and flowers are developed. This kind of stem usually forms every year a lateral bud with a tubercular root at its lower end, and, having unfolded its flowers and ripened its fruit, perishes, to be succeeded by the stem belonging to the lateral bud previously prepared; hence those species to which this kind of stem belongs have always a pair of tubercles, one shrivelling and in progress of exhaustion, the other swelling and in progress of completion. It is sometimes found that the successive formation and destruction of annual tubercles takes place beneath an equal number of skins, the new bud and tubercular root being always formed within the axil of a scale-like coating belonging to the parent; this takes place in the genus Thelymitra and elsewhere. Sometimes such a stem, instead of forming a new bud upon its side, pushes out a slender subterranean root-like runner, which, after growing to some length, is arrested in its growth, and then forms at its extremity a new bud, which lengthens at its base into a tubercle. In such instances as this, a kind of locomotion may be correctly said to take place, the plant shifting its place yearly, and to such a distance as may be determined by the length of the runner, which separates the parent plant that perishes from the young offspring that is generated. Instances of this are common in terrestrial genera. A modification of it is when the tubercles are buried deep under ground, and always emit a root-like stem upwards, which produces true roots until it reaches the light, and then only develops leaves. This occurs in Corysanthes and elsewhere. In other cases the growing point becomes perennial, thickens, is scarred with the remains of leaves which once grew upon it, and assumes the state of a short, round, or ovate perennial stem or pseudo-bulb. In such a case it commonly emits from its base a shoot, which creeps along the ground, or over the surface of a branch, if the species is an epiphyte, and becomes a woody rhizoma, covered with scales which represent undeveloped leaves; after having advanced to a length which varies in different species, the rhizoma ceases to grow, and forms a new pseudo-bulb at its end. The latter subsequently protrudes a new horizontal rhizoma, which again terminates in a pseudo-bulb, and thus by degrees large masses of pseudo-bulbs are formed by a single individual, and literally pave the place upon which they grow. Such pseudo-bulbs are entirely analogous to the scaly bud found upon the end of the tubercular root of an Ophrydea; and the rhizoma in like manner is of the same nature as the runner that connects the old tubercle with the new one in such a plant; but pseudo-bulbs, in consequence of their perennial nature, are more completely formed, often have a woody texture, generally a hard epidermis, assume various angular or other figures, and develop a definite number of leaves from their points. This is the common mode of growth of the genera Maxillaria, Stanhopea, and many others. Pseudo-bulbs of this kind are always composed of cellular tissue, containing a great quantity of mucilage (and amylaceous granules) traversed by simple fibro-vascular cords, and hollowed into an infinite number of minute chambers. In other cases the rhizoma, instead of having pseudo-bulbs, forms short stems which are terminated by one or more leaves, as in Pleurothallis and its allies, and in the genus Cattleya and others; these differ from the pseudo-bulbous species only in the thickness and form of their axis. The formation of tubercles and terminal buds, or of creeping rhizomata and pseudo-bulbs, is the most common tendency of the order, but not the only one; in Eulophia, Bletia, and others, the rhizoma assumes simply the form of an ordinary tuber; and in Vanilla, Dendrobium, Vanda, and others of a similar nature, there is no rhizoma, but the stem lengthens as in common plants, from which there is nothing to distinguish it; some of the species of Dendrobium are remarkable for having the pseudo-bulbous form at one end of their stem, and the common state at the other, as D. crumenatum, &c. When such plants as Dendrobium Pierardi grow very fast, in an atmosphere which suits them, their stems will frequently branch, when the new branches throw out roots in abundance from their base; in such cases the original branches are equivalent to the rhizoma of the pseudo-bulbous species, and the secondary branches to the pseudo-bulbs themselves.

The leaves are very uncertain in their appearance: usually they are sheathing at the base, and membranous; but in Vanilleæ they are hard, stalked, articulated with the stem, and have no trace of a sheath. Frequently they are leathery and veinless, as frequently they are membranous and strongly ribbed, and both these conditions occur in the same genus, as in Maxillaria and Cypripedium. In a large number of the epiphytal species the leaves are notched unequally at the apex, a singular structure which has not yet been noticed in those with membranous leaves.

Their floral envelopes are constructed irregularly upon a ternary type, and consist of three exterior and three interior pieces. The exterior pieces are usually nearly equal, and less brightly coloured than the interior; but the two lateral ones are often of a somewhat different form from the other, which is anterior as the flower is placed upon the inflorescence when young, but which often becomes posterior when the flower is expanded, in consequence of the flower-stalk being twisted or curved: these parts are occasionally united by their edges into a long tube, as in Masdevallia, or the lateral ones adhere to the unguis of the lip in various degrees, or two of them are consolidated into one, as in Corycium and many other genera. Occasionally the intermediate piece is prolonged at the back or base into one or two hollow spurs, as in the genera Satyrium and Disa; still more rarely the lateral pieces are also spurred, as in Disperis. Various other less important modifications of the exterior pieces occur, but in all cases the whole number, three, is present. The interior pieces are usually three, never more; but in the instances of Monomeria and Aviceps, the intermediate one only is present. They are generally unequal, the two lateral pieces corresponding in form and size, while that between them, called the lip, is of some other form and size: in the genus Thelymitra however, and in Paxtonia, they are all alike. Nothing can be more variable than the proportions they bear to each other and to the exterior pieces. It is only a few of their modifications which it seems important to notice. The lateral pieces are occasionally bifid, as in certain species of Habenaria: in Megaclinium falcatum they are glandular at the apex: in most cases they are distinct from the column; but in Lepanthes, Gongora, Disa, and some others, they are adnate to that organ: in no instance are they spurred or saccate. The lip is either distinct from the column or united to it, stalked at its base, or dilated there, and often extended into a bag or spur, which is sometimes, as in certain species of the genus Epidendrum, consolidated with the ovary: very rarely it has two spurs, as in Diplocentrum. In the instances of Camarotis and Acropera it is saccate at the point. Its form is infinitely varied, the extremes of variation being Paxtonia for simplicity, and Coryanthes or Stanhopea for complexity: these and all other complicated forms may, without difficulty, be reduced to a three-lobed type, the simple form of which is found in Maxillaria, Bletia, and many Cattleyas. The lip is often so slightly articulated with the column as to swing to and fro upon the least disturbance, on which account it sometimes seems as if it were endowed with a power of spontaneous motion: this is particularly apparent in certain species of Pterostylis. There is a frequent tendency in the lip to produce tubercles or lamellæ upon its surface; the latter are always confined to the veins, the former are principally found near the base of the lip, and do not appear to have any relation to the veins: it is in the genus Oncidium, Eria, and Zygopetalum that these bodies, the use of which is unknown, are most conspicuous. Not unfrequently the lip is hairy, convex, and so marked and coloured as to bear no little resemblance to an insect.

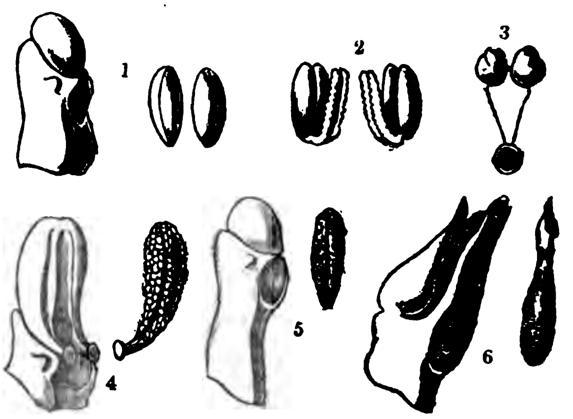
It is usual to call the exterior series of floral envelopes calyx, and the interior corolla; but the analogy of Marantaceæ renders it probable that the so-called petals are a row of outer sterile stamens. This however is a point upon which it is not here necessary to enlarge.

The centre of the flower is occupied by a body called the column, which is formed by the consolidation of the style and true stamens. In the greater part of the order there is but one stamen present, and it is in that case placed opposite the intermediate sepal, and consequently alternate with the lateral petals; when, as in Cypripedium, there are two stamens present, then the usual stamen remains in its customary position, in a sterile state; and the two perfect stamens are additional, and placed right and left of it. It is supposed that in those species which have but one anther there are two other stamens present in an incomplete condition, and consolidated with the other; and from the evidence offered by monstrous formations, it is thought that such sterile stamens are represented in Orchis and its allies by two tubercles, one on each side of the column; in Burlingtonia by two auricles near the apex of the column, and by other signs in other cases. Some objections have however been taken to this, but they do not appear of sufficient moment to require particular discussion. The reader who is anxious for information as to this and several other points of a similar kind, is referred to the prefatory remarks by the writer of this article in Bauer's 'Illustrations of Orchidaceous Plants,' 4to., London, 1830, 1838, with forty plates, in 4to.

In the greater part of the order a single anther terminates the column. This is usually two-celled, but often has its cells divided into two or four other cavities, by the extension of the endothecium between the lobes of the pollen masses, or is occasionally more or less completely one-celled by the absorption of the connective. In Ophrydeæ it is erect, with a distinct connective, and with the bases of the cells either parallel or diverging, and then its cells dehisce along their face. In Neottieæ it is also erect, but appears to be dorsal instead of terminal, in consequence of the stigma being placed before it for its whole length. In the remainder of the order it falls prone upon the head of the column, or the clinandrium, like a lid, and often is easily detached: sometimes this kind of anther originates from the margin of the clinandrium; sometimes from within the margin, in which case it is occasionally covered as by a hood, as in Cryptarrhena and other genera.

The pollen consists o lenticular or spheroidal grains, either single or cohering in pairs, threes, or fours, or in larger masses in indefinite number. The grains are usually held together by an elastic filamentous substance, which in all Ophrydeæ and many others forms an axis round which the grains or masses of grains are arranged, and which in a very large part of the order assumes the appearance of a strap or caudicula. This body either contracts an adhesion with a gland originating on the margin of the stigma, as in Ophrydeæ, Neottieæ, and Vandeæ, or it is folded upon the pollen masses, as in Epidendreæ, or it terminates in an amorphous dilatation, as in many Malaxideæ. In all cases it consists of cellular tissue, sometimes very lax and large, and thin-sided, as in Polystachya ramulosa, more generally very compact, tough, and thick-sided; towards the end which adheres to the stigmatic gland the tissue becomes elongated, but otherwise it is more or less lenticular. In Ophrydeæ the caudicula is extended towards the base of the anther-cells; but in all the other divisions of the order the caudicula, when present, is lengthened in the direction of the apex of the cells.

The differences in the structure of the column, anther, and pollen now explained, furnish botanists with the best means of classifying the order and of breaking it up into suborders, in the following manner:—



1. *Malaxideæ* (*fig.* 1), anther opercular; pollen waxy, with neither caudicula nor gland.
2. *Epidendreæ* (*fig.* 2), anther opercular; pollen waxy, with the caudicula folded back upon the pollen grains, and no gland.
3. *Vandeæ* (*fig.* 3), anther opercular; pollen waxy, with a membrano-cartilaginous caudicula and gland.
4. *Ophrydeæ* (*fig.* 4), anther erect; pollen sectile or granular.
5. *Arethuseæ* (*fig.* 5), anther opercular; pollen granular or powdery.
6. *Neottieæ* (*fig.* 6), anther dorsal; pollen powdery.
7. *Cypripedieæ*, anthers two, separated by a broad sterile lobe.

The ovary adheres firmly to the tube of the calyx, and is often so twisted, when the flower is about to expand, that its back, with the floral envelopes belonging to it, is turned to the front. It consists of three perfect carpels, stationed alternately with the stamens opposite the petals, and bearing the placentæ in their axis, and of three other pieces alternate with the first, destitute of placentæ, and eventually separating from them when the fruit is ripe.

The stigma is a viscid excavation in front of the anther.

and just below it. In most cases it is quite simple, merely terminating in a glandular dilatation of the upper margin, called the rostellum. It is lined with a lax tissue composed of minute ascending jointed hairs, and has a direct communication with the cavity of the ovary, either open or only imperfectly closed up. The glandular dilatation in all Vandeæ and Ophrydeæ, and in many genera, separates from the stigma and adheres to the pollen masses, but it is also in numerous other genera at all times inseparable from it. In Bonatea, in Habenaria, and in some other genera of Ophrydeæ, there are two arms to the upper edge of the stigma, each arm being channelled for the reception of the caudicula of a pollen-mass, and terminating in a separable gland; between these lies a membrane, very variable in size, sometimes merely a connecting web, sometimes a distinct plicature or lobe, and occasionally fornicate and extended in the middle into a mucro.

The fruit is usually a capsule of six valves, bursting when ripe, and discharging a multitude of minute seeds, with a netted loose tonic. In Vanilla however and some other genera the fruit is succulent, and the seeds have a hard brittle integument immersed in aromatic pulp. The seeds apparently contain an exalbuminous embryo; but from the great minuteness of the parts this point is not yet satisfactorily determined.

Impregnation in Orchidaceæ was at one time thought to take place in a peculiar manner, by intersusception of the fertilising principle of the pollen grains. It has now however been proved experimentally by Brown, A. Brongniart, Morren, and the writer of this article, that it in reality takes place only by the application of pollen grains to the mucous surface of the stigma, as in other plants.

Those who are desirous of further acquaintance with this singular order should consult Bauer's *Illustrations*, above quoted; R. Brown's *Prodromus Floræ N. Hollandiæ*, 8vo., 1810; the same author's *Observations upon the Impregnation of Orchideæ and Asclepiadeæ*, 8vo., London, 1831; Lindley's *Genera and Species of Orchidaceous Plants*, 8vo., London 1830-40, still in course of publication; and Endlicher's *Genera Plantarum*, p. 185, 4to., Vienna, 1836-40, still publishing.

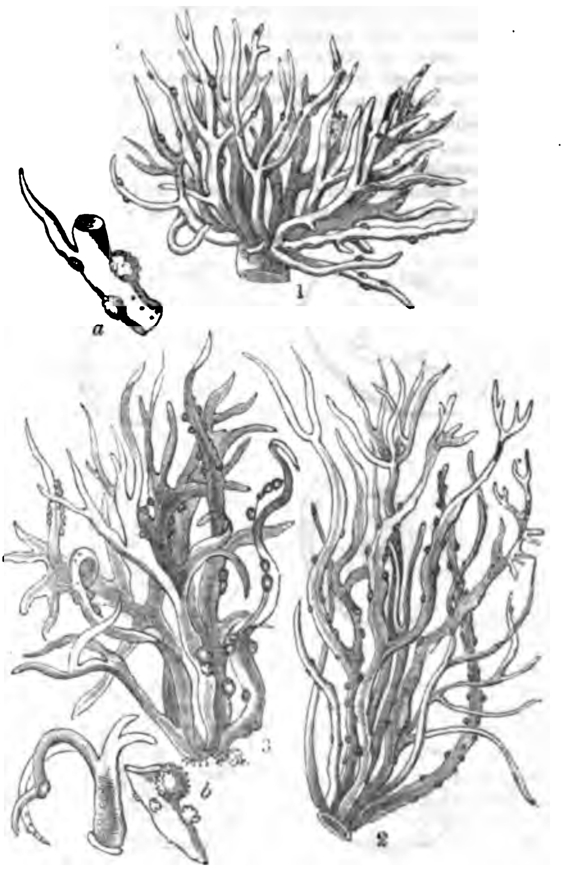
ORCHIL, or ORCHELLA, also written *Archil*, is the name of a dye as well as of the plant (one of the humble tribe of Lichens, or Rock-Moss) which yields it. The name is derived from the *Oricello* of the Italians or the Spanish *Orchella*. It is often corrupted in commerce into Rochilla weed. Several kinds are employed for the same purpose, which are distinguished according to the country from whence they are imported, and also by manufacturers into *weed* and *moss*, the former name being applied to the filiform lichens of botanists belonging to the genus Roccella, to be treated of here, while the terms *moss* and *rock-moss* are applied to the crustaceous lichens belonging to the genus Lecanora, which include the Cudbear and Parelle of dyers. [PARELLA.] Tournefort is of opinion that this dye was known to the antients, and that it was the λειχην of Dioscorides; this of course it is difficult to prove, but it is remarkable that the Arabian authors give *abryon* (an βρυον?) as the Greek synonym of a lichen which is in India used as a dye. Tournefort further thought that this was the substance used in dyeing the *purple of Amorgos*, one of the Cyclades, and says that when he was in the island, the lichen was still collected, and sold for ten crowns the hundredweight, to be sent to England.

The mode of preparing the dye was however lost, until rediscovered by a Florentine, who realised a large fortune, and kept the process secret. The manufacture was retained for a century in Italy, and the weed was collected on the shores of the Mediterranean and those of its islands. It was however called tincture of *turnsole*. The Dutch afterwards carried on the manufacture, and called it lacmus or litmus; but it has for some time been extensively carried on in England and Scotland, as is evident from 1813 cwts. having been imported in 1829, though the quantities of good kinds have since diminished, from the difficulty of procuring them, as the price has continued to rise, and many parts of the world have been searched for species fit for the use of the dyer. That imported from the Canaries sells for 250*l.* to 350*l.* a ton; Cape de Verde weed, as high as 300*l.*; the Azores or Western Island weed, 230*l.*; Madeira, 150*l.*; Africa, 120*l.*; South America, 120*l.*; Cape of Good Hope, 20*l.*; while some has recently been brought from the East Indies, where both kinds are found, and one of them very abundantly. This great difference of price is owing to different kinds being collected; some kinds, as the Canary weed, *Roccella tinctoria*, abound in colour; while others, as the *R. fuciformis*, contain it in much smaller proportion. Those species resemble each other a good deal, and therefore the difficulty is great of collecting the good kind. Sir W. J. Hooker has given as the character of the genus Roccella,—Thallus coriaceo-cartilaginous, rounded or plane, branched or lacineated; apothecia orbicular, adnate with the thallus; the disk coloured, plano-convex, with a border at length thickened and elevated, formed of the thallus, and covering a sublentiform, black, compact, pulverulent powder, concealed within the substance of the thallus.

R. tinctoria (Dyers' Roccella, or Orchil): thallus suffruticose, *rounded*, branched, somewhat erect, greyish-brown, bearing powdery warts; apothecia flat and horny, with a scarcely prominent border. A practical writer describes 'the good kind as having a nearly white powder on its surface towards the centre; the under surface is of a grey colour, and is not hairy; if wetted, it does not turn of an orange colour; its edges are flat and thin.'

R. fuciformis (flat-leaved Orchil): thallus *flat*, branched, nearly upright, greyish-white, bearing powdery warts; apothecia horny, bordered.

Both kinds are found on maritime rocks, as well on the coast of England as those of the places already indicated or on dry stone walls, exposed to the influence of the sea-breeze; the more arid the situation, the better is the quality of the lichens. The presence of the colouring matter is ascertained by steeping the weed broken up in small pieces in diluted solution of ammonia, in a bottle half filled with liquid, which should be kept corked, but frequently opened in a temperature not exceeding 150° Fahr. Orchil forms a rich purple dye, which, though fugitive, is considered indispensable by the dyers, because it greatly improves the brilliancy of some of the colours, and gives the pecular lustre and purple tint to some of the English broad-cloths in consequence of their being first dyed with orchil. [ARCHIL.] ('Proceed. Com. Asiatic Soc.,' April, 1837; also Thomson's 'Chemistry of Organic Bodies—Vegetables,' where a full account is given of several chemical analyses of dye-yielding lichens, p. 399.)



1, Roccella tinctoria; *a*, warts on the thallus.
2, Roccella tinctoria (East India).
3, Roccella fuciformis; *b*, apothecia.

ORCHO'MENUS, called the 'Minyean,' and afterwards 'the Bœotian,' was a city on the western shore of the Lake Copais, in Bœotia. In the earliest period of Grecian history it was known as a place of great power and wealth. (Homer, *Iliad*, ix. 381.) Its antient magnificence is attested by the treasury of Minyas in it, which is described by Pausanias as being equal to any similar building which he had seen, and by the subterranean outlets of the Lake Copais, the remains of which exist to this day. [BŒOTIA. vol. v., p. 43.] In the earliest times Orchomenus was the chief city of the Minyans, to whom the greater part of Bœotia, including Thebes itself, was subject. The history of this people is very obscure. Andreus, the first king of Orchomenus, is called the son of the river Peneus in Thessaly. In Thessaly moreover we find Minyans, with a city Orchomenus. Minyas is also made a descendant of Æolus. Mr. Thirlwall says that the early legends about the Minyans 'may be considered as indications of a native race, apparently Pelasgians, overpowered by Æolian invaders; and the same fact seems still more clearly attested by the names of the two Orchomenian tribes, the Eteoclean and the Cephisian; the former of which, called after Eteocles, the son of Andreus, seems to have comprised the warlike chiefs; the latter, the industrious people which tilled the plains watered by the Cephisus.' (*History of Greece*, vol. i., p. 93.) From the heroes of the Argonautic expedition being called Minyans, and from other circumstances, it has been thought that the name was not originally that of a nation, but was used as a title of honour equivalent to heroes or warriors, and was afterwards appropriated to the Æolians who established themselves at Iolcus and on the adjacent coast. (*Ibid.*, p. 91.) In the sixtieth year after the Trojan war, the Æolian Bœotians, who had been expelled from Thessaly, drove out the Minyans from Orchomenus, which was then with its territory added to Bœotia. (Thucyd., i. 12; Strabo, ix., p. 401.)

At and shortly before the time of the Peloponnesian war, we find Orchomenus as one of the most powerful states of the Bœotian confederacy, and having under it the towns of Chæronea and Tegyra. Its government was oligarchical: the ruling order was called 'knights.' (Diod. Sic., xv. 79.) When Thebes was feeble, and Bœotia was subject to Athens (about B.C. 447), Orchomenus was a refuge for the oligarchical exiles of the neighbourhood. (Thucyd., i. 113.) After the peace of Antalcidas (B.C. 387), by which the Bœotian cities were freed from the supremacy of Thebes, Orchomenus was confederate with Sparta, and had in it a Lacedæmonian garrison. (Plutarch, *Pelop.*, 16.) In the year 368 B.C., the Thebans, taking advantage of the absence of Epaminondas on an expedition, destroyed Orchomenus, slaying the men, and selling the women and children into slavery. It was rebuilt after the destruction of Thebes, and is mentioned by Dicæarchus about twenty years after the death of Alexander.

Coins of Bœotia.
British Museum. Actual Size

The worship most prevalent in Orchomenus was that of the three Graces (χαριτήσια): there was also a temple of Dionysus in the city, and shrines of the heroes Actæon and Minyas, with which games (Μινύεια) were connected (Schol. to Pind., *Isth.*, i. 11), and a tomb of Hesiod, at which offerings were made. In the Orchomenian town of Tegyra there was a temple and oracle of Apollo. (Steph. Byz., Τέγυρα.)

(Müller's *Orchomenos und die Minyer*; Wachsmuth's *Hellenische Alterthumskunde*; Clinton's *Fasti Hellenici*, Thirwall's *History of Greece*.)

ORCHO'MENUS, Arcadia. [ARCADIA.]

ORCIN, a peculiar matter obtained by Robiquet from a species of lichen (*variolaria orcina*). He found that the colour of this substance is derived from the presence of a body which is white until it is acted upon by the air and alkalis, when it becomes reddish violet. The process of preparing orcin consists in making an alcoholic solution of the lichen, and then treating it with water, which separates a fatty colouring matter, and dissolves a bitter and saccharine substance; this, after several solutions and evaporations, is obtained in white crystals. These crystals are orcin, which become, as already stated, of a reddish violet colour by the action of the air and alkalis.

ORDEAL, from the Anglo-Saxon *ordæl*. Spelman derives this word from *or*, 'magnum,' and *dæl*, 'judicium;' which is also the derivation given by Ducange. Lye and Bosworth derive it from *or*, privative, 'without,' and *dæl*, 'difference,' an indifferent or impartial judgment, a judgment without distinction of persons. The German word *urtheil*, a judgment, is apparently the same word, and is also a compound. (See Selden, *Notes to Eadmer*, and Hickes's *Diss. Epist.*, p. 149.)

The earliest traces of any custom resembling the ordeal is found in the book of Numbers (ch. v.), in the waters of jealousy, which the Hebrew women suspected of adultery were compelled to drink as a test of their innocence.

Blackstone (*Comm. on the Laws of England*, vol. iv., ch. 27, 'Of Trial and Conviction') says:—'The several methods of trial and conviction of offenders established by the laws of England were formerly more numerous than at present, through the superstition of our Saxon ancestors, who, like other northern nations, were extremely addicted to divination, a character which Tacitus observes of the antient Germans (*De Mor. Germ.*, x.). They therefore invented a considerable number of methods of purgation, or trial, to preserve innocence from the danger of false witnesses; and in consequence of a notion that God would always interpose miraculously to vindicate the guiltless. The most antient species of trial was that by *Ordeal*; which was peculiarly distinguished by the appellation of *Judicium Dei*, and sometimes *vulgaris purgatio*, to distinguish it from the canonical purgation, which was by the oath of the party. This was of two sorts, either fire-ordeal or water-ordeal, the former being confined to persons of higher rank, the latter to the common people. Both these might be performed by deputy; but the principal was to answer for the success of the trial, the deputy only venturing some corporal pain for hire, or perhaps for friendship. Fire-ordeal was performed either by taking up in the hand, unhurt, a piece of red-hot iron, of one, two, or three pounds weight; or else by walking, barefoot and blindfold, over nine red-hot ploughshares, laid lengthwise at unequal distances; and if the party escaped being hurt, he was adjudged innocent; but if it happened otherwise, as without collusion it usually did, he was then condemned as guilty. However, by this latter method Queen Emma, the mother of Edward the Confessor, is mentioned to have cleared her character when suspected of familiarity with Alwyn bishop of Winchester. (Rudborne, *Hist. maj. Winton*, l. 4, ch. i.) Water-ordeal was performed either by plunging the bare arm up to the elbow in boiling water, and escaping unhurt thereby; or by casting the person suspected into a river or pond of cold water, and if he floated therein without any action of swimming, it was deemed an evidence of his guilt, but if he sunk, he was acquitted.' Another species of ordeal was the corsned, or morsel of execration: this was a piece of cheese or bread, about an ounce in weight, which was consecrated with a peculiar form, in which the Almighty was called upon, and it was prayed that the bread might cause convulsions and paleness, and find no passage, if the man was really guilty, but might turn to health and nourishment, if he was innocent. The corsned was then given to the suspected person, who received the holy sacrament at the same time: if indeed, as some have suspected, the corsned was not the sacramental bread itself. It is said that Godwin, earl of Kent, in the reign of king Edward the Confessor, on taking his oath that he had not caused the death of the king's brother, appealed to his corsned, 'per buccellam deglutiendam abjuravit' (Ingulphus), which stuck in his throat and killed him.

The Ordeals of water and iron are first mentioned in the 77th law of Ina. (Wilkins, *Leg. Anglo-Sax.*, p. 27.) See also the laws of Athelstan, Edward the Confessor, and the Conqueror. (*Ibid.*, pp. 60, 198, 229.)

In the 'Domesday Survey' the readiness of claimants to prove their title to land, by ordeal or by battle, occurs in a great variety of instances; as among the lands belonging to the monastery of Ely, at a place then called Photestorp, in Norfolk: 'Hanc terram calumpniatur esse liberam Vlchetel homo Hermeri quocunque modo judicetur, vel bello vel *Juditio*.' (*Domesd.*, tom. ii., fol. 213. See other instances, *Ibid.*, fol. 110 b, 137, 162, 166, 172 b, 193, 208, 277 b, 332.) 'Ferri candentis Judicium' (the ordeal of hot iron) is the only ordeal of the 'Domesday Survey.' The reason for this is given by Glanville (*Tract. de Leg. et Consuet. Regni Angliæ*, l. xiv., ch. 1): 'in such a case the accused is bound to clear himself by the judgment of God, namely, by hot iron, or by water, according to the difference of rank, that is, by hot iron if he should be a free man, and by water if he should be a villain (si fuerit rusticus).'

Eadmer (*Hist. Novor.*, p. 48) speaks of no fewer than fifty persons of Saxon origin who, in the reign of William Rufus, being accused of killing the king's stags, were at one time sentenced to the fire-ordeal.

It is probable that the Trial by Ordeal was not discontinued in England by any positive law or ordinance, although Sir E. Coke (9 *Rep.*, 32), and after him Blackstone (4 *Comm.*, 345), have expressed an opinion that it was finally abolished by an act of parliament, or rather an order of the king in council, in the 3 Henry III. (1219). This order is to be found in Rymer's 'Fœdera,' vol. i., p. 228; Spelman's 'Glossary,' sub voce *Judicium Dei;* and in Selden's 'Notes to Eadmer.' Spelman however thinks that this was merely a temporary law, without any general or permanent operation, and that the Trial by Ordeal continued to a later period. This opinion seems confirmed by a reference in the 'Cal. Rot. Pat.,' p. 15, to another order in council in the 14 Henry III., 'De justitiâ faciendâ loco ignis et aquæ.' As however it is only mentioned as a former custom, and not as an existing institution, by Bracton (lib. iii., cap. 16), who wrote at the end of the reign of Henry III. or the commencement of that of Edward I., it is probable that, in consequence of the judgments of councils and the interference of the clergy, the Trial by Ordeal fell into disuse about the middle of the thirteenth century (Selden's *Notes to Eadmer*); but this was long after it had disappeared from the judicial systems of most other European nations.

Blackstone, in the part of his 'Commentaries' already quoted, says, 'Purgation by ordeal seems to have been very antient, and very universal in the times of superstitious barbarity. It was known to the antient Greeks: for in the 'Antigone' of Sophocles (v. 270) a person, suspected by Creon of a misdemeanor, declares himself ready "to handle hot iron, and to walk over fire," in order to manifest his innocence; which the scholiast tells us was then a very usual purgation.' And Grotius (on *Numb.* v. 17) gives us many instances of water-ordeal in Bithynia, Sardinia, and other places.

'In Siam, besides the usual methods of fire and water ordeal, both parties are sometimes exposed to the fury of a tiger let loose for that purpose: and if the beast spares either, that person is accounted innocent; if neither, both are held to be guilty; but if he spares both, the trial is incomplete, and they proceed to a more certain criterion.' (*Mod. Univ. Hist.*, vol. vii., p. 266.)

The '*Asiatic Researches*' (vol. i., 4to. Calcutta, 1788, p. 389-404) contain a memoir on the trials by ordeal among the Hindus, by Ali Ibrahim Khân, chief magistrate at Benares, communicated by Warren Hastings, Esq., nine in number: 1, by the balance; 2, by fire; 3, by water; 4, by two sorts of poison; 5, by Cosha, in which the accused drinks of water in which the images of the sun and other deities have been washed; 6, by chewing rice; 7, by hot oil; 8, by hot iron; 9, by Dharmach, in which an image named Dharma, or the genius of justice, made of silver, and another of an antagonist genius Adharma, made of clay or iron, or those figures painted respectively on white and black cloth, are thrown into a large jar, from which the accused is instructed to draw at hazard.

The Latin forms of service for the different species of ordeal, as antiently used in England, are given by Spelman in his 'Glossary,' in *v.* from the Textus Roffensis.

The reader may consult for further information Grimm's *Deutsche Rechts-Alterthümer, Gottesurtheil.*

ORDER is distinguished from *degree* in mathematical language by a purely conventional boundary. Both are terms of succession; thus an expression is of the first, second, third, &c. degree, according as its highest power is the first, second, third, &c. of the principal letter. But if another succession should occur, say one of differentiations, then the number of such successive operations is the order of the process. Thus a differential equation which contains, at the highest, the fifth power of a differential co-efficient, is said to be of the fifth degree; while if the highest differential co-efficient which occurs in it is the third, it is said to be of the third *order*.

There is a particular use of the word *order* in regard to quantities which increase or diminish without limit. If A and B both diminish without limit, but if A diminish without limit with respect to B [Infinite], A is said to be of an inferior order to B; and generally the first powers of small quantities are said to be of the first order; products of two small quantities, and second powers, of the second order; and so on.

ORDERS, HOLY. [Ordination.]

ORDERS OF ARCHITECTURE. [Civil Architecture; Column.]

ORDERS OF KNIGHTHOOD. [Knighthood.]

ORDINARY. This term, when used in English law, commonly signifies the bishop of the diocese, who is in general, and of common right, the ordinary judge in ecclesiastical causes arising within his jurisdiction. (Lindwoode's *Provinciale*, lib. i., tit. 3.) The term is also applied to the commissary or official of the bishop, and to other persons having, by custom or peculiar privilege, judicial power annexed to their offices or dignities. Thus an archdeacon is an ordinary. A bishop therefore is always an ordinary, but every ordinary is not a bishop.

The term is derived from the Canonists, and is in common use in several European countries. Since the Lateran council, when the apostolic see assumed the power of presenting to benefices, the pope has sometimes been called by canonical writers 'ordinarius ordinariorum.' In England the probate of wills, the granting of letters of administration, the admission, institution, and induction of parsons, and several other authorities of a judicial nature, are vested in the ordinary. The judex ordinarius of the canon and of the later Roman law is a judge who has judicial cognizance in his own proper right, as such judge, of all causes arising within the territorial limits of his jurisdiction. He is opposed to the judex delegatus, or extraordinarius, whose jurisdiction extends only to such causes as are specifically delegated to him by some superior authority. (Ayliffe's *Parergon*, p. 309; Justin., *Novell.*, 20, c. 3, and 112, c. 31.) With reference to this distinction, it became usual to apply the term 'ordinary' to bishops, who, when acting in their judicial character in ecclesiastical causes, have strictly an ordinary jurisdiction; and we find it used in this sense by Bracton and the earliest writers upon English law.

ORDINATE is that particular rectangular Co-ordinate of a curve which is measured perpendicularly to one of the axes and not upon an axis. [Co-ordinate.] It is necessary to observe that though the term co-ordinate has been extended to what are called polar co-ordinates, yet the word ordinate is not separately used in the latter system. The etymology of ordinate will be found in the article cited.

ORDINATION, the ceremony by which holy orders are conferred, or by which a person is initiated into the ministry of religion, or set apart for preaching, administering the sacraments, and discharging other ecclesiastical rites and duties, public or private. In the Church of England, a candidate must be twenty-three years of age before he can be ordained deacon, and twenty-four before he can be ordained priest; must have an appointment to some cure, except he be a fellow of a college; bring letters testimonial of his life and doctrine, for three years, from three beneficed clergymen; undergo an examination in Latin, Greek, and theological learning; subscribe to the Thirty-nine Articles and the Liturgy; and, as bishops now almost invariably require, have graduated at one of the English universities, at Trinity College, Dublin, or at some other recognised school. No person can hold any vicarage, rectory, or benefice whatever, except he be in full orders.

A form of some kind has always been observed in conferring the priesthood. This was the case under the Old Testament dispensation; in which the family, age, and qualifications of the individual appointed, are particularly described. In the New Testament, our Lord called the twelve apostles, and sent them out—ordained them to perform the offices of religion. So likewise the apostles ordained others; and the form they adopted for setting them apart was *prayer* and the *imposition of hands*. In this manner bishops, priests, and deacons were appointed; and, for at least ten centuries, no other ceremony was used or added thereto. When the church became corrupt, this, like almost every other ordinance, shared the general perversion. It lost its primitive simplicity, and was elevated to the dignity of a sacrament. The plan was adopted of delivering to a person ordained priest the *sacred vessels*, *i.e.* the plate and the cup; employing with the action certain words by which he was authorised to offer sacrifice to God, and to celebrate mass. To constitute a sacrament, three things are required, *matter*, *form*, and *institution*. Ordination was evidently instituted by Jesus Christ and his apostles; but in their institution of it, it clearly wants the main essentials of a sacrament. The church of the eleventh century, in converting it into a sacrament, considered the *vessels* as the *matter*, and the *form* was the delivering them with the words:—'Take thou authority to offer up sacrifices to God, and to celebrate masses, both for the living and the dead; in the name of the Father, the Son, and the Holy Ghost.' Protestant churches have returned to the original method of conferring orders, and use only prayer and the imposition of hands; some sects dispense with the latter, as the Wesleyan Methodists.

The great controversy between Episcopalians and Presbyterians is, the authority by which holy orders are conferred. The former hold that bishops alone are vested with this authority; and those especially who entertain the notion of *Apostolic succession*, *i.e.* assert the fact of an unbroken episcopal series from the days of the Apostles to the present time, to which the power of ordaining ministers is confined and through which it descends, deny the validity of orders and even the existence of a church, where there is no bishop. The Presbyterians, on the contrary, contend that the presbytery, or a body of priests, have authority for this purpose; and that bishops and presbyters are in Scripture the same, and not distinct orders or officers. They urge that Timothy was ordained by the laying on of the hands of the presbytery; and that Paul and Barnabas were ordained by certain teachers and prophets in the church of Antioch, and not by any bishop presiding in that city. It is certain however that bishops have existed as a distinct order from the very earliest times; and though we cannot assert that they are absolutely essential, yet they evidently contribute to complete the idea of a church, and tend to its orderly and effectual operation.

Many at the Reformation held the call of the people the only thing essential to the validity of the ministry, and taught that ordination is only a ceremony which renders the call more solemn and authentic. Accordingly the Protestant churches of Scotland, France, Holand, Switzerland, &c., have no episcopal ordination. For Luther, Calvin, Bucer, Melancthon, and all the first reformers and founders of these churches, who ordained ministers among them, were themselves presbyters and no other. The following remarks on this subject appear at once liberal and judicious. They are from Burnett's 'Exposition of the Thirty-nine Articles;' himself an English bishop, and attached to the Episcopal form of church government. 'If a company of Christians find the public worship where they live to be so defiled that they cannot with a good conscience join in it, and if they do not know of any place to which they can conveniently go, where they may worship God purely, and in a regular way; if, I say, such a body, finding some that have been ordained, though to the lower functions, should submit itself entirely to their conduct; or finding none of those, should by a common consent desire some of their own number to minister to them in holy things, and should upon that beginning grow up to a regulated constitution; though we are very sure that this is quite out of all rule, and could not be done without a very great sin, unless the necessity were great and apparent; yet if the necessity is real and not feigned, this is not condemned or anulled by the article (the 23rd); for when this grows to a constitution, and when it was begun by the consent of a body, who are supposed to have an authority in such an extraordinary case, whatever some hotter spirits have thought of this since that time, yet we are very sure that not only those who penned the Articles, but the body of this church for above half an age after, did, notwithstanding these irregularities, acknowledge the foreign churches so constituted to be true churches as to all the essentials of a church, though they had been at first irregularly formed, and continued still to be in an imperfect state.' And again:—'Whenever God by his providence brings Christians under a visible necessity of being either without all order and joint worship, or of joining in an unlawful and defiled worship, or finally, of breaking through rules and methods in order to the being united in worship and government; of these three, of which one must be chosen, the *last* is the *least* evil, and has the fewest inconveniences hanging upon it, and therefore it may be chosen.' (Burnett *On the Articles*; Watson's *Theological Dictionary*.)

ORDNANCE, a general term applied to the great artillery (guns, carronades, howitzers, and mortars) which is used in war, on land or at sea; the name being probably derived from the *compagnies d'ordonnance*, or Francs Archers, instituted in 1448 by Charles VII. of France.

The wars between the emperor Charles V. and Francois I. gave rise on the Continent to the first important improvements in the construction and use of heavy artillery. According to Templehof it was then that some efforts were made to establish a system of proportions between the length, the thickness, and the calibre of ordnance; that gunpowder was improved, and that certain relations between the charge of powder and the weight of the projectile began to be established. It was not however till the beginning of the seventeenth century that artillery, which had before been chiefly used in the attack and defence of fortresses, began to be extensively employed in engagements between hostile armies; but in 1632 the Austrians and Swedes together are said to have brought into the field 2000 pieces, among which were 24, 16, 12, and 6 pounder guns.

An artillery capable of accompanying the rapid movements of cavalry was first systematically introduced in warfare by Frederic the Great; but the full development of the important services which are capable of being rendered by this arm is due to the Prussian general Scharnhorst, since whose time the horse-artillery, as it is called, has been considered as an indispensable requisite in the armies of every nation in Europe.

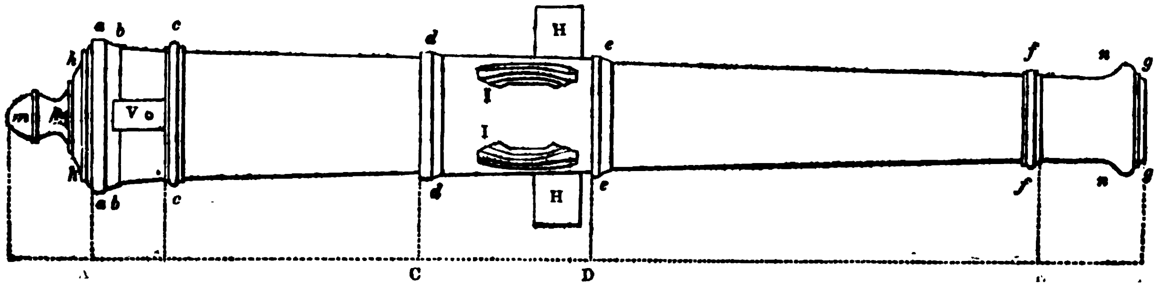
In the British service the management of the military rockets invented by Sir W. Congreve is assigned to a particular troop; and though these missiles have not been yet very generally employed, they have occasionally rendered considerable service. [ROCKET.]

The materials of which ordnance is formed are iron and brass; the latter being a mixed metal composed of copper and tin, in the proportion of from 8 to 12 parts of the latter to 100 parts of the former. Iron guns are stronger than those made of brass, and consequently they are better able to resist the effects of the long continued firing which takes place at the sieges of fortresses. Brass guns, on the other hand, being lighter, are more conveniently transported from place to place with troops in the field, and they are strong enough to resist all the firing which can be required to be made from them in any general action. It is said that in the campaigns of the duke of Wellington, in Spain, 120 rounds were fired in one day from brass ordnance; and that from 300 to 350 rounds were fired constantly, in the same time, from iron 24-pounder guns.

Ordnance is now cast either in loam or in dry sand; and the latter material is said to be preferred because it permits the surface of the gun to be more correctly formed, and renders it unnecessary to complete the figure of the piece by the process of turning. To make the mould for casting in sand, a model or pattern of the gun is executed, in parts, of wood, or more properly of brass; these parts are placed severally within what is called the gun-box, which is of cast-iron, and consists of portions corresponding to those of the model. Between the latter and the interior surface of the gun-box the sand is then well rammed; and when the whole of the moulding is thus formed, the gun-box is taken to pieces, the several parts of the mould are fitted together, and in this state dried at a stove. Lastly, the mould being placed in a vertical position, with the breech or thicker part downwards, and its interior surface having been painted in order to prevent adhesion to the metal in casting, the melted iron or brass is suffered to flow in through a pipe at the upper extremity of the mould, on one side of what is called the dead head (a mass of metal which, in casting, is formed beyond the muzzle extremity of the gun). In 12 hours after being cast, the mould may be removed, and the gun may be bored. [CANNON.] Guns, carronades, howitzers, and mortars are all cast and bored in the same manner.

Iron guns are cast from pig-metal of different qualities, which are melted together in order to produce a composition possessing only that degree of hardness which will permit the boring to be effected. Ordnance formed of cast-iron and of gun-metal being apt to run at the vent in consequence of the heat produced by rapid firing in action, the vent in guns of the former kind is drilled in a bolt of wrought-iron, and in those of the latter kind, in a bolt of pure copper: the bolts are then screwed into the pieces for which they were intended.

The following cut shows the form of a brass gun whose proportions are those of a heavy 6-pounder; and we have subjoined a table of the dimensions and weights of the principal natures of guns in use in the British service. The natures and uses of carronades, howitzers, and mortars have been already described under those words.



AF is considered as the length of the gun (= 7 feet). **AB** is called the vent-field (= 5·5 in.). **V** the vent. **BC** the first reinforce (= 20·9 in.). **CD** the second reinforce (= 13·3 in.). **DE** the chase (= 35·8 in.). **EF** the muzzle (= 8·5 in.). **AG** the cascable (= 6·2 in). **HH** the trunnions. **II** the dolphins or handles.

aa is called the base ring (diam. = 11·75 in.). *bb* the base ring ogee. *cc* an astragal and fillets. *dd* the first reinforce ring and ogee (diam. = 9·8 in.). *ee* the second do. (diam. = 9·5 in.). *ff* an astragal and fillets (diam. at *nn* = 6·33 in.). *gg* the muzzle mouldings. *hh* the breech ogee and fillets. *k* the neck. *m* the button.

Nature of Ordnance.			Calibre in inches.	Length of Gun in Calibres.	Length of Gun in Inches.	Length of Bore in Calibres	Weight. cwt.	qr.	lb.
Brass Guns	12-Pounders	med.	4.623	17.0	78.6	16.18	18	0	0
		light	4.623	13.0	60.08	12.94	12	0	0
	9-ditto		4 2	17.0	71.4	16.13	13	2	0
	6-ditto	heavy	3.668	22.9	84.0	21.91	12	0	0
		med.	3.668	19.63	72.0	19.0	9	1	2
		light	3 668	16.36	60.0	15.67	6	0	0
	3 ditto		2.913	22.72	72.0	22.12	6	0	0
			2.913	16.48	48.0	15.79	3	0	0
			2.913	12.36	36.0	11.67	2	1	0
	2-ditto		2.019	29.72	60.0	28.72	2	2	11
Iron Guns.	10-inch		10.0	9.0	90.0	8.86	56	0	0
	68-Pounders		8.05	10.0	80.5	10.0	60	0	0
	42-ditto		7.018	16.24	108.5	15.24	65	1	0
	32-ditto		6.41	17.8	108.5	16.72	55	2	24
			6 41	14 98	96.0	14.0	47	2	24
	24-ditto		5.823	19.56	108.5	18.46	50	0	16
			5 823	15.45	84.5	14.42	40	0	8
	18-ditto		5.292	20.4	108.0	19.22	42	0	12
			5.292	18.18	96 0	16.95	37	2	12
	12-ditto		4.623	23.36	108.0	22.11	33	3	24
			4.623	22.06	96.5	20.81	33	0	0
			4.623	19.47	84 5	18.22	29	2	8
	9-ditto		4.2	25.71	108.0	24.4	31	0	2
			4.2	24.28	96.5	23 0	28	2	3
			4.2	21.42	84.5	20.13	26	0	4
			4.2	20.0	84.0	18.68	24	3	27
	6-ditto		3.668	27.81	96.5	26.4	23	0	4
			3.668	21.26	72.5	19.89	18	0	0
			3.668	19.63	72.0	12.25	17	0	4
Carronades.	68-Pounders		8.05	7.70	61.72	7.70	36	0	0
			8.05	5.96	48.0	5.96	29	0	0
	42-ditto		6.84	7.52	52.42	7.52	22	0	0
	32-ditto		6.25	7.68	47.71	7.68	17	0	0
	24-ditto		5.68	7.66	43.32	7 66	13	0	0
			5.68	6.34	36.0	6.34	11	2	0
	18-ditto		5.16	7.59	29.3	7.59	10	0	0
			5.16	5.45	28.0	5.45	8	1	0
	12-ditto		4.58	5.78	32.36	5.78	6	0	0

The axis of the trunnions is at right angles to that of the gun, and is usually about half their diameter below the latter axis; but Dr. Gregory, in his 'Lectures on Gunnery,' recommends that it should intersect the axis of the gun, in order that the recoil of the piece in firing may be more steady. The vent is two-ninths of an inch in diameter, and it enters the bore at about eight-tenths of an inch from the bottom of the latter.

The diameter of the bore is called the calibre of the gun; this is rather greater than the diameter of the shot by which the nature of the gun is designated, and the difference between them is called the windage. [WINDAGE.]

A scale of quarter degrees is graduated on the base ring, the zero line being in a plane passing through the axis of the gun and cutting the exterior surface immediately above the trunnions, and the intersection of such plane with the side of the muzzle is marked by a notch on the latter These quarter-sights, as they are called, serve to give the gun an elevation not exceeding three degrees; and this is accomplished by lowering the breech till the division expressing the intended elevation and the notch on the side of the muzzle are in a line with the object. The axis of the gun will then be inclined to a plane passing through the object and the axis of the trunnions, in an angle equal to that which is indicated by the division above mentioned.

A point-blanc disposition of the gun is that in which the zero notch on the base ring and that on the side of the muzzle are made to coincide in direction with the object, whether this line of direction be or be not parallel to the horizon. But when a notch on the top of the base ring and one at the top of the muzzle are made to coincide in direction with the object, the gun is said to have the *line of metal elevation*. [GUNNERY, p. 493, col. 1.] The angle which the axis of the gun, in this case, makes with a plane passing through the trunnions and the object is about one degree.

For elevations greater than three degrees a tangent scale is employed; this is a brass rod which slides up and down in a groove formed in the direction of a diameter to the base-ring of the gun, and is divided into quarter degrees. In using this scale the latter is drawn up till the graduation expressing the intended elevation is at the surface of the base ring; then the breech of the gun is lowered till a notch at the top of the scale and that at the top of the muzzle are in a line with the object. The axis of the gun (allowance being made for the difference between the semidiameters of the base ring and muzzle [DISPART]) is then inclined to a plane passing through the trunnions (and the object in an angle indicated by the said graduation.

The iron employed in gun-making is now so much refined and the processes of casting and boring are so much improved, that it has been found practicable to diminish considerably the quantity of metal in iron guns, and thus to facilitate greatly their transport from place to place; accordingly iron ordnance is at present cast with much lighter proportions than formerly. So much advantage also is now obtained from the more uniform density and the more perfect sphericity of shot, that it has even been found convenient to *ream up* (scrape out or re-bore) the existing ordnance, so as to bring each nature of gun to the next higher calibre.

Thus the old iron 6-pounders have been converted into 9-pounders; 18-pounders into 24-pounders, and so on. The practice was first recommended by Colonel Paixhans, in France, and it has lately been adopted in this country.

The application of locks to naval ordnance was introduced by Sir Charles Douglas (captain of the fleet to Admiral Rodney in the action of 1782), and their efficiency has since been fully recognised. At first the locks were made with one flint only, and in the event of this becoming unserviceable the loss of time attending the fixing a fresh flint was found to be so great, that instead of renewing the flint, recourse was generally then had to the lintstock or port-fire. But this defect has been removed by the construction of a lock which carries two flints, so disposed, that on the failure of one, by simply turning the nut, the other may be brought into use. This improvement was made in 1818, by Major-Gen. Sir Howard Douglas; it was immediately introduced in the British navy, and has since been adopted in the land-service artillery.

From experiments made in France it has been ascertained that hollow shot, being with equal weight greater in diameter than such as are solid, when fired with low charges of powder against ships, produced most dangerous breaches in their sides; and, in consequence, certain heavy iron howitzer-guns for discharging such missiles have been introduced in the French navy. Similar experiments, attended by like results, were in 1828 made in this country by the late General Millar with a short and massive 12-inch gun which he invented on the occasion. The hollow shot projected from this piece of ordnance weighed 120 pounds, and being impelled by 11 pounds of powder, producing an initial velocity of 1000 feet per second, it pierced, at the distance of 400 yards, a strong frame-work of timber, making an opening which would have seriously compromised any ship so struck. A conviction of the necessity of using these powerful arms in a future war has led the British government to adopt them in the royal navy, and now the ships of war always carry a certain number of such guns on their lower decks. It is observed however that the effect of hollow shot cannot be depended upon at a distance of more than 400 yards if the weight of the shot is but half, nor at more than 500 or 600 yards if the weight is but two-thirds, of that of a solid shot of equal diameter.

Experiments have also been made in France on the effect of loaded or live shells as they are called, when projected horizontally into ships, the fuses of the shells being regulated so that the latter may explode as soon as they have pierced the side, and it is easy to conceive that the consequences must then be most destructive. The existence of loaded shells on board of ships has been objected to on account of the danger which might ensue from the accidental ignition of their fuses, but it is replied that this danger may be avoided by keeping each shell in a separate box, or by covering the fuse with a metallic cap till the moment when it is required to be put in the gun.

Carriages.—Carriages for ordnance are of several kinds, according to the nature of the arm or the manner in which it is employed.

Field gun-carriages consist of two cheeks or side pieces of elm, firmly attached together by transoms and resting on the axle-tree of the wheels; the trail, or rear extremity of the side pieces, touching the ground when the gun, which lies over the axle-tree, is in a horizontal position, that is, in a state for action. Generally now however, instead of continuing the two side pieces to the rear extremity, one solid or block trail of oak is firmly attached, near the axle, to two short side pieces, the other extremity resting on the ground in the case just mentioned, or being attached by a hook to the limber when the gun is travelling. The limber is a bed, with shafts, mounted on two wheels, and carrying two ammunition boxes for the service of the gun; the horses are harnessed to the limber, and the gun with its carriage is drawn after the latter. An ammunition waggon also accompanies each piece of ordnance, and there are others always in reserve.

Field howitzer carriages and their limbers are similar to those just mentioned, but stronger, and the cheeks of the carriage are farther asunder.

Carriages of a light construction are employed for the small artillery which is used on service in mountainous countries.

The travelling carriages for siege-ordnance are made wholly of oak, and the limber carries no ammunition; the great size and weight of the gun-carriage trail not permitting, when it rests on the limber, the boxes to be placed there. The trail of siege-howitzer carriages does not touch the ground when removed from the limber, but rests and is made to run on two iron truck-wheels.

Carriages for garrison service and for the navy consist of two short cheeks or brackets, connected by transoms, and they move on four truck-wheels. Garrison carriages are now generally made of cast-iron, which is more durable than wood, particularly in tropical climates. High platforms of timber or cast-iron are also occasionally placed at the salient angles of fortresses; they are made to turn at one extremity upon a vertical pivot, the other extremity traversing through ninety or a greater number of degrees. The usual garrison carriage is mounted upon this platform, and thus the piece can be fired over the parapet in any direction at pleasure.

Mortars are placed upon solid beds of wood or iron, which are made as heavy as is consistent with the power of transporting them from place to place, for the sake of obtaining steadiness when the piece is fired. The larger kinds of mortars and their beds are removed on platform carriages. Sea mortar-beds are made of strong timber; they have a hole in the middle for receiving the iron bolt on which the bed turns round, and they are placed on strong wooden frames fixed in the vessels by which they are carried.

The number of horses employed in the British service to draw artillery of the different natures is as follows:—For an 18-pounder or an 8-inch howitzer, from 8 to 10 horses. For a 12-pounder, 9-pounder, a heavy 6-pounder, or a 24-pounder howitzer, from 6 to 8 horses. For a light 6-pounder, a heavy 3-pounder, or a 12-pounder howitzer, from 4 to 6 horses. It may be observed here, that two horses cannot draw a weight twice as great as that which can be drawn by one; therefore the number of horses which should be applied to draw weights must be increased in a higher ratio than the weights.

Formerly two 6-pounder guns were attached to each battalion of infantry, but this practice has long been discontinued, and now all the artillery which accompanies an army into the field is formed into batteries or brigades, each invariably consisting of six pieces. The brigades of foot-artillery consist either of five medium 12-pounders and a heavy 5½-inch howitzer, or five 9-pounders and a 5½-inch howitzer; and a troop of horse-artillery is usually accompanied by five light 6-pounders, besides a light 5½-inch howitzer.

Six-pounder guns were not much employed with the armies under the Duke of Wellington, as they were found to be inferior in effect to the artillery which the French brought into action during the war; they may however be advantageously employed with a corps detached for the purpose of intercepting an enemy's convoy: but it may be observed in general, that field ordnance should be such as may take good effect against troops at the distance of 800 or 1000 yards. Twelve-pounders and even 18-pounders are necessary in the field when it is required to destroy palisades or small intrenchments, to break down bridges, and the like.

The guns hitherto employed in the attack and defence of fortresses have been 12, 18, and 24 pounders: the last are used in the formation of breaches, and the others for the purpose of dismounting the enemy's artillery by direct or by ricochet firing.

With respect to the quantity of ordnance which should accompany an army into the field, no precise rule can be given, as the ratio of the number of men to that of the guns in the great armies on foot during the late wars was very various; but, according to General Lespinasse, a division of 12,000 men, including two regiments of cavalry, should be attended by three brigades of horse and three of field artillery: one brigade of each kind is recommended to be always with the division, another of each kind to remain with the general *park* of artillery, and the rest with the depôt in rear of the army.

The principle which should govern a commander in the choice of guns for naval actions is, according to Sir Howard Douglas, that with equal calibre they should possess the greatest point-blanc range; the practical maxim for using them being to close to, or within that range, and then to fire with precision and rapidity. Long guns are now supposed, in general, to be preferable to carronades for the navy, both because their fire is more accurate, and because, when laid or pointed by the *line of metal*, the axis of the bore is more nearly horizontal in a long than in a shorgun. For the sake of obtaining a nearly horizontal direction when a ship is rolling, it is a common rule in action to fire when the vessel is nearly upright; but this is said to be subject to some limitation, for it may happen that then the ship is in the trough or hollow of the sea, in which case she will have less command over her enemy than if she were on the summit of a wave: and it is recommended that shot intended to take effect on the hull of an enemy's ship should be discharged while the side engaged is descending towards the water; or if intended to act against the rigging, it should be fired with the rising motion of the side, provided the aim be taken low.

Details concerning the exercises of ordnance for land-service may be seen in Spearman's *British Gunner*, under the word 'Exercise;' and for sea-service, in General Sir Howard Douglas's *Treatise on Naval Gunnery*, Part iii.

ORDOVI'CES. [BRITANNIA.]

ORE. [MINING.]

OREBRO. [SWEDEN.]

OREGRUND. [SWEDEN.]

OREL, a government of Great Russia, is situated between 51° 50′ and 55° N. lat. and 32° 50′ and 39° E. long. It is bounded on the north by Kaluga, on the north-east by Tula, on the east by Tambow, on the south-east by Woronetz, on the south by Kursk, on the south-west by Tschernigow, and on the north-west by Smolensk. Its area is stated by Hassel, according to Reymann's Map, at 17,830 square miles; but other writers make it only 16,000 square miles. Schubert agrees with Hassel.

Face of the Country; Soil; Climate.—The country has a considerable elevation, but it contains no mountains. There are some chains of calcareous hills, and some eminences along the banks of the rivers. The soil generally consists of fine sand mixed with fertilising ingredients, and is well adapted to all kinds of grain: in some parts it is composed of a rather more compact clay and loam. There is very little unproductive land, and few heaths and morasses. Some of the rivers belong to the basin of the Dnieper, and others to that of the Wolga; but the greater part of the country belongs to the basin of the Dnieper, and slopes to the south. The principal river is the Desna, which comes from Smolensk, passes through the circles of Briänsk and Trubtschewsk, where it becomes navigable, and, having received several other rivers, runs into the government of Tschernigow. The second river is the Oka, which rises on the frontier of Kursk, and would be navigable at Orel if the stream were not obstructed by numerous mills. It receives several small rivers, by which it is so enlarged, that during the whole summer it is navigable for flat-bottomed boats of the burden of 25,000 poods (900,000 lbs.), and when the water is lower, of 15,000 poods: no part of it is obstructed by rocks. The third principal river is the Sosna, the source of which is near that of the Oka; it runs to the north-east, receives on both sides several smaller streams, and falls into the Don on the frontier of Woronetz. There are no large lakes, but the province is extremely well watered by streams. It is of a very uniform temperature and very healthy. A general failure of the crops is extremely rare. The waters are frozen at the end of November, and thaw in the beginning of March.

Natural Productions.—Orel is one of the most fertile provinces of the empire. For corn in general the ground is never manured; but when it is greatly exhausted, it is suffered to lie fallow. All kinds of corn are cultivated, a little flax, much hemp, and in some places tobacco. Horticulture is pretty general; almost every landowner has his kitchen-garden and his orchard, in which all the culinary vegetables common in Russia are cultivated; also abundance of hops, apples, and cherries, and in some parts pears and plums. There are woods and copses in all the circles. The commonest trees are birches, alders, firs, aspens, limes, elms, and willows. Oak-forests cover the banks of the Desna, but there is so much waste that they are rapidly diminishing The chace, though a secondary occupation, is profitable, and very generally followed by the inhabitants. They hunt chiefly the fox and the hare. Birds, especially quails, are very abundant. The breed of domestic quadrupeds is better and more attended to than in the northern provinces. the horses are a fine breed, fit both for draught and the saddle, and there are many studs, which are supplied with stallions from other countries. The oxen are large and strong, and are used for draught. The sheep furnish good wool. Swine are very numerous. The inhabitants keep likewise great quantities of bees. The common domestic fowl and geese are generally kept. The mineral products are lime, millstones and grindstones, alabaster, saltpetre, and some bog-iron. No use is made of the peat which is found in the government.

Manufactures and Trade.—Agriculture and the breeding of cattle are the chief occupations of the inhabitants. The occasional employments of the women are spinning, weaving, and knitting; of the men, felling timber, and other work in the forests, lime-burning, stone-hewing, and saltpetre-boiling. There are no manufacturing establishments in the villages, and few mechanics. The country-people make for themselves almost everything that they have need of. There are however some iron-works, mills, &c. In the towns there are manufactories of coarse woollen cloths, linen, sail-cloth, table-linen, leather of various kinds, cordage, paper, colours, glass, earthenware, soap, &c. There are numerous brandy distilleries.

The chief articles of exportation are bar-iron, nails, steel, wire, window glass, brandy, bass mats, sacks, cordage, corn, flour, hemp, oil, some fir masts, balks and planks, tobacco, horses, oxen, tallow, butter, honey, wax, and other productions of the country. Almost all articles of foreign produce and manufactures of which the inhabitants are in want are procured from Moscow. The principal trading towns are Orel, Siäwsk (or Sewsk), Jeletz, and Briänsk.

With respect to the population, the same uncertainty exists as with regard to that of many other parts of Russia. Hassel, in 1821, states it at 1,270,000; Schubert, in 1835, states it at 1,229,000. Schnitler, in 1835, gives 1,300,000; yet he says that the official census for 1796 made it 935,000: and he shows, by the official account of several years between 1820 and 1830, that the average annual increase is above 20,000, which, says he, must have made a prodigious addition to the population since 1796. In fact it would make in 38 years, 760,000, which, added to 935,000, makes 1,695,000; and he himself makes three estimates, which give 1,553,000, 1,685,000, and 1,742,000 respectively, yet fixes on 1,300,000. We have reason to believe that the actual amount is a million and a half. The inhabitants are partly Great Russians, partly Little Russians and Cossacks; the great majority are of the Russian Greek church, and the head of the clergy is the bishop of Orel and Siäwsk. They have the character of being industrious and frugal, and are for the most part in easy circumstances; they however do not seek refinement, and dislike innovations.

OREL, the chief town of the government, is situated in 52° 56′ 40″ W. lat. and 36° 6′ E. long. It stands on the river Oka, where it is joined by the Orlik. The houses are in general of wood, and the interior of the town is gloomy. Up to the seventeenth century, Orel seems to have been an insignificant place; but it was then fortified, and a citadel built, part of which still remains. During the wars with the Poles, and in the time of the false Demetrius, it was frequently taken and retaken. Since that time it has rapidly increased; at the census in 1783 there were only 7762 *souls* (*i.e.* males), which implies a population of 15,000 or 16,000: in 1820, there were 20,000; and the official report of the civil governor in 1830 states the population at 31,000: it is probably (in 1840) nearly 40,000. This increase may be easily accounted for. Orel is well situated for trade; it is the entrepôt for the corn of Little Russia, and the place from which Moscow draws its chief supply. Corn and hemp are sent to St. Petersburg to be exported. Other articles are wine, procured from the southern to be sold in the northern provinces, tallow, butter, honey, wax, wool from Little Russia, hogs' bristles, and leather. There are manufactories of linen, cordage, and soap. The annual fairs are very well attended. Besides the buildings belonging to the crown, there are 20 churches, two of which are of wood, 2 convents, and a bazaar. The town, which is a bishop's see and the seat of government, has a gymnasium, a district school, and a seminary for the education of priests for the Greek church. In the vicinity there are many extensive gardens.

The other principal towns in this government are Siäwsk (or Sewsk), with 5000 inhabitants, the see of a bishop, with a seminary for 400 pupils; there are manufactures of earthenware, colours, &c; Briänsk on the Desna, with 5000 inhabitants, has a seminary, a cannon foundery, tanneries, and much trade with Kherson; Karatscheff, with 6000 inhabitants; Trubtschewsk, on the Desna, an antient town, with 3500 inhabitants; Dmitrowsk has 3000 inhabitants;

Kromy, 2000 inhabitants; Maloi-Archangelsk, 1500 inhabitants; Liwny, on the Sosna, 6000 inhabitants; Jeletz, on the Sosna, with 8000 inhabitants, has a great trade in iron wares and corn; Mzensk, at the junction of the Mezna and the navigable river Sudscha, has 6000 inhabitants; Bolchow, on the Nugra, is a well-built town, with 14,000 inhabitants. These 12 towns, including Orel, are the capitals of the 12 circles of the same names.

(Stein, 1820; Hassel, 1820; Hörschelmann, 1833; Schubert, 1835; Schnitler, 1835.)

ORELLANA. [AMAZON.]

ORELLA'NA, FRANCISCO, the first European who traversed the continent of South America, was born at Truxillo in Old Spain, about the beginning of the sixteenth century. He was of a good family, and, like many others of the same class, went to the New World to seek the wealth which he wanted at home. He accompanied the successful expedition of Francisco Pizarro to Peru in 1531. A cacique having reported that a country existed beyond the mountains east of Quito, abounding in gold and silver, cinnamon and other aromatic productions, the love of enterprise and the greediness of the Spaniards were excited. Gonzalez Pizarro, brother to Francisco, undertook to penetrate the trackless forests and snowy mountains lying between the city and this desirable country.

Orellana attached himself to Gonzalez, and they set forward on their expedition in 1540. The natural impediments they met with were severe, and the earthquakes, thunder, lightning, and torrents of rain which they experienced, by cutting off their communications, reduced them to the greatest extremities. At length they reached the province of Zumaco, where they found the cinnamon-tree growing in great abundance. From Zumaco, Gonzalez explored the country to the east, and followed the course of a river, supposed to be that branch of the Marañon called the Napo, for 200 leagues, when the supply of roots and berries on which they had been living became so scanty, that some expedient was necessary to obtain provisions. Accordingly, Orellana was ordered to proceed down the river in the bark which they had built, and having loaded her with provisions, to return immediately, leaving the baggage behind him. Orellana went forward until he arrived at the confluence of this branch with the main stream. He found however nothing but impenetrable forests and flooded plains. Either the ambition of discovery or the utter inability of his exhausted crew to row back against the heavy stream induced him to proceed. They were put to the greatest straits; they eat their shoes and saddles, many were killed in frays with the Indians on the shores of the river, and mutinies broke out among his people, which were only quelled by the firmness of Orellana. Having by his skill and perseverance overcome all these difficulties, he reached the sea in August, 1541, having navigated this vast river above one thousand leagues. On his return to Spain he spread such wonderful reports of the 'El Dorado' that he had passed through, of the temples roofed with gold, and of the Amazons inhabiting the banks of the river, that he soon obtained numerous followers, and the king of Spain granting him extensive possessions, he returned to the river Amazon in 1549, but shortly after fell a victim to one of the diseases prevalent in the low and swampy situations of the tropics. We know nothing of the details of the countries through which Orellana passed, nor was it until lately that any persons were willing to undertake so difficult and dangerous a journey. Lieutenant Maw, R.N., performed it in 1828, and Lieutenant Smyth, R.N., in 1834.

ORENBURG, the most westerly government of Asiatic Russia, is situated between 47° and 56° N. lat. and 50° 20′ and 64° 20′ E. long. It is bounded on the north by the government of Perm, on the north-west by Wiätka; on the west by Casan, Simbirsk, Saratof, and Astrachan; on the east and south by the steppe of the independent Kirghises, and on the north-eastern extremity by Tomsk and Tobolsk. Its area, according to Schubert (with whom Arsinief and others agree much more nearly than usual), is 118,650 square miles: Hörschelmann however makes it 134,400 square miles. It is divided into twelve circles.

Face of the Country; Soil; Climate.—Towards the south, in the country of the Cossacks of the Ural, the government is a steppe, which is destitute of trees, and only produces the plants peculiar to saline countries. Beyond the mountains it is a plain intersected by morasses and a great number of lakes; on this side of the mountains the surface is undulating, remarkably varied, and often very picturesque. To the north, where the Ural chain enters the government, it is called the Baschkirian Ural; the part which runs directly south, parallel with the river Ural, which it meets by making a sudden bend from east to west, is called the Gouberlin mountains, branches of which, stretching from east to west, extend into the government of Astrachan, and form what is called the Obstschei-Syrt. The base of the Ural chain is granite; the upper rocks are calcareous and quartz, sometimes bare, and covered with erratic blocks, and sometimes covered with a sufficient depth of sand and earth for the trees to take root. Immense caverns open into the interior of these mountains. The whole of the western part is fertile. The principal river is the Ural, which rises in the Ural mountains in the district of Troitsk, and forming in part of its course the western boundary between Orenburg and Astrachan, discharges itself by several mouths into the Caspian in 47°. N. lat. Its entire course, which is rapid and winding, but without falls, is above 1600 miles; its breadth, which is only 60 feet at Orskaia, and 150 at Orenburg, increases to 480 feet, but the water is so shallow that it is navigable only for very light vessels. It is however a very useful barrier to protect Russia against the nomade tribes of the steppes. Other rivers are the Kama, the Sakmara, which falls into the Ural, and the Belaia, at the conflux of which with the Ufa, the chief town Ufa is situated. There are numerous lakes, salt as well as fresh, on both sides of the Ural mountains. The Kamunisch-Samarskoi lake is, properly speaking, composed of six small lakes, which sometimes form one great sheet of water 130 miles in circumference. The climate varies considerably between the north and the south; and it is much more rigorous to the east than to the west of the Ural chain. In the steppes the heat in summer is very great. The winter is generally cold, and even in summer the nights rapidly become cool. The greatest degree of heat at Orenburg is + 33° Réaumur (106¼° Fahr.), and the greatest cold − 23° Réaumur (− 19¾° Fahr.). Whirlwinds and hurricanes are frequent, and the sudden transitions from heat to cold produce fevers and other disorders; yet it does not appear that the mortality is unusually great. The want of rain and the swarms of locusts are very distressing, especially in the south.

Natural Productions.—Agriculture, in which the Tartars, and next to them the Russians excel, is in general flourishing, and is favoured by the goodness of the soil. The chief grains are rye, barley, oats, buckwheat, and millet. The inhabitants grow but little flax, hemp, tobacco, and vegetables. The forests are of immense extent, but there is an enormous consumption of wood in the forges, for making charcoal, for the preparation of tar and potash, and for building houses and barks. Game is abundant in the forests, and the lakes abound in water-fowl. The golden eagle of the Ural may be tamed and trained for the chase. The chief wealth of the government consists in its horses and cattle. The former, which are of Tartar or Baschkirian breed, are handsome and strong; the Baschkirs and Metscheriaks have herds of 200, 1000, and even 2000 horses; the Russians, the Cossacks, and the Tartars, of 50 or 100. All have great numbers of oxen, goats, and more especially of sheep, of which a nomade will have from 500 to 4000, and the stationary inhabitants 400 or 500. The Christians possess great numbers of swine, and the nomades camels or dromedaries. The fishery in the Belaia and the Kama suffices for the consumption of the inhabitants; and that in the Ural is a source of considerable advantage to the Cossacks. This government possesses likewise great mineral wealth in the various mines; it produces gold in great abundance [URAL MOUNTAINS], copper, iron, and a great quantity of salt, which is procured from the mines of Iletzk, where the rock-salt is found four or five feet under the sand in beds covered with gypsum; the Cossacks however obtain their salt from the lakes. The other mineral products are asphaltum, sulphur, vitriol, marble, alabaster, agates, &c.

The *Population* of Orenburg, now estimated at 1,525,840, is extremely mixed; it consists of Great and Little Russians, besides some Finns, Cossacks, Tartars, Baschkirs, Teptjiars, Metscheriaks and Calmucks, Tchonvaches, Tcheremisses, Mordwins, Kissilbaches, and Armenians. The great majority are Russians; next to them are the Turks or Tartars, and the Baschkirs (about 15,000 families). Almost the whole of these ignorant, rude, and warlike people inhabit a district at the foot of the Ural chain, which is called after them, Baschkiria. They live by the breeding of cattle and bees, by the chase, and agriculture. They dwell in the summer under tents made of felt, and in winter in villages.

Manufactures and Commerce.—There are few manufacturing establishments in comparison with the extent of the country, the inhabitants in general being able to provide for their own wants. The women are extremely skilful in weaving and dyeing. The working of the mines employs a great number of hands. But manufacturing industry has made great progress within the last thirty years. According to the journal published by the direction of the government, there were, in 1838, 187 different establishments, which employed above 4000 workmen, not including those in the smelting-houses and founderies of the Ural mountains, or those in the manufactory of arms at Zlutoust: 63 tanneries dressed 30,000 skins a-year; six millions and a half pounds of potashes were made in 70 establishments; there were 10 great brandy distilleries, one brewery, 7 manufactories of woollen cloth for the army, 43 tallow-melting houses, 2 candle manufactories, and 1 glass-house.

There are some remarkable facts connected with the commerce of this government. It is carried on partly with the nomade tribes in the government itself, who exchange their horses, cattle, furs, carpets, and blankets of felt or wool, for English and Russian manufactures, brass, copper, and iron articles, and partly with the Kirghises and people of Bokhara, whose caravans come to Orenburg or Troitsk, the two chief commercial towns, where there are custom-houses. Through the same channel many goods are exported to Khiva, Bokhara, Taschkend, and the Kirghis steppe. The articles exported to the interior of Russia in Europe are chiefly the mineral products, many of which are sent to the ports on the Baltic. These caravans coming from Bokhara bring likewise the productions of that country, especially raw and manufactured silk and cotton, and also Cashmere and Persian shawls, indigo, Chinese goods, tea, &c. The fair of Orenburg has lost much of its importance since the merchants from Bokhara have been permitted to frequent the fair of Nischnei Novogorod. Orenburg is now only the place through which the caravans pass on their way to Europe; the Russian merchants residing there have however always opportunities to purchase goods from Bokhara, both for this government and that of Casan, while the merchandise which has been brought so far by camels is unloaded in order to be forwarded to Europe in waggons. In 1833, 14 caravans arrived at Orenburg, consisting of 2547 camels and 27 horses, with goods to the value of 3,551,198 rubles; and 13 caravans were despatched to the frontier, consisting of 4769 camels and 264 draught horses, with goods to the amount of 3,557,922 rubles. In 1838, eight caravans arrived, one of which consisted of 334 and another of 3206 camels. Twelve caravans were sent from Orenburg.

Education and Religion.—For public instruction Orenburg depends on the university of Casan, but education is very limited; according to the latest accounts that we have seen (1833), there were seven schools, with 30 teachers and 925 scholars, all males. The Mohammedans study at the high school of Gargali: a school was opened in 1833 at Tscheliaba, at the foot of the Ural Mountains, in the midst of the Baschkirs. The Russian clergy had also seven schools, with 21 masters and 564 scholars. The Tartars have schools attached to most of their mosques. There are two printing-offices, supported by the crown. Most of the inhabitants, the Great Russians, many Little Russians and Cossacks, and almost all the proselytes, Tscheremisses, Tschonvasches, Mordwins, &c. are of the Russian Greek religion. Most of the Little Russians and Cossacks are Rossolnicks. Of the other Christians, the Armenians and Lutherans have their churches. The Mohammedans, whose Mufti, assisted by a council, resides at Ufa, have 1714 mosques, of which 1684 are of the first class, with 2219 Imans, Mollahs, and other attendants. All the Tartars, the Baschkirs, Calmucks, Teptjiars, and Metscheriaks are of this religion.

The civil government is organised like those in Great Russia, but does not extend to the Kirghises and Cossacks, who are under a military governor, whose chief business is to provide for the security of the frontier, which is defended towards the Kirghis steppe by a line of fortresses, and by the Cossacks, the Metscheriaks, the Baschkirs, and the Calmucks, who in consideration of this service are exempt from all taxes to the government. The forts on the line of the Orenburg extend from Iletzkaja-Kreposth to the river Tobol in the north, at the distance of three miles from each other. From Iletzkaja-Kreposth southwards to Gurief is the line of the Cossacks of the Ural, defended in like manner by a long series of small forts.

Orenburg, formerly the capital of the government, is situated in 51° 46′ N. lat. and 52° 31′ E. long., in a vast plain at the conflux of the Sakmara and the Ural: it is of an oval form, pretty regularly built, and well fortified. The population is stated to amount to 20,000. There are nine Greek churches, one Lutheran church and school, a military academy for eighty pupils, a great European bazaar with 180 shops in the town, and an Asiatic bazaar with 492 shops in the Kirghis territory, a league from the town, which is the depôt for the merchandise of Central Asia and of Russia. The Kirghises bring annually between 300,000 and 400,000 broad-tailed sheep, horses, skins, carpets of divers colours; the Bokharians bring gold in grains, Persian gold and silver coin, lapis lazuli, precious stones, lamb-skins of a shining black colour which are worth a ducat in Bokhara, and at Orenburg sixteen shillings English a piece. There are at Orenburg 1000 exiles, for whom there is a very well arranged workhouse. The military governor resides here.

Ufa, the present capital, a fortified town at the conflux of the Ufa and the Belaia, has 6000 inhabitants, half of whom are Tartars. The public institutions and buildings are a gymnasium, a poor-house, a lunatic asylum, seven churches, and two convents. It is the see of the bishop of Orenburg, and the residence of the Mohammedan Tartar Mufti.

(Schnitler, *La Russie, la Pologne, et la Finlande*; Stein's *Handbuch*, edited by Hörschelmann; Eversmann, *Reise von Orenburg nach Buchara*; Ermann, *Reise nach Nord Asien*, 8vo., 1833; *Reise nach dem Ural*, &c., von A. von Humboldt, G. Ehrenberg, and G. Rose—vol. i., by G. Rose; *Russian Official Journals*.)

OREOCI′NCLA, Mr. Gould's name for a genus of birds inhabiting the Himalaya Mountains and New Zealand. The species from the latter locality (*Oreocincla macrorhyncha*) is nearly allied to, but differs from, *Turdus varius* of authors. In the British Museum. (*Zool. Proc.*, 1837.)

ORFA. [Mesopotamia.]

ORFORD. [Suffolk.]

ORFORD, EARL OF. [Walpole, Horace.]

ORGANIC REMAINS. By this term geologists understand the numerous reliquiæ of vegetables and animals which occur among the stratified rocks. The same objects receive also the name of organized fossils, and, with less precision, the titles of petrifactions and fossils. Some of these objects are obviously parts of animals and plants, and retain their original structure, more or less altered by chemical agencies since their sepulture in the earth; others are earthy, stony, or metallic bodies, moulded within or upon parts of animals or plants, and thus resembling those parts in external aspect, but having none of their internal organic texture. Further, we must not exclude from the notion of the 'remains of organic beings' the few cases where *marks* of vital action and movement occur on the surface and in the interior of rocks, such as the foot-prints of quadrupeds on the sandstones of Cheshire and Dumfriesshire, the holes made by lithophagous conchifers in the limestone of Mendip, and the perforations of the valves of conchifers by zoophagous mollusks.

A philosophical view of the bearings of this great branch of modern geological science requires the consideration of the following questions:—

1. What are the tribes of animals and plants which occur imbedded in aqueous deposits of great antiquity, or (as rather improperly termed) in a 'fossil' state?

2. In what condition are they preserved?

3. In what manner are they distributed in the earth?

§ 1. *Tribes of Fossil Animals and Plants.*

Judging from published catalogues and the course of discovery, the living creation may be estimated to contain 100,000 plants, and far more than double that number of animals. In a fossil state we may say, in round numbers, that 1000 plants and 10,000 animals have been accurately discriminated and classified. The numerical proportions vary according to the groups of plants and animals selected for comparison.

In 1828, M. Adolphe Brongniart, after examining the richest collections then known of fossil plants, gave the following interesting comparative table of fossil and recent species:—

Class of Plants.	Fossil.	Recent.
Agamia	27	7,000
Cryptogamia cellulosa	2	1,500
„ vasculosa	266	1,700
Phanerogamia gymnospermia	57	150
„ monocotyledonea	49	8,000
„ dicotyledonea	100	32,000
	501	50,350
Or	1 to	100

In 1830 Professor Phillips drew up some comparative tables of fossil and recent animals, which were inserted in the 'Encyclopædia Metropolitana.' One of these is subjoined:—

Remains of Animals.

	In the Strata.	In superficial Accumulations.	Living estimated.
Mammalia	35	109	1,100
„ Cetacea	8	.	
Birds	few	few	5,000
Reptiles	71	.	2,100
Fishes	183	.	5,500
Insecta	74	.	100,000
Crustacea	104	.	500
Annulosa	104	.	1,000
Cephalopoda	788	.	100
Pteropoda	5	.	50
Gasteropoda	880	.	3100
Conchifera	2,026	.	1,790
Tunicata	.	.	.
Radiaria	278	.	1,000
Polypiaria	476	.	1,000
	6,027	109	122,100
Or	1	to	20

The relative proportions of recent and fossil animals and plants, taken according to their terrestrial, fresh-water, or marine residence, were thus estimated by Professor Phillips in 1836 (*Guide to Geology*, 3rd edition):—

	Recent.	Fossil.	Proportions.
Terrestrial plants	59,000	500	118 to 1
„ animals	115,500	330	350 to 1
Fresh-water plants	100	40	2 to 1
„ animals	3,560	260	14 to 1
Marine plants	1,000	40	25 to 1
„ animals	11,750	6,065	2 to 1

Discoveries since made show that *all* the tables referred to contain estimates much below the truth; both plants and animals have been found to nearly twice the tabular numbers (fishes, for example, in 1838, were stated by Agassiz to be 800 fossil and 8000 recent); but as the proportions are not very materially affected, we shall not attempt the difficult task of constructing new tables suited to the present amount of knowledge.

The extreme paucity of terrestrial plants and animals in a fossil state is a circumstance very easily accounted for by the analogy of modern nature; for if few of the 60,000 plants and hundreds of thousands of animals find their way by inundations or other causes to modern lakes and oceans, we have no reason to expect the remains of the antient terrestrial fauna or flora to abound in the antient marine or lacustrine sediments. We must therefore always acknowledge the imperfection of the picture which organic remains present to us of the vegetables and animals which antiently covered the early dry land of our planet. On the other hand, the large proportion which fossil shells and zoophyta bear to the corresponding recent classes (nearly as 1 to 1, if the hard parts of the recent objects are alone considered) is exactly what might *à priori* be expected in examining sediments from water; and we may confidently affirm that from data so ample (corroborated by fossil fishes already bearing a proportion of 1 fossil to 10 recent), the condition and character of the antient oceans and lakes may be in a considerable degree known.

Organic fossils bear so general an affinity to existing races, that they may all be conveniently ranked in the same great classes; generally in the same great orders and families; sometimes in the same genera, but rarely, and only in the least antient strata, in the same species. It is very common to speak of them as the 'organic remains of a former world,' but the relations which appear between the existing creation and the imbedded plants and animals are much more various than this expression implies. We shall see in another part of this article that it would be more correct to speak of organic remains as belonging to several successive conditions of the world, all preceding and preparatory to its actual state.

§ 2. *Conservation of Organic Remains.*

The imperfection of innumerable specimens of fossil plants, shells, fishes, &c., is not entirely nor principally owing to the chemical and mechanical agencies which have been exerted to modify their aspect and substance; on the contrary, the broken condition of many fossil trees, and the scattered situations in which their stems, leaves, and fruits occur, and in some cases the loss of part of their structure, are to be ascribed to the turbulent action which accompanied their inhumation, and to the exposure and decomposition which they had previously sustained. Among fossil bivalve shells it is very common to find the pieces separated by the decay of the hinge ligaments; not unfrequently the shells are broken; sometimes they are rolled and worn. These accidents preceded their inclusion in the rocks, and they are indications not to be mistaken of the condition of the waters in which the mollusca lived, and the rate and circumstances of the deposition of sediment.

In whatever condition buried, the remains of plants and animals have been subsequently affected both by mechanical and chemical forces: the effect of the former is evident in the compressed ammonites of Watchet, Tytherton, and Speeton, in the goniatites and pectens of Bradford in Yorkshire, and in the fishes and ichthyosauri of Charmouth. Some of the most interesting cases of this mechanical compression are commonly witnessed among the shales and gritstones which cover coal; for the large cylindrical stems of sigillaria and lepidodendron lie *flat* as paper *between the laminæ of shale*, but appear with a depressed elliptical section when they lie *obliquely across the grits*, and retain their *cylindrical* figure whenever they stand *erect* in the rocks.

It is an error to apply to all 'organic remains' the title of petrifactions; a large proportion have undergone some chemical changes, and many have really been impregnated with stony particles; but there is a vast number of tertiary, secondary, and primary fossils which are in no true sense 'petrified.' To judge of the antiquity of organic remains by the degree of their petrifaction would lead to false and empirical results; and, in fact, there are several examples of complete petrification of vegetable substances belonging to the actual creation and historical times. Thus the woodwork of a Roman aqueduct near Lippe in Westphalia (see Mr. Stoke's *Notice in Geological Proceedings*, 1835) is partly petrified; the wood and nuts of the hazel are petrified in a singular manner at Ferrybridge, and on the shores of Lough Neagh; while on the other hand the wood of the lias and Kimmeridge clays is still inflammable.

Some of the conditions of preservation in which fossil plants appear may be thus classed:—

1. The plant little altered; as in the brown coal formations of the Rhine, and in a particular case at Gristhorp near Scarborough, among the oolites, where Solenites Murrayana of Lindley is found flexile, elastic, and with its tissues distinct. The same thing was observed by the author at Ardwick near Manchester, in the coal formation.

2. The plant carbonized to jet or coal. This *conversion* of the vegetable substance is very common in clays of every geological age; plentifully so in the coal formation.

3. The substance of the plant entirely removed from the place that it occupied, leaving a hollow where it was deposited. This happens in coarse gritstone, as near Leeds.

4. The cells of the plant filled with extraneous matter, as carbonate of lime in Lepidodendron Harcourtii (see the *Fossil Flora of Great Britain*), pyrites in the fruits of Sheppey, silica in the wood of Woburn.

The remains of the animal kingdom present a parallel series:—

1. Bones of vertebrata generally, scales of fishes, the coverings of crustacea, are often but slightly changed from their original composition. They often retain the gelatinous parts of their mass.

2. Shells, corals, and echinodermata, composed of carbonate of lime with gelatine, have in some cases (and very often among tertiary strata) not lost the whole of their gelatinous part. From this condition of little change there is every gradation observable, till (in the oolites particularly) the whole of the organic substance has been entirely removed, and a cavity is left in its place. The sides of this cavity

retain the *impression* of the external surface of the coral or shell; and it not unfrequently happens that in the cavity once occupied by a shell is an almost unattached mass of stone, which filled the interior of the shell, and represents the figure of the animal, in several respects, perfectly.

3. Into this cavity carbonate of lime has been again introduced in solution, so as to become clearly crystallized in solitary rhomboids, or in a connected mass, replacing completely the gelatine and carbonate of lime which composed the original shell; in other cases silica, and, rarely, iron pyrites, fill up the vacuity.

4. The green-sand formations show abundance of examples of the impregnation of the calcareous substance of shells, corals, and echinodermata, with a siliceous infiltration.

Now the chemical changes thus briefly sketched, in the substance of plants and the hard parts of animals, are found partly dependent on the original nature of the bodies and partly on that of the rocks in which they occur. In almost all sorts of rocks, belemnites and ostracea retain their fibrous or lamellar structure; in the oolitic rocks calcareous impregnations abound, and in the green-sands most of the shells, spongiadæ, &c. are siliceous.

§ 3. *Distribution of Organic Remains in the Earth.*

The occurrence of organic remains is not known to be dependent on depth below the surface of the earth or on particular height above it. Fossil plants occur in our deepest collieries, and fossil shells crown very lofty points of the Alps and Pyrenees. Yet, because of the limited thickness of the strata, and the entire absence of organic reliquiæ from the granite masses below them, it is evident that at the depth of a few thousand yards below the surface, in most situations, the traces of antient life end. In like manner, because in general the *lower strata*, in which few or no organic forms remain, rise to the highest ground, many mountain ranges are almost or absolutely deficient in fossils. Upon the whole these are most numerous in the lower parts of the earth's surface, because the formations there occurring are generally of a later origin than the stratified rocks which are uplifted into mountain-chains.

In modern oceans the occurrence of marine mollusca, zoophyta, &c., in a living state, is either known or inferred to be limited to moderate depths, from 10 to 100 or 1000 feet; when therefore we reflect on the vast abundance of shells in the Silurian strata, buried beneath several thousand feet of old red-sandstone, or of the comparable phenomena presented by the mountain-limestone shells which are covered by 3000 or 5000 feet of coal strata, we see clearly in these cases the *probability* (independent of the *proof* deduced from considering the nature and position of the rocks) of the occurrence of great upward and downward movements affecting large breadths of the ancient oceans.

Shells, fishes, and polypiaria affect, while living, peculiar situations; the rocky, sandy, and argillaceous parts of the sea-bed yield radiaria, cardiacea, and ostracea in very unequal abundance, and it is worth inquiry how far such relations and peculiarities can be discovered among fossil reliquiæ. If antiently vegetables were swept down by inundations from the land and buried in marine or fresh-water deposits, we ought to find some correspondence between these deposits and the sediments which now, in various parts of the world, are drifted with the trees and herbs to great inland lakes, æstuaries, or the open sea. This expectation is justified by observation. It is almost exclusively in arenaceous and argillaceous strata, which for other reasons geologists have inferred to be detrital deposits, that we find the specimens of terrestrial herbs and trees, mostly fragmentary, and often accumulated in irregular patches. This is well seen in the arenaceous strata of the Yorkshire coast. Again, it is principally in limestones that we find the lamelliferous corals and a large proportion of the echinodermata, and this is in accordance with observation of the analogous living races. Some of the antient limestones (as at Torquay, Aymestry, Garsdale, &c.) appear in fact to be composed of little else than the hard parts of polypiaria and echinodermata, and thus closely approximate to some modern coral reefs. Another example of this accordance of habits of life between fossil and recent groups may be taken from the ostracea, which abound remarkably in the argillaceous strata and on the mud-banks of modern seas. One fossil species (*Ostrea deltoidea*) forms *continuous beds* in the Kimmeridge clay of England and France, almost unmixed with other shells, and extending many miles near Weymouth, in North Wilts, in Yorkshire, and at Hâvre. In collecting fossils from the oolitic or carboniferous systems of strata, the abundance of fossils in the calcareous parts, contrasted with the paucity of them in the sandy beds, strikes every observer, and by carefully attending to these and other cases of the definite relation which fossils present, both as to number and kind, with particular sorts of rock, geologists may hope by degrees to arrive at just views regarding the circumstances of the existence of antient marine animals, the conditions and directions under which terrestrial plants were drifted, and the manner in which both classes of fossils have been buried in chemical sediments or mechanical aggregations.

But the circumstance to which the laws of distribution of organic remains in the earth are most distinctly and constantly related, is the antiquity of the strata. This will appear from the following brief statements.

In the oldest of all the strata known to geologists, the gneiss and mica schist systems, which repose upon the unstratified granites and congeneric rocks, few or rather no traces of organic life appear. Hence it is that organic fossils appear excluded from particular geographical areas, as for example frequently from the interior parts of great mountain-ranges, which are generally composed in a considerable proportion of these antient '*primary*' strata.

On the contrary, among the more recent of the marine strata for example, the eocene tertiary strata of London and Paris, the number of organic fossils is prodigiously great. If these contrasted cases were the only ones which appeared to suggest a law that 'the *number of organic fossils in the strata continually augmented from the earliest primary to the latest tertiary rocks*,' they would deserve attention; but the supposition becomes changed into exact inference by comparing successively the systems of strata on a uniform plan. The table already given in the article Geology and the remarks which accompany it [vol. xi., p. 148] will illustrate this point.

Such being the facts with regard to the *number* of species of organic remains in the several systems of strata, we may next inquire as to the distribution of the several *kinds* of fossil plants and animals. Taking the broadest view of the subject first, we may represent the distribution of the *classes* of plants and animals in compendious tables. The classification of animals is that used in the 'Cyclopædia of Anatomy and Physiology,' and we include in the term 'Palæozoic,' all the generally argillaceous and arenaceous strata between the mica schist and the old red-sandstone. The asterisks indicate affirmatively the discovery of plants belonging to the classes named in the columns above, in the systems of strata included between the same horizontal lines.

Distribution of the Classes of Plants.

Systems of Strata.	Agamia.	Cryptogamia cellulosa.	Cryptogamia vasculosa.	Phanerogamia gymnospermia.	Phanerogamia monocotyledonea.	Phanerogamia dicotyledonea.
Tertiary . . .	*	*	*	*	*	*
Cretaceous . .	*	—	*	*	*	—
Oolitic . . .	*	—	*	*	*	—
Saliferous . .	*	—	*	*	*	—
Carboniferous . .	*	—	*	—	*	—
Palæozoic . .	*	—	*	—	—	—
Primary . . .	—	—	—	—	—	—

It is thought by some writers that true dicotyledonous plants occur in the carboniferous strata. It is perhaps uncertain whether the fossil plants of the slaty strata of the Rhine and Brittany are rightly referred by Brongniart to the Palæozoic period.

The reader will not fail to remark that the classes belonging to the columns marked ‡ below, are represented in all the fossiliferous strata, and that they all contain *hard conservable parts*, more abundantly than any other of the classes. They are also principally *marine*, some of them exclusively so. These facts should make us scrupulous in believing that the full system of antient organic life is disclosed to us by the series of organic fossils preserved in the earth.

Distribution of the Classes of Invertebral Animals.

Systems of Strata.	Polygastrica.	Porifera.	Polypifera.	Acalephæ.	Echinodermata.	Entozoa.	Rotifera.	Cirrhopoda.	Annelida.	Myriapoda.	Insecta.	Arachnida.	Crustacea.	Tunicata.	Conchifera.	Gasteropoda.	Pteropoda.	Cephalopoda.
Tertiary . . .	•	•	•	—	•	—	•	•	•	•	•	•	•	—	•	•	•	•
Cretaceous . .	•	•	•	—	•	—	—	•	•	—	—	—	•	—	•	•	—	•
Oolitic . . .	—	•	•	—	•	—	—	—	•	—	•	—	•	—	•	•	—	•
Saliferous . .	—	—	•	—	•	—	—	—	—	—	—	—	•	—	•	•	—	•
Carboniferous . .	—	—	•	—	•	—	—	—	—	—	•	•	•	—	•	•	—	•
Palæozoic . .	—	—	•	—	•	—	—	—	—	—	—	—	•	—	•	•	—	•
Primary . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			‡		‡								‡		‡	‡		‡

Distribution of the Classes of Vertebral Animals.

Systems of Strata.	Pisces.	Amphibia.	Reptilia.	Aves.	Mammalia.
Tertiary . . .	•	•	•	•	•
Cretaceous . .	•	—	•	—	—
Oolitic . . .	•	—	•	•	•
Saliferous . .	•	—	•	—	—
Carboniferous . .	•	—	—?	—	—
Palæozoic . .	•	—	—	—	—
Primary . . .	—	—	—	—	—

Fishes are the only class of vertebrata found in all the systems of strata. Reptiles begin to appear (if not in the carboniferous system) certainly in the next above. Birds and mammalia appear locally and rarely in the oolitic rocks, and we believe the amphibia (fresh-water tribes of Batrachida) are not known in strata older than the tertiaries. If, lastly, we inquire in what part of the series of aqueous deposits the remains of Man have been found, the answer furnished by modern observation is very different from the fanciful conjectures common in the seventeenth century. Then the remains of men, 'evidences of the deluge' (as Scheuchzer calls his imaginary fossil man, but real fossil salamander!), were supposed to be common in rocks of every age; now we are not able to quote a single authentic example of any such occurrence except in loose surface soil, sand, gravel, and caverns, in which, not uncommonly, pottery, fabricated bones, and other marks of rude civilization accompany the reliques of our progenitors. If this absence of the bones of men from the marine strata were the only evidence which geology had to offer concerning the comparatively late creation of man, we might excuse the singular error which from time to time is revived by speculators little acquainted with the progress of science, the error of attributing to the human race, for whom the present aspect and arrangement of the globe is adapted, the same antiquity of origin as to those numerous tribes of plants and animals which became extinct before the birth of man, and were adapted to other and earlier conditions of the planet.

We may produce a few of the proofs necessary to the establishment of this truth, by determining first, what are the degrees of analogy to existing races presented by the organic fossils of the different systems of strata. As before observed, the remains of terrestrial plants and animals occur too rarely, and in a certain sense too accidentally, in the strata of marine origin to be of much importance in this reasoning. Taking then our examples chiefly from marine tribes, we may state that in the Palæozoic strata none of the species are known to be now living, and about two-thirds of them belong to genera which are also extinct. Among these extinct genera are the whole group of Trilobites, the Clymeniæ, Goniatites, Orthocerata, Phragmocerata, &c., Productæ, and many lamelliferous corals.

All the species in the carboniferous system are in the same manner extinct, and fully half of the marine tribes belong to extinct genera, often identical with those in the Palæozoic series. Here we find some hundreds of terrestrial plants (Lepidodendron, Stigmaria, &c.), now entirely unknown among the 60,000 which botanists are acquainted with. Nearly the same proportion of the species found in the saliferous and oolitic systems (about 40 per cent.) belongs to extinct genera (all the species being unknown in modern oceans). Among these genera we have the gigantic reptile forms, the Enaliosaurians, the Iguanodons, the Megalosaurus; the countless Cephalopods, Ammonites, and Belemnites; many Crinoidea and Echinida, besides plants approaching to Zamia, Equisetum, and tropical ferns.

The cretaceous system in like manner contains many extinct genera (Mososaurus, Turrilites, Scaphites, Ananchytes, Marsupites, &c.), in which about 40 per cent. of the species yet found may be ranked. All the species are distinct from existing tribes.

But in the tertiary strata, which crown the series of marine deposits, a different result has rewarded the diligent comparison between fossil and recent species. The great number of shells in these deposits gives excellent means of judgment, and M. Deshayes has in consequence been able to establish very exact inferences. In the oldest of the tertiaries ('Eocene deposits' of Lyell) there occur from three to five per cent. of existing species. In those of middle age ('Meiocene deposits') from 7 to 28 (averaging 18 per cent.); but in the uppermost series of tertiaries ('Pleiocene deposits') from 40 to 95 per cent.

Thus by estimates, as exact as can be made, of the whole number of species, geologists are enabled to perceive clearly that the affinity between fossil and recent species of animals and plants is greatest in the most recent strata, least in the most antient, and in general is *inversely* proportional to the antiquity of the strata. Not only man is absent from the fossil world of life, but nearly all the actual creation is wanting there, and is replaced by the relics of other and earlier creations.

By considering and comparing the organic remains which fill the successive systems of strata, we find that, as few living forms appear among the lower tertiaries, few or none of the tertiary forms appear in the lower parts of the cretaceous system: this system is in the same manner distinct from the mass of the oolites, these from the red-sandstones, the latter from the carboniferous rocks, and all from the Palæozoic groups. (For proof of this, compare the following works, namely—Murchison's *Silurian System*; Phillips's *Mountain-Limestone Districts of Yorkshire*; Smith's *Strata Identified*; Mantell's *Geology of Sussex*; Deshayes's *Tertiary Fossils*.)

Each of these systems of strata contains the reliquiæ of animals and plants which were in existence in the sea, in fresh waters, or on the land, at or previous to the time of the production of those strata; and, by combining the evidence derived from all, we arrive at a view, incomplete indeed, yet not necessarily inaccurate, of the *succession of organic life upon the globe*.

It is perhaps a common opinion that the earliest forms of life, those which occur in the fossiliferous primary (or Palæozoic) rocks, are of simpler organization than such as belong to later periods; and a conjectural view of the succession of organic life on the globe obscurely hints at a gradual 'perfectionnement' of the animal and vegetable organizations in proportion to the elapsed time. In favour of this view, the first occurrence of fishes in the uppermost of the Silurian strata, and the first occurrence of reptiles in the lower beds of the magnesian limestone formation, deserve consideration. But on the other hand, it is not to be concealed that the earliest fishes which do appear exhibit analogies to reptile structure, and betray no mark of inferior organization; and the earliest remains of reptiles belong to high grades of that class.

On referring to the most antient known British fossils, those few which lie in the slates of Snowdonia, we find them to consist of lamelliferous *Polypiaria* and *Brachiopoda*, such as Lingula, Producta, and Spirifera—a small assortment certainly, and thus perfectly in harmony with the view of the gradually increasing numerical amount of fossil forms already explained, but not such as to justify a statement of their inferiority of organization. In the next stage of organic life, the Silurian system, the fossil species amount to several hundreds (at least 600), and among them are many *Polypiaria*, many *Echinodermata*, *Brachiopoda*, and other *Conchifera*, *Gasteropoda*, and *Cephalopoda*, with *Crustacea* and *Fishes*. It cannot be said that these organizations, compared with others of the same class now living, are, in any just sense, inferior or less complex; nor do we find reason to qualify this assertion while reviewing the similar and larger series of fossils from the carboniferous system, in which *Fishes* become numerous and varied in structure.

It is needless to pursue this discussion through the superior stages of the strata, in which the introduction of *Reptiles* and the development of the several classes of animals continually augment the analogy to the existing system of nature. The general result of this whole discussion, if we had room to pursue it, would be to establish the fact of the successive introduction of all the classes and most of the great divisions of marine animals in the successive geological periods, not by the improvement or expansion of one original general type, but by addition of *new organizations* to meet *new physical conditions* of the globe.

This important result, which presents to us a series of great revolutions in organic life anterior to the desiccation of our present land (which is the bed, or rather exhibits many successively obliterated beds, of the antient seas, with their extinct inhabitants), and adapted to the chain of physical phenomena which preceded and prepared the actual arrangements of nature, may be confirmed by a brief notice of the duration of certain extinct races. By this expression it is not meant to state or to insinuate definite periods of time, but the space occupied on a scale of successive geological events, by the whole traceable duration of particular races of animals. For this purpose we shall take two genera of Brachiopoda (Producta, Spirifera), four of Cephalopoda (Goniatites, Orthoceras, Ammonites, Belemnites), three of Crustacea (Calymene, Asaphus, Glyphia), three of Fishes (Holoptychus, Palæoniscus, Tetragonolepis), and three of Reptiles (Ichthyosaurus, Pterodactylus, and Mososaurus). The systems of strata being, as before, represented by horizontal lines, and the particular fossils ranged in vertical columns, the asterisks denote the occurrence and geological duration of the groups.

Systems of Strata.	Producta.	Spirifera.	Goniatites.	Orthoceratites.	Ammonites.	Belemnites.	Calymene.	Asaphus.	Glyphia.	Holoptychus.	Palæoniscus.	Tetragonolepis.	Ichthyosaurus.	Pterodactylus.	Mososaurus.
Tertiary . . .															
Cretaceous . .					•	•									•
Oolitic . . .		•			•	•			•			•	•	•	
Saliferous . .	•	•			•						•				
Carboniferous . .	•	•	•	•				•		•					
Palæozoic . .	•	•	•	•			•	•		•					
Gneiss, &c. . .															

Here then is a representation of very numerous facts known to geologists, which demonstrate that each *group* of *extinct organization*, each *genus* of such a group, each *species* of such a genus, has a definite geological range, appears at a particular point in the scale of geological events, and ceases at another point. From these facts, investigated and collected, it is a clear and positive inference that, during the period which elapsed in the production of the stratified rocks, many combinations of animals and plants—in this sense many systems of organic life—came into being and passed away, not by violent catastrophes or universal revolutions, but by partial substitutions distinctly traceable, often coincident with or consequent on changes of the strata, and more or less referrible to previous remarkable changes in the physical condition of the globe.

From such a view, which we regard as fully established in truth, the 'identification of strata' by organic remains (as geologists, following Dr. William Smith, term the employment of zoological and botanical evidence to determine the geological age of formations or systems of strata) follows as a natural and simple consequence. But in employing this powerful instrument of research, geologists must not overlook ascertained facts which limit the extent and modify the rigour of the application:—

1. The geographical area within which any one species of fossil has been found is limited, and seldom (except in the Palæozoic strata) extends beyond a few degrees of latitude and longitude. (The same thing applies to living species.)

2. The geographical range of fossil genera and larger groups is much greater, but their geological range is also greater, and the evidence which they furnish of geological age is diminished in precision.

3. Difficulties hence arise of a very serious nature where strata really contemporaneous or nearly so, but widely separated (as in North America and Europe), are to be compared. Of 100 species of fossils found in the cretaceous rocks of America, only two or three are identical with European species in the same rock.

4. In all cases where distant deposits are to be classed in age by their organic contents, a prudent geologist will not decide by what is called a *characteristic fossil*, since this may only have a local value; he will not be satisfied with a few fossils of one genus or group; he will not pronounce a positive opinion, unless several species of characteristic groups, and belonging to different organizations, are presented for examination. On such evidence, embodying the *characteristic combinations of organic life* for each geological period, a just and secure inference may rest, and thus employed, 'organic remains' become a clue to many of the darkest pages in the antient history of our planet.

ORGAN, CONSTRUCTION OF. We have on record several kinds of organs—the Hydraulic, the Pneumatic, the Barrel, and the Finger or Church organ.

Of the hydraulic organ we know little beyond its having been operated on in some way by water: it probably resembled the clepsydra, or water-clock, which chimed at certain hours. The pneumatic organ, whether more or less antient than the hydraulic, was certainly the parent of the present finger organ; but it was so decidedly rude in its construction, that it must always be considered as a distinct instrument. The barrel organ is a machine with little variety and no expression; it nevertheless contains many clever contrivances, and is daily receiving improvements. The present finger organ is the largest and noblest of all musical instruments; its power is that of a full band, and for delicacy and sweetness of tone it is unrivalled.

A complete and full finger organ should have *three sets of keys*, and at least *two octaves of pedals*.

The first set of keys takes the *swell*, the second the *great organ*, and the third the *choir*. The compass, as well as the size of organs, must depend upon circumstances. The German scale or compass is C C to F in alt; the English descend to G below, and in some organs as low as C C C, which, for duet and solo performances, is certainly the best. A good swell is always important to an organ, and we should recommend C C to F in alt as the compass to be preferred. The compass of the choir is generally the same as that of the great organ. These several parts, or organs, when brought together by stops, called *couplers*, give to the keys of the *great* organ the command of *every pipe in the instrument*, the power and majesty of which are without parallel in instrumental combinations.

Figure 1 is a section of a large organ, showing the several situations of certain principal parts of the instrument, which are variously placed however by different organ-builders. A is the *swell-box*, which is usually made of deal, and the thicker the better, but it certainly should not be less than an inch and a half in thickness: it must be lined with paper or leather to deaden the tone when shut. The front is formed of *Louvre*-boards, all of which are made to move on centres; they must also be an inch and a half thick. The performer opens them by a pedal expressly employed for opening and shutting the swell. This kind of front is what is known by the name *Venetian*. B is the choir *sound-board*, or part in which the pipes of that part of the organ are placed; C is the great organ *sound-board*, which also contains its pipes; D is the *bellows;* E is the *pedal sound-board*; F is one of the front pipes, to which the wind is conveyed by metal tubes called *conveyances;* G G G are three roller-boards, one for each organ; H is a *tracker*, used with *squares* and *centres* to reach distant parts of the action; I is the *keys;* K is the *pedals;* L is the seat. The numerous things which are not indicated in this figure must be sought for in *working* drawings, as we cannot and do not pretend to give these matters a practical form.

Fig. 1.

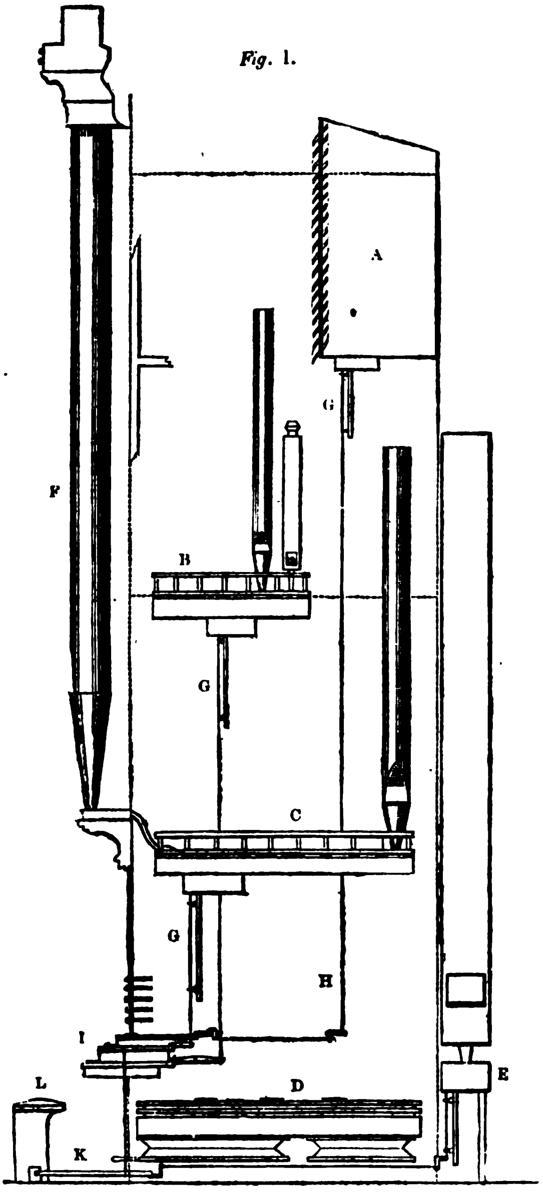


Figure 2 represents the present *bellows*, known under the name of *horizontal bellows*. A shows the *reservoir*: B, the deep frame through which the wind is taken; C, the part moved in blowing, called the *feeder;* D D, the *registrars*, by which the equal rising of the reservoir is ensured: there are valves inside for receiving and retaining the wind, all of which are differently constructed by different builders.

Fig. 2

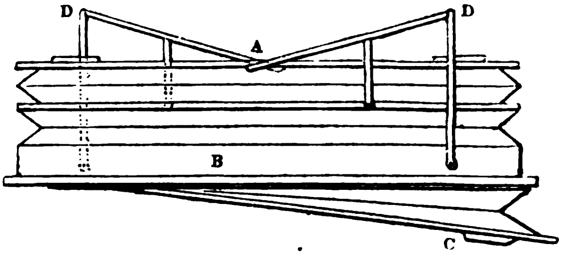


Figure 3 is a perspective view of a *roller-board;* A A A the board on which the rollers are fixed; B, three pull-downs, explained below; C C C, rollers centred at each end into small blocks, in which they move; there are also *arms* to each end, in front, connecting the rollers with the keys and the wind-chest; D, the levers which are connected with the keys and the pull-downs, and are longer or shorter as may be required; they are also *parallel* or *fan-like*, to suit their position.

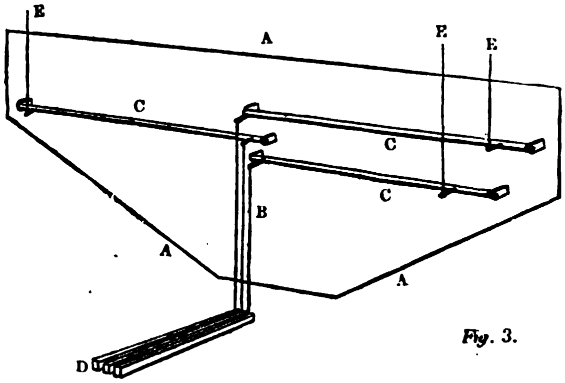
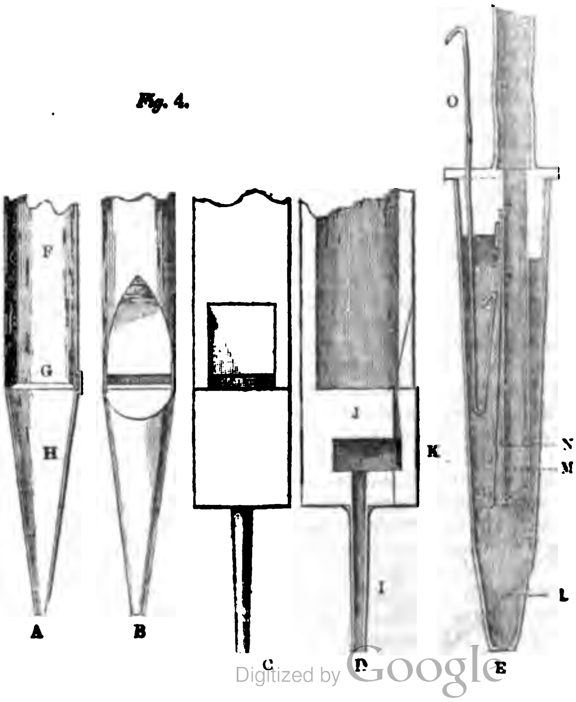


Fig. 3.

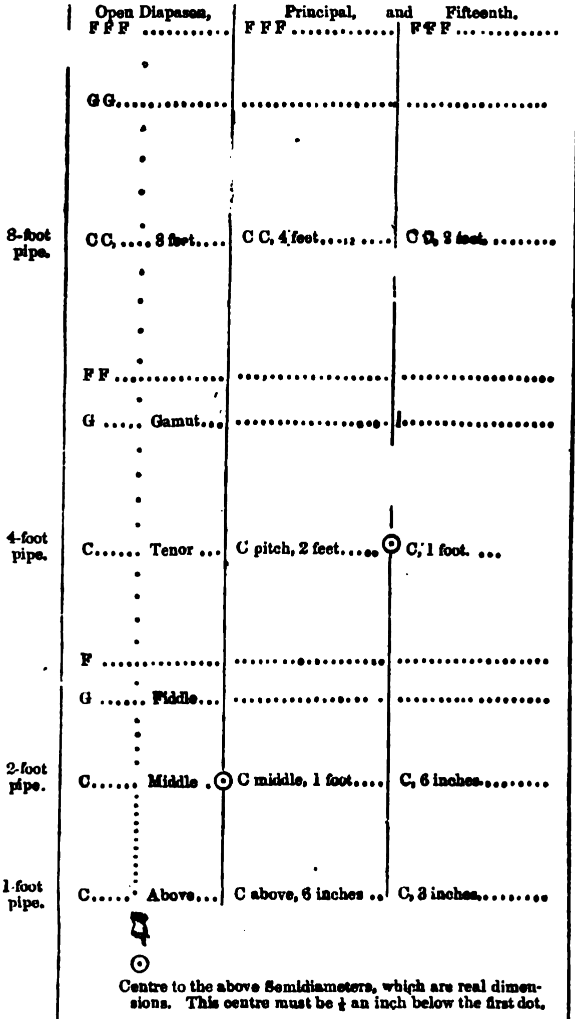
Figure 4 contains a few examples of pipes. A is a metal open pipe; F, the sounding part; G, the part called the *language*, and H, the *foot;* B is the same pipe, show-

Fig. 4.



ing the *mouth* and the flattened part for *voicing;* C is a front view of a *stopped diapason* pipe; D is a section showing the arrangement of its construction; I is the *foot;* J is the *block*, and K is the *cap*. E is a section of the voice part of a *reed* pipe. L, the *foot;* M, the *mouth-piece;* N, the *reed;* and O, the spring. The pipe itself is made of metal composed of tin and lead; the *reed* is brass, and the *spring* is soft steel wire, about a tenth of an inch in diameter. This form of reed pipe is the basis of all the others, their differences being more in shape than in principle. When speaking of the lengths of pipes, it is generally with reference to *tuning* or *pitch* c, which is one foot long; and *all* c*'s below are doubled* as we go from 1 to 2, 2 to 4, 4 to 8, 8 to 16, and 16 to 32; the last, although little used in this country, gives the highest rank to organs.

Speaking Lengths and Semidiameters of Stops.



This Table shows the relative lengths and diameters of the open *diapason*, the *principal*, and the *fifteenth stops*, as high as c above middle c.

Quints, *twelfths*, and *sesquialteras*, all take the sizes and lengths of their proper tones in the open diapason. *Trumpet* and *Oboe stops*, being what are called *unison stops*, also take their lengths from the *open diapason*. The *clarion*, an octave stop, is measured by the *principal*. The bells of all *reed-pipes* should be as large as their places in the organ will admit of.

Middle c in the *dulciana* is an inch and a quarter in diameter and about two feet two inches long. A large size stop-diapason is seldom pure and musical. An inch and eighth wide and an inch and three-eighths deep, with thirteen inches in length, is a good scale for a *middle* c *stop-diapason pipe* in wood. Scales may be taken of larger or smaller dimensions, if desired, in which case the larger must be shorter and the smaller must be longer. Where stops are repeated, two or three of the same name, it is thought better to have them of different diameters, from an opinion that two or more unison-pipes of the same diameter affect the ear only as one pipe. There is something in this opinion, but how much we will not venture to determine.

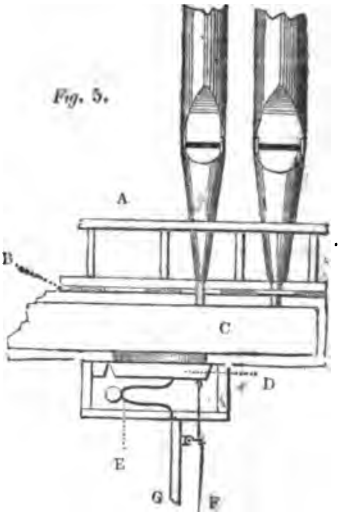


Figure 5 is a section of a *sound-board*, showing some part of the mechanism. A is the *rack-board*, by which the pipes are held in upright position; B shows the ends of the slides; C, that part of the sound-board which contains the *channels* for conveying the wind to the pipes; D, the pallet or valve which is opened by the finger of the organist, through the *key*, the *lever*, the *pull-down*, and the *roller* (see *figure* 7); E is the spring which keeps the pallet in its place when not in use; F is the *pull-down*, having a small screw and a leather button at one end, and a piece of hard bell-wire at the other; the former is fixed to the *lever*, and the latter to the *arm* of the *roller;* G is merely one end of the roller-board.

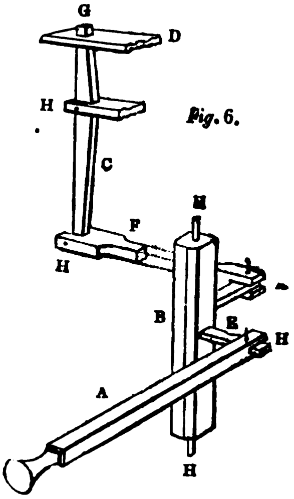


Fig. 6.

Figure 6 represents a *draw-stop*, a *trundle*, and a *lever*, all of which are used by the organist in changing a stop or slide; A is the *draw-stop;* B is the *trundle;* C is the *lever;* D is the *slide*. The draw-stop is linked to the trundle at E, the trundle is linked to the lever at F, and the lever is fitted to the slide at G. Their centres are all at H. In connection with the above, there are also pedals called *composition pedals*, three, four, and five to an organ.

Figure 7 represents certain small parts of the action. A is the wire by which the pallet is opened; B is the pull-down attached to it: C is the pallet-end of the roller, with its fixing to the board; D is an end view of a roller, with a pull-down and lever, all in their relative connection; E is the pull-down, and F is the lever, to which the key follows; G is a common form of a *square* or *centre*, by which the trackers are united. *Trackers* are pieces of pine wood, ⅜ of an inch wide, and from an ⅛ to a ¼ thick; they are of different lengths, and may be used to any extent. The

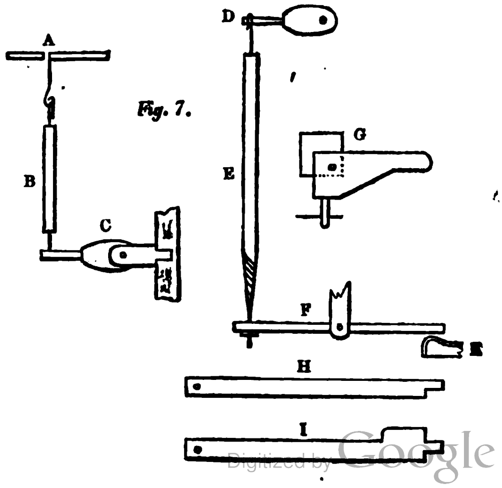


Fig. 7.

Birmingham organ is said to have four miles and a half of trackers in it. In the cathedral organ at Canterbury, they are employed to remove the keys to a distance from the instrument, which is done to the extent of ninety feet. H is the form of a pedal-key; I is the *sharp*, and H is the *natural*. The length is about two feet; the distance from centre to centre of each pedal is two inches and a half.

Figure 8 represents an *anemometer*, or wind-gage. It is a glass tube bent as in the figure: the dark part is supposed to be water. A is the place to which it is applied in the organ, which is generally the hole for the pipe used as the pitch A or C. The pressure of the wind at B drives the water up to C, and the measure of their difference is what is called the *wind*. Some organs have more, and some less; two inches and a half is the common measure. The organ at St. Paul's cathedral is said to have as much as three inches.

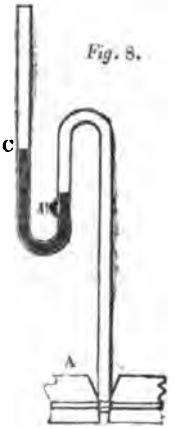


Fig. 8.

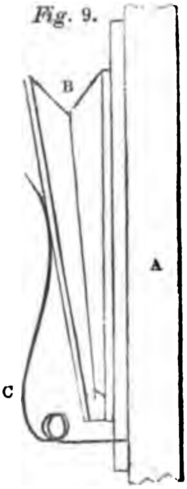


Fig. 9.

Figure 9 represents a percussion valve. It may be said to be a small bellows pressed by a spring. A is the wind-trunk, to which it is fixed; B is the valve itself, and C is the spring. The use of this part of an organ is to steady the wind, which is sometimes disturbed by sudden transitions or very rapid performance: the spring of the valve is regulated so as to give way on such occasions and to moderate their effects.

Figure 10 is a section of a common barrel-organ. A is the handle; B, the *worm* and *crank*, which move the *barrel* and *bellows*; C is the barrel on which the tunes are set. The setting is effected by brass pins and staples driven into the barrel at proper distances, accordingly as the notes are longer or shorter. D is the key, the rising of which over the pins causes it to press down the sticker (E) into the wind-chest (F), and thus to open the pallet for the wind to enter the pipe above; G is the bellows; H, a stop-diapason pipe. This diagram shows only one barrel, which is the common plan, but Messrs. Gray and Co. have lately introduced three, by which great risk to the mechanism is avoided and much trouble is saved. The celebrated Apollonicon, invented by Messrs. Flight and Robson, reflects high credit upon the builders, but we very much doubt its real claim to be ranked among musical instruments. Its introduction into churches should be sparingly encouraged, or it will certainly endanger both the pleasure and the practice of music.

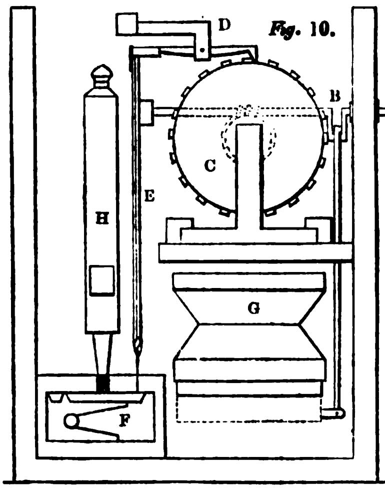


Fig. 10.

Figure 11 represents the only known form of *bellows without leather*, and this we have found in Swedenborg's 'Opera Philosophica.' A A are the bellows, which consisted each of two boxes, an upper and a lower, the upper shutting over the lower; B, the bar on which the blower is held; C C, the levers on which he alternately stepped or jumped to put them in motion. How far we are correct in the adoption of this figure has yet to be proved. The manner of working such bellows has been sufficiently described in early writers, but their construction has been entirely overlooked, except by the above-mentioned author.

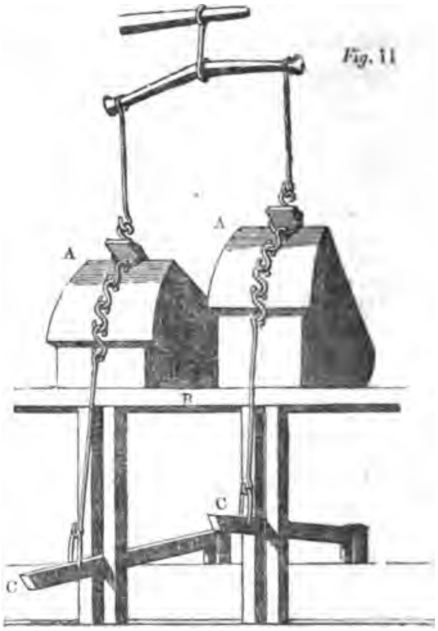


Fig. 11

The tuning of organs is a subject on which there is much difference of opinion. Some tune from C, and allow of what is called the *wolf*, a discordance arising from the extreme flatness of some of the fifths. Others tune from A, and adopt the *equal temperament;* this latter certainly has the better reasoning in its form, as it approaches nearer to the human voice, interferes less with the band, and is more agreeable in general modulation. This subject has been minutely handled by certain curious and scientific men who have given themselves the trouble of what may be called *splitting* octaves into *smaller intervals*. But the advantages of this minuteness have not yet extended beyond the schemers themselves, for not one of their methods has yet left the cradle of its birth. The Temple organ is said to have 14 sounds in the octave; the Foundling 16, Hawke's patent 17; Loeschman has 24, and Liston's enharmonic organ as many as 59, of which 24 are on the keys, and the rest on the pedals and other contrivances. If such schemes were to become general, they would make practical men tremble; but *flat fifths* are still in use notwithstanding the enharmonic divisions, and they have nothing to fear beyond an occasional dispute on the subject.

The numbers and kinds of stops are matters not subject to rule; they vary in almost every organ, and seem more under the command of circumstances, such as space and price, than any other parts of the instrument.

END OF VOLUME THE SIXTEENTH.

Printed by WILLIAM CLOWES and SONS, Stamford-street.

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